National Electricity Rules

Indicative mark up of changes made by the draft *National Electricity Amendment (Improving the NEM access standards – Package 1) Rule 2025*.

Note:

This is an indicative version of the changes to the National Electricity Rules made by the draft *National Electricity Amendment (Improving the NEM access standards – Package 1) Rule 2025*. It comprises extracts from the National Electricity Rules updated to take into account changes in rules made but not yet in force.

This document is provided for information purposes only. The actual amendments are set out in the draft *National Electricity Amendment (Improving the NEM access standards – Package 1) Rule 2025.*

The Australian Energy Market Commission does not guarantee the accuracy, reliability or completeness of this indicative mark-up of the National Electricity Rules.

CHAPTER 4

4. Power System Security

4.2 Definitions and Principles

This rule sets out certain definitions and concepts that are relevant to this Chapter.

4.2.1 [Deleted]

4.2.2 Satisfactory Operating State

The *power system* is defined as being in a *satisfactory operating state* when:

(a) the *frequency* at all energised *busbars* of the *power system* is within the *normal operating frequency band*, except for brief excursions outside the *normal operating frequency band* but within the *normal operating frequency excursion band*;

(b) the ~~*voltage*~~ voltage magnitudes at all energised *busbars* at any *switchyard* or *substation* of the *power system* are within the relevant limits set by the relevant *Network Service Providers* in accordance with clause S5.1.4 of schedule 5.1;

(c) the current flows on all *transmission lines* of the *power system* are within the ratings (accounting for time dependency in the case of emergency ratings) as defined by the relevant *Network Service Providers* in accordance with schedule 5.1;

(d) all other *plant* forming part of or impacting on the *power system* is being operated within the relevant operating ratings (accounting for time dependency in the case of emergency ratings) as defined by the relevant *Network Service Providers* in accordance with schedule 5.1;

(e) the configuration of the *power system* is such that the severity of any potential fault is within the capability of circuit breakers to *disconnect* the faulted circuit or equipment; and

(f) the conditions of the *power system* are stable in accordance with requirements designated in or under clause S5.1.8 of schedule 5.1.

4.3 Power System Security Responsibilities and Obligations

4.3.1 Responsibility of AEMO for power system security

The *AEMO power system security responsibilities* are:

(a) to maintain *power system security*;

(b) to monitor the operating status of the *power system*;

(c) to co-ordinate the *System Operators* in undertaking certain of its activities and operations and monitoring activities of the *power system*;

(d) to ensure that *high voltage* switching procedures and arrangements are utilised by *Network Service Providers* to provide adequate protection of the *power system*;

(e) to assess potential infringement of the *technical envelope* or *power system operating procedures* which could affect the security of the *power system*;

(f) to ensure that the *power system* is operated within the limits of the *technical envelope*;

(g) to ensure that all *plant* and equipment under its control or co-ordination is operated within the appropriate operational or emergency limits which are advised to *AEMO* by the respective *Network Service Providers* or *Registered Participants*;

(h) to assess the impacts of technical and any operational *plant* on the operation of the *power system*;

(i) to arrange the *dispatch* of *scheduled resources* and *ancillary services* (including *dispatch* by remote control actions or specific directions) in accordance with the *Rules*, allowing for the dynamic nature of the *technical envelope*;

(j) to determine any potential *constraint* on the *dispatch* of *scheduled resources* and *ancillary services* and to assess the effect of this *constraint* on the maintenance of *power system security*;

(k) to assess the availability and adequacy, including the dynamic response, of *contingency capacity reserves* and *reactive power reserves* in accordance with the *power system security standards* and to ensure that appropriate levels of *contingency capacity reserves* and *reactive power reserves* are available:

(1) to ensure the *power system* is, and is maintained, in a *satisfactory operating state*; and

(2) to arrest the impacts of a range of significant multiple *contingency events* (affecting up to 60% of the total *power system load*) or *protected events* to allow a prompt restoration or recovery of *power system security*, taking into account under-*frequency* initiated *load shedding* capability provided under *connection agreements*, by *emergency frequency control schemes* or otherwise;

(l) to monitor demand and *generation* capacity in accordance with the *reliability standard implementation guidelines* and, if necessary, initiate action in relation to a *relevant AEMO intervention event*;

(m) to publish as appropriate, information about the potential for, or the occurrence of, a situation which could significantly impact, or is significantly impacting, on *power system security*, and advise of any *low reserve* condition for the relevant periods determined in accordance with the *reliability standard implementation guidelines*;

(n) to refer to *Registered Participants*, as *AEMO* deems appropriate, information of which *AEMO* becomes aware in relation to significant risks to the *power system* where actions to achieve a resolution of those risks are outside the responsibility or control of *AEMO*;

(o) to utilise resources and services provided or procured as *ancillary services*, *system strength services* or *inertia network services* or otherwise to maintain or restore the *satisfactory operating state* of the *power system*;

(p) to manage activities reasonably required to effectively prepare for and coordinate a response to a *major supply disruption*, including (but not limited to):

(1) procuring adequate *SRASs* in accordance with clause 3.11.9 to enable *AEMO* to co-ordinate a response to a *major supply disruption*;

(2) developing the *system restart plan* and coordinating activities among *Registered Participants*, including the testing of *SRASs* or any other equipment, as reasonably necessary to prepare for the implementation of the *system restart plan*; and

(3) managing and coordinating the restoration of *supply* following a *major supply disruption*;

(p1) to coordinate the provision of *emergency frequency control schemes* by *Network Service Providers* and to determine the settings and intended sequence of response by those schemes;

(p2) to determine the boundaries of *inertia sub-networks* and the *inertia requirements* for each *inertia sub-network* and to *enable inertia network services*;

(p3) to determine the *system strength requirements* for each *region* and to *enable system strength services*;

(q) to interrupt, subject to clause 4.3.2(l), *Registered Participant connections* as necessary during emergency situations to facilitate the re-establishment of the *satisfactory operating state* of the *power system*;

(r) to issue a *direction* or *clause 4.8.9 instruction* (as necessary) to any *Registered Participant*;

(s) to co-ordinate and direct any rotation of widespread interruption of demand in the event of a major *supply* shortfall or disruption;

(t) to liaise with *participating jurisdictions* should there be a need to manage an extensive disruption, including the use of emergency services powers in a *participating jurisdiction*;

(u) to determine the extent to which the levels of *contingency capacity reserves* and *reactive power reserves* are or were appropriate through appropriate testing, auditing and simulation studies;

(v) to investigate and review all major *power system* operational incidents and to initiate action plans to manage any abnormal situations or significant deficiencies which could reasonably threaten *power system security*. Such situations or deficiencies include without limitation:

(1) *power system frequencies* outside those specified in the definition of *satisfactory operating state*;

(2) *power system* ~~*voltages*~~ voltages outside those specified in the definition of *satisfactory operating state*;

(3) actual or potential *power system* instability; and

(4) unplanned/unexpected operation of major *power system* equipment; and

(w) to ensure that each *System Operator* satisfactorily interacts with *AEMO*, other *System Operators* and *Distribution System Operators* for both *transmission* and *distribution network* activities and operations, so that *power system security* is not jeopardised by operations on the *connected transmission networks* and *distribution networks*.

4.3.5 ~~Market~~ Customer obligations

(a) All *Schedule 5.3 Participants* ~~*Market Customer*~~ having expected peak demands at *connection points* in excess of 10 MW, must provide automatic *interruptible load* of the type described in clause S5.1.10 ~~of schedule 5.1~~. The level of this automatic *interruptible load* must be a minimum of 60% of their expected demand, or such other minimum *interruptible load* level as may be periodically determined by the *Reliability Panel*, to be progressively automatically *disconnected* following the occurrence of a *power system* under-*frequency* condition described in the *power system security standards*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b) *Schedule 5.3 Participants* ~~*Market Customers*~~ must provide their *interruptible load* in manageable blocks spread over a number of steps within under-*frequency* bands from 49.0 Hz down to 47.0 Hz as nominated by *AEMO*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(c) Any *load shedding* capability the subject of an *ancillary services agreement* or *enabled* as a *market ancillary service* can be counted as automatic *interruptible load* provided for the purposes of clause 4.3.5.

4.4 Power System Frequency Control

4.4.2 Operational frequency control requirements

To assist in the effective control of *power system frequency* by *AEMO* the following provisions apply:

(a) *AEMO* may give *dispatch instructions* in respect of *scheduled resources* and *market ancillary services* pursuant to rule 4.9;

(b) each *Generator* and *Integrated Resource Provider* must ensure that all of its ~~*generating units* and *bidirectional*~~ *production units* meet the technical

requirements for *frequency* control in their *performance standards* established under clause S5.2.5.11;

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(c) *AEMO* must use reasonable endeavours to arrange to be available and allocated to *regulating duty* such *generating units or bidirectional units* as *AEMO* considers appropriate for automatic control or direction by *AEMO* to ensure that all normal *load* variations do not result in *frequency* deviations outside the limitations specified in clause 4.2.2(a);

(c1) subject to clause 4.4.2A(c) and any exemption or variation approved by *AEMO* under clause 4.4.2B, each *Scheduled Generator*, *Semi-Scheduled Generator* and *Scheduled Integrated Resource Provider* that has received a *dispatch instruction* in accordance with clause 4.9.2 to generate a volume greater than zero MW must operate its *scheduled generating unit*, *semi-scheduled generating unit* or *scheduled bidirectional unit* in accordance with the *Primary Frequency Response Requirements* as applicable to that unit;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) *AEMO* must use reasonable endeavours to ensure that adequate *facilities* are available and under the direction of *AEMO* to allow the managed recovery of the *satisfactory operating state* of the *power system*.

4.4.3 Generator protection requirements

Generators and *Integrated Resource Providers* must, in accordance with schedule 5.2 and Chapter 5, provide any necessary automatically initiated protective device or systems to protect their *plant* and associated *facilities* against abnormal ~~*voltage*~~ voltage and extreme *frequency* excursions of the *power system*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This clause is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

4.5 Control of Power System Voltage

4.5.1 Power system voltage control

(a) *AEMO* must determine the adequacy of the capacity of the *power system* to produce or absorb *reactive power* in the control of the *power system* ~~*voltages*~~ voltages.

(b) *AEMO*, in consultation with *Network Service Providers*, must assess and determine the limits of the operation of the *power system* associated with the avoidance of ~~*voltage*~~ voltage failure or collapse under any *credible contingency event* or *protected event* scenario.

(c) The limits of operation of the *power system* must be translated by *AEMO*, in consultation with *Network Service Providers*, into key location operational ~~*voltage*~~ voltage settings or limits, *transmission line* capacity limits, *reactive power* production (or absorption) capacity or other appropriate limits to enable their use by *AEMO* in the maintenance of *power system security*.

(d) The determination referred to in clause 4.5.1(b) must include a review of the dynamic stability of the ~~*voltage*~~ voltage of the *power system*.

(e) *AEMO* must use its reasonable endeavours to maintain ~~*voltage*~~ voltage conditions throughout the *power system* so that the *power system* remains in a *satisfactory operating state*.

(f) *AEMO* must use reasonable endeavours to arrange the provision of *reactive plant* and *power system* ~~*voltage*~~ voltage stabilising facilities through:

(1) *ancillary services agreements* in accordance with rule 3.11; or

(2) negotiation and agreement with appropriate *Network Service Providers* on the use of their *networks* and the provision of *ancillary services* under *network support agreements*; or

(3) obligations on the part of *Registered Participants* under their *connection agreements*.

(g) Without limitation, such *reactive plant* may include:

(1) *synchronous generator voltage controls* (rotor current adjustment) usually associated with *tap-changing transformers*;

(2) *synchronous condensers* (compensators);

(3) *static VAR compensators* (SVC);

(4) *shunt capacitors*;

(5) *shunt reactors*.

4.5.2 Reactive power reserve requirements

(a) *AEMO* must use its reasonable endeavours to ensure that sufficient *reactive power reserve* is available at all times to maintain or restore the *power system* to a *satisfactory operating state* after the most critical *contingency event* as determined by previous analysis or by periodic contingency analysis by *AEMO*.

(b) If ~~*voltages*~~ voltages are outside acceptable limits, and the means of ~~*voltage*~~ voltage control set out in this rule 4.5 are exhausted, *AEMO* must take all reasonable actions, including to direct changes to demand (through selective *load shedding* from the *power system*), additional *generation* operation or reduction in the *transmission line* flows but only to the extent necessary to restore the ~~*voltages*~~ voltages to within the relevant limits. A *Registered Participant* must comply with any such direction.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

4.5.3 Audit and testing

AEMO must arrange, co-ordinate and supervise the conduct of appropriate tests to assess the availability and adequacy of the provision of *reactive power* to control and maintain *power system* ~~*voltages*~~ voltages under both *satisfactory operating state* and *contingency event* conditions.

4.9 Power System Security Related Market Operations

4.9.2 Instructions to Scheduled Generators, Semi-Scheduled Generators and Scheduled Integrated Resource Providers

(a) To implement *central dispatch* or, where *AEMO* has the power to direct or to instruct a *Scheduled Generator*, *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* either under Chapter 3 or this Chapter, then for the purpose of giving effect to that direction or instruction, *AEMO* may at any time give an instruction to the *Generator* or *Integrated Resource Provider* in relation to any of its *generating units* or *bidirectional units* (a *dispatch instruction*), in accordance with clause 4.9.5(b), nominating:

(1) whether the facilities for *generation* remote control by *AEMO*, if available, must be in service; and

(2) in the case of a:

(i) *scheduled generating unit* or *scheduled bidirectional unit*, the level or schedule of power; and

(ii) *semi-scheduled generating unit*, the *dispatch level*,

applicable over the specified period.

(b) Subject to paragraph (c), *AEMO* may at any time give an instruction to a *Generator* or *Integrated Resource Provider* in relation to any of its *generating units* with a *nameplate rating* of 30MW or more, or its *generating systems* of combined *nameplate rating* of 30 MW or more, nominating that:

(1) the *generating unit* or *generating system* transformer is to be set to a nominated tap position (if it has on-load tap changing capability);

(2) the *generating unit's* or *generating system's* ~~*voltage*~~ voltage *control system* set-point is to be set to give a nominated ~~*voltage*~~voltage; or

(3) the *generating unit* or *generating system* is to be operated to supply or absorb a nominated level of *reactive power* at its *connection point*.

(b1) Subject to paragraph (c), *AEMO* may at any time give an instruction to an *Integrated Resource Provider* in relation to any of its *bidirectional units* with a *nameplate rating* of 5 MW or more, or its *integrated resource systems* of combined *nameplate rating* of 5 MW or more, nominating that:

(1) the *bidirectional unit* or *integrated resource system* transformer is to be set to a nominated tap position (if it has on-load tap changing capability);

(2) the *bidirectional unit's* or *integrated resource system's* ~~*voltage*~~voltage *control system* set-point is to be set to give a nominated ~~*voltage*~~voltage; or

(3) the *bidirectional unit* or *integrated resource system* is to be operated to supply or absorb a nominated level of *reactive power* at its *connection point*.

(c) Unless otherwise provided under an *ancillary services agreement*, a *network support agreement* or a *connection agreement*, *AEMO* must not give an instruction under paragraph (b) or (b1) that requires a *generating unit* or *generating system* or *bidirectional unit* or *integrated resource system* (as applicable) to supply or absorb *reactive power* at a level outside the *plant's* relevant *performance standard*.

(d) A *Scheduled Generator*, *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* must, with respect to its *generating units* or *bidirectional units* that have an availability offer of greater than 0 MW (whether *synchronised* or not), ensure that appropriate personnel are available at all times to receive and immediately act upon *dispatch instructions* issued by *AEMO* to the relevant *Generator* or *Integrated Resource Provider*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

4.9.4 Dispatch related limitations on Scheduled Generators, Semi-Scheduled Generators and Scheduled Integrated Resource Providers

A *Scheduled Generator*, *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* (as the case may be) must not, unless in the *Generator's* or *Integrated Resource Provider's* reasonable opinion, public safety would otherwise be threatened or there would be a material risk of damaging equipment or the environment:

(a) send out any *energy* from a *generating unit* or *bidirectional unit*, except:

(1) in accordance with a *dispatch instruction*;

(2) in response to remote control signals given by *AEMO* or its agent;

(3) in connection with a test conducted in accordance with the requirements of this Chapter or Chapter 5; or

(3A) as a consequence of its operation in *frequency response mode* in order to adjust *power system frequency* in response to *power system* conditions; or

(4) in the case of a *scheduled generating unit*, in accordance with the *self-commitment* process specified in clause 4.9.6 up to the *self-dispatch level*;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b) adjust the *transformer tap position* or *excitation control system* ~~*voltage*~~ voltage set-point of a *scheduled generating unit*, *scheduled bidirectional unit* or *semi-scheduled generating unit* except:

(1) in accordance with a *dispatch instruction*;

(2) in response to remote control signals given by *AEMO* or its agent;

(3) if, in the *Generator's* or *Integrated Resource Provider's* reasonable opinion, the adjustment is urgently required to prevent material damage to the *Generator's* or *Integrated Resource Provider's plant* or associated equipment, or in the interests of safety; or

(4) in connection with a test conducted in accordance with the requirements of rule 5.7;

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(c) *energise* a *connection point* in relation to a *generating unit* or *bidirectional unit* without obtaining approval from *AEMO* immediately prior to *energisation*;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) *synchronise* or *de-synchronise* a *scheduled generating unit* with a *nameplate rating* of 30MW or more, without prior approval from *AEMO* or other than in response to a *dispatch instruction* except:

(1) *de-synchronisation* as a consequence of the operation of automatic protection equipment; or

(2) where such action is urgently required to prevent material damage to *plant* or equipment or in the interests of safety;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e) change the *frequency response mode* of a *scheduled generating unit*, *semi-scheduled generating unit* or *scheduled bidirectional unit* without the prior approval of *AEMO*; or

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(f) remove from service or interfere with the operation of any *power system* stabilising equipment installed on that *generating unit* or *bidirectional unit*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

4.14 Acceptance of Performance Standards

(a) **[Deleted]**

(b) **[Deleted]**

(c) **[Deleted]**

(d) **[Deleted]**

(e) **[Deleted]**

(f) **[Deleted]**

(g) **[Deleted]**

(h) **[Deleted]**

(i) **[Deleted]**

(j) **[Deleted]**

(k) **[Deleted]**

(l) **[Deleted]**

(m) **[Deleted]**

(n) *AEMO* must establish and maintain a register of the *performance standards* applicable to *Registered Participants' plant* as advised ~~*by Registered Participantsto AEMO*~~ in accordance with clause 5.3.7(g)(1), 5.3.8(f), ~~clause~~ 5.3.9(h) or 5.3.12(h), or established in accordance with rule 4.16~~4.14~~.

(n1) By 1 July each year, *AEMO* must provide to the *AER* an up-to-date copy of the register of *performance standards* required to be maintained under rule 4.14(n), including a copy of the corresponding *performance standards*.

(n2) The *AER* may, at any time, request *AEMO* to provide:

(1) an up-to-date copy of the register of *performance standards* (current as at the date of the *AER's* request) including a copy of the corresponding *performance standards*; or

(2) a copy of the *performance standards* relating to specified *plant*,

if, in the reasonable opinion of the *AER*, it is required for the performance or exercise of the *AER's* functions.

(n3) Following a request under subparagraph (n2), *AEMO* must provide the information requested within:

(1) 10 *business days* for a request under subparagraph (n2)(1); and

(2) 5 *business days* for a request under subparagraph (n2)(2),

unless the *AER* agrees otherwise.

(o) **[Deleted]**~~*AEMO* or, in respect of a matter concerning the quality of *supply* to *Network Users*, *AEMO* in consultation with the relevant *Network Service Provider*, must, when determining the applicable *performance standard* for a particular requirement based on any provision of schedules 5.1, 5.2, 5.3 and 5.3a, require a *Registered Participant* to meet or exceed the *minimum access standard* but must not require the *Registered Participant* to exceed the relevant *automatic access standard* for that requirement.~~

(p) A *performance standard* applicable to a *Schedule 5 Participant* (whether or not a *Registered Participant*) may be amended at any time by agreement between ~~*AEMO*, the relevant *Registered Participant* and~~ the relevant *Schedule 5 Participant*, the *Network Service Provider* and, if the *performance standard* relates to an *AEMO advisory matter*, *AEMO*, if:

(1) where the *performance standard* was established under a transitional arrangement in rule 4.16 or 4.17, the amendment is consistent with the actual *plant* capability agreed between *AEMO*, the relevant *Schedule 5 Participant* ~~*Registered Participant*~~ and the *Network Service Provider*, even if it is less than the relevant *minimum access standard* that applied to *applications to connect* at the time of agreement; or

(2) the amendment satisfies all requirements for *negotiated access standards* under clause 5.3.4A(b); or

(3) the amendment satisfies all requirements to be an *automatic access standard*.

Note:

If clause 5.3.7(g) applied in respect of the *Schedule 5 Participant's connection agreement*, clause 5.3.8(f) will require any updated *performance standards* to be notified to *AEMO*.

(q) **[Deleted]**~~*AEMO* must not withhold agreement under rule 4.14(p) on a matter that is not an *AEMO advisory matter* under clause 5.3.4A(a), unless the proposed amendment would adversely affect *power system security*.~~

(r) The *Network Service Provider* may as a condition of considering an amendment proposed under rule 4.14(p) require payment of a fee to meet the reasonable costs anticipated to be incurred by the *Network Service Provider*, other *Network Service Providers* and *AEMO*, in the assessment of the proposed amendment.

(s) The *Network Service Provider* must require payment of a fee under rule 4.14(r) if so requested by *AEMO*.

(t) On payment of the required fee referred to in rule 4.14(r), the *Network Service Provider* must pay the costs anticipated to be incurred by the other *Network Service Providers* and *AEMO*, as appropriate.

CHAPTER 5

5. Network Connection Access, Planning and Expansion

Part A Introduction

5.1 Introduction to Chapter 5

5.1.1 Structure of this Chapter

(a) This Chapter deals with matters relating to *networks*.

(b) It is divided into the following Parts:

(1) this Part is introductory;

(2) Part B provides a framework for *connection* and access to a *transmission network* or a *distribution network* and to the *national grid*;

(3) Part C addresses the *network* related issues following the negotiation of a *connection agreement* under Part B, namely the design of *connected* equipment, inspection and testing, commissioning and *disconnection* and reconnection; and

(4) Part D deals with the planning and expansion of *networks* and the *national grid*.

5.1.2 Overview of Part B and connection and access under the Rules

(a) Rule 5.1A sets out the purpose, application and principles for Part B.

(b) Rule 5.2 sets out the obligations of *Registered Participants* under Part B and other relevant Parts of this Chapter 5.

(c) Rule 5.2A sets out obligations and principles relevant to *connection* and access to *transmission networks* and *designated network assets*. This includes the classification of certain services relating to assets relevant to *connection* as *prescribed transmission services*, *negotiated transmission services* and *non-regulated transmission services*. Rule 5.2A does not apply to the *declared transmission system* of an *adoptive jurisdiction*.

(d) Rules 5.3, 5.3A and 5.3AA and Chapter 5A set out processes by which *Connection Applicants* can negotiate for connection and access to the *national grid* from a *Network Service Provider*. The process applicable will depend on the nature of the ~~application~~ proposed *connection* and the applicant. For illustrative purposes only, the table below sets out an overview of the relevant processes:

	Type of connection or access sought	Process
1	*Connection* to a *transmission network* (other than a *declared shared network*) of any *plant*, including another *network*, a *generating system*, an *integrated resource system*, a *synchronous condenser system* or a *load*	Rule 5.3 applies. If *connecting* to part of a *transmission network* which is a *designated network asset*, then rule 5.3

	Type of connection or access sought	Process
		applies subject to the relevant *access policy* (see clause 5.2A.8).
2	*Connection* to a *declared shared network* of any *plant*, including another *network*, a *generating system*, an *integrated resource system*, a *synchronous condenser system* or a *load*	Rule 5.3, as modified by clause 5.1A.1(d) to (g), and rule 5.3B apply.
3	*Connection* to a *distribution network* of a *schedule 5.3a plant* or another *distribution network* (including an *embedded network*), where the *Connection Applicant*: • is a *Registered Participant* or intends to become a *Registered Participant*; or • intends to apply for an exemption from a requirement to register under Chapter 2 (and is not eligible for an automatic exemption)	Rule 5.3 applies.
4	*Connection* to a *distribution network* of a *generating system*, an *integrated resource system*, a *synchronous condenser system* or a *large inverter based load*, where the *Connection Applicant*: • is a *Registered Participant* or intends to become a *Registered Participant* (and is not acting as the agent of a *retail customer*); • intends to apply for an exemption from a requirement to register under Chapter 2 (and is not eligible for an automatic exemption); • is a *non-registered DER provider* who has made an election for rule 5.3A to apply instead of Chapter 5A; or • intends to *connect* a *synchronous condenser system* or *large inverter based load*	Rule 5.3A applies, subject to clause 5.3.1A.
5	Alteration of a *generating system*, *integrated resource system* or *synchronous condenser* by a *Schedule 5.2 Participant*	Clause 5.3.9 applies if the conditions in that clause are met.
6	Alteration of *plant*: • that includes an *inverter based resource* by a *Schedule 5.3 Participant*; or	Clause 5.3.12 applies if the conditions in that clause are met.

-	Type of connection or access sought	Process
	• *a schedule 5.3a plant* by a *Schedule 5.3a Participant*	
7	Access to a *prescribed transmission service* or *negotiated transmission service* not requiring establishment or modification of a *connection*	Rule 5.3 applies, subject to modification as provided in clause 5.2A.3(c).
8	*Distribution network user access* sought by an applicant who: • is a *Registered Participant* or intends to become a *Registered Participant* (and is not acting as the agent of a *retail customer*); or • is a *non-registered DER provider* who has made an election for rule 5.3A to apply instead of Chapter 5A	Rule 5.3 or 5.3A (as applicable) and rule 5.3AA apply. The election is not available where *connecting* to a *regulated SAPS*.
9	A *load connecting* to a *distribution network* where the *Connection Applicant* is not a *Registered Participant* and is not intending to become a *Registered Participant* (unless it is acting as the agent of a *retail customer*) and is not *connecting* a *large inverter based resource* Any *load* or *non-registered DER provider* connecting to a *regulated SAPS* A *non-registered DER provider* who does not make an election for rule 5.3A to apply instead of Chapter 5A	Chapter 5A applies, subject to clause 5.3.1A(d).
10	A *retail customer* (or a *retailer* or *Small Resource Aggregator* on behalf of that customer) seeking a *micro DER connection*	Chapter 5A applies.

~~-~~	~~Connection Applicant~~	~~Process~~
~~1~~	~~A *Registered Participant* or a person intending to become a *Registered Participant* for a *generating system* or *integrated resource system* to a *transmission network*~~	~~Rule 5.3 applies~~ ~~If the person is *connecting* to part of a *transmission network* which is a *designated network asset*, then rule 5.3 applies subject to~~

-	**Connection Applicant**	**Process**
		the relevant *access policy* (see clause 5.2A.8)
2	A *Registered Participant* or a person intending to become a *Registered Participant* (or a person pursuant to clause 5.1A.1(c)) for a source of *load connecting* to a *transmission network*	Rule 5.3 applies If the person is *connecting* to part of a *transmission network* which is a *designated network asset*, then rule 5.3 applies subject to the relevant *access policy* (see clause 5.2A.8)
3	A source of *load connecting* to a *distribution network* where the *Connection Applicant* is a *Registered Participant* or a person intending to become a *Registered Participant* (and is not acting as the agent of a *retail customer*)	Rule 5.3 applies
4	A *distribution network* (including an *embedded network*) *connecting* to another *distribution network* or to a *transmission network* where the *Connection Applicant* is a *Registered Participant*, intending to become a *Registered Participant* or will obtain an exemption from registration	Rule 5.3 applies
5	A *Market Network Service Provider* or person intending to register as one seeking *connection* to a *distribution network* or a *transmission network*	Rule 5.3 applies
6	A *distributed connected unit connecting* to a *distribution network* where the *Connection Applicant* is: • a *Registered Participant* or a person intending to become a *Registered Participant* or a person seeking *connection* for a *large inverter based resource*; or • a *non-registered DER provider* who makes an election for rule 5.3A to apply instead of Chapter 5A.	Rules 5.3 and 5.3A apply (see clause 5.3.1A for the interaction between the two rules) The election is not available where *connecting* to a *regulated SAPS*
7	[**Deleted**]	[**Deleted**]

-	**Connection Applicant**	**Process**
8	A *Generator* or *Integrated Resource Provider* wishing to alter a *generating system* or an *integrated resource system* in the circumstances set out in clause 5.3.9	Clause 5.3.9 applies
8A -	A *Network User* wishing to alter *connected plant* in the circumstances set out in clause 5.3.12	Clause 5.3.12 applies
9	A *Connection Applicant* for *prescribed transmission services* or *negotiated transmission services* that do not require the establishment or modification of a *connection* or alteration of a *generating system* or an *integrated resource system* in the circumstances set out in clause 5.3.9 or alteration of *connected plant* in the circumstances set out in clause 5.3.12	Rule 5.3 applies as modified by clause 5.2A.3(c)
10	A *Distribution Connected Resource Provider* or *non-registered DER provider* who makes an election for rule 5.3A to apply instead of Chapter 5A, or *Market Network Service Provider*, in each case who is applying for *distribution network user access*.	Rule 5.3 or 5.3A (as applicable) and rule 5.3AA apply
11	A *generating system*, *integrated resource system*, or source of *load* to a *declared shared network*	Rule 5.3 as modified by clause 5.1A.1(d) to (g) and rule 5.3B apply
12	A source of *load connecting* to a *distribution network* where the *Connection Applicant* is not a *Registered Participant* and is not intending to become a *Registered Participant* (unless it is acting as the agent of a *retail customer*) and is not *connecting* a *large inverter-based resource* Any *load connecting* to a *regulated SAPS* A *non-registered DER provider* who does not make an election for Rule 5.3A to apply instead of Chapter 5A or is *connecting* to a *regulated SAPS*	Chapter 5A applies
13	A *retail customer* (or a *retailer* or *Small Resource Aggregator* on behalf of that customer) seeking a *micro DER connection*	Chapter 5A applies

(e) In addition to the rules referred to in paragraph (d), in relation to *connection* and access to a *distribution network*:

(1) a *Distribution Network Service Provider* must comply with its *negotiating framework* and *Negotiated Distribution Service Criteria* when *negotiating the terms and conditions of access* to *negotiated distribution services*;

(2) disputes relating to the *terms and conditions of access* to a *direct control service* or to a *negotiated distribution service*, *access charges* or matters referred to in rules 5.3AA(f) or 5.3AA(h) may be referred to the *AER* in accordance with Part L of Chapter 6;

(3) Part G of Chapter 5A provides for dispute resolution by the *AER* for certain disputes under Chapter 5A; and

(4) other disputes relating to *connection* and access may be subject to dispute resolution under rule 8.2.

(f) In addition to the rules referred to in paragraph (d), in relation to *connection* and access to a *transmission network*:

(1) schedule 5.11 sets out the negotiating principles which apply to negotiations between a *Transmission Network Service Provider* and a *Connection Applicant* for *negotiated transmission services*;

(2) rule 5.4 provides a framework for *Connection Applicants* and *Transmission Network Service Providers* to appoint an *Independent Engineer* to provide advice on certain technical matters; and

(3) rule 5.5 provides for commercial arbitration of disputes between a *Transmission Network Service Provider* and a *Connection Applicant* as to *terms and conditions of access* for the provision of *prescribed transmission services* or for the provision of *negotiated transmission services*.

(g) Part B also provides for an owner of a *designated network asset* to have an *access policy* for a *designated network asset* and for commercial arbitration under rule 5.5 to apply to a *DNA services access dispute*.

5.1.3 Application of this chapter to a connection to a regulated SAPS

The following provisions do not apply to or in respect of a *connection* or proposed *connection* to a *regulated SAPS*:

(a) rules 5.3 and 5.3A; and

(b) Part C.

Part B Network Connection and Access

5.1A Introduction to Part B

5.1A.1 Purpose and Application

(a) This Part B:

(1) [**Deleted**]

(2) has the following aims:

(i) to detail the principles and guidelines governing *connection* and access to a *network*;

(ii) to establish the process to be followed ~~by a *Registered Participant* or a person intending to become a *Registered Participant*~~ for establishing or modifying ~~a~~ *connection*s to a *network* by *Registered Participants* and, for certain types of *plant*, by other persons, and~~or~~ for altering certain types of *plant* ~~*generating plant*~~ *connected* to a *network*;

(iii) to address a *Connection Applicant's* reasonable expectations of the level and standard of *power transfer capability* that the relevant *network* should provide; and

(iv) to establish processes to ensure ongoing compliance with the technical requirements applied under ~~of~~ this Part B to facilitate management of the *national grid*.

(b) [**Deleted**].

(c) ~~If a person who is not a *Registered Participant* or a person intending to become a *Registered Participant* requests *connection* of a *load* to a *transmission network* and agrees to comply with this Part B as if that person was a *Registered Participant*, the relevant *Transmission Network Service Provider* must comply with this Part B as if that person was a *Registered Participant*~~.

(d) Subject to paragraphs (e) and (g), the following *Rules* apply in the application of this Part B to *transmission services* provided by means of, or in connection with, the *declared transmission system* of an *adoptive jurisdiction*:

(1) a reference to a *Network Service Provider* is, in relation to the provision of *connection services*, to be read as a reference to a *declared transmission system operator*; and

(2) a reference to a *Network Service Provider* is, in relation to the provision of *shared transmission services*, to be read as a reference to *AEMO*.

(e) A reference in any of the following provisions to a *Network Service Provider* will, in relation to the *declared transmission system* of an *adoptive jurisdiction*, be construed as a reference to *AEMO*:

(1) clause 5.2.3(b);

(2) clause 5.2.6;

(3) clause 5.3A.12;

(4) clause 5.7.6;

(5) clause 5.7.7 (except clause 5.7.7(c));

(6) rule 5.11;

(7) clause 5.12.1;

(8) clause 5.12.2 (except clause 5.12.2(c)(2));

(9) clause 5.14.1;

(10) schedule 5.1, clause S5.1.2.3;

(11) schedule 5.3, clause S5.3.5.

(f) Subject to clause (f1) a reference in:

(1) the definition of *RIT-T proponent* in clause 5.10.2;

(2) clause 5.14.3;

(3) clause 5.16.4;

(3A) clause 5.16A.4;

(3B) clause 5.16A.7(c);

(4) rule 5.16B;

(5) rule 5.18;

(6) rule 5.19;

(7) rule 5.20B;

(8) rule 5.20C; and

(9) clause 5.22.6(d),

to a *Transmission Network Service Provider* will, in relation to the *declared transmission system* of an *adoptive jurisdiction*, be construed as a reference to *AEMO*.

(f1) A reference in:

(1) the definition of *RIT-T proponent* in clause 5.10.2;

(2) clause 5.16.4; and

(2A) clause 5.16A.4; and

(3) rule 5.16B,

to a *Transmission Network Service Provider* will, in relation to the *declared transmission system* of an *adoptive jurisdiction*, be construed as a reference to the relevant *declared transmission system operator* where:

(4) the relevant *RIT-T project* is to address an *identified need* that arises from the retirement or de-rating of *network* assets; and

(5) a *credible option* for that *RIT-T project* is replacement of *network* assets.

(g) A reference in any of the following provisions to a *Network Service Provider* will, in relation to the *declared transmission system* of an *adoptive jurisdiction*, be construed as a reference to the relevant *declared transmission system operator*:

(1) clause 5.2.3(d)(12), (e) and (e1)(except 5.2.3(e1)(2));

(2) clause 5.3.4A(c) and (d);

(3) clause 5.9.3;

(4) clause 5.9.4;

(5) clause 5.9.6;

(6) Schedule 5.1, clause S5.1.10.3(a);

(7) Schedule 5.2 clause S5.2.3(a)(8).

5.1A.2 Principles

This Part B is based on the following principles relating to *connection* to the *national grid* for the types of *connection* to which this Chapter 5 applies:

(a) all ~~*Registered Participants*~~ *Connection Applicants* should have the opportunity to form a *connection* to a *network* and have access to the *network services* provided by the *networks* forming part of the *national grid*, except that if the *connection* is to a part of a *network* that is a *designated network asset* then that *connection* and access will be subject to the relevant *access policy* for that *designated network asset*;

(b) the terms and conditions on which *connection* to a *network* and provision of *network service* is to be granted are to be set out in commercial agreements on reasonable terms entered into between a *Network Service Provider* and ~~other *Registered Participants*~~ each *Connection Applicant*;

(c) the technical terms and conditions of *connection agreements* regarding standards of performance must be established at levels at or above the *minimum access standards* set out in schedules 5.1, 5.2, 5.3 and 5.3a, with the objective of ensuring that the *power system* operates securely and reliably and in accordance with the *system standards* set out in schedule 5.1a;

(d) [**Deleted**]

(e) the operation of the *Rules* should result in open communication and information flows relating to *connections* between *Registered Participants*, and between *Registered Participants* and *AEMO*, while ensuring the security of *confidential information* belonging to competitors in the *market*.

~~(e) the operation of the *Rules* should result in the achievement of:~~

~~(1) long term benefits to *Registered Participants* in terms of cost and *reliability* of the *national grid*; and~~

~~(2) open communication and information flows relating to *connections* between *Registered Participants* themselves, and between *Registered Participants* and *AEMO*, while ensuring the security of *confidential information* belonging to competitors in the *market*.~~

5.2 Obligations

5.2.1 Obligations of all Registered Participants

(a) All *Registered Participants* must ~~maintain and operate (or ensure their authorised *representatives* maintain and operate)~~ ensure that all *plant* and equipment that is part of their *facilities* is provided, maintained and operated in accordance with:

(1) relevant laws;

(2) the requirements of the *Rules*; and

(3) *good electricity industry practice*, all ~~and~~ relevant *Australian Standards* and, to the extent specified in the *Rules*, relevant international instruments.

(b) All *Registered Participants* must ensure that the *connection agreements* to which they are a party require the provision, ~~and~~ maintenance and operation of all required *facilities* consistent with *good electricity industry practice* and must provide, maintain and operate their *plant* and equipment in a manner:

(1) to assist in preventing or controlling instability within the *power system*;

(2) to comply with their *performance standards* and assist in achieving the *system standards*;

(3) to assist in the maintenance of, or restoration to, a *satisfactory operating state* of the *power system*; and

(4) to prevent uncontrolled separation of the *power system* into isolated *regions* or partly combined *regions*, *intra-regional transmission* break-up, or *cascading outages*, following any *power system* incident.

5.2.2 Connection agreements

(a) If requested to do so by a ~~*Transmission Network User, Distribution* *Network User*~~, *AEMO* or the *AER*, a *Network Service Provider* and a *Transmission* ~~*Network User* or *Distribution*~~ *Network User* ~~(as the case may be)~~ must document the terms of any *network connection* arrangements made prior to 13 December 1998 and the resulting document will then be deemed to be a *connection agreement* for the purposes of the *Rules*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b) The *Rules* apply to:

(1) *connection agreements* made after 13 December 1998;

(2) deemed *connection agreements* under paragraph (a); and

(3) requests to establish *connection* after 13 December 1998.

(c) This Chapter is neither intended to have, nor is it to be read or construed as having, the effect of:

(1) altering any of the terms of a *connection agreement*; or

(2) altering the contractual rights or obligations of any of the parties under the *connection agreement* as between those parties; or

(3) relieving the parties under any such *connection agreement* of their contractual obligations under such an agreement.

(d) Notwithstanding the provisions of clause 5.2.2(c), if any obligation imposed or right conferred on a *Registered Participant* by this Chapter is inconsistent with the terms of a *connection agreement* to which the *Rules* apply; and

(1) if ~~and~~ the application of the inconsistent terms of the *connection agreement* would adversely affect the quality or security of *network service* to other *Network Users*, the parties to the *connection agreement* must observe the provisions of this Chapter as if they prevail over the *connection agreement* to the extent of the inconsistency~~.~~; and

(2) otherwise, the *connection agreement* is to prevail.

(e) Subject to paragraph (d), a *Registered Participant* must plan, design, operate and maintain its *facilities* so as to comply with the terms of its applicable *connection agreements*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

5.2.3 Obligations of network service providers

(a) The obligations in this clause 5.2.3 apply to a *Network Service provider* in addition to its obligations as a *Registered Participant* under clauses 5.2.1 and 5.2.2.~~To be registered by *AEMO* as a *Network Service Provider*, a person must satisfy the relevant requirements specified in Chapter 2 and submit an application to *AEMO* in such form as *AEMO* may require.~~

(b) Subject to clause 5.2.2(d), a ~~A~~ *Network Service Provider* must comply with the *power system* performance and quality of *supply* standards described in schedule 5.1.~~:~~

Note

The AEMC proposes to recommend that this provision no longer be classified as a civil penalty provision under the National Electricity (South Australia) Regulations.

~~(1) described in schedule 5.1;~~

~~(2) in accordance with any *connection agreement* with a *Registered Participant*,~~

~~and if there is an inconsistency between schedule 5.1 and such a *connection agreement*:~~

~~(3) if compliance with the relevant provision of the *connection agreement* would adversely affect the quality or security of *network service* to other *Network Users*, schedule 5.1 is to prevail;~~

~~(4) otherwise the *connection agreement* is to prevail.~~

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(c) Where the provisions of a~~the~~ *connection agreement* vary the technical requirements set out in the schedules to this Chapter, the relevant *Network Service Provider* must report on such variations to *AEMO* on an annual basis. *AEMO* must allow access to such information to all other *Network Service*

Providers and the *Network Service Providers* must keep such information confidential.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(c1) Where a *Network Service Provider's network* comprises or incorporates *plant*:

(1) for which *access standards* are specified in schedule 5.2 or 5.3a; and

(2) that is not subject to the terms of a *connection agreement* with another person incorporating *performance standards* for the *plant*,

the *Network Service Provider* must determine and document the *performance standards* applicable to that *plant* in accordance with the requirements of the relevant schedule, and must promptly advise *AEMO* of those *performance standards*, and any changes to them.

(d) A *Network Service Provider* must:

(1) review and process *applications to connect* or modify a *connection* which are submitted to it and must enter into a *connection agreement* with each *Registered Participant* and any other person to which it has provided a *connection* in accordance with rules 5.3 or 5.3A (as is relevant) to the extent that the *connection point* relates to its part of the *national grid*;

(1A) co-operate with any other *Network Service Provider* who is processing a *connection* enquiry or *application to connect* to allow that *connection* enquiry or *application to connect* to be processed expeditiously and in accordance with rules 5.3 or 5.3A (as is relevant);

(2) ensure that, to the extent that a *connection point* relates to its part of the *national grid*, every arrangement for *connection* with a *Registered Participant* or any other arrangement involving a *connection agreement* with that *Network Service Provider* complies with all relevant provisions of the *Rules*;

(3) co-ordinate the design aspects of equipment proposed to be *connected* to its *networks* with those of other *Network Service Providers* in accordance with rule 5.6 in order to seek to achieve *power system* performance requirements in accordance with schedule 5.1;

(4) together with other *Network Service Providers*, arrange for and participate in planning and development of their *networks* and *connection points* on or with those *networks* in accordance with Part D of Chapter 5;

(5) permit and participate in inspection and testing of *facilities* and equipment in accordance with rule 5.7;

(6) permit and participate in commissioning of *facilities* and equipment which are to be *connected* to its *network* in accordance with rule 5.8;

(7) advise a *Registered Participant* or other person with whom there is a *connection agreement* upon request of any expected interruption characteristics at a *connection point* on or with its *network* so that the *Registered Participant* or other person may make alternative arrangements for *supply* during such interruptions, including negotiating for an alternative or backup *connection*;

Note

This subparagraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(8) use its reasonable endeavours to ensure that modelling data used for planning, design and operational purposes is complete and accurate and order tests in accordance with rule 5.7 where there are reasonable grounds to question the validity of data;

Note

This subparagraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(9) provide to *AEMO* and other *Network Service Providers* all data available to it and reasonably required for modelling the static and *dynamic performance* of the *power system*;

(10) forward to *AEMO* and other *Network Service Providers* subsequent updates of the data referred to in subparagraph (9) and, to the best of its ability and knowledge, ensure that all data used for the purposes referred to in rules 5.3 or 5.3A (as is relevant) is consistent with data used for such purposes by other *Network Service Providers*;

Note

This subparagraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(11) provide to *AEMO* the information required from relevant *Registered Participants* and *Connection Applicants* (including, where relevant, from the *Network Service Provider* itself) ~~*Generators or Integrated Resource Providers*~~ under schedules 5.2, 5.3 or 5.3a ~~and from *Customers* under schedule 5.3 and from *Market Network Service Providers* under schedule 5.3a in relation to a *connection agreement*~~ and details of any *connection points* with other *Network Service Providers*; and

Note

The AEMC proposes to recommend that this subparagraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This subparagraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(12) where *network augmentations*, setting changes or other technical issues arise which could impact across *regional* boundaries, provide *AEMO* with a written report on the impact and its effects.

Note

This subparagraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e) A *Network Service Provider* must arrange for operation of that part of the interconnected national electricity system over which it has control in accordance with instructions given by *AEMO*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e1) A *Network Service Provider* must, except in so far as its *market network services* and parts of its *network* which are used solely for the provision of *market network services* are concerned, arrange for:

(1) management, maintenance and operation of its part of the *national grid* such that, in the *satisfactory operating state*, electricity may be transferred continuously at a *connection point* on or with its *network* up to the *agreed capability*;

(2) operation of its *network* such that the fault level at any *connection point* on or with that *network* does not breach the limits that have been specified in a *connection agreement*;

(3) management, maintenance and operation of its *network* to minimise the number of interruptions to *agreed capability* at a *connection point* on or with that *network* by using *good electricity industry practice*; and

(4) restoration of the *agreed capability* at a *connection point* on or with that *network* as soon as reasonably practicable following any interruption at that *connection point*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(f) A *Network Service Provider* must comply with *applicable regulatory instruments*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(g) Each *Network Service Provider* must in respect of proposed new or altered *schedule 5.3a* plant (whether or not ~~equipment owned, operated or controlled by it~~ for the purpose of providing a *market network service*):

(1) submit an *application to connect* and enter into a *connection agreement* with each other ~~a~~ *Network Service Provider* to whose *network* a new *schedule 5.3a plant* is to be *connected*, in accordance with rule 5.3, prior to that equipment being *connected* to the *network* of that *Network Service Provider* or altered (as the case may be);

(2) comply with the reasonable requirements of *AEMO* and the relevant *Network Service Provider* in respect of design requirements of equipment proposed to be *connected* to the *network* of that *Network Service Provider* in accordance with rule 5.6 and schedule 5.3a;

(3) provide forecast information to the relevant *Network Service Provider* in accordance with Part D of Chapter 5;

(4) permit and participate in inspection and testing of *facilities* and equipment in accordance with rule 5.7;

(5) permit and participate in commissioning of *facilities* and equipment which are to be *connected* to a *network* for the first time in accordance with rule 5.8; and

(6) **[Deleted]**

(7) give notice of intended voluntary permanent *disconnection* in accordance with rule 5.9.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(g1) **[Deleted]**

Note

The AEMC proposes to recommend that this provision no longer be classified as a civil penalty provision under the National Electricity (South Australia) Regulations.

~~A *Network Service Provider* must comply with any terms and conditions of a *connection agreement* for its *market network service facilities* that provide for the implementation, operation, maintenance or performance of a *system strength remediation scheme*.~~

~~Note~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(h) ~~-~~**[Deleted]**

(h1) ~~-~~**[Deleted]**

(h2) **[Deleted]**

(h3) **[Deleted]**

(i) This Chapter is neither intended to require, nor is it to be read or construed as having the effect of requiring, a *Network Service Provider* to permit *connection* to or to *augment* any part of its *network* which is solely used for the provision of *market network services*.

(j) If in *AEMO*'s reasonable opinion, there is a risk a *Network Service Provider*'s *plant* or equipment will:

(1) adversely affect *network capability*, *power system security*, quality or reliability of *supply*, *inter-regional power transfer capability*;

(2) adversely affect the use of a *network* by a *Network User*; or

(3) have an *adverse system strength impact*,

AEMO may request the *Network Service Provider* to provide information of the type described in clause 4.3.4(o), and following such a request, the *Network Service Provider* must provide the information to *AEMO* and any other relevant *Network Service Provider*(s) in accordance with the requirements and circumstances specified in the *Power System Model Guidelines*, the *Power System Design Data Sheet* and the *Power System Setting Data Sheet*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(k) If in *AEMO*'s reasonable opinion, information of the type described in clause 4.3.4(o) is required to enable a *Network Service Provider* to conduct the assessment required by clause 5.3.4B, *AEMO* may request any other relevant *Network Service Provider* to provide the information, and following such a request, that *Network Service Provider* must provide the information to *AEMO* and the other relevant *Network Service Provider*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(l) All information provided to *AEMO* and the relevant *Network Service Provider*(s) under paragraphs (j) and (k) must be treated as *confidential information* by those recipients.

5.2.3A Obligations of Market Network Service Providers

(a0) The obligations in this clause 5.2.3A apply to a *Market Network Service Provider* in addition to its obligations as a *Registered Participant* under clauses 5.2.1 and 5.2.2 and as a *Network Service Provider* under clause 5.2.3.

(a) If in *AEMO*'s reasonable opinion, there is a risk a *Market Network Service Provider*'s *plant* or equipment will:

(1) adversely affect *network capability*, *power system security*, quality or reliability of *supply*, *inter-regional power transfer capability*;

(2) adversely affect the use of a *network* by a *Network User*; or

(3) have an *adverse system strength impact*,

AEMO may request the *Market Network Service Provider* to provide information of the type described in clause S5.3a.1(a1), and following such a request, the *Market Network Service Provider* must provide the information to *AEMO* and the relevant *Network Service Provider*(s) in accordance with the requirements and circumstances specified in the *Power System Model Guidelines*, the *Power System Design Data Sheet* and the *Power System Setting Data Sheet*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b) If in *AEMO*'s reasonable opinion, information of the type described in clause S5.3a.1(a1) is required to enable a *Network Service Provider* to conduct the assessment required by clause 5.3.4B, *AEMO* may request a *Market Network Service Provider* to provide the information, and following such a request, the *Market Network Service Provider* must provide the information to *AEMO* and the relevant *Network Service Provider*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c) All information provided to *AEMO* and the relevant *Network Service Provider*(s) under paragraphs (a) and (b) must be treated as *confidential information* by those recipients.

(d) **[Deleted]**

Note

The AEMC proposes to recommend that this provision no longer be classified as a civil penalty provision under the National Electricity (South Australia) Regulations.

~~A *Market Network Service Provider* must comply with any terms and conditions of a *connection agreement* for its *connected plant* that provide for the implementation, operation, maintenance or performance of a *system strength remediation scheme*.~~

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

5.2.4 Obligations of customers

(a) The obligations in this clause 5.2.4 apply to a *Customer* in addition to its obligations as a *Registered Participant* under clauses 5.2.1 and 5.2.2.

Note

The AEMC proposes to recommend that this provision no longer be classified as a civil penalty provision under the National Electricity (South Australia) Regulations.

~~Each *Customer* must plan and design its *facilities* and ensure that its *facilities* are operated to comply with~~:

~~(1) its *connection agreement* with a *Network Service Provider*;~~

~~(2) subject to clause 5.2.4(a)(1), all applicable *performance standards*; and~~

~~(3) subject to clause 5.2.4(a)(2), the *system standards*.~~

~~Note~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b) A *Customer* must:

(1) submit an *application to connect* in respect of new or altered equipment owned, operated or controlled by the *Customer* and enter into a *connection agreement* with a *Network Service Provider* in accordance with rule 5.3 or 5.3A prior to that equipment being *connected* to the *network* of that *Network Service Provider* or altered (as the case may be);

(2) comply with the reasonable requirements of the relevant *Network Service Provider* in respect of design requirements of equipment proposed to be *connected* to the *network* of that *Network Service Provider* in accordance with rule 5.6 and schedule 5.3;

(3) provide *load* forecast information to the relevant *Network Service Provider* in accordance with Part D of Chapter 5;

(4) permit and participate in inspection and testing of *facilities* and equipment in accordance with rule 5.7;

(5) permit and participate in commissioning of *facilities* and equipment which are to be *connected* to a *network* for the first time in accordance with rule 5.8; and

(6) **[Deleted]**

(7) give notice of any intended voluntary permanent *disconnection* in accordance with rule 5.9.

(c) If in *AEMO*'s reasonable opinion, there is a risk that a *Customer*'s *plant* will:

(1) adversely affect *network capability*, *power system security*, quality or reliability of *supply*, *inter-regional power transfer capability*;

(2) adversely affect the use of a *network* by a *Network User*; or

(3) have an *adverse system strength impact*,

AEMO may request a *Customer* to which Schedule 5.3 applies to provide information of the type described in clause S5.3.1(a1), and following such a request, the *Customer* must provide the information to *AEMO* and the relevant *Network Service Provider*(s) in accordance with the requirements and circumstances specified in the *Power System Model Guidelines*, the *Power System Design Data Sheet* and the *Power System Setting Data Sheet*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) If in *AEMO*'s reasonable opinion, information of the type described in clause S5.3.1(a1) is required to enable a *Network Service Provider* to conduct the assessment required by clause 5.3.4B, *AEMO* may request a *Customer* to which Schedule 5.3 applies, to provide the information, and following such a request, the *Customer* must provide the information to *AEMO* and the relevant *Network Service Provider*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e) All information provided to *AEMO* and the relevant *Network Service Provider*(s) under paragraphs (c) and (d) must be treated as *confidential information* by those recipients.

(f) **[Deleted]**

Note

The AEMC proposes to recommend that this provision no longer be classified as a civil penalty provision under the National Electricity (South Australia) Regulations.

~~A *Customer* must comply with any terms and conditions of a *connection agreement* for its *connected plant* that provide for the implementation, operation, maintenance or performance of a *system strength remediation scheme*.~~

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

5.2.5 Obligations of Generators

(a) The obligations in this clause 5.2.5 apply to a~~A~~ *Generator* in addition to its obligations as a *Registered Participant* under this clauses 5.2.1 and 5.2.2.

Note

The AEMC proposes to recommend that this provision no longer be classified as a civil penalty provision under the National Electricity (South Australia) Regulations.

~~must plan and design its *facilities* and ensure that they are operated to comply with:~~

~~(1) the *performance standards* applicable to those *facilities*;~~

~~(2) subject to subparagraph (1), its *connection agreement* applicable to those *facilities*; and~~

~~(3) subject to subparagraph (2), the *system standards*.~~

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b) A *Generator* must:

(1) submit an *application to connect* in respect of new *generating plant* owned, operated or controlled by the *Generator*, or to be owned, operated or controlled by the *Generator*, and enter into a *connection agreement* with a *Network Service Provider* in accordance with rule 5.3 prior to that *generating plant* being *connected* to the *network* of that provider;

(2) comply with the reasonable requirements of the relevant *Network Service Provider* in respect of design requirements of *generating plant* proposed to be *connected* to the *network* of that provider in accordance with rule 5.6 and schedule 5.2;

(3) provide *generation* forecast information to the relevant *Network Service Provider* in accordance with Part D of Chapter 5;

(4) permit and participate in inspection and testing of *facilities* and equipment in accordance with rule 5.7;

(5) permit and participate in commissioning of *facilities* and equipment which are to be *connected* to a *network* for the first time in accordance with rule 5.8; and

(6) give notice of intended voluntary permanent *disconnection* in accordance with rule 5.9.

(c) **[Deleted]**

Note

The AEMC proposes to recommend that this provision no longer be classified as a civil penalty provision under the National Electricity (South Australia) Regulations.

~~A *Generator* must comply with any terms and conditions of a *connection agreement* for its *generating system* that provide for the implementation, operation, maintenance or performance of a *system strength remediation scheme*.~~

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(d) If in *AEMO*'s reasonable opinion, there is a risk that a *Generator's plant* will:

(1) adversely affect *network capability*, *power system security*, quality or reliability of *supply*, *inter-regional power transfer capability*;

(2) adversely affect the use of a *network* by a *Network User*; or

(3) have an *adverse system strength impact*,

AEMO may request a *Generator* to provide information of the type described in clause S5.2.4, and following such a request, the *Generator* must provide the information to *AEMO* and the relevant *Network Service Provider*(s) in accordance with the requirements and circumstances specified in the *Power System Model Guidelines*, the *Power System Design Data Sheet* and the *Power System Setting Data Sheet*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e) If in *AEMO*'s reasonable opinion, information of the type described in clause S5.2.4 is required to enable a *Network Service Provider* to conduct the assessment required by clause 5.3.4B, *AEMO* may request a *Generator* to provide the information, and following such a request, the *Generator* must provide the information to *AEMO* and the relevant *Network Service Provider*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(f) All information provided to *AEMO* and the relevant *Network Service Provider*(s) under paragraphs (c) and (d) must be treated as *confidential information* by those recipients.

5.2.5A Obligations of Integrated Resource Providers

(a) The obligations in this clause 5.2.5A apply to an *Integrated Resource Provider* in addition to its obligations as a *Registered Participant* under clauses 5.2.1 and 5.2.2. ~~An *Integrated Resource Provider* must plan and design its *facilities* and ensure that they are operated to comply with:~~

~~(1) the *performance standards* applicable to those *facilities*;~~

~~(2) subject to subparagraph (1), its *connection agreement* applicable to those *facilities*; and~~

~~(3) subject to subparagraph (2), the *system standards*.~~

(b) An *Integrated Resource Provider* must:

(1) submit an *application to connect* in respect of new *generating plant* (including an *integrated resource system*) owned, operated or controlled by the *Integrated Resource Provider*, or to be owned, operated or controlled by the *Integrated Resource Provider*, and enter into a *connection agreement* with a *Network Service Provider* in accordance with rule 5.3 prior to that *generating plant* being *connected* to the *network* of that provider;

(2) comply with the reasonable requirements of the relevant *Network Service Provider* in respect of design requirements of *generating plant* proposed to be *connected* to the *network* of that provider in accordance with rule 5.6 and schedule 5.2;

(3) provide *generation* forecast information to the relevant *Network Service Provider* in accordance with Part D of Chapter 5;

(4) permit and participate in inspection and testing of *facilities* and equipment in accordance with rule 5.7;

(5) permit and participate in commissioning of *facilities* and equipment which are to be *connected* to a *network* for the first time in accordance with rule 5.8; and

(6) give notice of intended voluntary permanent *disconnection* in accordance with rule 5.9.

(c) **[Deleted]**~~An *Integrated Resource Provider* must comply with any terms and conditions of a *connection agreement* for its *generating system* or *integrated resource system* that provide for the implementation, operation, maintenance or performance of a *system strength remediation scheme*.~~

(d) If in *AEMO's* reasonable opinion, there is a risk that an *Integrated Resource Provider's plant* will:

(1) adversely affect *network capability*, *power system security*, quality or reliability of *supply* or *inter-regional power transfer capability*;

(2) adversely affect the use of a *network* by a *Network User*; or

(3) have an *adverse system strength impact*,

AEMO may request the *Integrated Resource Provider* to provide information of the type described in clause S5.2.4, and following such a request, the *Integrated Resource Provider* must provide the information to *AEMO* and the relevant *Network Service Provider*(s) in accordance with the requirements and circumstances specified in the *Power System Model Guidelines*, the *Power System Design Data Sheet* and the *Power System Setting Data Sheet*.

(e) If in *AEMO's* reasonable opinion, information of the type described in clause S5.2.4 is required to enable a *Network Service Provider* to conduct the assessment required by clause 5.3.4B, *AEMO* may request the *Integrated Resource Provider* to provide the information, and following such a request, the *Integrated Resource Provider* must provide the information to *AEMO* and the relevant *Network Service Provider*.

(f) All information provided to *AEMO* and the relevant *Network Service Provider*(s) under paragraphs (d) and (e) must be treated as *confidential information* by those recipients.

5.2.6 Obligations of AEMO

AEMO must provide to *Network Service Providers* on request, a copy of any report provided to *AEMO* by a *Network Service Provider* under clause 5.2.3(d)(12). If a *Registered Participant* reasonably considers that it is or may be adversely affected by a development or change in another *region*, the *Registered Participant* may request the preparation of a report by the relevant *Network Service Provider* as to the technical impacts of the development or change. If so requested, the *Network Service Provider* must prepare such a report and provide a copy of it to *AEMO*, the *Registered Participant* requesting the report and, on request, any other *Registered Participant*.

Note

This clause is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

5.2.6A AEMO review of technical requirements for connection

(a) *AEMO* must conduct a review of some or all of the technical requirements set out in ~~Schedule~~ schedule 5.2, ~~Schedule~~ schedule 5.3 and ~~Schedule~~ schedule

5.3a at least once in every five year period (and may conduct a review more frequently if *AEMO* considers necessary) to assess whether those requirements should be amended, having regard to:

(1) the *national electricity objective*;

(2) the need to achieve and maintain *power system security*;

(3) changes in *power system* conditions; and

(4) changes in technology and capabilities of *facilities* and *plant*.

(b) When conducting a review under this clause 5.2.6A, *AEMO* must consult with, among other affected parties, the *Reliability Panel*.

(c) *AEMO* must commence a review under this clause 5.2.6A with the publication of an approach paper on its website, which must:

(1) set out the scope of the review, including the nature and extent of the issues to be reviewed;

(2) describe the technical requirements to be consulted on; and

(3) state the date by which a draft report will be published.

(d) *AEMO* must publish a draft report on its website that:

(1) sets out *AEMO's* recommendations for any amendments to the technical requirements set out in ~~Schedule~~ schedule 5.2, ~~Schedule~~ schedule 5.3 and ~~Schedule~~ schedule 5.3a and the reasons for those recommendations; and

(2) includes an invitation for written submissions to be made to *AEMO* within a period specified in the invitation (which must be at least 30 *business days*) on the technical requirements and recommendations in the draft report and must publish any submissions on its website, subject to obligations in respect of *confidential information*.

(e) *AEMO* must publish a final report on its website within 12 months of the approach paper's publication under paragraph (c), setting out *AEMO's* recommendations for any amendments to the technical requirements set out in ~~Schedule~~ schedule 5.2, ~~Schedule~~ schedule 5.3 and ~~Schedule~~ schedule 5.3a, having regard to the matters set out in subparagraphs (a)(1) to (4) and any submissions made in response to its invitation under subparagraph (d)(2).

(f) As soon as practicable following publication of a final report under paragraph (e), *AEMO* must provide written notification to the *AEMC* as to whether *AEMO* will be submitting a *Rule* change proposal that results from the review.

5.2.7 Obligations of designated network asset owners

(a) [**Deleted**]

(b) An owner of a *designated network asset* must plan, design and construct its *designated network asset* to comply with:

(1) the functional specifications applicable to those *designated network assets* as specified by the *Primary Transmission Network Service Provider*; and

(2) its *network operating agreement* applicable to those *designated network assets*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c) An owner of a *designated network asset* must prepare, maintain and publish an *access policy* in accordance with clause 5.2A.8.

(d) An owner of a *designated network asset* must permit and participate in commissioning of *facilities* and equipment that are to be *connected* to a *network* for the first time in accordance with rule 5.8.

5.3 Establishing or Modifying Connection

5.3.1 Process and procedures

(a) For the purposes of this rule 5.3:

(1) **establish a connection** includes:

(i) modify an existing *connection* or alter *plant* but does not include alterations to *plant* in the circumstances set out in clause 5.3.9 or clause 5.3.12; or

(ii) incorporating a *designated network asset* into a *transmission network*.

(2) **connect** includes the incorporation of a *designated network asset* into a *transmission network*.

(b) ~~Subject to paragraph (b1),~~ A person who wishes to establish a *connection*:

(1) to a *transmission network*, for any *plant*, must follow the process in this rule 5.3, subject to paragraph (b1);

(2) to a *distribution network*, for a *schedule 5.3a plant* or another *distribution network* (including an *embedded network*), must follow the process in this rule 5.3; or

(3) to a *distribution network*, for any other *plant*, must follow the applicable process determined in accordance with clause 5.3.1A. ~~a *Registered Participant* or person intending, or required by the *Rules*, to become a *Registered Participant* who wishes to *establish a connection* to a *network* must follow the procedures in this rule 5.3.~~

(b1) If a person ~~*Registered Participant*, or person intending to become a *Registered Participant*,~~ wishes to establish a *connection* to a part of a *network* that is a *designated network asset* either through a *dedicated connection asset* or by way of a new *designated network asset*, then:

(1) for *connection*, the process in rule 5.3 applies; and

(2) for access to *DNA services* from the existing *designated network asset*, the access is governed by the relevant *access policy* that applies.

(c) A ~~*Generator or Integrated Resource Provider*~~ *Schedule 5.2 Participant* wishing to alter any *connected generating system*, ~~or~~ *integrated resource*

system or *synchronous condenser system* must comply with clause 5.3.9 and a *Schedule 5.3 Participant or Schedule 5.3a Participant* ~~*Network User* or *Market Network Service Provider*~~ to whom clause 5.3.12 applies must comply with clause 5.3.12.

(d) **[Deleted]**~~*AEMO* must comply with clause 5.3.11 in relation to requests to change *normal voltage*.~~

(e) For *connection* to a *transmission network*, there may be more than one *Connection Applicant* in relation to a *connection* where there are different persons developing and owning *contestable IUSA components*, *dedicated connection assets*, *designated network assets* and *Transmission Network User facilities* in relation to that *connection*.

5.3.1A Application of rule to connection of distribution connected systems

(a) [**Deleted**]

(b) If a *Connection Applicant* wishes to *connect* a *generating system*, ~~or~~ an *integrated resource system*, a *synchronous condenser system* or a *large inverter based load* to a *distribution network*, then:

(1) unless otherwise provided, rule 5.3A applies to the proposed connection and clauses 5.3.2, 5.3.3, 5.3.4 and 5.3.5 do not apply to the proposed *connection*; and

(2) for the avoidance of doubt, the application of the balance of Chapter 5, Part B to the *Connection Applicant* is otherwise unaffected by this clause 5.3.1A.

(c) For the purposes of paragraph (b), a~~A~~ reference to a *Connection Applicant* ~~in paragraph (b)~~ is to a:

(1) *Registered Participant* or person who intends to be a *Registered Participant*~~*Distribution Connected Resource Provider*~~;

(2) person who has applied or intends to apply to *AEMO* for an exemption from the requirement to register as a *Generator* or *Integrated Resource Provider* ~~-~~ in respect of a *generating system* or an *integrated resource system* (and is not eligible for an automatic exemption under the *registration information resource and guidelines*);

(3) *non-registered DER provider* who has made an election under clause 5A.A.2(c); or

(4) a person (including a *non-registered DER provider* or other *retail customer*) who is seeking *connection* for a *large inverter based resource* or a *synchronous condenser system*~~,~~.

~~and who makes a *connection* enquiry under clause 5.3A.5 or an *application to connect* under clause 5.3A.9 in relation to any *generating systems* or *integrated resource systems*, or any *network elements* used in the provision of a *network service*, as the case may be.~~

(d) The process for *establishing a connection* to a *distribution network* by a person other than a *Connection Applicant* listed in paragraph (c) is specified in Chapter 5A, provided that where the person is:

(1) a *Schedule 5.2 Participant* under clause S5.2.1, the requirements of schedule 5.2 apply to the extent provided for under clause S5.2.1; or

(2) a *Schedule 5.3 Participant* under clause S5.3.1a, the requirements of schedule 5.3 apply to the extent provided for under clause S5.3.1a,

and for the purposes of determining *performance standards* under the relevant schedule, the processes in clause 5.3.4A will apply with such modifications as are appropriate to the nature of the *connection*.

5.3.2 Connection enquiry

(a) A person referred to in clause 5.3.1(b) who wishes to make an *application to connect* must first make a *connection* enquiry by advising the *Local Network Service Provider* of the type, magnitude and timing of the proposed *connection* to that provider's *network*.

(b) If the information submitted with a *connection* enquiry is inadequate to enable the *Local Network Service Provider* to process the enquiry the provider must within 5 *business days*, advise the *Connection Applicant* what other relevant preliminary information of the kind listed in schedule 5.4 is required before the *connection* enquiry can be further processed.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c) The *Local Network Service Provider* must advise the *Connection Applicant* within 10 *business days* of receipt of the *connection* enquiry and the further information required in accordance with paragraph (b) if the enquiry would be more appropriately directed to another *Network Service Provider*.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) The *Connection Applicant*, notwithstanding the advice received under paragraph (c), may if it is reasonable in all the circumstances, request the *Local Network Service Provider* to process the *connection* enquiry and the provider must meet this request.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e) Where the *Local Network Service Provider* considers that the *connection* enquiry should be jointly examined by more than one *Network Service Provider*, with the agreement of the *Connection Applicant*, one of those *Network Service Providers* may be allocated the task of liaising with the *Connection Applicant* and the other *Network Service Providers* to process and respond to the enquiry.

(f) A *Network Service Provider* must to the extent that it holds technical information necessary to facilitate the processing of a *connection* enquiry

made in accordance with paragraph (a) or an *application to connect* in accordance with clause 5.3.4(a), provide that information to the *Connection Applicant* in accordance with the relevant requirements of schedule 5.1, 5.2, 5.3 or 5.3a.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(g) If applicable, a *Primary Network Service Provider* may charge a *Connection Applicant* an enquiry fee, the amount of which must not be more than necessary to cover the reasonable costs of work required to provide the information in clauses 5.3.3(b)(5A) and (7) to (10).

5.3.3 Response to connection enquiry

(a) In preparing a response to a *connection* enquiry, the *Network Service Provider* must liaise with other *Network Service Providers* with whom it has *connection agreements*, if the *Network Service Provider* believes, in its reasonable opinion, that compliance with the terms and conditions of those *connection agreements* will be affected. The *Network Service Provider* responding to the *connection* enquiry may include in that response the reasonable requirements of any such other *Network Service Providers* for information to be provided by the *Connection Applicant*.

(b) The *Network Service Provider* must:

(1) within:

(i) 40 *business days* after receipt of the *connection* enquiry which relates to a *designated network asset* and all such additional information (if any) advised under clause 5.3.2(b);

(ii) 30 *business days* after receipt of any other *connection* enquiry and all such additional information (if any) advised under clause 5.3.2(b); or

(2) within 30 *business days* after receipt of a request from the *Connection Applicant* to the *Local Network Service Provider* to process the *connection* enquiry under clause 5.3.2(d),

provide the following information in writing to the *Connection Applicant*:

(3) the identity of other parties that the *Network Service Provider* considers:

(i) will need to be involved in planning to make the *connection*; and

(ii) must be paid for *transmission services* or *distribution services* in the appropriate jurisdiction;

(4) whether it will be necessary for any of the parties identified in subparagraph (3) to enter into an agreement with the *Connection Applicant* in respect of the provision of *connection* or other *transmission services* or *distribution services* or both, to the *Connection Applicant*;

(5) in relation to *Distribution Network Service Providers* and *Network Service Providers* for *declared transmission systems*, whether any service the *Network Service Provider* proposes to provide is *contestable* in the relevant *participating jurisdiction*;

(5A) whether any service a *Transmission Network Service Provider* proposes to provide in relation to the *connection* enquiry is a *prescribed transmission service*, a *negotiated transmission service* or a *non-regulated transmission service* including, if applicable:

(i) whether the capital cost of any *identified user shared asset* is reasonably expected to exceed $10 million; and

(ii) if so, the *contestable IUSA components* and *non-contestable IUSA components*;

(5B) whether the *connection* enquiry relates to *connection* to a part of a *network* that is a *designated network asset*;

(6) a *preliminary program* showing proposed milestones for *connection* and access activities which may be modified from time to time by agreement of the parties, where such agreement must not be unreasonably withheld;

(7) the specification of the interface required to provide the *connection*, including plant and equipment requirements for the *connection* of a *dedicated connection asset* or *designated network asset* (as applicable), to the *transmission network* and of the interface between the *transmission network* and any *contestable IUSA components* or *designated network asset*;

(8) if applicable, the scope of work for any *non-contestable IUSA components*;

(9) if the response to the *connection enquiry* specifies the need for an *identified user shared asset* the capital cost of which is reasonably expected to exceed $10 million or includes a *designated network asset*, a functional specification:

(i) setting out the technical parameters for that asset as described in the table in clause 5.2A.4 with sufficient detail to enable the *Connection Applicant* to obtain binding tenders for the provision of detailed design, construction and ownership services for the *contestable IUSA components* or *designated network asset*; and;

(ii) at the *Primary Transmission Network Service Provider's* option in respect of an *identified user shared asset*, that is above those minimum requirements in subparagraph (i) subject to the *Primary Transmission Network Service Provider* separately identifying the additional requirements and agreeing to fund the additional works related to those requirements;

(10) an indicative costing for operation and maintenance services for any *identified user shared asset* or *designated network asset*, based on the functional specification provided pursuant to subparagraph (9); and

(11) the amount of any enquiry fee under clause 5.3.2(g).

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b1) The *Network Service Provider* must:

(1) within 30 *business days* after receipt of the *connection* enquiry and all such additional information (if any) advised under clause 5.3.2(b); or

(2) within 30 *business days* after receipt of a request from the *Connection Applicant* to the *Local Network Service Provider* to process the *connection* enquiry under clause 5.3.2(d),

provide the *Connection Applicant* with the following written details of each technical requirement relevant to the proposed *plant*:

(3) the *automatic access standards*;

(4) the *minimum access standards*;

(5) the applicable *plant standards*;

(6) the *negotiated access standards* that will require *AEMO's* involvement in accordance with clause 5.3.4A(c); and

(7) ~~the *normal voltage* level, if that is to change from the *nominal voltage* level.~~the information required under clause 5.3.2(f).

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b2) A *Registered Participant*, *AEMO* or *interested party* may request the *Reliability Panel* to determine whether, in respect of one or more technical requirements for access, an existing Australian or international standard, or a part thereof, may be adopted as a *plant standard* for a particular class of *plant*.

(b3) Where, in respect of a technical requirement for access, the *Reliability Panel* determines a *plant standard* for a particular class of *plant* in accordance with clause 8.8.1(a)(8) as an acceptable alternative to a particular *minimum access standard* or *automatic access standard*, a *plant* which meets that *plant standard* is deemed to meet the applicable *automatic access standard* or *minimum access standard* for that technical requirement.

(b4) In making a determination in accordance with clause 5.3.3(b2) the *Reliability Panel* must consult *Registered Participants* and *AEMO* using the *Rules consultation procedures*.

(b5) For a *connection point* for a proposed new *connection* in relation to which clause 5.3.4B applies, within the time applicable under paragraph (b1), the *Network Service Provider* must provide the *Connection Applicant* with the following written details:

(1) the minimum *three phase fault level* at the *connection point*;

(2) the results of the *Network Service Provider's* preliminary assessment of the impact of the new *connection* undertaken in accordance with the *system strength impact assessment guidelines* and clause 5.3.4B; and

(3) except where, under clause 5.3.4B(a3), the *Network Service Provider* is not required to calculate the *system strength locational factor*:

(i) the indicative *system strength quantity* for the *connection point*;

(ii) the *system strength locational factor* for the *connection point*; and

(iii) the relevant *system strength node* and the indicative *system strength charge* using the then applicable *system strength unit price*.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c) Within 30 *business days* after receipt of the *connection* enquiry and all such additional information (if any) advised under clause 5.3.2(b) or, if the *Connection Applicant* has requested the *Local Network Service Provider* to process the *connection* enquiry under clause 5.3.2(d), within 20 *business days* after receipt of that request, the *Network Service Provider* must provide to the *Connection Applicant* written advice of all further information which the *Connection Applicant* must prepare and obtain in conjunction with the *Network Service Provider* to enable the *Network Service Provider* to assess an *application to connect* including:

(1) details of the *Connection Applicant's connection* requirements, and the *Connection Applicant's* specifications of the *facility* to be connected, consistent with the requirements advised in accordance with clause 5.3.3(b1);

(2) details of the *Connection Applicant's* reasonable expectations of the level and standard of service of *power transfer capability* that the *network* should provide;

(3) a list of the technical data to be included with the *application to connect*, which may vary depending on the *connection* requirements and the type, rating and location of the *facility* to be *connected* and will generally be in the nature of the information set out in schedule 5.5 but may be varied by the *Network Service Provider* as appropriate to suit the size and complexity of the proposed *facility* to be *connected*;

(4) commercial information to be supplied by the *Connection Applicant* to allow the *Network Service Provider* to make an assessment of the ability of the *Connection Applicant* to satisfy the prudential requirements set out in rules 6.21 and 6A.28;

(4A) the *DER generation information* that the *Network Service Provider* requires;

(5) the amount of the application fee which is payable on lodgement of an *application to connect*, such amount:

(i) not being more than necessary to cover the reasonable costs of all work anticipated to arise from investigating the *application to connect* and preparing the associated offer to *connect* and to meet the reasonable costs anticipated to be incurred by *AEMO* and other *Network Service Providers* whose participation in the assessment of the *application to connect* will be required; and

(ii) must not include any amount for, or in anticipation of, the costs of the person using an *Independent Engineer*; and

(6) any other information relevant to the submission of an *application to connect*.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

5.3.4 Application for connection

(a) A person who has made a *connection* enquiry under clause 5.3.2 may, following receipt of the responses under clause 5.3.3, make an *application to connect* in accordance with this clause 5.3.4, clause 5.3.4A and clause 5.3.4B.

(b) To be eligible for *connection* the *Connection Applicant* must submit an *application to connect* containing:

(1) the information specified in clause 5.3.3(c);

(2) the relevant application fee to the relevant *Network Service Provider*;

(3) for services related to *contestable IUSA components* that the *Connection Applicant* has not obtained from the *Primary Transmission Network Service Provider* or a *designated network asset* (as applicable):

(i) the *Connection Applicant*'s process for how the *Primary Transmission Network Service Provider* will undertake a review of the detailed design and inspect the construction of those components or assets and how risks of defects will be addressed;

(ii) the detailed design of those components or assets; and

(iii) if the *Primary Transmission Network Service Provider* will not own the *contestable IUSA components* or *designated network asset*, the *Connection Applicant*'s proposed changes (if any) to the form of *network operating agreement* published pursuant to schedule 5.10; and

(4) if the *Connection Applicant* has obtained services related to *contestable IUSA components* or a *designated network asset* other than from the *Primary Transmission Network Service Provider*, all information reasonably required for the *Primary Transmission Network Service Provider* to properly provide operation and maintenance services for the life of those components or assets, including details of the *contestable IUSA components* or *designated network assets*'

construction, instructions for operation and maintenance and health safety and asset management manuals; and

(5) except where, under clause 5.3.4B(a3), the *Network Service Provider* is not required to calculate the *system strength locational factor*, the *Connection Applicant's* election under clause 5.3.4B(b1).

(b1) The *Connection Applicant's* detailed design under paragraph (b)(3)(ii):

(1) must be consistent with the minimum functional specification provided by the *Primary Transmission Network Service Provider* under clause 5.3.3(b)(9)(i);

(2) must not unreasonably inhibit the capacity for future expansion of the *identified user shared asset* or preclude the possibility of future *connections* to that asset; and

(3) subject to the *Connection Applicant* considering the *Primary Transmission Network Service Provider's* additional requirements under clause 5.3.3(b)(9)(ii) in good faith, may be (but is not required to be) consistent with those additional requirements.

(c) In relation to *Distribution Network Service Providers* and *Network Service Providers* for *declared transmission systems*, the *Connection Applicant* may submit *applications to connect* to more than one *Network Service Provider* in order to receive additional offers to *connect* in respect of *facilities* to be provided that are *contestable*.

(d) To the extent that an application fee includes amounts to meet the reasonable costs anticipated to be incurred by any other *Network Service Providers* or *AEMO* in the assessment of the *application to connect*, a *Network Service Provider* who receives the *application to connect* and associated fee must pay such amounts to the other *Network Service Providers* or *AEMO*, as appropriate.

(e) For each technical requirement where the proposed arrangement will not meet the *automatic access standards* nominated by the *Network Service Provider* pursuant to clause 5.3.3(b1), the *Connection Applicant* must submit with the *application to connect* a proposal for a *negotiated access standard* for each such requirement to be determined in accordance with clause 5.3.4A.

(f) The *Connection Applicant* may:

(1) lodge separate *applications to connect* and separately liaise with the other *Network Service Providers* identified in clause 5.3.3(b) who may require a form of agreement;

(2) lodge one *application to connect* with the *Network Service Provider* who processed the *connection* enquiry and require it to liaise with those other *Network Service Providers* and obtain and present all necessary draft agreements to the *Connection Applicant*; or

(3) lodge a combined *application to connect* with the *Primary Network Service Provider* where the *connection* involves more than one *Connection Applicant* due to different persons developing and owning *contestable IUSA components*, *dedicated connection assets*, *designated*

network assets and *Transmission Network User facilities* in relation to that *connection*.

(g) A *Connection Applicant* who proposes a *system strength remediation scheme* under clause 5.3.4B must submit its proposal with the *application to connect*.

5.3.4A Negotiated access standards

(a) *AEMO* must advise on *AEMO advisory matters*.

(b) A *negotiated access standard* must:

(1) subject to subparagraph (1A), be no less onerous than the corresponding *minimum access standard* provided by the relevant *Network Service Provider* under clauses 5.3.3(b1)(4) or S5.4B(b)(2);

(1A) with respect to a submission ~~by a *Generator* or *Integrated Resource Provider*~~ under clause 5.3.9(b)(3)~~,~~ or ~~a submission by a *Network User* or *Market Network Service Provider* under clause~~ 5.3.12(b)(3), or a proposed amendment under clause 4.14(p), be, if the existing *performance standard* for that technical requirement is less onerous than~~below~~ the *minimum access standard*, no less onerous than the existing *performance standard* that corresponds to the technical requirement that is affected by the alteration to the relevant *plant*~~*generating system* or *integrated resource system* or *plant* (as applicable)~~, unless otherwise as agreed by *AEMO* and the *Network Service Provider*;

(2) be set at a level that will not adversely affect *power system security* or achievement of the *system standards*;

(3) be set at a level that will not adversely affect the quality of *supply* for other *Network Users*; and

(4) subject to subparagraph (1A), meet the requirements of a *negotiated access standard* for the corresponding technical requirement under schedule 5.2, schedule 5.3 or schedule 5.3a as applicable,~~subject to subparagraph (1A), in respect of *generating plant*, meet the requirements applicable to a *negotiated access standard* in Schedule 5.2.~~

where the assessment of those matters considers, as relevant and in the range of expected *power system* operating conditions, the expected performance of the existing *power system*, *considered projects* and projects for *connection* of *Network Users* that the *Network Service Provider* reasonably considers will proceed.

(b1) When submitting a proposal for a *negotiated access standard* under clauses 5.3.4(e), 5.3A.9(f), 5.3.9(b)(3), 5.3.12(b)(3) or subparagraph (h)(3), and where there is a corresponding *automatic access standard* for the relevant technical requirement, a *Connection Applicant* must propose a standard that is as close as practicable to the corresponding *automatic access standard*, having regard to:

(1) the need to protect the *plant* from damage;

(2) *power system* conditions at the location of the proposed *connection*; and

(3) the commercial and technical feasibility of complying with the *automatic access standard* with respect to the relevant technical requirement.

(b2) When proposing a *negotiated access standard* under paragraph (b1), the *Connection Applicant* must provide reasons and evidence to the *Network Service Provider* and *AEMO* as to why, in the reasonable opinion of the *Connection Applicant*, the proposed *negotiated access standard* is appropriate, including:

(1) how the *Connection Applicant* has taken into account the matters outlined in subparagraphs (b1)(1) to (3); and

(2) how the proposed *negotiated access standard* meets the requirements of paragraph (b).

(c) Following the receipt of a proposed *negotiated access standard* under clauses 5.3.4(e), 5.3A.9(f), 5.3.9(b)(3), 5.3.12(b)(3) or subparagraph (h)(3), the *Network Service Provider* must consult with *AEMO* as soon as practicable in relation to *AEMO advisory matters* for that proposed standard.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) Within 20 *business days* following the later of:

(1) receipt of a proposed *negotiated access standard* under clauses 5.3.4(e), 5.3A.9(f), 5.3.9(b)(3), 5.3.12(b)(3) or subparagraph (h)(3); and

(2) receipt of all information required to be provided by the *Connection Applicant* under clauses S5.2.4, S5.5.6, S5.3.1(a1) or S5.3a.1(a1),

AEMO must advise the *Network Service Provider* in writing, in respect of *AEMO advisory matters*, whether the proposed *negotiated access standard* should be accepted or rejected.

(d1) When advising the *Network Service Provider* under paragraph (d) to reject a proposed *negotiated access standard*, and subject to obligations in respect of *confidential information*, *AEMO* must:

(1) provide detailed reasons in writing for the rejection to the *Network Service Provider*, including:

(i) where the basis of *AEMO*'s advice is lack of evidence from the *Connection Applicant*, details of the additional evidence of the type referred to in paragraph (b2) *AEMO* requires to continue assessing the proposed *negotiated access standard*; and

(ii) the extent to which each of the matters identified at subparagraphs (b)(1), (b)(1A), (b)(2) and (b)(4) contributed to *AEMO*'s decision to reject the proposed *negotiated access standard*; and

(2) recommend a *negotiated access standard* that *AEMO* considers meets the requirements of subparagraphs (b)(1), (b)(1A), (b)(2) and (b)(4).

(e) Within 30 *business days* following the later of:

(1) receipt of a proposed *negotiated access standard* in accordance with clauses 5.3.4(e), 5.3A.9(f), 5.3.9(b)(3), 5.3.12(b)(3) or subparagraph (h)(3); and

(2) receipt of all information required to be provided by the *Connection Applicant* under clauses S5.2.4, S5.5.6, S5.3.1(a1) or S5.3a.1(a1),

the *Network Service Provider* must accept or reject a proposed *negotiated access standard*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(f) The *Network Service Provider* must reject the proposed *negotiated access standard* where:

(1) in the *Network Service Provider*'s reasonable opinion, one or more of the requirements at subparagraphs (b)(1), (b)(1A), (b)(3) and (b)(4) are not met; or

(2) *AEMO* has advised the *Network Service Provider* under paragraph (d) to reject the proposed *negotiated access standard*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(g) If a *Network Service Provider* rejects a proposed *negotiated access standard*, the *Network Service Provider* must, at the same time:

(1) subject to obligations in respect of *confidential information*, provide to the *Connection Applicant*:

(i) where the basis for the *Network Service Provider's* rejection is lack of evidence from the *Connection Applicant*, details of the additional evidence of the type referred to in paragraph (b2) the *Network Service Provider* requires to continue assessing the proposed *negotiated access standard*;

(ii) detailed reasons in writing for the rejection, including the extent to which each of the matters identified at subparagraphs (b)(1), (b)(1A), (b)(3) and (b)(4) contributed to the *Network Service Provider's* decision to reject the proposed *negotiated access standard*; and

(iii) the detailed reasons and recommendation (if any) provided by *AEMO* to the *Network Service Provider* in respect of an *AEMO advisory matter* under subparagraphs (d1)(1) and (2); and

(2) advise the *Connection Applicant* of a *negotiated access standard* that the *Network Service Provider* considers meets the requirements of subparagraphs (b)(1), (b)(1A), (b)(3) and (b)(4).

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(h) The *Connection Applicant* may in relation to a proposed *negotiated access standard* advised by a *Network Service Provider* in accordance with subparagraph (g)(2):

(1) accept the proposed *negotiated access standard*;

(2) reject the proposed *negotiated access standard*;

(3) propose an alternative *negotiated access standard* to be further evaluated in accordance with the criteria in paragraph (b); or

(4) elect to adopt the relevant *automatic access standard* or a corresponding *plant standard*.

(i) An *automatic access standard* or if the procedures in this clause 5.3.4A have been followed a *negotiated access standard*, that forms part of the terms and conditions of a *connection agreement*, is taken to be the *performance standard* applicable to the *connected plant* for the relevant technical requirement.

5.3.4B System strength mitigation requirement

(a) This clause applies in relation to:

(1) a proposed new *connection* of a *schedule 5.2 plant* or *schedule 5.3 plant* that, in either case, includes a *large inverter-based* resource; or~~*generating system, integrated resource system* or *market network service facility* to which rule 5.3 or 5.3A applies;~~

(2) a proposed new *connection* of a *schedule 5.3a plant* that is not subject to *transmission service* regulation under Chapter 6A;~~for a *Network User* to whom schedule 5.3 applies where the *facility* to be *connected* includes an *inverter based resource*;~~ and

Note:

The joint planning obligations of the relevant *Network Service Providers* under Part D of Chapter 5 apply to the *connection* of a *schedule 5.3a plant* that will be subject to economic regulation.

(3) a proposed alteration to *plant* described in subparagraph (1) or (2) ~~a *generating system, integrated resource system*~~ where clause 5.3.9 or ~~applies or to other *connected plant* where clause~~ 5.3.12 applies.

(a1) In this clause, a reference to a *Connection Applicant* includes a reference to a *Schedule 5.2 Participant* ~~*Generator* or an *Integrated Resource Provider*~~ to whom clause 5.3.9 applies and a *Schedule 5.3 Participant* or *Schedule 5.3a Participant* ~~*Network User* or *Market Network Service Provider*~~ to whom clause 5.3.12 applies.

(a2) For each proposed new *connection* or proposed alteration to ~~a *generating system, integrated resource system* or other *connected*~~ *plant* to which this clause applies, a *Network Service Provider* must:

(1) undertake a preliminary *system strength impact assessment* in accordance with the *system strength impact assessment guidelines*;

(2) subject to paragraph (a3), calculate the *system strength locational factor* for the new *connection* or proposed alteration in accordance with the *system strength impact assessment guidelines*;

(2A) subject to paragraph (a3), calculate, in accordance with the *system strength impact assessment guidelines*, the indicative *system strength quantity*;

(3) undertake a full *system strength impact assessment* following the preliminary assessment, unless:

(i) the preliminary assessment indicates there will be no *general system strength impact* or the impact is below any threshold specified in the *system strength impact assessment guidelines* for the purposes of paragraph (f)(3); or

(ii) where applicable, the *Connection Applicant* has elected in accordance with paragraph (b1) to pay the *system strength charge* in relation to the *connection*; and

(4) where the *Connection Applicant* has elected in accordance with paragraph (b1) to pay the *system strength charge* in relation to the *connection* or proposed alteration, undertake modelling in accordance with the *system strength impact assessment guidelines* to verify the stability of the *plant.*

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(a3) A *Network Service Provider*:

(1) is not required to calculate the *system strength locational factor* where it determines in accordance with the *system strength impact assessment guidelines* that a *system strength locational factor* cannot reasonably be calculated or would be manifestly excessive; and

(2) is not required to calculate an indicative *system strength quantity* if, in accordance with subparagraph (1), it is not required to calculate the *system strength locational factor*.

(a4) A *Connection Applicant* may request the *Network Service Provider* to undertake a further preliminary *system strength impact assessment* in accordance with the *system strength impact assessment guidelines* and provide a revised *system strength locational factor* and a revised indicative *system strength quantity* for a new *connection* or proposed alteration to a *generating system, integrated resource system* or other *connected plant*.

(a5) A *Network Service Provider* may require payment of a fee to meet the reasonable costs anticipated to be incurred by the *Network Service Provider* in undertaking any further preliminary assessment or providing a revised *system strength locational factor* or a revised indicative *system strength quantity* requested under paragraph (a4).

(b) The *Network Service Provider* must give the results of the preliminary assessment and where applicable the full assessment to the *Connection Applicant* concerned following consultation with *AEMO*.

(b1) A *Connection Applicant* must elect in its *application to connect*, its submission under clause 5.3.9(b) or its submission under clause 5.3.12(b) (as applicable) whether the *system strength charge* will be payable in relation to the new *connection* or alteration to the *generating system*, *integrated resource system* or other *connected plant* (as applicable). The election cannot be revoked.

(c) A dispute referred to in paragraph (d) between any of:

(1) *AEMO*;

(2) a *Network Service Provider* required to conduct an assessment under paragraph (a);

(3) a *Connection Applicant* who has submitted an *application to connect* for which a full assessment is required under paragraph (a2)(3); and

(4) a *Connection Applicant* ~~*Generator or Integrated Resource Provider*~~ who proposes an alteration ~~to a *generating system* or *integrated resource system*~~ to which clause 5.3.9 or clause 5.3.12 applies and for which a full assessment is required under paragraph (a2)(3)~~; and~~

(5) **[Deleted]**~~a *Network User* or *Market Network Service Provider* who proposes an alteration to *connected plant* to which clause 5.3.12 applies and for which a full assessment is required under paragraph (a2)(3),~~

may be determined under rule 8.2.

(d) Paragraph (c) applies to any dispute relating to the assessment of the *general system strength impact* as a result of conducting a *system strength impact assessment* including a dispute in relation to:

(1) whether the model specified by *AEMO* for the purposes of clause 4.6.6(b)(2) was reasonably appropriate for conducting the *system strength impact assessment*; and

(2) the application of the *system strength impact assessment guidelines* when undertaking a *system strength impact assessment*.

(e) Subject to paragraph (f), a *Network Service Provider* must undertake *system strength connection works* at the cost of the *Connection Applicant* if the full assessment undertaken in accordance with the *system strength impact assessment guidelines* indicates that the *Connection Applicant's* proposed new *connection* or proposed alteration will have a *general system strength impact*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(f) Paragraph (e) does not require a *Network Service Provider* to undertake, nor permit a *Network Service Provider* to require, *system strength connection works* in the following circumstances:

(1) the proposed new *connection* or alteration does not proceed;

(2) (2) to the extent that the *general system strength impact* referred to in paragraph (e) is or will be avoided or remedied by a *system strength remediation scheme* agreed or determined under this clause and implemented by the *Connection Applicant* in accordance with its *connection agreement*;

(3) to the extent that the impact is below any threshold specified in the *system strength impact assessment guidelines* for this purpose; or

(4) the *Connection Applicant* has elected for the *system strength charge* to be payable in relation to the new *connection* or proposed alteration.

(g) A *Connection Applicant* must include any proposal for a *system strength remediation scheme* in its *application to connect* or its proposal under clause 5.3.9(b)(4) or under clause 5.3.12(b)(4).

(h) A *Connection Applicant* proposing to install *plant* as part of a *system strength remediation scheme* must include a description of the *plant* and other information (including models) reasonably required by the *Network Service Provider* and *AEMO* to assess the *system strength remediation scheme*.

(i) A *Network Service Provider* must, following the receipt of a proposal for a *system strength remediation scheme*, consult with *AEMO* as soon as practical in relation to the proposal.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(j) Following the submission of a proposal for a *system strength remediation scheme*, *AEMO* must use reasonable endeavours to respond to the *Network Service Provider* in writing in respect of the proposal within 20 *business days*.

(k) A *Network Service Provider* must within 10 *business days* following the receipt of a response from *AEMO* under paragraph (h) to a proposal for a *system strength remediation scheme*, accept or reject the proposal.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(l) The *Network Service Provider* must reject a proposal for a *system strength remediation scheme* if the scheme is not reasonably likely to achieve its required outcome or would:

(1) in the reasonable opinion of the *Network Service Provider* adversely affect quality of *supply* for other *Network Users*; or

(2) on *AEMO's* reasonable advice, adversely affect *power system security*.

(m) If a *Network Service Provider* rejects a proposal for a *system strength remediation scheme*, the *Network Service Provider* must give its reasons but has no obligation to propose a *system strength remediation scheme* that it will accept.

(n) The *Connection Applicant* submitting a proposal for a *system strength remediation scheme* rejected by a *Network Service Provider* may:

(1) propose an alternative *system strength remediation scheme* to be further evaluated following the process initiated under paragraph (i); or

(2) request negotiations under paragraph (o).

(o) If a *Connection Applicant* requests negotiations under this paragraph, the *Connection Applicant*, the *Network Service Provider* and *AEMO* must negotiate in good faith to reach agreement in respect of the proposal for a *system strength remediation scheme*.

(p) If the matter is not resolved by negotiation under paragraph (o):

(1) in the case of a *connection* to a *transmission system* other than the *declared transmission system* of an *adoptive jurisdiction*, the matter may be dealt with as a dispute under rule 5.5 (but not rule 8.2); or

(2) otherwise, may be dealt with under rule 8.2 or as a *distribution service access dispute* as applicable.

(q) The parties to a *connection agreement* containing a *system strength remediation scheme* must not modify the scheme unless the modified scheme has been agreed or determined under this clause. A party ~~*Registered Participant*~~ proposing to modify a *system strength remediation scheme* must submit its proposal for modification to the *Network Service Provider* for evaluation by the *Network Service Provider* and *AEMO* under this clause. Once agreed or determined, the modified scheme must be incorporated as an amendment to the *connection agreement* and notified to *AEMO* under clause 5.3.7(g).

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

5.3.4C Information about system strength connection points

(a) A *Network Service Provider* for a *system strength connection point* who is not also the *System Strength Service Provider* for the *system strength connection point* must notify the information in paragraph (b) to the relevant

System Strength Service Provider within 10 *business days* of either of the following occurring:

(1) an election being made under clause 5.3.4B(b1) for the *system strength charge* to be payable in relation to a new *connection* or proposed alteration; or

(2) agreement being reached under clause 5.3.9 or clause 5.3.12 to vary the performance of *plant* at a *system strength connection point*, relative to the technical requirements in clause S5.2.5.15, clause S5.3.11 or clause S5.3a.7 (as applicable).

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b) The *Network Service Provider* must notify:

(1) the *system strength locational factor*;

(2) its calculation of the indicative *system strength quantity*;

(3) the expected date from which the *system strength charge* for the *connection* will commence or the amendment take effect; and

(4) information reasonably required by the *System Strength Service Provider* to identify the relevant *connection*.

(b1) A *Network Service Provider* for a *system strength connection point* who is not also the *System Strength Service Provider* for the *system strength connection point* must notify to the relevant *System Strength Service Provider*, within 20 *business days* of execution of the *connection agreement* for the *connection point*, the *short circuit ratio* and ~~*rated active power*, rated~~ *active power capability, power transfer capability* or *maximum demand* for the *system strength connection point* agreed in accordance with clause S5.2.5.15, clause S5.3.11 or clause S5.3a.7 (as applicable).

(c) A *Network Service Provider* for a *system strength connection point* must, within 20 *business days* of a request of the relevant *System Strength Service Provider*:

(1) calculate in accordance with the *system strength impact assessment guidelines* and notify to the *System Strength Service Provider*, the *system strength locational factor* applicable to the *system strength connection point* for each year of the *system strength charging period* specified by the *System Strength Service Provider*; and

(2) provide any other information reasonably required by the *System Strength Service Provider* for the purposes of calculating and billing *system strength charges* for the *system strength connection point*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) A *System Strength Service Provider* must establish and maintain arrangements to enable other *Network Service Providers* to provide information to the *System Strength Service Provider* in accordance with this clause 5.3.4C.

(e) A *System Strength Service Provider* must establish and maintain a record of all *connections* subject to the *system strength charge* and for which it is the *System Strength Service Provider* and must include in the record all information reasonably required by the *System Strength Service Provider* to identify the relevant *connection* for the purposes of calculating and billing *system strength charges.*

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

5.3.6 Offer to connect

(a) Subject to paragraph (a3), a *Network Service Provider* processing an *application to connect* must make an offer to *connect* the *Connection Applicant's facilities* to the *network* within the following timeframes:

(1) where the *application to connect* was made under clause 5.3.4(a), the timeframe specified in the *preliminary program*, subject to clause 5.3.3(b)(6); and

(2) where the *application to connect* was made under clause 5.3A.9(b), a period of time no longer than 4 months from the date of receipt of the *application to connect* and any additional information requested under clause 5.3A.9(d), unless agreed otherwise.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(a1) The *Network Service Provider* may amend the time period referred to in paragraph (a)(1) to allow for any additional time taken in excess of the period allowed in the *preliminary program* for the negotiation of *negotiated access standards* in accordance with clause 5.3.4A or a *system strength remediation scheme* in accordance with clause 5.3.4B or any time taken by *AEMO* to respond under clause 5.3.4B(j) in excess of 20 *business days*.

(a2) In relation to the timeframes fixed in paragraph (a)(2), for the purposes of calculating elapsed time, the following periods shall be disregarded:

(1) the period that commences on the day when a dispute is initiated under clause 8.2.4(a) and ends of the day on which the dispute is withdrawn or is resolved in accordance with clauses 8.2.6D or 8.2.9(a);

(2) any time taken to resolve a *distribution services access dispute*; and

(3) any time taken by *AEMO* to respond under clause 5.3.4B(j) in excess of 20 *business days*.

(a3) In relation to a *Connection Applicant's application to connect* made under clause 5.3.4(a) for *connection* to a part of a *network* that is a *designated*

network asset, the *Network Service Provider* must not make an offer to *connect* under paragraph (a), unless the owner of the *designated network asset* has given notice to the *Network Service Provider*:

(1) confirming access to *DNA services* in respect of that the *designated network asset* has been agreed with the *Connection Applicant* in accordance with the relevant *access policy*; and

(2) providing any details on technical requirements or limitations agreed as part of the *DNA services* that are relevant to the offer to *connect*.

(b) In relation to an *application to connect* made under clause 5.3.4(a), the offer to *connect* must contain the proposed terms and conditions for *connection* to the *network* including:

(1) for each technical requirement identified by the *Network Service Provider* under clause 5.3.3(b1), the *automatic access standard* or the *negotiated access standard* as determined in accordance with clauses 5.3.4 and 5.3.4A; and

(2) the terms and conditions of the kind set out in Part A and (where applicable) Part B of schedule 5.6,

and must be capable of acceptance by the *Connection Applicant* so as to constitute a *connection agreement* and (where applicable) a *network operating agreement*.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b1) The proposed terms and conditions detailed in the offer to *connect* must be no lower than the applicable *minimum access standards*.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b2) An offer to *connect* made under paragraph (a)(2), must be accompanied by:

(1) so far as is relevant, and in relation to services the *Distribution Network Service Provider* intends to provide, an itemised statement of *connection* costs including:

(i) *connection service* charges;

(ii) costs associated with metering requirements contained in the offer to *connect*;

(iii) costs of *network extension*;

(iv) details of *augmentation* required to provide the *connection* and associated costs;

(v) details of the interface equipment required to provide the *connection* and associated costs;

(vi) details of any ongoing operation and maintenance costs and charges by the *Distribution Network Service Provider*; and

(vii) other incidental costs and their basis of calculation;

(2) if any item in the statement of costs in subparagraph (1) differs substantially from the estimate provided under clause S5.4B(h), an explanation of the differences;

(3) a *connection agreement* capable of execution by the *Connection Applicant*, which must contain the proposed terms and conditions for *connection* to the *distribution network* (of the kind set out in Part A of schedule 5.6) including, for each technical requirement identified by the *Distribution Network Service Provider* in the *detailed response* provided under clause 5.3A.8(c), the *automatic access standard* or the negotiated access standard as determined in accordance with clause 5.3.4A; and

(4) an explanation:

(i) of how the offer to *connect* can be accepted; and

(ii) that the offer to *connect* remains open for 20 *business days*, unless otherwise agreed.

(b3) An offer to *connect* made under paragraph (a)(2) must remain open for acceptance for 20 *business days* from the date it is made and, if not accepted within that period, lapses unless the *Connection Applicant* has sought an extension of the period of time from the *Distribution Network Service Provider*. The *Distribution Network Service Provider* may not unreasonably withhold consent to the extension.

(b4) An offer to *connect* by a *Primary Transmission Network Service Provider* made under paragraph (a)(1) must include:

(1) the *Primary Transmission Network Service Provider's* requirements in relation to the matters proposed in clause 5.3.4(b)(3) and (b)(4); and

(2) the costs of the services proposed to be provided by the *Primary Transmission Network Service Provider* separated between *negotiated transmission services* and *non-regulated transmission services* (if applicable).

(b5) A *Connection Applicant* may seek amendments to the offer to *connect* provided that the *Connection Applicant* agrees to changes to the *preliminary program* to reflect the additional time required to agree the amendments.

(c) The offer to *connect* must be fair and reasonable and must be consistent with the safe and *reliable* operation of the *power system* in accordance with the *Rules*. Without limitation, unless the parties otherwise agree, to be fair and reasonable an offer to *connect* must offer *connection* and *network services* consistent with schedule 5.1 and (as applicable) schedules 5.2, 5.3 and 5.3a and must not impose conditions on the *Connection Applicant* which are more onerous than those contemplated in schedules 5.1, 5.2, 5.3 or 5.3a.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c1) **[Deleted]**

(d) The *Network Service Provider* must use its reasonable endeavours to provide the *Connection Applicant* with an offer to *connect* in accordance with the reasonable requirements of the *Connection Applicant*, including without limitation, the location of the proposed *connection point* and the level and standard of *power transfer capability* that the *network* will provide.

(e) An offer to *connect* may contain options for *connection* to a *network* at more than one point in a *network* and/or at different levels of service and with different terms and conditions applicable to each *connection point* according to the different characteristics of *supply* at each *connection point*.

(f) Both the *Network Service Provider* and the *Connection Applicant* are entitled to negotiate with each other in respect of the provision of *connection* and any other matters relevant to the provision of *connection* and, if negotiations occur, the *Network Service Provider* and the *Connection Applicant* must conduct such negotiations in good faith.

(g) An offer to *connect* must define the basis for determining *transmission service* charges in accordance with Chapter 6A, including the prudential requirements set out in that Chapter.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(h) An offer to *connect* must define the basis for determining *distribution service* charges in accordance with Chapter 6, including the prudential requirements set out in Part K of Chapter 6.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(i) [**Deleted**]

(j) An offer to *connect* in respect of a *distribution network* made to a *Connection Applicant* specified in rule 5.3AA(a)(2)~~*Distribution Connected Resource Provider* or a *Market Network Service Provider*,~~ must conform with the relevant access arrangements set out in rule 5.3AA.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(k) [**Deleted**]

5.3.7 Finalisation of connection agreements and network operating agreements

(a) If a *Connection Applicant* wishes to accept an offer to *connect*, the *Connection Applicant* must negotiate and enter into:

(1) a *connection agreement* with each relevant *Network Service Provider* identified in accordance with clauses 5.3.3(b)(3) and (4) or clauses S5.4A(d) and (e); and

(2) if applicable, a *network operating agreement* with the *Primary Transmission Network Service Provider*,

and in doing so must use its reasonable endeavours to negotiate in good faith with all parties with which the *Connection Applicant* must negotiate such a *connection agreement* and (if applicable) *network operating agreement*.

(b) The *connection agreement* must include proposed *performance standards* with respect to each of the technical requirements identified in schedules 5.2, 5.3 and 5.3a and each proposed *performance standard* must have been established in accordance with the relevant technical requirement.

(c) The proposed *performance standards* must be based on the *automatic access standard* or, if the procedures in clause 5.3.4A have been followed, the *negotiated access standard*.

(d) The provision of *connection* by any *Network Service Provider* may be made subject to gaining environmental and planning approvals for any necessary *augmentation* or *extension* works to a *network* or any *system strength connection works*.

(e) Where permitted by the applicable law in the relevant *participating jurisdiction*, the *connection agreement* may assign responsibility to the *Connection Applicant* for obtaining the approvals referred to in paragraph (d) as part of the project proposal and the *Network Service Provider* must provide all reasonable information and may provide reasonable assistance for a reasonable fee to enable preparation of applications for such approvals.

(f) Subject to paragraph (e), each *connection agreement* must be based on the offer to *connect* as varied by agreement between the parties.

(f1) The parties may agree to have one *connection agreement* between a *Primary Transmission Network Service Provider*, owner of a *dedicated connection asset* or *designated network asset* and a *Transmission Network User* for a *connection*.

(f2) A *network operating agreement* must be based on the offer to *connect* as varied by agreement between the parties.

(f3) Paragraph (g) applies in respect of a *connection agreement* if:

(1) the relevant *Connection Applicant* is, or will be, a *Registered Participant* for the *plant* to be *connected*; or

(2) the *connection agreement* includes an *AEMO advisory matter*.

(g) Within 20 *business days* of execution of a ~~the~~ *connection agreement* in respect of which this paragraph (g) applies., the *Network Service Provider* responsible for the *connection point* and the ~~*Registered Participant*~~ *Connection Applicant* must jointly notify *AEMO* that a *connection agreement* has been entered into between them and forward to *AEMO* relevant technical details of the proposed *plant* and *connection*, including as applicable:

(1) details of all *performance standards* that form part of the terms and conditions of the *connection agreement*;

(2) if the *Connection Applicant* is a *Schedule 5.2* Participant, ~~*Registered Participant* is a *Generator* or *Integrated Resource Provider*,~~ the arrangements for:

(i) updating the *releasable user guide* and other information required under clause S5.2.4(b); and

(ii) informing *AEMO* when the *connection agreement* expires or is terminated;

(3) the proposed *metering installation*;

(4) arrangements to obtain physical access to the *metering installation* for the *Metering Provider* and the *Metering Data Provider* for *metering installations* type 4A, 5 and 6;

(5) the terms upon which a *Registered Participant* is to supply any *ancillary services* under the *connection agreement*; and

(6) the details of any *system strength remediation scheme* agreed, determined or modified under clause 5.3.4B.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(h) *AEMO* must, within 20 *business days* of receipt of a ~~the~~ notice under paragraph (g), advise the relevant *Network Service Provider* and the *Connection Applicant* ~~*Registered Participant*~~ of whether the proposed *metering installation* is acceptable for those *metering installations* associated with those *connection points* which are classified as *metering installation* types 1, 2, 3 and 4 as specified in schedule 7.4.

5.3.8 Provision and use of information

(a) The data and information provided under rules 5.2A, 5.3 and 5.3A is *confidential information* and must:

(1) be prepared, given and used in good faith; and

(2) not be disclosed or made available by the recipient to a third party except as set out in rule 3.7F, clause 3.13.3, this clause 5.3.8 or in accordance with rule 8.6.

(a1) The data and information provided to a *Primary Transmission Network Service Provider* in relation to its provision of non-contestable services as specified under clause 5.2A.4(a) must not be used by the *Primary Transmission Network Service Provider* for the purpose of tendering for, or negotiating, *contestable* services specified under clause 5.2A.4(a) in the *connection* process in which the data or information was given, or in future *connection* processes, without the consent of the *Connection Applicant*.

(b) The data and information to be provided under this rule 5.3 may be shared between a *Network Service Provider* and *AEMO* for the purpose of enabling:

(1) the *Network Service Provider* to advise *AEMO* of *ancillary services*~~.~~; and

(2) either party to:

(i) assess the effect of a proposed *facility* or proposed alteration to *a facility*~~*generating plant*~~ (as the case may be) on:

(A) the performance of the *power system*; or

(B) another proposed *facility* or another proposed alteration;

(ii) assess proposed *negotiated access standards*;

(iii) determine the extent of any required *augmentation* or *extension* or *system strength connection works*;

(iv) assess *system strength remediation scheme* proposals; or

(v) conduct the *capability assessment*.

(c) A *Network Service Provider* may disclose the data and information to be provided under rules 5.2A, 5.3 and 5.3A to another *Network Service Provider* if the *Network Service Provider* considers the information or data is materially relevant to that provider for *connection*.

(d) A person intending to disclose information under paragraphs (b) or (c) must first advise the relevant *Connection Applicant* of the extent of the disclosure, unless the information may be disclosed in accordance with rule 8.6.

(d1) If a *Connection Applicant* becomes aware of any material change to information contained in or relevant to a *connection* enquiry under rule 5.3 following receipt of the response from the *Network Service Provider* under clause 5.3.3, that *Connection Applicant* must promptly notify the *Network Service Provider* of that change.

(e) If a *Connection Applicant* or *Network Service Provider* becomes aware of any material change to any information contained in or relevant to an *application to connect*, it must promptly notify the other party in writing of that change.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e1) If a *Connection Applicant* becomes aware of any material change to any data or information provided to *AEMO* and the *Network Service Provider* under clause 5.3.7A, that *Connection Applicant* must promptly notify *AEMO* and the *Network Service Provider* of that change.

(f) A ~~*Registered Participant*~~ *Network Service Provider* or a *Schedule 5 Participant* must, within 5 *business days* of becoming aware that any information provided to *AEMO* in relation to a *performance standard* or other information of a kind required to be provided to *AEMO* under clause 5.3.7 is incomplete, inaccurate or out of date, ~~incorrect, advise~~ provide *AEMO* with ~~of~~ the ~~correct~~ updated information.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

5.3.9 Alteration of ~~a generating system or integrated resource system~~ schedule 5.2 plant

(a) This clause 5.3.9 applies where a *Schedule 5.2 Participant*~~:~~

~~(1) a *Generator* or *Integrated Resource Provider*~~ proposes to alter a *connected schedule 5.2 plant*~~*generating system* or a *generating system*~~ for which *performance standards* have been previously accepted by the *Network Service Provider* and *AEMO* (in relation to *AEMO advisory matters*, to the extent applicable to the *schedule 5.2 plant* under clause S5.2.1) and that alteration:

(1) ~~(i)~~ will affect the performance of the *schedule 5.2 plant*~~*generating system*~~ relative to any of the technical requirements set out in clauses S5.2.5, S5.2.6, S5.2.7 and S5.2.8; or

(2) ~~(ii)~~ will, in *AEMO's* reasonable opinion, have an *adverse system strength impact*; or

(3) ~~(iii)~~ will, in *AEMO's* reasonable opinion, adversely affect *network capability*, *power system security*, quality or reliability of *supply*, *inter-regional power transfer capability* or the use of a *network* by another *Network User*.

~~(2) an *Integrated Resource Provider* proposes to alter a *connected integrated resource system* or an *integrated resource system* for which *performance standards* have been previously accepted by the *Network Service Provider* and *AEMO* (in relation to *AEMO advisory matters*) and that alteration:~~

~~(i) will affect the performance of the *integrated resource system* relative to any of the technical requirements set out in clauses S5.2.5, S5.2.6, S5.2.7 and S5.2.8; or~~

~~(ii) will, in *AEMO's* reasonable opinion, have a *general system strength impact*; or~~

~~(iii) will, in *AEMO's* reasonable opinion, adversely affect *network capability*, *power system security*, quality or reliability of *supply*, *inter-regional power transfer capability* or the use of a *network* by another *Network User*.~~

(a1) This clause 5.3.9 does not apply in relation to any modifications made ~~to a *scheduled generating unit*, *semi-scheduled generating unit* or *scheduled bidirectional unit* by a *Scheduled Generator*, *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider*~~ in order to comply with the *Primary Frequency Response Requirements* as applicable to a *schedule 5.2 plant* ~~that unit~~.

(b) A ~~*Generator* or *Integrated Resource Provider*~~ *Schedule 5.2 Participant* to which this clause applies, must submit to the *Network Service Provider* with a copy to *AEMO*:

(1) a description of the nature of the proposed alteration and the timetable for implementation;

(2) in respect of the proposed alteration ~~to the *generating system*~~, details of the ~~*generating unit*~~ design data and ~~*generating unit*~~ setting data for *production units* or *synchronous condensers* in accordance with the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*;

Note

The AEMC proposes to recommend that this subparagraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This subparagraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(2A) **[Deleted]**~~in respect of the proposed alteration to the *integrated resource system*, details of the *bidirectional unit* and where applicable *generating unit* design data and setting data in accordance with the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*;~~

(3) in relation to each relevant technical requirement for which the proposed alteration to the equipment will affect the performance of the *schedule 5.2 plant*~~*generating system* or *integrated resource system*~~, the proposed amendments to the *plant's* existing corresponding *performance standard* for that technical requirement; and

(4) where relevant, the ~~*Generator's* or *Integrated Resource Provider's*~~ *Schedule 5.2 Participant's* ~~–~~proposed *system strength remediation scheme* or its election for the *system strength charge* to be payable in relation to the alteration.

(c) Clause 5.3.4A applies to a submission ~~by a *Generator* or *Integrated Resource Provider*~~ under subparagraph (b)(3).

(c1) Clause 5.3.4B applies to a submission ~~by a *Generator* or *Integrated Resource Provider*~~ under subparagraph (b)(4). A *Schedule 5.2 Participant* ~~A *Generator*~~

~~or Integrated Resource Provider~~ may request the *Network Service Provider* to undertake a preliminary assessment and (subject to clause 5.3.4B(a3)) calculate the *system strength locational factor* and indicative *system strength quantity* in accordance with clause 5.3.4B(a2) before making a submission under paragraph (b).

(d) Without limiting paragraph (a), a proposed alteration to the equipment specified in column 1 of the table set out below is deemed to affect the performance of the ~~*generating system or integrated resource system*~~ *schedule 5.2 plant* relative to technical requirements specified in column 2, thereby necessitating a submission under subparagraph (b)(3), unless *AEMO* and the *Network Service Provider* otherwise agree.

Column 1 (altered equipment)	Column 2 (clause)
machine windings	S5.2.5.1, S5.2.5.2, S5.2.8
power converter	S5.2.5.1, S5.2.5.2, S5.2.5.5, S5.2.5.5A, S5.2.5.12, S5.2.5.13, ~~S5.2.8,~~ 5.2.5.15, S5.2.8
reactive compensation plant	S5.2.5.1, S5.2.5.2, S5.2.5.5, S5.2.5.5A, S5.2.5.12, S5.2.5.13
excitation control system	S5.2.5.5, S5.2.5.5A, S5.2.5.7, S5.2.5.12, S5.2.5.13
~~*voltage*~~ voltage *control system*	S5.2.5.5, S5.2.5.5A, S5.2.5.7, S5.2.5.12, S5.2.5.13
governor *control system*	S5.2.5.7, S5.2.5.11, S5.2.5.14
power *control system*	S5.2.5.11, S5.2.5.14
protection system	S5.2.5.3, S5.2.5.4, S5.2.5.5, S5.2.5.5A, S5.2.5.7, S5.2.5.8, S5.2.5.9, S5.2.5.10, 5.2.5.16
auxiliary supplies	S5.2.5.1, S5.2.5.2, S5.2.7
remote control and monitoring system	S5.2.5.14, S5.2.6.1, S5.2.6.2

(e) The *Network Service Provider* may as a condition of considering a submission made under paragraph (b), require payment of a fee to meet the reasonable costs anticipated to be incurred by the *Network Service Provider*, other *Network Service Providers* and *AEMO*, in the assessment of the submission.

(f) The *Network Service Provider* must require payment of a fee under paragraph (e) if so requested by *AEMO*.

(g) On payment of the required fee referred to in paragraph (e), the *Network Service Provider* must pay such amounts as are on account of the costs anticipated to be incurred by the other *Network Service Providers* and *AEMO*, as appropriate.

(h) If the application of this clause 5.3.9 leads to a variation to any information of a kind required to be provided to *AEMO* under clause 5.3.7, ~~an existing connection agreement~~ the *Network Service Provider* and the ~~*Generator* or *integrated resource system*~~ *Schedule 5.2 Participant* must immediately jointly advise *AEMO*, including the details of any *performance standards* amended pursuant to this clause 5.3.9.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

5.3.10 Acceptance of performance standards for plant that is altered

(a) A ~~*Generator*~~ *Schedule 5.2 Participant* must not commission altered ~~*generating*~~ *schedule 5.2 plant* until the *Network Service Provider* has advised the ~~*Generator*~~ *Schedule 5.2 Participant* that the *Network Service Provider* ~~provider~~ and *AEMO* are satisfied in accordance with paragraph (b).

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(a1) **[Deleted]**~~An *Integrated Resource Provider* must not commission altered *plant* comprised in an *integrated resource system* (including *generating plant*) until the *Network Service Provider* has advised the *Integrated Resource Provider* that the provider and *AEMO* are satisfied in accordance with paragraph (b).~~

(b) In relation to altered *plant*, the *Network Service Provider* and *AEMO*~~, to the extent of *AEMO's* advisory role under clause 5.3.4A and clause 5.3.4B,~~ (in relation to *AEMO advisory matters*, to the extent applicable to the *schedule 5.2 plant* under clause S5.2.1) must be satisfied that:

(1) the *Schedule 5.2 Participant* ~~Generator or Integrated Resource Provider~~ has complied with clause 5.3.9; and

(2) each amended *performance standard* submitted by the *Schedule 5.2 Participant* ~~*Generator* or *Integrated Resource Provider*~~ either meets:

(i) the *automatic access standard* applicable to the relevant technical requirement; or

(ii) the *negotiated access standard* under clause 5.3.4A as applied in accordance with clause 5.3.9(c); and

(3) any *system strength remediation scheme* satisfies clause 5.3.4B.

(c) For the purposes of paragraph (a), *AEMO* must advise the *Network Service Provider* as to whether it is satisfied with the matters referred to paragraph (b), if applicable.

5.3.11 [Deleted]~~Notification of request to change normal voltage~~

~~(a) On receipt of a request from a *Network Service Provider* to change *normal voltage*, *AEMO* must *publish* a notice to *Registered Participants* advising:~~

~~(1) the change in *normal voltage* requested; and~~

~~(2) the *connection point* to which the request relates.~~

~~(b) Within a reasonable period after publication of the notice in paragraph (a), *AEMO* must *publish* a further notice to *Registered Participants* advising:~~

~~(1) whether the *normal voltage* at the relevant *connection point* will change; and~~

~~(2) the nature of, and reasons for, any such change.~~

5.3.12 Procedure to be followed for alterations to other connected plant

(a) This clause 5.3.12 applies where a *Schedule 5.3 Participant* ~~*Network User*~~ specified in clause S5.3.11(a) or a *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ specified in clause S5.3a.1a proposes to alter *connected plant* and that alteration will affect the performance of the *plant* relative to a technical requirement in schedule 5.3 or schedule 5.3a ~~the technical requirements in clause S5.3.11 or clause S5.3a.7~~ (as applicable) that is an *AEMO advisory matter*.

(b) A *Schedule 5.3 Participant* or *Schedule 5.3a Participant* ~~*Network User* or *Market Network Service Provider*~~ to whom this clause applies, must submit to the *Network Service Provider* with a copy to *AEMO*:

(1) a description of the nature of the alteration and the timetable for implementation;

(2) in respect of the proposed alteration to the *plant*, details of the design setting data in accordance with the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*;

(3) in relation to the technical requirements in clause S5.3.11 or clause S5.3a.7 (as applicable), the proposed amendments to the *plant's* existing corresponding *performance standard* for that technical requirement; and

(4) except where the alteration relates to *schedule 5.3a plant* that is subject to *transmission service* regulation under Chapter 6A, the ~~*Network User's* or *Market Network Service Provider's*~~ proposed *system strength remediation scheme* or ~~its~~an election for the *system strength charge* to be payable in relation to the alteration.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(c) Clause 5.3.4A applies to a submission under subparagraph (b)(3).

(d) Clause 5.3.4B applies to a submission under subparagraph (b)(4). A *Schedule 5.3 Participant* or *Schedule 5.3a Participant* ~~*Network User* or *Market Network Service Provider*~~ (as applicable) may request the *Network Service Provider* to undertake a preliminary assessment in accordance with the *system strength impact assessment guidelines* before making a submission under paragraph (b).

(e) The *Network Service Provider* may as a condition of considering a submission made under paragraph (b), require payment of a fee to meet the reasonable costs anticipated to be incurred by the *Network Service Provider*, other *Network Service Providers* and *AEMO*, in the assessment of the submission.

(f) The *Network Service Provider* must require payment of a fee under paragraph (e) if so requested by *AEMO*.

(g) On payment of the required fee referred to in paragraph (d), the *Network Service Provider* must pay such amounts as are on account of the costs anticipated to be incurred by the other *Network Service Providers* and *AEMO*, as appropriate.

(h) If the application of this clause 5.3.12 leads to a variation to any information of a kind required to be provided to *AEMO* under clause 5.3.7~~the agreed technical requirements in clause S5.3.11 or clause S5.3a.7 (as applicable) in an existing *connection agreement*~~, the *Network Service Provider* and the *Schedule 5.3 Participant* or *Schedule 5.3a Participant* ~~*Network User* or *Market Network Service Provider*~~ (as applicable) must immediately jointly advise *AEMO*, including the details of any *performance standards* amended pursuant to this clause 5.3.12.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

5.3.13 Acceptance of performance standards for other plant that is altered

(a) A *Schedule 5.3 Participant* or *Schedule 5.3a Participant* ~~*Network User* or *Market Network Service Provider*~~ to whom clause 5.3.12 applies must not commission altered *plant* until the *Network Service Provider* has advised the

Schedule 5.3 Participant or *Schedule 5.3a Participant* ~~*Network User or Market Network Service Provider*~~ (as applicable) that the provider and *AEMO* are satisfied in accordance with paragraph (b).

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b) In relation to altered *plant*, the *Network Service Provider* and *AEMO*, to the extent of *AEMO's* advisory role under clause 5.3.4A and clause 5.3.4B, must be satisfied that:

(1) the *Schedule 5.3 Participant* or *Schedule 5.3a Participant* ~~*Network User or Market Network Service Provider*~~ (as applicable) has complied with clause 5.3.12; and

(2) each amended *performance standard* submitted by the *Schedule 5.3 Participant* or *Schedule 5.3a Participant* ~~*Network User or Market Network Service Provider*~~ (as applicable) meets the relevant technical requirements of schedule 5.3 or schedule 5.3a ~~clause S5.3.11 or clause S5.3a.7~~ (as applicable); and

(3) any *system strength remediation scheme* satisfies clause 5.3.4B.

(c) For the purposes of paragraph (a), *AEMO* must advise the *Network Service Provider* as to whether it is satisfied with the matters referred to paragraph (b).

5.3A Establishing or modifying connection - distribution connected systems

5.3A.A1 Definitions

(a) [**Deleted**]

(b) For the purposes of this rule 5.3A and Schedules 5.4A and 5.4B:

detailed response means the response to a *connection* enquiry prepared under clause 5.3A.8.

establish a connection has the same meaning as in clause 5.3.1.

information pack means information relevant to the making of an *application to connect* specified in clause 5.3A.3(b).

preliminary response means the response to a *connection* enquiry prepared under clause 5.3A.7.

sub-transmission line has the same meaning as in clause 5.10.2.

zone substation has the same meaning as in clause 5.10.2.

5.3A.1 Application of rule 5.3A

(a) [**Deleted**]

(b) Where a *Connection Applicant* wishes to *connect* a *schedule 5.2 plant*, a *schedule 5.3a plant* or a *large inverter-based resource* ~~*generating system* or *an integrated resource system*~~ to a *distribution network*, this rule 5.3A applies.

(c) For the purposes of this rule 5.3A and ~~S~~schedules 5.4A and 5.4B, a *Connection Applicant* refers to a person specified in clause 5.3.1A(c).~~:~~

~~(1) a reference to a *Connection Applicant* is to a:~~

~~(i) person who intends to be a *Distribution Connected Resource Provider*;~~

~~(ii) person who has applied or intends to apply to *AEMO* for an exemption from the requirement to register as a *Generator* or *Integrated Resource Provider* in respect of a *generating system* or *integrated resource system* (and is not eligible for an automatic exemption under the *registration information resource and guidelines*);~~

~~(iii) *non-registered DER provider* who has made an election under clause 5A.A.2(c); or~~

~~(iv) a person (including a *non-registered DER provider*) who is seeking *connection* for a *large inverter based resource*,~~

~~and who makes a *connection* enquiry under clause 5.3A.5 or an *application to connect* under clause 5.3A.9 in relation to any *generating systems* or *integrated resource systems*, or any *network elements* used in the provision of a *network service*, as the case may be.~~

(2) the *Distribution Network Service Provider* is the *Distribution Network Service Provider* required under clause 5.3A.5 to process and respond to a *connection* enquiry or required under clause 5.3A.10 to prepare an offer to *connect* for the establishment or modification of a *connection* to the *distribution network* owned, controlled or operated by that *Distribution Network Service Provider* or for the provision of a *network service*.

5.3A.3 Publication of Information

(a) A *Distribution Network Service Provider* must *publish* the following in the same location on its website:

(1) an enquiry form for *connection* of a *generating system* or an *integrated resource system* to a *distribution network*;

(2) a register of completed distribution connected resource projects under rule 5.18B; and

(3) an *information pack*.

(b) An *information pack* must include:

(1) a description of the process for lodging an *application to connect* under this rule, including:

(i) the purpose of each stage of the *connection* enquiry and application processes;

(ii) the steps a *Connection Applicant* will need to follow at each stage of the *connection* enquiry and application processes;

(iii) the information that is to be included by the *Connection Applicant* with a *connection* enquiry and the information that will be made available to the *Connection Applicant* by the *Distribution Network Service Provider* at each stage of the *connection* enquiry;

(iv) the information that is to be included with an *application to connect* and the type of information that will be made available to the *Connection Applicant* by the *Distribution Network Service Provider* after lodgement of the application;

(v) the factors taken into account by the *Distribution Network Service Provider*, at each stage of the *connection* enquiry and application, when assessing an *application to connect* under this rule;

(vi) the process for negotiating *negotiated access standards* under clause 5.3.4A and any *system strength remediation scheme* under clause 5.3.4B and a summary of the factors the *Distribution Network Service Provider* takes into account when considering proposed *negotiated access standards* and *system strength remediation schemes* and where applicable, in determining the *system strength locational factor* and the indicative *system strength quantity*; and

(vii) a list of services, if any, relevant to the *connection* that are *contestable* in the relevant *participating jurisdiction*;

(2) single line diagrams of the *Distribution Network Service Provider's* preferred *connection* arrangements, and a range of other possible connection arrangements for integration of a *generating system* or an *integrated resource system*, showing the *connection point*, the point of common coupling, the *distribution connected unit(s)*, other sources of *load*, *meter(s)*, circuit breaker(s) and isolator(s);

(3) a sample schematic diagram of the *protection system* and *control system* relevant to the *connection* to the *distribution network*, showing the *protection system* and *control system*, including all relevant current circuits, relay potential circuits, alarm and monitoring circuits, back-up systems and parameters of protection and *control system* elements;

(4) worked examples of *connection service* charges, enquiry and application fees for the *connection* of a *generating system* or an *integrated resource system*, based on the preferred and possible *connection* arrangements set out in paragraph (b)(2);

(5) details of any *minimum access standards* or *plant standards* the *Distribution Network Service Provider* considers are applicable;

(6) technical requirements relevant to the processing of a *connection* enquiry or an *application to connect*, including information of the type, but not limited to:

(i) *protection systems* and protection schemes;

(ii) fault level management principles;

(iii) *reactive power capability* and *power factor* correction;

(iv) power quality and how limits are allocated;

(v) responses to *frequency* and ~~*voltage*~~ voltage disturbances;

(vi) ~~*voltage*~~ voltage control and regulation;

(vii) *remote monitoring equipment*, control and communication requirements;

(viii) earthing requirements and other relevant safety requirements;

(ix) circumstances in which *augmentation* may be required to facilitate integration of a *generating system* or an *integrated resource system* into the *network*;

(x) commissioning and testing requirements; and

(xi) circumstances in which a *system strength remediation scheme* or *system strength connection works* will be required as a condition of *connection*; and

(7) model *connection agreements* used by that *Distribution Network Service Provider*.

5.3AA Access arrangements relating to Distribution Networks

(a) In this rule 5.3AA:

(1) the *Distribution Network Service Provider* is the *Distribution Network Service Provider* required under clauses 5.3.3 or 5.3A.5 to process and respond to a *connection* enquiry or required under clauses 5.3.5 or 5.3A.10 to prepare an offer to *connect* for the establishment or modification of a *connection* to the *distribution network* owned, controlled or operated by that *Distribution Network Service Provider* or for the provision of *network service*;

(2) the references to a *Connection Applicant* are to:

(i) a *Distribution Connected Resource Provider*;

(ii) a *Schedule 5.3a Participant*~~*Market Network Service Provider*~~; or

(iii) a *non-registered DER provider* who makes an election for rule 5.3A to apply instead of Chapter 5A,

who makes a *connection* enquiry under clauses 5.3.2 or 5.3A.5 or an application to *connect* under clauses 5.3.4 or 5.3A.10 in relation to any *generating system* or *integrated resource system*,, or any *network elements* used in the provision of a *network service*, as the case may be.

(b) If requested by a *Connection Applicant*, whether as part of a *connection* enquiry, application to *connect* or the subsequent negotiation of a *connection*

agreement, the *Distribution Network Service Provider* must negotiate in good faith with the *Connection Applicant* to reach agreement in respect of the *distribution network user access* arrangements sought by the *Connection Applicant*.

(c) As a basis for negotiations under paragraph (b):

(1) the *Connection Applicant* must provide to the *Distribution Network Service Provider* such information as is reasonably requested relating to the expected operation of its *connected plant*; and ~~:~~:

~~(i) its *distribution connected units* (in case of a *Distribution Connected Resource Provider*);~~

~~(ii) its *network elements* used in the provision of *network service* (in the case of a *Market Network Service Provider*); and~~

(2) the *Distribution Network Service Provider* must provide to the *Connection Applicant* such information as is reasonably requested to allow the *Connection Applicant* to fully assess the commercial significance of the *distribution network user access* arrangements sought by the *Connection Applicant* and offered by the *Distribution Network Service Provider*.

(d) A *Connection Applicant* may seek *distribution network user access* arrangements at any level of *power transfer capability* between zero and the *active power capability*, *maximum demand* or *power transfer capability*, as applicable~~:~~.

~~(1) in the case of a *Distribution Connected Resource Provider*, the greater of the maximum output or *maximum demand* of the relevant *distribution connected units* or group of *distribution connected units*; and~~

~~(2) in the case of a *Market Network Service Provider*, the *power transfer capability* of the relevant *network elements*.~~

(e) The *Distribution Network Service Provider* must use reasonable endeavours to provide the *distribution network user access* arrangements being sought by the *Connection Applicant* subject to those arrangements being consistent with *good electricity industry practice* considering:

(1) the *distribution connection assets* to be provided by the *Distribution Network Service Provider* or otherwise at the *connection point*; and

(2) the potential *augmentations* or *extensions* required to be undertaken on all affected *transmission networks* or *distribution networks* to provide that level of *power transfer capability* over the period of the *connection agreement* taking into account the amount of *power transfer capability* provided to other *Registered Participants* under *distribution network user access* arrangements in respect of all affected *distribution networks*.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(f) The *Distribution Network Service Provider* and the *Connection Applicant* must negotiate in good faith to reach agreement as appropriate on:

(1) the *connection service* charge to be paid by the *Connection Applicant* in relation to *distribution connection assets* to be provided by the *Distribution Network Service Provider*;

(2) in the case of a *Schedule 5.3a Participant*~~*Market Network Service Provider*~~, the service level standards to which the *Schedule 5.3a Participant*~~*Market Network Service Provider*~~ requires the *Distribution Network Service Provider* to adhere in providing its services;

(3) the charge to be paid:

(i) by the *Connection Applicant* in relation to any *augmentations* or *extensions* required to be undertaken on all affected *transmission networks* and *distribution networks*; and

(ii) where the *Connection Applicant* is a *Schedule 5.3a Participant*~~*Market Network Service Provider*~~, to the *Schedule 5.3a Participant*~~*Market Network Service Provider*~~ in respect of any reduction in the long run marginal cost of *augmenting* the *distribution network* as a result of it being *connected* to the *distribution network*,

(*negotiated augmentation and extension charges*); and

(4) the following amounts:

(i) the amount to be paid by the *Connection Applicant* to the *Distribution Network Service Provider* in relation to the costs reasonably incurred by the *Distribution Network Service Provider* in providing *distribution network user access*;

(ii) where the *Connection Applicant* is a *Distribution Connected Resource Provider*:

(A) the compensation to be provided by the *Distribution Network Service Provider* to the *Distribution Connected Resource Provider* in the event that the *distribution connected units* or group of *distribution connected units* of the *Distribution Connected Resource Provider* are *constrained off* or *constrained on* during a *trading interval*; and

(B) the compensation to be provided by the *Distribution Connected Resource Provider* to the *Distribution Network Service Provider* in the event that dispatch of the *Distribution Connected Resource Provider's distribution connected units* or group of *distribution connected units* causes another *Generator's* or *Integrated Resource Provider's production units* or group of *production units* to be *constrained* off or *constrained* on during a *trading interval*; and

(iii) where the *Connection Applicant* is a *Market Network Service Provider*:

(A) the compensation to be provided by the *Distribution Network Service Provider* to the *Market Network Service Provider* in the event that the *distribution network user access* is not provided; and

(B) the compensation to be provided by the *Market Network Service Provider* to the *Distribution Network Service Provider* in the event that dispatch of the relevant *market network service* causes a *Generator's* or *Integrated Resource Provider's production units* or group of *production units* to be *constrained off* or *constrained on* during a *trading interval* or causes the *dispatch* of another *market network service* to be *constrained*.

(g) The maximum *negotiated augmentation and extension charges* applied by a *Distribution Network Service Provider* must be in accordance with the applicable requirements of Chapter 6 and the *Negotiated Distribution Service Criteria* applicable to the *Distribution Network Service Provider*.

(h) A *Distribution Network Service Provider* must pass through to a *Connection Applicant* the amount calculated in accordance with paragraph (i) for the locational component of *prescribed TUOS services* that would have been payable by the *Distribution Network Service Provider* to a *Transmission Network Service Provider* had the *Connection Applicant* not been *connected* to its *distribution network*.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(i) To calculate the amount to be passed through to a *Connection Applicant* in accordance with paragraph (h), a *Distribution Network Service Provider* must, if prices for the locational component of *prescribed TUOS services* were in force at the relevant *transmission network connection point* throughout the relevant *financial year*:

(1) determine the charges for the locational component of *prescribed TUOS services* that would have been payable by the *Distribution Network Service Provider* for the relevant *financial year*:

(i) where the *Connection Applicant* is a *Distribution Connected Resource Provider*, if that *Distribution Connected Resource Provider* had not injected any *energy* at its *connection point* during that *financial year*;

(ii) where the *Connection Applicant* is a *Market Network Service Provider*, if the *Market Network Service Provider* had not been *connected* to the *Distribution Network Service Provider's distribution network* during that *financial year*; and

(2) determine the amount by which the charges calculated in subparagraph (1) exceed the amount for the locational component of *prescribed TUOS services* actually payable by the *Distribution Network Service Provider*, which amount will be the relevant amount for the purposes of paragraph (h).

(j) Where prices for the locational component of *prescribed TUOS services* were not in force at the relevant *distribution network connection point* throughout the relevant *financial year*, as referred to in paragraph (i), the *Distribution Network Service Provider* must apply an equivalent procedure to that referred to in paragraph (i) in relation to that component of its *TUOS service* charges which is deemed by the relevant *Transmission Network Service Provider* to represent the marginal cost of *transmission*, less an allowance for locational signals present in the *spot market*, to determine the relevant amount for the purposes of paragraph (h).

Part C Post-Connection Agreement matters

5.7 Inspection and Testing

5.7.2 Right of testing

(a) A *Registered Participant*, who has reasonable grounds to believe that equipment owned or operated by a *Registered Participant* with whom it has a *connection agreement* (which equipment is associated with the *connection agreement*) may not comply with the *Rules* or the *connection agreement*, may request testing or assessment of the relevant equipment by giving notice in writing to the other *Registered Participant*.

(b) If a notice is given under clause 5.7.2(a) any test that requires, or may cause, an *outage* or change to normal operation of any *power system* equipment ~~the relevant test~~ is to be conducted at a time agreed by *AEMO*.

(c) The *Registered Participant* who receives a notice under clause 5.7.2(a) must co-operate in relation to conducting tests or assessments requested under clause 5.7.2(a).

(d) The cost of tests or assessments requested under clause 5.7.2(a) must be borne by the *Registered Participant* requesting them ~~test~~, unless the equipment is determined by the tests not to comply with the *Rules* or the relevant *connection agreement* ~~and the *Rules*~~, in which case all reasonable costs of such tests or assessments must be borne by the owner of that equipment.

(e) Tests or assessments conducted in respect of a *connection point* under clause 5.7.2 must be conducted using ~~test~~ procedures agreed between the relevant *Registered Participants*, which agreement is not to be unreasonably withheld or delayed.

(f) Tests or assessments under clause 5.7.2 must be conducted only by persons with the relevant skills and experience.

(g) A *Transmission Network Service Provider* must give *AEMO* adequate prior notice of intention to conduct a test in respect of a *connection point* to that *Network Service Provider's network*.

(h) The *Registered Participant* who requests a test under this clause 5.7.2 may appoint a *representative* to witness a test and the other~~relevant~~ *Registered Participant* must permit that appointed~~a~~ *representative* ~~appointed under this clause 5.7.2(h)~~ to be present while the test is being conducted.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(i) A *Registered Participant* who conducts a test or assessment under this clause 5.7.2 must submit a report to the *Registered Participant* who requested the relevant test, *AEMO* (where paragraph (b) applied) and to any other *Registered Participant* which is likely to be materially affected by the results of the test, within a reasonable period after the completion of the test and the report is to outline relevant details of the tests conducted, including but not limited to the results of those tests.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(j) A *Network Service Provider* may attach test equipment or *monitoring equipment* to *plant* owned by a *Registered Participant* or require a *Registered Participant* to attach such test equipment or *monitoring equipment*, subject to the provisions of clause 5.7.1 regarding entry and inspection.

(k) In carrying out monitoring under clause 5.7.2(j) the *Network Service Provider* must not cause the performance of the monitored *plant* to be *constrained* in any way.

5.7.3 Tests to demonstrate compliance with connection requirements for Generators and Integrated Resource Providers

(a) Each *Generator* must, in accordance with the time frames specified in rule 4.15, provide evidence to any relevant *Network Service Provider* with which that *Generator* has a *connection agreement* and to *AEMO*, that its *generating system* complies with:

(1) the applicable technical requirements of clause S5.2.5; and

(2) the relevant *connection agreement* including the *performance standards*.

Note

This paragraph is classified as a tier 3 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(a1) Each *Integrated Resource Provider* must, in accordance with the time frames specified in rule 4.15, provide evidence to any relevant *Network Service Provider* with which that *Integrated Resource Provider* has a *connection*

agreement and to *AEMO*, that its *generating system* or *integrated resource system* (as applicable) complies with:

(1) the applicable technical requirements of clause S5.2.5; and

(2) the relevant *connection agreement* including the *performance standards*.

(b) **[Deleted]**

(c) If a test required by paragraph (a) or (a1) demonstrates that a *generating system* or *integrated resource system* is not complying with one or more technical requirements of clause S5.2.5 or the relevant *connection agreement* or one or more of the *performance standards* then the *Generator* or *Integrated Resource Provider* must:

(1) promptly notify the relevant *Network Service Provider* and *AEMO* of that fact; and

(2) promptly notify the *Network Service Provider* and *AEMO* of the remedial steps it proposes to take and the timetable for such remedial work; and

(3) diligently undertake such remedial work and report at monthly intervals to the *Network Service Provider* on progress in implementing the remedial action; and

(4) conduct further tests or monitoring on completion of the remedial work to confirm compliance with the relevant technical requirements or *performance standards* (as the case may be).

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) If *AEMO* reasonably believes that a *generating system* or *integrated resource system* is not complying with one or more applicable *performance standards* or one or more applicable technical requirements of clause S5.2.5 or the relevant *connection agreement*, *AEMO* may instruct the *Generator* or *Integrated Resource Provider* to conduct tests within 25 *business days* to demonstrate that the relevant *generating system* or *integrated resource system* complies with those *performance standards* or technical requirements.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e) If the tests undertaken in accordance with paragraph (d) provide evidence that the *generating system* or *integrated resource system* continues to comply with those requirements *AEMO* must reimburse the *Generator* or *Integrated Resource Provider* for the reasonable expenses incurred as a direct result of conducting the tests.

(f) If *AEMO*:

(1) is satisfied that:

(i) a *generating system* or *integrated resource system* is not complying with the relevant *performance standards* for that system in respect of one or more of the technical requirements contained in S5.2.5, S5.2.6, S5.2.7 or S5.2.8 and the relevant *connection agreement*; or

(ii) a *generating system's* or *integrated resource system's* performance is not adequately represented by the applicable analytical model provided under clause 5.7.6(h) or clause S5.2.4; and

(2) holds the reasonable opinion that the performance of the *plant*~~*generating system or integrated resource system*~~, or inadequacy of the applicable analytical model, ~~of the *generating system or integrated resource system*~~ is impeding or will impede *AEMO's* ability to carry out its role in relation to *power system security*,

AEMO may:

(3) (in the case of a *generating system*) direct the relevant *Generator* or *Integrated Resource Provider* to operate the *generating system* at a particular *generated* output or in a particular mode; or

(4) (in the case of an *integrated resource system*) direct the relevant *Integrated Resource Provider* to operate the *integrated resource system* at a particular level of *active power*, or a particular pattern or profile of *active power*, or in a particular mode,

until the relevant *Generator* or *Integrated Resource Provider* submits evidence reasonably satisfactory to *AEMO* that the *generating system* or *integrated resource system* is complying with the relevant *performance standard* and performing substantially in accordance with the applicable analytical model.

(g) Each *Generator* and *Integrated Resource Provider* must maintain records for 7 years for each of its *generating systems*, *integrated resource systems* and *power stations* setting out details of the results of all technical performance and monitoring conducted under this clause 5.7.3 and make these records available to *AEMO* on request.

5.7.3A Tests to demonstrate compliance with system strength remediation schemes

(a) Each *Registered Participant* required under a *connection agreement* to implement a *system strength remediation scheme* by means of *facilities* owned, operated or controlled by the *Registered Participant* must at the request of *AEMO* or the relevant *Network Service Provider* made not more than once in a calendar year provide evidence that those *facilities* satisfy the requirements of the *system strength remediation scheme* set out in the *connection agreement*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b) If at any time the *facilities* do not satisfy the requirements of the *system strength remediation scheme* set out in the *connection agreement*, the *Registered Participant* must:

(1) promptly notify the relevant *Network Service Provider* and *AEMO* of that fact;

(2) promptly notify the *Network Service Provider* and *AEMO* of the remedial steps it proposes to take and the timetable for such remedial work;

(3) diligently undertake such remedial work and report at monthly intervals to the *Network Service Provider* on progress in implementing the remedial action; and

(4) conduct further tests or monitoring on completion of the remedial work to confirm compliance with the requirements of the *system strength remediation scheme*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c) If *AEMO* reasonably believes the requirements of a *system strength remediation scheme* are not being complied with, *AEMO* may instruct the *Registered Participant* to conduct tests within 25 *business days* to demonstrate that the requirements are being met.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) If the tests undertaken in accordance with paragraph (c) provide evidence that the requirements of a *system strength remediation scheme* are being complied with, *AEMO* must reimburse the *Registered Participant* for the reasonable expenses incurred as a direct result of conducting the tests.

(e) If *AEMO*:

(1) is satisfied that the requirements of a *system strength remediation scheme* are not being complied with; and

(2) holds the reasonable opinion that the failure is impeding or will impede *AEMO's* ability to carry out its role in relation to *power system security*,

AEMO may direct the relevant *Registered Participant* to operate its *facility* at a particular output or *power transfer capability* or in a particular mode until the relevant *Registered Participant* submits evidence reasonably satisfactory to *AEMO* that the requirements of the *system strength remediation scheme* are being complied with.

(f) Each *Registered Participant* referred to in paragraph (a) must maintain records for 7 years for each of its relevant *facilities* setting out details of the results of monitoring and testing conducted under this clause 5.7.3A and make these records available to *AEMO* on request.

5.7.4 Routine testing of protection equipment

(a) A *Registered Participant* must co-operate with any relevant *Network Service Provider* to test the operation of equipment forming part of a *protection system* relating to a *connection point* at which that *Registered Participant* is *connected* to a *network* and the *Registered Participant* must conduct these tests:

(1) prior to the *plant* at the relevant *connection point* being placed in service; and

(2) at intervals specified in the *connection agreement* or in accordance with an asset management plan agreed between the *Network Service Provider* and the *Registered Participant*.

(a1) A *Network Service Provider* must institute and maintain a compliance program to ensure that its *facilities* of the following types, to the extent that the proper operation of a *facility* listed in this clause may affect *power system security*, operate reliably and in accordance with their performance requirements under schedule 5.1:

(1) *protection systems*;

(2) *control systems* for maintaining or enhancing *power system* stability;

(3) *control systems* for controlling ~~*voltage*~~ voltage or *reactive power*; and

(4) *control systems* for *load shedding*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(a2) A compliance program under clause 5.7.4(a1) must:

(1) include monitoring of the performance of the *facilities*;

(2) to the extent reasonably necessary, include provision for periodic testing of the performance of those *facilities* upon which *power system security* depends;

(3) provide reasonable assurance of ongoing compliance of the *facilities* with the relevant performance requirements of schedule 5.1; and

(4) be in accordance with *good electricity industry practice*.

(a3) A *Network Service Provider* must immediately notify *AEMO* if it reasonably believes that a *facility* of a type listed in clause 5.7.4(a1) does not comply with, or is likely not to comply with, its performance requirements.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(a4) A notice issued under clause 5.7.4(a3) must:

(1) identify the *facility* and the requirement with which the *facility* does not comply;

(2) give an explanation of the reason why the *facility* failed to comply with its performance requirement;

(3) give the date and time when the *facility* failed to comply with its performance requirement;

(4) give the date and time when the *facility* is expected to again comply with its performance requirement; and

(5) describe the expected impact of the failure on the performance of the *Network Service Provider's transmission system* or *distribution system*.

(b) Each *Registered Participant* must bear its own costs of conducting tests under this clause 5.7.4.

Part D Network Planning and Expansion

5.13 Distribution annual planning process

5.13.1 Distribution annual planning review

Scope

(a) A *Distribution Network Service Provider* must:

(1) subject to paragraph (b), determine an appropriate *forward planning period* for its *distribution assets*; and

(2) analyse the expected future operation of its *network* over the *forward planning period* in accordance with this clause 5.13.1.

Note

This subparagraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b) The minimum *forward planning period* for the purposes of the *distribution* annual planning review is 5 years.

(c) The *distribution* annual planning review must include all assets that would be expected to have a material impact on the *Distribution Network Service Provider's network* over the *forward planning period*.

Requirements

(d) Each *Distribution Network Service Provider* must, in respect of its *network*:

(1) prepare forecasts covering the *forward planning period* of *maximum demands* for:

(i) *sub-transmission lines*;

(ii) *zone substations*; and

(iii) to the extent practicable, *primary distribution feeders*,

having regard to:

(iv) the number of customer *connections*;

(v) *energy* consumption; and

(vi) estimated total output of known *distribution connected units*;

(2) identify, based on the outcomes of the forecasts in subparagraph (1) and paragraph (d1), limitations on its *network*, including limitations caused by one or more of the following factors:

(i) forecast *load* or forecast use of *distribution services* by *distribution connected units* exceeding total capacity;

(ii) the requirement for asset refurbishment or replacement;

(iii) the requirement for *power system security* or *reliability* improvement;

(iv) design fault levels being exceeded;

(v) the requirement for ~~*voltage*~~ voltage regulation and other aspects of quality of supply to other *Network Users*; and

(vi) the requirement to meet any *regulatory obligation or requirement*;

(3) identify whether corrective action is required to address any system limitations identified in subparagraph (2) and, if so, identify whether the *Distribution Network Service Provider* is required to:

(i) carry out the requirements of the *regulatory investment test for distribution*;

(ii) carry out industry engagement obligations as required under paragraph (f); and

(4) take into account any *jurisdictional electricity legislation*;

(5) take into account the most recent *general power system risk review*; and

(6) consider the operation of, and any known or potential interactions between:

(i) any *emergency frequency control schemes* or emergency controls in place under clause S5.1.8, on its *network*; and

(ii) *protection systems* or *control systems* of *plant connected* to its *network* (including consideration of whether the settings of those systems are fit for purpose for the future operation of its *network*),

where the *Distribution Network Service Provider* expects that such operation or interactions would be likely to lead to *cascading outages* or *major supply disruptions*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(d1) Each *Distribution Network Service Provider* must, in respect of its *network*, prepare forecasts covering the *forward planning period* of demand for *distribution services* by *distribution connected units* at:

(1) *sub-transmission lines*;

(2) *zone substations*; and

(3) to the extent practicable, *primary distribution feeders*,

having regard to:

(4) the number of customer *connections*;

(5) *energy* consumption; and

(6) estimated total output of known *distribution connected units*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

Industry engagement obligations

(e) Each *Distribution Network Service Provider* must develop a strategy for:

(1) engaging with *non-network providers*;

(2) considering *non-network options*; and

(3) in relation to a *SAPS enabled network*, considering *SAPS options*.

(f) A *Distribution Network Service Provider* must engage with *non-network providers* and consider *non-network options* and *SAPS options* for addressing system limitations in accordance with its *industry engagement strategy*.

(g) A *Distribution Network Service Provider* must develop and *publish* an *industry engagement document* setting out its *industry engagement strategy*.

(h) A *Distribution Network Service Provider* must include the information specified in schedule 5.9 in its *industry engagement document*.

(i) A *Distribution Network Service Provider* must review and *publish* a revised *industry engagement document* at least once every three years.

(j) A *Distribution Network Service Provider* must establish and maintain a facility by which parties can register their interest in being notified of developments relating to *distribution network* planning and expansion. A *Distribution Network Service Provider* must have in place a facility under this paragraph (j) no later than the date of publication of the *Distribution Network Service Provider's industry engagement document* under paragraph (g).

5.18B Completed distribution connected resource projects

5.18B.2 Register of completed distribution connection resource projects

(a) In relation to completed distribution connected resource projects, a *Distribution Network Service Provider* must establish and *publish*, on its website, a register of the *plant*, including but not limited to:

(1) technology of each *distribution connected unit* comprised in the project (e.g. *synchronous generating unit*, induction generator, photovoltaic array, etc) and its make and model;

(2) maximum power *generation* capacity of all *distribution connected units* comprised in the system;

(3) contribution to fault levels;

(4) the size and rating of the relevant *transformer*;

(5) a single line diagram of the *connection* arrangement;

(6) *protection systems* and communication systems;

(7) ~~*voltage*~~ voltage control and *reactive power capability*; and

(8) details specific to the location of a *facility connected* to the *network* that are relevant to any of the details in subparagraphs (1)-(7).

(b) Subject to satisfying any relevant exemptions contained in clause 8.6.2, the *Distribution Network Service Provider* must not *publish confidential information* as part of, or in connection with, the register.

(c) The *Distribution Network Service Provider* must:

(1) include in the register the details contained in paragraph (b) for all completed distribution connected resource projects projects within the 5 year period preceding the establishment of the register; and

(2) update the register by the *DAPR date* each year thereafter with details of all completed distribution connected resource projects in the 5 year period preceding the *DAPR date*.

5.20 System security reports

5.20.4 Inertia requirements methodology

(a) *AEMO* must develop and publish the *inertia requirements methodology* in accordance with the *Rules consultation procedures*.

(b) *AEMO* may amend the *inertia requirements methodology*.

(c) *AEMO* must comply with the *Rules consultation procedures* when making or amending the *inertia requirements methodology*.

(d) *AEMO* may make minor and administrative amendments to the *inertia requirements methodology* without complying with the *Rules consultation procedures*.

(d1) The *inertia requirements methodology* must provide for *AEMO* to take the following matters into account in determining the *system-wide inertia level*:

(1) the rate of change of *frequency* limit for the mainland following a *credible contingency event*, as specified in the *frequency operating standard*; and

(2) any other matters as *AEMO* considers appropriate.

(d2) The *inertia requirements methodology* must describe how *AEMO* determines the likelihood of a *sub-network islanding risk*.

(e) The *inertia requirements methodology* determined by *AEMO* must provide for *AEMO* to take the following matters into account in determining the *secure inertia level*:

(1) the capabilities and expected response times provided ~~by *generating units* providing *market ancillary services*~~ *ancillary service units* (other than the *regulating raise service* or *regulating lower service*) in the *inertia sub-network*;

(2) the maximum *load shedding* or *generation shedding* expected to occur on the occurrence of any *credible contingency event* affecting the *inertia sub-network* when the *inertia sub-network* is *islanded*;

(3) additional *inertia* needed to account for the possibility of a reduction in *inertia* if the *contingency event* that occurs is the loss or unavailability of ~~*a synchronous*~~ *production* ~~*generating*~~ *unit, synchronous condenser or any other facility* or service that is material in determining *inertia requirements*;

(4) any *constraints* that could reasonably be applied to the *inertia sub-network* when *islanded* to achieve a *secure operating state* and any *unserved energy* that might result from the *constraints*; and

(5) any other matters as *AEMO* considers appropriate.

(f) The *inertia requirements methodology* must include a specification (***inertia network service specification***), which contains:

(1) a detailed description of each kind of *inertia network service*;

(2) the performance parameters and requirements which must be satisfied in order for a service to qualify as the relevant *inertia network service* and also when an *Inertia Service Provider* provides the relevant kind of *inertia network service*; and

(3) the process and requirements for *AEMO* to approve equipment under paragraph (g).

(g) For the purposes of paragraph (f), *AEMO* may, at the request of an *Inertia Service Provider*, approve equipment by means of which *inertia network services* are to be made available by, or to, the *Inertia Service Provider* where the equipment:

(1) is not a *synchronous production unit* or a *synchronous condenser*; and

(2) AEMO is satisfied the *inertia network services* provided by means of the equipment will contribute to the operation of the relevant *inertia sub-network* in a *satisfactory operating state* or *secure operating state*, in accordance with the circumstances described in clause 4.4A.3(b)(2) or (3), as applicable.

(h) An *Inertia Service Provider* making a request under paragraph (g) must give *AEMO*:

(1) details of the proposed equipment by means of which an *inertia network service* will be made available;

(2) information about how the *inertia network services* provided by means of the proposed equipment will contribute to the operation of the relevant *inertia sub-network* in a *satisfactory operating state* or *secure operating state* in accordance with the circumstances described in clause 4.4A.3(b)(2) or (3), as applicable; and

(3) any other information requested by *AEMO* in connection with the request.

(i) For the purposes of approving equipment in accordance with paragraph (g), *AEMO* may:

(1) give or withhold its approval under paragraph (h) in its discretion and subject to any conditions determined by *AEMO*;

(2) approve equipment of a specific type or a generic type; and

(3) approve equipment at the request of a particular *Inertia Service Provider* and determine that its approval also applies to the same type of equipment to be made available by, or to, another *Inertia Service Provider*,

provided that *AEMO* must have regard to the *inertia network service specification* in making its decision.

5.20.6 Publication of system strength requirements methodologies

(a) *AEMO* must develop and publish the *system strength requirements methodology* in accordance with the *Rules consultation procedures*.

(b) *AEMO* may amend the *system strength requirements methodology*.

(c) *AEMO* must comply with the *Rules consultation procedures* when making or amending the *system strength requirements methodology*.

(d) *AEMO* may make minor and administrative amendments to the *system strength requirements methodology* without complying with the *Rules consultation procedures*.

(e) The *system strength requirements methodology* determined by *AEMO* must provide for *AEMO* to take the following matters into account in determining the *system strength requirements*:

(1) the combination of *three phase fault levels* at each *system strength node* in the *region* that could reasonably be considered to be sufficient for the *power system* to be in a *secure operating state*;

(2) the maximum *load shedding* or *generation shedding* expected to occur on the occurrence of any *credible contingency event* or *protected event* affecting the *region*;

(3) the stability of the *region* following any *credible contingency event* or *protected event*;

(4) the risk of *cascading outages* as a result of any *load shedding* or ~~*generating system, integrated resource system*~~ *schedule 5.2 plant* or *schedule 5.3a plant* ~~*market network service facility*~~ tripping as a result of a *credible contingency event* or *protected event* in the *region*;

(5) additional contribution to the *three phase fault level* needed to account for the possibility of a reduction in the *three phase fault level* at a *system strength node* if the *contingency event* that occurs is the loss or unavailability of a *synchronous production unit* or any other *facility* or service that is material in determining the *three phase fault level* at the *system strength node*;

(6) the stability of any equipment that is materially contributing to the *three phase fault level* or *inertia* within the *region*; and

(7) any other matters *AEMO* considers appropriate.

(f) The *system strength requirements methodology* determined by *AEMO* must:

(1) provide an overview of *system strength nodes* and the process to declare them;

(2) describe:

(i) how *AEMO* forecasts new *connections* and the information it takes into account;

(ii) how *AEMO* will determine the assumptions it will use about the size, type and operational profile of *facilities* or classes of *facilities* to be *connected* and their contribution to the matters taken into account in determining the *system strength requirements*; and

(iii) the modelling and analysis methodologies *AEMO* will use to determine *system strength nodes* and minimum *three phase fault levels* at the *system strength nodes* and the matters it will take into account;

(3) provide for *AEMO* to take the following matters into account in determining the *system strength requirements*:

(i) the *Integrated System Plan* and the *Electricity Statement of Opportunities*;

(ii) the matters in paragraphs (e)(1) to (7) for each year of the forecast period; and

(iii) any other matters *AEMO* considers appropriate; and

(4) provide a description of what is meant by stable ~~*voltage*~~ voltage waveforms for the purposes of clause S5.1.14(b)(2) (in addition to that provided in clause S5.1.14(c)) including the matters that may be taken into account by *System Strength Service Providers* to assess, for the level and type of *inverter based resources* projected by *AEMO* at *system strength nodes*, what may be required to achieve stable operation.

5.20B Inertia sub-networks and requirements

5.20B.6 Inertia network services information and approvals

(a) An *Inertia Service Provider* required to make *inertia network services* available under clause 5.20B.4(a1) or clause 5.20B.4(b) must prepare and give to *AEMO*, and keep up to date, a schedule setting out the *inertia network services* made available by the *Inertia Service Provider* for the *inertia sub-network*.

(b) Where the *Inertia Service Provider* procures *inertia network services* from a *Generator* or *Integrated Resource Provider* provided by means of a ~~*synchronous*~~ *production* ~~*generating*~~ *unit* under an *inertia services agreement*, the *Inertia Service Provider* must register the *production* ~~*generating*~~ *unit* with *AEMO* as an *inertia unit* and specify that the *production* ~~*generating*~~ *unit* may be periodically used to provide *inertia network services* and will not be eligible to set *spot prices* when *constrained on* to provide *inertia* in accordance with clause 3.9.7(c).

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b1) **[Deleted]**~~Where the *Inertia Service Provider* procures *inertia network services* from an *Integrated Resource Provider* provided by means of a *bidirectional unit* under an *inertia services agreement*, the *Inertia Service Provider* must register the *bidirectional unit* with *AEMO* as an *inertia unit* and specify that the *bidirectional unit* may be periodically used to provide *inertia network services* and will not be eligible to set *spot prices* when *constrained on* to provide *inertia* in accordance with clause 3.9.7(c).~~

(b2) An *Inertia Service Provider* must establish arrangements for each *inertia network service* it makes available to *AEMO* under the *Rules*, including under any relevant *inertia services agreement*, to ensure:

(1) that *inertia network service* is capable of being *enabled* by *AEMO* under clause 4.4A.1 on and from 2 December 2025; and

(2) that *inertia network service* is only capable of being *enabled* by *AEMO*, unless otherwise agreed by *AEMO*.

Note

Clause 4.4A.1 commences on 2 December 2025.

(c) An *Inertia Service Provider* required to make *inertia network services* available under clause 5.20B.4(a1) or clause 5.20B.4(b) must give to *AEMO* and keep up to date the following details for each *inertia network service*:

(1) a description of the *inertia network service*, including:

(i) the nature of the *inertia network service*;

(ii) the *inertia unit* or other *facilities* used to provide the *inertia network service*;

(iii) the purpose for which the *inertia network service* is being provided;

(iv) the location in the *transmission network* or *distribution network* of the *facilities* used to provide the *inertia network service*;

(v) the quantity of *inertia* to be provided when the *inertia network service* is *enabled* and;

(vi) any other information requested by *AEMO* in connection with the *inertia network service*;

(2) information about the availability of the *inertia network service*, including:

(i) the times when, and the period over which, the *inertia network service* will be available to provide *inertia*;

(ii) any possible restrictions on the availability of the *inertia network service* and

(iii) the costs to *enable* the *inertia network service*.

(d) An *Inertia Service Provider* required to make *inertia network services* available under clause 5.20B.4(a1) or clause 5.20B.4(b) must prepare and submit to *AEMO* for approval under paragraph (e) the following details for each *inertia network service*:

(1) the technical specification and performance standards for the *inertia network service*; and

(2) the arrangements necessary for *AEMO* to give instructions to *enable* or cease the provision of the *inertia network service* including:

(i) the period of any notice that has to be given to the provider of the *inertia network service* for it to be *enabled*;

(ii) the response time to any instruction for the *inertia network service* to be *enabled* or to cease being provided; and

(iii) communication protocols between it, *AEMO* and the *Registered Participants* that provide *inertia network services*.

(e) The technical specification. performance standards and arrangements necessary for *AEMO* to give the instructions referred to in paragraph (d) and any change to them must be consistent with the *Rules* and approved by *AEMO*.

(f) An *Inertia Service Provider* must ensure that *AEMO's* approval is obtained under paragraph (e) before the *inertia network service* is first made available and in the case of a change, before the change comes into effect.

Note

This clause is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(g) *AEMO* must use reasonable endeavours to respond to the *Inertia Service Provider* within 20 *business days* following the receipt of a request for approval under paragraph (e) stating whether it gives its approval.

(h) If *AEMO* does not approve the matters in a request for approval under paragraph (e):

(1) *AEMO* must tell the *Inertia Service Provider* its reasons for withholding approval and may advise the *Inertia Service Provider* of the changes *AEMO* requires to be made; and

(2) the *Inertia Service Provider* must amend its request to address the matters identified by *AEMO* and submit to *AEMO* a new request for approval.

5.20C System strength requirements

5.20C.1 Declaring system strength requirements

(a) *AEMO* may from time to time declare *system strength nodes*, being locations on the *transmission network* of a *System Strength System Provider* at which:

(1) in relation to *AEMO*, clauses 4.2.6(g) and 4.6.1(b) and rule 4.4A apply; and

(2) in relation to a *System Strength Service Provider* for a *system strength node*, clause S5.1.14 applies.

(b) *AEMO* must, by 1 December each year, determine the *system strength requirements* for each *system strength node* by applying the *system strength requirements methodology*.

(c) The *system strength requirements* to be determined for a *system strength node* are:

(1) the minimum *three phase fault level* for the *system strength node* applicable for the purposes of clauses 4.2.6(g), 4.4A.3(b)(4) and 4.6.1(b) for the following year (commencing 2 December); and

(2) *AEMO's* forecast of the following matters for each of the following ten years (commencing 2 December):

(i) the minimum *three phase fault level* applicable at the *system strength node* for the purposes of clause S5.1.14(b)(1); and

(ii) the level and type of *inverter based resources* and *schedule 5.3a plant*~~*market network service facilities*~~ projected by *AEMO* for the *system strength node* for the purposes of clause S5.1.14(b)(2).

(d) *AEMO* must publish its declaration of *system strength nodes* under paragraph (a) and the *system strength requirements* determined for each *system strength node* in the *System Strength Report*.

(e) If *AEMO* becomes aware of a material change to the *power system* likely to affect the *system strength requirements* for a *system strength node*, where the timing, occurrence or impact of the change was unforeseen, *AEMO* must as soon as reasonably practicable, revise and publish its determination of the

minimum *three phase fault level* under paragraph (c)(1) and the forecast under paragraph (c)(2) for the *system strength node.*

(f) If AEMO publishes a revision to one or more of the *system strength requirements* in accordance with paragraph (e) within three years of the commencement of the relevant year to which a *binding system strength requirement* relates, then the *System Strength Service Provider*:

(1) may make *system strength services* available to meet the revised *system strength requirement*;

(2) is not required to make *system strength services* available where the revised *system strength requirement* exceeds the *binding system strength requirement* for the relevant year.

5.20C.4 System strength services information and approvals

(a) A *System Strength Service Provider* who makes *system strength services* available for the purposes of clause S5.1.14 must prepare and give to *AEMO*, and keep up to date, a schedule setting out

the *system strength services* available to contribute to the *three phase fault level* at each *system strength node*.

(b) Where the *System Strength Service Provider* procures *system strength services* from a *Generator* or *Integrated Resource Provider* provided by means of a *production~~generating~~ unit* under a *system strength services agreement*, the *System Strength Service Provider* must register the *production~~generating~~ unit* with *AEMO* as a *system strength production unit* and specify that the *generating unit* may be periodically used to provide *system strength services* and will not be eligible to set *spot prices* when *constrained on* to provide *system strength services* in accordance with clause 3.9.7(c).

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b1) **[Deleted]**~~Where the *System Strength Service Provider* procures *system strength services* from an *Integrated Resource Provider* provided by means of a *bidirectional unit* under a *system strength services agreement*, the *System Strength Service Provider* must register the *bidirectional unit* with *AEMO* as a *system strength production unit* and specify that the *bidirectional unit* may be periodically used to provide *system strength services* and will not be eligible to set *spot prices* when *constrained on* to provide *system strength services* in accordance with clause 3.9.7(c).~~

(b2) A *System Strength Service Provider* must establish arrangements for each *system strength service* it makes available to *AEMO* under the *Rules*, including under any relevant *system strength services agreement*, to ensure:

(1) that *system strength service* is capable of being *enabled* by *AEMO* under clause 4.4A.1 on and from 2 December 2025; and

(2) that *system strength service* is only capable of being *enabled* by *AEMO*, unless otherwise agreed by *AEMO*.

Note

Clause 4.4A.1 commences on 2 December 2025.

(c) A *System Strength Service Provider* must give to *AEMO* and keep up to date the following details for each *system strength service* it makes available to *AEMO* under the *Rules*:

(1) a description of the *system strength service*, including:

(i) the nature of the *system strength service*;

(ii) the *system strength production unit* or other *facilities* used to provide the *system strength service*;

(iii) the purpose for which the *system strength service* is being provided;

(iv) the location in the *transmission network* or *distribution network* of the *facilities* used to provide the *system strength service*;

(v) the contribution to the *three phase fault level* at each relevant *system strength node* and the *facility's connection point* when the *system strength service* is *enabled*; and

(vi) any other information (including models) requested by *AEMO* to assess the contribution of the *system strength service* referred to in subparagraph (v).

(2) information about the availability of the *system strength service*, including:

(i) the times when, and the period over which, the *system strength service* will be available to contribute to the *three phase fault level* at each relevant *system strength node*;

(ii) any possible restrictions on the availability of the *system strength service*; and

(iii) costs to *enable* the *system strength service*.

(d) A *System Strength Service Provider* must prepare and submit to *AEMO*, for approval under paragraph (e), the following details for each *system strength service* it makes available to *AEMO* under the *Rules*:

(1) the technical specification and performance standards for the *system strength service*; and

(2) the arrangements necessary for *AEMO* to give instructions to *enable* or cease the provision of the *system strength service* including:

(i) the period of any notice that has to be given to the provider of the *system strength service* for it to be *enabled*;

(ii) the response time to any instruction for the *system strength service* to be *enabled* or to cease being provided; and

(iii) communication protocols between it, *AEMO* and the *Registered Participants* or other persons that provide *system strength services*.

(e) The arrangements necessary for *AEMO* to give the instructions referred to in paragraph (d) and any change to them must be consistent with the *Rules* and approved by *AEMO*.

(f) A *System Strength Service Provider* must ensure that *AEMO*'s approval is obtained under paragraph (e) before the *system strength service* is first made available and in the case of a change, before the change comes into effect.

Note

This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(g) *AEMO* must use reasonable endeavours to respond to the *System Strength Service Provider* within 20 *business days* following the receipt of a request for approval under paragraph (e) stating whether it gives its approval.

(h) If *AEMO* does not approve the matters in a request for approval under paragraph (e):

(1) *AEMO* must tell the *System Strength Service Provider* its reasons for withholding approval and may advise the *System Strength Service Provider* of the changes *AEMO* requires to be made; and

(2) the *System Strength Service Provider* must amend its request to address the matters identified by *AEMO* and submit to *AEMO* a new request for approval.

5.22 Integrated System Plan

5.22.10 Preparation of ISP

ISP requirements

(a) In preparing an *Integrated System Plan*, *AEMO* must:

(1) comply with any requirements set out in the *Cost Benefit Analysis Guidelines* under clause 5.22.5(c);

(2) comply with any requirements set out in the *Forecasting Best Practice Guidelines* under clause 5.22.5(j);

(3) adopt the inputs and assumptions, material issues and scenarios identified in the *Inputs, Assumptions and Scenarios Report*, or provide reasons where *AEMO* has used updated information;

(4) seek to deliver *power system needs*;

(5) consider the following matters:

(i) the efficient integration of ISP development opportunities;

(ii) the risks to consumers arising from uncertainty, including over investment, under-investment, premature or overdue investment;

(iii) fuel security;

(iv) *credible options* (including *non-network options*);

(v) outcomes of joint planning with *Transmission Network Service Providers* under clause 5.14.4;

(vi) relevant intra jurisdictional developments and any incremental works that may be needed to coordinate the *Integrated System Plan* with intra jurisdictional planning;

(viA) outcomes of the *general power system risk review*;

(vii) the forecast quantity of electricity that is expected to flow, and the periods in which electricity is expected to flow, and the magnitude and significance of future *network losses* on *interconnectors*, as projected in the *Integrated System Plan* over the *Integrated System Plan* planning horizon;

(viii) the projected capability of the *national transmission grid*, and the technical requirements of the *power system* (such as *frequency*, ~~*voltage*~~voltage, *inertia* and system strength) required to support the secure and reliable operation of the *national transmission grid*;

(ix) *good electricity industry practice*; and

(x) such other matters as *AEMO* considers relevant.

Relevant documents

(b) In preparing an *Integrated System Plan*, *AEMO* must have regard to the following documents:

(1) the *ISP methodology*;

(2) the *Cost Benefit Analysis Guidelines*;

(3) the *Forecasting Best Practice Guidelines*;

(4) the most recent *Transmission Annual Planning Reports*;

(5) the most recent *statement of opportunities*;

(6) the most recent gas statement of opportunities under the National Gas Law;

(7) the most recent *NSCAS Report*, *System Security Report* and *Inertia Report*;

(7A) the most recent *general power system risk review*;

(8) *ISP consumer panel* reports;

(8A) any *REZ design reports* published under clause 5.24.1(b)(1); and

(9) any other documents that *AEMO* considers relevant.

Market benefits

(c) In preparing an *Integrated System Plan*, *AEMO* must:

(1) consider the following classes of market benefits that could be delivered by the *development path*:

(i) changes in fuel consumption arising through different patterns of *generation dispatch*;

(ii) changes in voluntary *load* curtailment;

(iii) changes in involuntary *load shedding*, with the market benefit to be considered using a reasonable forecast of the value of electricity to consumers;

(iv) changes in costs for parties due to:

(A) differences in the timing of new plant;

(B) differences in capital costs; and

(C) differences in the operating and maintenance costs;

(v) differences in the timing of expenditure;

(vi) changes in *network losses*;

(vii) changes in *ancillary services* costs;

(viii) changes in Australia's greenhouse gas emissions;

(ix) competition benefits;

(x) any additional option value (where this value has not already been included in the other classes of market benefits) gained or foregone from implementing that *development path* with respect to the likely future investment needs of the *market*; and

(xi) other classes of market benefits that are:

(A) determined to be relevant by *AEMO* and agreed to by the *AER* in writing before the publication of the draft *Integrated System Plan*; or

(B) specified as a class of market benefit in the *Cost Benefit Analysis Guidelines*;

(2) include a quantification of all classes of market benefits which are determined to be material to the optimal *development path* in *AEMO's* reasonable opinion; and

(3) consider all classes of market benefits as material unless it can provide reasons why:

(i) a particular class of market benefit is likely not to materially affect the outcome of the assessment of the *development path*; or

(ii) the estimated cost of undertaking the analysis to quantify the market benefit is likely to be disproportionate given the level of uncertainty regarding future outcomes.

Costs

(d) In preparing an *Integrated System Plan*, *AEMO* must quantify the following classes of costs:

(1) costs incurred in constructing or providing the projects in the *development path*;

(2) operating and maintenance costs in respect of the projects in the *development path*;

(3) the cost of complying with laws, regulations and applicable administrative requirements in relation to the construction and operation of the projects in the *development path*; and

(4) any other class of costs that are:

(i) determined to be relevant by *AEMO* and agreed to by the *AER* in writing before the publication of the draft *Integrated System Plan*; or

(ii) specified as a class of cost in the *Cost Benefit Analysis Guidelines*.

Schedule 5.1a System standards

S5.1a.3 System stability

The *power system* should remain in synchronism and be stable:

(a) **Transient stability**: following any *credible contingency event* or *protected event*; and

(b) **Oscillatory stability**: in the absence of any *contingency event*, for any level of *inter-regional* or *intra-regional* power transfer up to the applicable operational limit; and

(c) **Voltage stability**: stable ~~*voltage*~~ voltage control must be maintained following the most severe *credible contingency event* or any *protected event*.

For the purposes of clause S5.1a.3 a *credible contingency event* includes the application of a fault (other than a three-phase fault) to any part of the *power system* and de-energisation of the faulted element within the allowable clearance time applicable to that element according to clause S5.1a.8.

The halving time of any *inter-regional* or *intra-regional* oscillation, being the time for the amplitude of an oscillation to reduce by half, should be less than 10 seconds. To allow for planning and operational uncertainties, the *power system* should be planned and operated to achieve a halving time of 5 seconds.

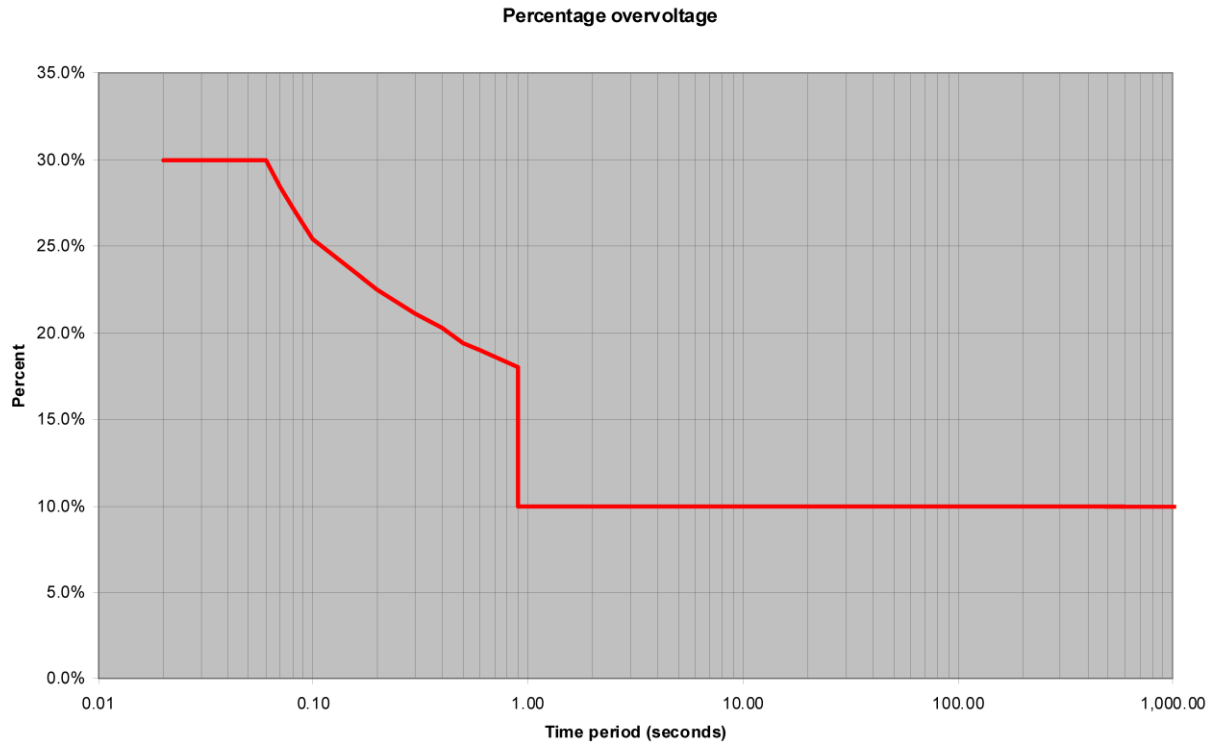
S5.1a.4 Power frequency voltage

Except as a consequence of a *contingency event*, the ~~*voltage*~~ voltage of *supply* at a *connection point* should not vary by more than 10 percent above or below its ~~normal~~ *nominal voltage*, provided that the *reactive power* flow and the *power factor* at the *connection point* is within the corresponding limits set out in the *connection agreement*.

As a consequence of a *credible contingency event*, the ~~*voltage*~~ voltage of *supply* at a *connection point* should not rise above its ~~*normal*~~ *nominal voltage* by more than a given percentage of ~~*normal*~~ *nominal voltage* for longer than the corresponding period shown in Figure S5.1a.1 for that percentage.

As a consequence of a *contingency event*, the ~~*voltage*~~ voltage of *supply* at a *connection point* could fall to zero for any period.

Figure S5.1a.1



S5.1a.5 Voltage fluctuations

The ~~*voltage*~~ voltage fluctuation level of *supply* should be less than the "compatibility levels" set out in ~~Table 1 of~~ the International Electrotechnical Commission publication IEC/TR 61000.3.7~~*Australian Standard* AS/NZS 61000.3.7:2001~~. To facilitate the application of this standard *Network Service Providers* must establish "planning levels" for their *networks* as provided for in IEC/TR 61000.3.7 ~~the *Australian Standard*~~.

The following principles apply to the use of the shared network:

(a) the sharing between *Network Users* of the capability of *connection assets* to withstand ~~*voltage*~~ voltage fluctuations is to be managed by *Network Service Providers* in accordance with the provisions of clause S5.1.5 of schedule 5.1; and

(b) to the extent practicable, the costs of managing or abating the impact of ~~*voltage*~~ voltage fluctuations in excess of the costs which would result from the application of an *automatic access standard* are to be borne by those *Network Users* whose *facilities* cause the ~~*voltage*~~ voltage fluctuations.

S5.1a.6 Voltage waveform distortion

Harmonic ~~*voltage*~~ voltage distortion level of *supply* should be less than the "compatibility levels" defined in ~~Table 1 of~~ the International Electrotechnical Commission publication IEC/TR 61000.3.6~~*Australian Standard* AS/NZS 61000.3.6:2001~~. To facilitate the application of this standard *Network Service Providers* must establish "planning levels" for their *networks* as provided for in ~~the *Australian Standard*~~ IEC/TR 61000.3.6.

The following principles apply to the use of the shared network:

(a) the sharing between *Network Users* of the capability of *connection assets* to absorb or mitigate harmonic ~~*voltage*~~ voltage distortion is to be managed by *Network Service Providers* in accordance with the provisions of clause S5.1.6 of schedule 5.1; and

(b) to the extent practicable, the costs of managing or abating the impact of harmonic distortion in excess of the costs which would result from the application of an *automatic access standard* are to be borne by those *Network Users* whose *facilities* cause the harmonic ~~*voltage*~~ voltage distortion.

S5.1a.7 Voltage unbalance

Except as a consequence of a *contingency event*, the average ~~*voltage*~~ voltage unbalance, measured at a *connection point*, should not vary by more than the amount set out in column 2 of Table S5.1a.1, when determined over a 30 minute averaging period.

As a consequence of a *credible contingency event* or *protected event*, the average ~~*voltage*~~ voltage unbalance, measured at a *connection point*, should not vary by more than the amount set out in column 3 of Table S5.1a.1, when determined over a 30 minute averaging period.

The average ~~*voltage*~~ voltage unbalance, measured at a *connection point*, should not vary by more than the amount set out in column 4 of Table S5.1a.1 for the relevant nominal *supply* ~~*voltage*~~voltage, when determined over a 10 minute averaging period.

The average ~~*voltage*~~ voltage unbalance, measured at a *connection point*, should not vary more often than once per hour by more than the amount set out in column 5 of Table S5.1a.1 for the relevant ~~nominal~~ *nominal* ~~*supply*~~ *voltage*, when determined over a 1 minute averaging period.

For the purpose of this clause, ~~*voltage*~~ voltage unbalance is measured as negative sequence voltage.

Table S5.1a.1

Nominal supply voltage (kV)	Maximum negative sequence voltage (% of nominal voltage)			
Column 1	Column 2	Column 3	Column 4	Column 5
	no contingency event	credible contingency event or protected event	general	once per hour
	30 minute average	30 minute average	10 minute average	1 minute average
more than 100	0.5	0.7	1.0	2.0

Nominal supply voltage (kV)	Maximum negative sequence voltage (% of nominal voltage)			
Column 1	Column 2	Column 3	Column 4	Column 5
	no contingency event	credible contingency event or protected event	general	once per hour
	30 minute average	30 minute average	10 minute average	1 minute average
more than 10 but not more than 100	1.3	1.3	2.0	2.5
10 or less	2.0	2.0	2.5	3.0

S5.1a.9 Minimum three phase fault levels and stability for system strength nodes

(a) The *power system* should have minimum *three phase fault levels* sufficient to enable:

(1) the *protection systems* of *transmission networks*, *distribution networks*, *Transmission Network Users* and *Distribution Network Users* to operate correctly;

(2) ~~*voltage*~~ voltage *control systems* (such as reactive bank switching and dynamic ~~*voltage*~~ voltage control) to be stable; and

(3) the *power system* to remain stable following any *credible contingency event* or *protected event*.

(b) There should be stable ~~*voltage*~~ voltage waveforms at *connection points* in the *power system* such that:

(1) in steady state conditions, *plant* does not create, amplify or reflect instabilities; and

(2) avoiding ~~*voltage*~~ voltage waveform instability following any *credible contingency event* or *protected event* is not dependent on *plant disconnecting* from the *power system* or varying *active power* or *reactive power* transfer at *connection points* except in accordance with applicable *performance standards*.

Table S5.1a.2

Nominal voltage at fault location(kV)	Time(milliseconds)		
Column 1	**Column 2**	**Column 3**	**Column 4**
400kV and above	80	100	175
at least 250kV but less than 400kV	100	120	250
more than 100kV but less than 250kV	120	220	430
less than or equal 100 kV	As necessary to prevent *plant* damage and meet stability requirements		

Schedule 5.1 Network Performance Requirements to be Provided or Co-ordinated by Network Service Providers

S5.1.1 Introduction

(a) This schedule describes the planning, design and operating criteria that must be applied by *Network Service Providers* to the *transmission networks* and *distribution networks* which they own, operate or control. It also describes the requirements on *Network Service Providers* to institute consistent processes to determine the appropriate technical requirements to apply for each *connection* enquiry or *application to connect* processed by the *Network Service Provider* with the objective that all *connections* satisfy the requirements of this schedule.

(b) Together, these are the *power system* performance and quality of *supply* standards that *Network Service Providers* must comply with in accordance with clause 5.2.3(b).

(c) The criteria and the obligations of *Registered Participants* to implement them, fall into two categories, namely:

~~(a)~~ (1) those required to achieve adequate levels of *network power transfer capability* or quality of *supply* for the common good of all, or a significant number of, *Registered Participants*; and

~~(b)~~ (2) those required to achieve a specific level of *network service* at an individual *connection point*.

(d) A *Network Service Provider* must:

(1) fully describe the quantity and quality of *network services* which it agrees to provide to a person under a *connection agreement* in terms that apply to the *connection point* as well as to the *transmission system* or *distribution system* as a whole;

(2) ensure that the quantity and quality of those *network services* are not less than could be provided to the relevant person if the *national grid*

were planned, designed and operated in accordance with the criteria set out in this clause S5.1.1 and recognising that levels of service will vary depending on location of the *connection point* in the *network*; and

(3) observe and apply the relevant provisions of the *system standards* in accordance with this schedule 5.1.

(e) To the extent that this schedule 5.1 does not contain criteria which are relevant to the description of a particular *network service*, the *Network Service Provider* must describe the *network service* in terms which are fair and reasonable.

(f) In negotiating a *connection agreement* with a *Connection Applicant* to which any of schedules 5.2, 5.3 or 5.3a apply, the *Network Service Provider* must:

(1) set relevant *access standards* for the purposes of clause S5.1.9; and

(2) be satisfied that the application of any *negotiated access standards* will be consistent with the requirements of this schedule 5.1, in addition to the requirements of clause 5.3.4A(b).

~~This schedule includes provisions for *Network Service Providers* and *Registered Participants* to negotiate the criteria to apply to a *connection* within defined ranges between a lower bound (*minimum access standard*) and an upper bound (*automatic access standard*). All criteria which are intended to apply to a *connection* must be recorded in a *connection agreement*. Where it is intended to apply a *negotiated access standard* in accordance with clause 5.3.4A of the *Rules*, the *Network Service Provider* must first be satisfied that the application of the *negotiated access standard* will not adversely affect other *Registered Participants*.~~

(g) This schedule does not apply to a *Distribution Network Service Provider* in relation to a *regulated SAPS*. The performance and quality of *supply* standards for a *regulated SAPS* are defined by the *Distribution Network Service Provider* in accordance with clause 5.13B.1 and schedule 5.13.

(h) A *power system* performance or quality of *supply* standard in this schedule 5.1 does not apply to a *Network Service Provider* in respect of a *network element* for which *performance standards* have been recorded in accordance with schedule 5.2 or schedule 5.3a.

S5.1.2 Network reliability

S5.1.2.1 Credible contingency events

Network Service Providers must plan, design, maintain and operate their *transmission networks* and *distribution networks* to allow the transfer of power from *production units* to ~~*Customers*~~ *loads* with all *facilities* or equipment associated with the *power system* in service and may be required ~~by a *Registered Participant*~~ under a *connection agreement* to continue to allow the transfer of power with certain facilities or *plant* associated with the *power system* out of service, whether or not accompanied by the occurrence of certain faults (called ***credible contingency events***).

The following *credible contingency events* and practices must be used by *Network Service Providers* for planning and operation of *transmission networks* and

distribution networks unless otherwise agreed by each *Registered Participant* who would be affected by the selection of *credible contingency events*:

(a) The *credible contingency events* must include the *disconnection* of any single *production unit* or *transmission line*, with or without the application of a single circuit two-phase-to-ground solid fault on lines operating at or above 220 kV, and a single circuit three-phase solid fault on lines operating below 220 kV. The *Network Service Provider* must assume that the fault will be cleared in primary protection time by the faster of the duplicate protections with installed intertrips available. For existing *transmission lines* operating below 220 kV but above 66 kV a two-phase to earth fault criterion may be used if the modes of operation are such as to minimise the probability of three-phase faults occurring and operational experience shows this to be adequate, and provided that the *Network Service Provider* upgrades performance when the opportunity arises.

(b) For lines at any ~~*voltage*~~ voltage above 66 kV which are not protected by an overhead earth wire and/or lines with tower footing resistances in excess of 10 ohms, the *Network Service Provider* may extend the criterion to include a single circuit three-phase solid fault to cover the increased risk of such a fault occurring. Such lines must be examined individually on their merits by the relevant *Network Service Provider*.

(c) For lines at any ~~*voltage*~~ voltage above 66 kV a *Network Service Provider* must adopt operational practices to minimise the risk of slow fault clearance in case of inadvertent closing on to earths applied to equipment for maintenance purposes. These practices must include but not be limited to:

(1) Not leaving lines equipped with intertrips alive from one end during maintenance; and

(2) *Off-loading* a three terminal (tee connected) line prior to restoration, to ensure switch on to fault *facilities* are operative.

(d) The *Network Service Provider* must ensure that all *protection systems* for lines at a ~~*voltage*~~ voltage above 66 kV, including associated intertripping, are well maintained so as to be available at all times other than for short periods (not greater than eight hours) while the maintenance of a *protection system* is being carried out.

S5.1.2.2 Network service within a region

The following paragraphs of this section set out minimum standards for certain *network services* to be provided to ~~*Registered Participants*~~ *Network Users* by *Network Service Providers* within a *region*. The amount of *network* redundancy provided must be determined by the process set out in rules 5.12 and 5.13 of the *Rules* and is expected to reflect the grouping of *production units*, their expected capacity factors and availability and the size and importance of ~~*Customer*~~ *load* groups.

The standard of service to be provided at each *connection point* must be included in the relevant *connection agreement*, and must include a *power transfer capability* such as that which follows:

(a) In the *satisfactory operating state*, the *power system* must be capable of providing the highest reasonably expected requirement for *power transfer* (with appropriate recognition of diversity between individual peak requirements and the necessity to withstand *credible contingency events*) at any time.

(b) During the most critical single element *outage* the *power transfer* available through the *power system* may be:

(1) zero (single element *supply*);

(2) the defined capacity of a backup *supply*, which, in some cases, may be provided by another *Network Service Provider*;

(3) a nominated proportion of the normal *power transfer capability* (eg 70 percent); or

(4) the normal *power transfer capability* of the *power system* (when required by a *Registered Participant*).

In the case of clauses S5.1.2.2(b)(2) and (3) the available capacity would be exceeded sufficiently infrequently to allow maintenance to be carried out on each *network element* by the *Network Service Provider*. A *connection agreement* may state the expected proportion of time that the normal capability will not be available, and the capability at those times, taking account of specific design, locational and seasonal influences which may affect performance, and the random nature of element *outages*.

A *connection agreement* may also state a conditional *power transfer capability* that allows for both circuits of a double circuit line or two closely parallel circuits to be out of service.

S5.1.2.3 Network service between regions

The *power transfer capability* between *regions* must be determined by the process set out in Part B of Chapter 5.

The following paragraphs of this section set out a framework within which *Network Service Providers* must describe to *AEMO* the levels of *network service* that apply for *power transfer* between *regions*. In cases where *power transfer capability* is determined by stability considerations on the *power system* (refer to clause S5.1.8 of this schedule) it is expected that line *outages* within *transmission networks* within a *region* will weaken the *network* so as to result in reduced *power transfer capability* even in the absence of *outages* of the lines between *regions*.

(a) In the *satisfactory operating state* the *power transfer capability* between *regions* is defined by a multi-term equation for each *connection* between *regions* which takes account of all *power system* operating conditions which can significantly impact on performance. The majority of these operating conditions are the result of *market* operation and are outside the control of the *Network Service Provider*. In the *satisfactory operating state* the *network* must be planned by the *Network Service Provider* and operated by *AEMO* to withstand the impact of any *single contingency* with severity less than the *credible contingency events* ~~stated~~ described in clause S5.1.2.1.

(b) During critical single element *outages* reduced *power transfer capabilities* will apply. In those cases where *outage* of the remaining element will result

in breaking of the *connection* between the *regions AEMO* must provide for the effect on *power system frequency* in the separate *transmission systems* following this event when determining the maximum *power transfer*.

S5.1.4 Magnitude of power frequency voltage

A *Transmission Network Service Provider* must plan and design its *transmission system* and equipment for control of ~~*voltage*~~ voltage such that the minimum steady state ~~*voltage*~~ voltage magnitude, the maximum steady state ~~*voltage*~~ voltage magnitude and variations in ~~*voltage*~~ voltage magnitude are consistent with the levels stipulated in clause S5.1a.4 of the *system standards*.

(a) The *Network Service Provider* must determine the *automatic access standard* for the ~~*voltage*~~ voltage of *supply* at the *connection point* such that the ~~*voltage*~~voltage may vary in accordance with clause S5.1a.4 of the *system standards*.

(b) The *Network Service Provider* must determine the *minimum access standard* for the ~~*voltage*~~voltage of *supply* at the *connection point* such that the ~~*voltage*~~voltage may vary:

(1) as a consequence of a *credible contingency event* or *protected event* in accordance with clause S5.1a.4; and

(2) otherwise, within a range of 5% of *nominal voltage* above and below ~~between 95 percent and 105 percent of~~ the target ~~*voltage*~~voltage.

(c) For the purposes of clause S5.1.4(b) the target ~~*voltage*~~ voltage must be determined as follows:

(1) if the *connection point* is connected to a *transmission line* (but not through a *transformer*), the *Network Service Provider* must determine the target ~~*voltage*~~ voltage in consultation with *AEMO* taking into account the capability of existing *facilities* that are subject to that *supply* ~~*voltage*~~voltage; and

(2) otherwise, *Network Users* that share the same *supply* ~~*voltage*~~ voltage must jointly determine the target ~~*voltage*~~ voltage which may be specified to vary with aggregate *loading level*;

provided that at all times the *supply* ~~*voltage*~~ voltage remains between 90 percent and 110 percent of the ~~*normal*~~ *nominal voltage* determined in accordance with clause S5.1a.4 except as a consequence of a *contingency event*.

(d) For the purposes of this clause, the ~~*voltage*~~ voltage of *supply* is measured as the average of the root mean square of the voltages between each pair of phases~~*RMS phase voltage*~~.

Where the independent control of ~~*voltage*~~ voltage at the *connection point* is possible without adverse impact on ~~*voltage*~~ voltage control at another *connection point*, the *Network Service Provider* must make reasonable endeavours to meet the request. The target ~~*voltage*~~ voltage and any agreement to a target range of ~~*voltage*~~ voltage magnitude must be specified in the relevant *connection agreement*. The agreement may include a different target range in the *satisfactory operating state* and after a *credible contingency event* or *protected event* (and how these target ranges may be required to vary with *loading level*).

A *Network Service Provider* must ensure that each *facility* that is part of its *transmission network* or *distribution network* is capable of continuous uninterrupted operation in the event that variations in ~~*voltage*~~ voltage magnitude occur due to faults external to the *facility*. The design of a *facility* should anticipate the likely time duration and magnitude of variations in the power-*frequency* phase ~~*voltages*~~ voltages which may arise dependent on the nature and location of the fault.

S5.1.4A Slow front overage-voltages

A *Network Service Provider* must design its *network* and undertake insulation coordination so that switching of *network* elements does not cause *connected plant* to experience recurring slow front over-voltages (switching surges) of the type contemplated in the International Electrotechnical Commission standard IEC 60071-1, for voltages above those described in clause S5.1a.4 of the *system standards*.

S5.1.5 Voltage fluctuations

A *Network Service Provider* must use reasonable endeavours to design and operate its *transmission system* or *distribution system* and include conditions in *connection agreements* in relation to the permissible variation with time of the power *generated* or *load* taken by a *Network User* to ensure that other *Network Users* are supplied with a power-*frequency* ~~*voltage*~~ voltage which fluctuates to an extent that is less than the levels stipulated in accordance with the provisions of clause S5.1a.5 of the *system standards* and this clause S5.1.5.

In accordance with the International Electrotechnical Commission publication IEC/TR 61000.3.7 ~~AS/NZS 61000.3.7:2001~~ and guidelines published by *Standards Australia* and applying the assumption that *Schedule 5.3 Participants* ~~*Customers*~~ will comply with their obligations under schedule 5.3, a *Network Service Provider* must determine "Planning Levels" for *connection points* on their *network* in order to maintain ~~*voltage*~~ voltage fluctuation levels for all supply points to customers supplied from their *network* below the "Compatibility Levels" defined in Table 1 of IEC/TR 61000.3.7 ~~AS/NZS 61000.3.7:2001~~.

The *Network Service Provider* must allocate emission limits in response to a *connection* enquiry or an *application to connect* and evaluate the acceptability for *connection* of fluctuating sources as follows:

(a) *Automatic access standard*: the *Network Service Provider* must allocate emission limits no more onerous than the lesser of the acceptance levels determined in accordance with either of the stage 1 or the stage 2 evaluation procedures defined in IEC/TR 61000.3.7 ~~AS/NZS 61000.3.7:2001~~.

(b) *Minimum access standard*: subject to clause S5.1.5(c), the determination by the *Network Service Provider* of acceptable emission limits must be undertaken in consultation with the party seeking *connection* using the stage 3 evaluation procedure defined in IEC/TR 61000.3.7 ~~AS/NZS61000.3.7:2001~~.

(c) In respect of each new *connection* at a level of performance below the *automatic access standard* the *Network Service Provider* must include provisions in the relevant *connection agreement* requiring the *Network User* if necessary to meet the *system standards* or allow connection of other

Network Users to either upgrade to the *automatic access standard* or fund the reasonable cost of the works necessary to mitigate their effect of connecting at a standard below the *automatic access standard*.

(d) If for existing customer *connections* the level of ~~*voltage*~~ voltage fluctuation is, or may be, exceeded as a result of a proposed new *connection*, the *Network Service Provider* must, if the cause of that excessive level cannot be remedied by enforcing the provisions of existing *connection agreements*, undertake all reasonable works necessary to meet the technical standards in this schedule or to permit the proposed new *connection* within the requirements stated in this clause.

For other than a new *connection* in accordance with the preceding paragraph, the responsibility of a *Network Service Provider* for excursions in ~~*voltage*~~ voltage fluctuations above the levels defined above is limited to ~~*voltage*~~ voltage fluctuations caused by *network plant* and the pursuit of all reasonable measures available under the *Rules* and its *connection agreements*.

S5.1.6 Voltage harmonic or voltage notching distortion

A *Network Service Provider* must use reasonable endeavours to design and operate its *network* and include conditions in *connection agreements* to ensure that the effective harmonic ~~*voltage*~~ voltage distortion at any point in the *network* will be limited to less than the levels stipulated in accordance with the provisions of clause S5.1a.6 of the *system standards* and this clause S5.1.6.

In accordance with the International Electrotechnical Commission publication IEC/TR 61000.3.6 ~~AS/NZS 61000.3.6:2001~~ and guidelines published by *Standards Australia* and applying the assumption that *Schedule 5.3 Participants*~~*Customers*~~ will comply with their obligations under schedule 5.3 *Network Service Providers* must determine "Planning Levels" for *connection points* on their *network* in order to maintain harmonic ~~*voltage*~~ voltage distortion for all supply points to customers supplied from their *network* below the "Compatibility Levels" defined in Table 1 of IEC/TR 61000.3.6~~AS/NZS 61000.3.6:2001~~.

The *Network Service Provider* must allocate emission limits to a *connection* enquiry or an *application to connect* and must evaluate the acceptability for *connection* of distorting sources as follows:

(a) *Automatic access standard*: the *Network Service Provider* must allocate emission limits no more onerous than the lesser of the acceptance levels determined in accordance with either of the stage 1 or the stage 2 evaluation procedures defined in IEC/TR 61000.3.6 ~~AS/NZS 61000.3.6:2001~~.

(b) *Minimum access standard*: subject to clause S5.1.6(c), the determination by the *Network Service Provider* of acceptable emission limits must be undertaken in consultation with the party seeking *connection* using the Stage 3 evaluation procedure defined in AS/NZS61000.3.6:2001.

(c) In respect of each new *connection* at a level of performance below the *automatic access standard* the *Network Service Provider* must include provisions in the relevant *connection agreement* requiring the *Network User* if necessary to meet the *system standards* or allow connection of other *Network Users* to either upgrade to the *automatic access standard* or fund the

reasonable cost of the works necessary to mitigate their effect of connecting at a standard below the *automatic access standard*.

(d) If for existing customer *connections* the level of harmonic ~~*voltage*~~ voltage distortion is, or may be, exceeded as a result of a proposed new *connection*, the *Network Service Provider* must, if the cause of that excessive level cannot be remedied by enforcing the provisions of existing *connection agreements*, undertake all works necessary to meet the technical standards in this schedule or to permit a proposed new *connection* within the *automatic access standard* defined in clause S5.3.8 and the requirements stated in this clause.

For other than a new *connection* in accordance with the preceding paragraph, the responsibility of a *Network Service Provider* for harmonic ~~*voltage*~~ voltage distortion outside the range defined above is limited to harmonic ~~*voltage*~~ voltage distortion caused by *network plant* and the pursuit of all measures available under the *Rules* and its *connection agreements*.

S5.1.7 Voltage unbalance

(a) A *Transmission Network Service Provider* must balance the effective impedance of the phases of its *network*, and a *Distribution Network Service Provider* must balance the current drawn in each phase at each of its *connection points*, so as to achieve average levels of negative sequence ~~*voltage*~~ voltage at all *connection points* that are equal to or less than the values set out in Table S5.1a.1 as determined in accordance with the accompanying provisions of clause S5.1a.7 of the *system standards*.

(b) A *Network Service Provider* must include conditions in *connection agreements* to ensure that a *Connection Applicant* will balance the current drawn in each phase at each of its *connection points* so as to achieve:

(1) for *Schedule 5.3 Participants*~~those Network Users listed in clause S5.3.1a(a)~~: the levels permitted in accordance with clause S5.3.6 of schedule 5.3;

(2) for *Schedule 5.3a Participants*~~Market Network Service Providers~~: the levels permitted in accordance with clause S5.3a.9 of schedule 5.3a;

(3) otherwise: the average levels of negative sequence ~~*voltage*~~voltage at each of its *connection points* that are equal to or less than the values set out in Table S5.1a.1 and the accompanying provisions of clause S5.1a.7 of the *system standards*.

The responsibility of the *Network Service Provider* for ~~*voltage*~~voltage unbalance outside the ranges defined above is limited to ~~*voltage*~~voltage unbalance caused by the *network* and the pursuit of all measures available under the *Rules* and its *connection agreements*.

(c) A *Network Service Provider* must include conditions in *connection agreements* to ensure that each *Generator* and *Integrated Resource Provider* will balance:

(1) the ~~*voltage*~~voltage *generated* in each phase of its *generating system* or *integrated resource system*; and

(2) when not generating, the current drawn in each phase,

in order to achieve average levels of negative sequence ~~*voltage*~~voltage at each of the *generating system* or *integrated resource system connection points* due to phase imbalances within the *generating plant* that are not more than the values determined by the *Network Service Provider* to achieve average levels of negative sequence ~~*voltage*~~voltage at the *connection points* of other *Network Users* in accordance with clause S5.1a.7.

(d) When including conditions under paragraph (c), the *Network Service Provider* must have regard to the capabilities of the relevant *generating plant* technology.

S5.1.8 Stability

In conforming with the requirements of the *system standards*, the following criteria must be used by *Network Service Providers* for both planning and operation:

For stable operation of the *national grid*, both in a *satisfactory operating state* and following any *credible contingency events* ~~or any *protected event*~~ described in clause S5.1.2.1 or any *protected event*:

(a) the *power system* will remain in synchronism;

(b) damping of *power system* oscillations will be adequate; and

(c) ~~*voltage*~~voltage stability criteria will be satisfied.

Damping of *power system* oscillations must be assessed for planning purposes according to the design criteria which states that *power system damping* is considered adequate if after the most critical *credible contingency event* or any *protected event*, simulations calibrated against past performance indicate that the halving time of the least damped electromechanical mode of oscillation is not more than five seconds.

To assess the damping of *power system* oscillations during operation, or when analysing results of tests such as those carried out under clause 5.7.7 of the *Rules*, the *Network Service Provider* must take into account statistical effects. Therefore, the *power system damping* operational performance criterion is that at a given operating point, real-time monitoring or available test results show that there is less than a 10 percent probability that the halving time of the least damped mode of oscillation will exceed ten seconds, and that the average halving time of the least damped mode of oscillation is not more than five seconds.

The ~~*voltage*~~voltage control criterion is that stable ~~*voltage*~~voltage control must be maintained following the most severe *credible contingency event* or any *protected event*. This requires that an adequate *reactive power* margin must be maintained at every *connection point* in a *network* with respect to the ~~*voltage*~~voltage stability limit as determined from the ~~*voltage*~~voltage/reactive *load* characteristic at that *connection point*. Selection of the appropriate margin at each *connection point* is at the discretion of the relevant *Network Service Provider*, subject only to the requirement that the margin (expressed as a capacitive *reactive power* (in MVAr)) must not be less than one percent of the maximum fault level (in MVA) at the *connection point*.

In planning a *network* a *Network Service Provider* must consider *non-credible contingency events* such as *busbar* faults which result in tripping of several circuits, uncleared faults, double circuit faults and multiple contingencies which could

potentially endanger the stability of the *power system*. In those cases where the consequences to any *network* or to any *Registered Participan*t of such events are likely to be severe disruption a *Network Service Provider* and/or a *Registered Participant* must in consultation with *AEMO*, install, maintain and upgrade emergency controls within the *Network Service Provider's* or *Registered Participant's* system or in both, as necessary, to minimise disruption to any *transmission network* or *distribution network* and to significantly reduce the probability of cascading failure.

A *Registered Participant* must co-operate with a *Network Service Provider* to achieve stable operation of the *national grid* and must use all reasonable endeavours to negotiate with the *Network Service Provider* regarding the installation of emergency controls as described in the previous paragraph. The cost of installation, maintenance and operation of the emergency controls must be borne by the *Network Service Provider* who is entitled to include this cost when calculating the *Transmission Customer use of system* price.

S5.1.13 [Deleted]~~Information to be provided~~

~~A *Network Service Provider* must, in response to a *connection* enquiry or an *application to connect* made in accordance with clause 5.3.2 of the *Rules*, provide the *connection applicant* electrical design information relevant to the nominal point of *connection* in accordance with a relevant requirement of schedules 5.2, 5.3 or 5.3a.~~

S5.1.14 Minimum three phase fault levels and stability for system strength nodes

(a) In this clause:

relevant year means each period of 12 months commencing 2 December.

system strength standard specification means, for a *system strength node* at any time in a relevant year, the forecast system strength requirements for the *system strength node* determined for the relevant year three years prior (that is, in the *system strength requirements* due to be determined by 1 December falling three years before the relevant year commenced and disregarding any revision under clause 5.20C.1(e)).

Examples

If the relevant year is 2 December 2026 to 1 December 2027, the system strength standard specification on each day during that year will be the forecast made in the determination of the *system strength requirements* due to be made by 1 December 2023.

If a new *system strength node* is declared on 1 December 2028, there will be no system strength standard specification for that *system strength node* for the relevant years commencing 2 December 2028, 2 December 2029 and 2 December 2030. During those relevant years the *Transmission Network Service Provider* will nonetheless have obligations under paragraph (b) to plan, design etc its *network* to meet the standard for the relevant year commencing 2 December 2031.

forecast system strength requirements means, for a *system strength node* for a relevant year, *AEMO's* forecast under clause 5.20C.1(c) of:

(i) the minimum *three phase fault level* applicable at the *system strength node*; and

(ii) the level and type of *inverter based resources* and *schedule 5.3a plant ~~market network service facilities~~* projected by *AEMO* for the *system strength node*.

(b) A *Transmission Network Service Provider* who is a *System Strength Service Provider* must use reasonable endeavours to plan, design, maintain and operate its *transmission network*, or make *system strength services* available to *AEMO*, to meet the following requirements at *system strength nodes* on its *transmission network* in each relevant year:

(1) maintain the minimum *three phase fault level* specified by *AEMO* for the *system strength node* in the system strength standard specification for the relevant year; and

(2) achieve stable ~~*voltage*~~voltage waveforms for the level and type of *inverter based resources* and *schedule 5.3a plant ~~market network service facilities~~* projected by *AEMO* in the system strength standard specifications for the *system strength node* for the relevant year:

(i) in steady state conditions; and

(ii) following any *credible contingency event* described in clause S5.1.2.1 or any *protected event*.

(c) For paragraph (b)(2), ~~*voltage*~~voltage waveforms must be sufficiently stable such that:

(1) in steady state conditions, *inverter based resources* and *schedule 5.3a plant ~~market network service facilities~~* do not create, amplify or reflect instabilities;

(2) avoiding ~~*voltage*~~voltage waveform instability following any *credible contingency event* described in clause S5.1.2.1 or any *protected event* is not dependent on any of the *inverter based resources* or *schedule 5.3a plant ~~market network service facilities~~ disconnecting* from the *power system* or significantly varying the *active power* or *reactive power* transfer at the *connection point* except in accordance with applicable *performance standards*; and

(3) the description of what is meant by stable ~~*voltage*~~voltage waveforms in the *system strength requirements methodology* is satisfied.

Schedule 5.2 ~~Conditions for Connection of Generators and Integrated Resource Providers~~Technical connection requirements for generating systems, integrated resource systems and synchronous condensers

S5.2.1 Application of the schedule~~Outline of requirements~~

(a) This schedule sets out details of additional requirements and conditions that a person to whom this schedule applies (described in paragraph (b)) must satisfy as a condition of *connection* to the *power system* of a *production system* or *synchronous condenser system* ("*schedule 5.2 plant*").~~*Generators*~~

~~and *Integrated Resource Providers* must satisfy as a condition of *connection* of a *generating system* or *integrated resource system* to the *power system*.~~

Note

For *integrated resource systems*, the definition of *production system* includes only its *production units* and *synchronous condensers*, and relevant auxiliary or *reactive plant*. Any other source of *load* that is part of an *integrated resource system* may be a *schedule 5.3 plant*, depending on its characteristics.

(b) ~~This schedule does not apply to a person, in respect of a *generating system* or *integrated resource system* that is or will be owned, operated or controlled by that person, if:~~

~~(1) that person has received an exemption from the requirement to register as a *Generator* or *Integrated Resource Provider* under clause 2.1A.2, or is eligible for an automatic exemption under the *registration information resource and guidelines*, subject to any terms and conditions imposed by *AEMO* as part of that exemption; and~~

~~(2) that *generating system* or *integrated resource system* is *connected*, or the person intends to *connect* it; and~~

~~(3) that *generating system* or *integrated resource system* is intended for use in a manner the *Network Service Provider* considers is unlikely to cause a material degradation in the quality of *supply* to other *Network Users*.~~

This schedule applies to a person ("*Schedule 5.2 Participant*") in respect of *schedule 5.2 plant* if that person is one of the following:

(1) the *Connection Applicant* in respect of a *schedule 5.2 plant*, who:

(i) is or intends to be the *Registered Participant* for that *plant*; or

(ii) has appointed or intends to appoint an *intermediary* for that *plant*;

(2) the *Connection Applicant* in respect of a *production system*, who:

(i) has received, or intends to apply for, an exemption from a requirement to register as a *Generator* or *Integrated Resource Provider* under clause 2.1A.2; or

(ii) is entitled to an automatic exemption under the *registration information resource and guidelines*,

but, in either case, only to the extent of the requirements in this schedule 5.2 that the *Network Service Provider* considers necessary to minimise any adverse effect of the *connection* or operation of the *production system* on the quality or security of *network service* to other *Network Users*;

(3) the *Connection Applicant* (other than a person referred to in subparagraph (1)) in respect of a *synchronous condenser system* that is neither part of a *production system* nor part of the *network* to which it is or will be *connected*:

(i) if the combined *nameplate rating* of the *synchronous condensers* is 5 MVA or more; or

(ii) otherwise only to the extent of the requirements in this schedule 5.2 that the *Network Service Provider* considers necessary to

minimise any adverse effect of the *connection* or operation of the *synchronous condenser system* on the quality or security of *network service* to other *Network Users*;

(4) subject to paragraph (b1), the *Network Service Provider* whose *network* incorporates the *schedule 5.2 plant*, where that *plant*:

(i) is a *production system* having *production units* with a combined *nameplate rating* of 5 MW or more or a *synchronous condenser system* having *synchronous condensers* with a combined *nameplate rating* of 5 MVA or more; and

(ii) is not (or will not be when operational) subject to the terms of a *connection agreement* with a third party responsible for the operation of that *plant*.

(b1) This schedule applies to a *Schedule 5.2 Participant* described in subparagraph (b)(4) with the following modifications:

(1) where this schedule contemplates that a matter is to be agreed with or approved by the *Network Service Provider*, the *Schedule 5.2 Participant* must determine that matter in a manner consistent with achieving all relevant *system standards* and performance requirements under schedule 5.1 and subject to any requirement for *AEMO's* agreement or approval;

(2) the *Schedule 5.2 Participant* must consult with *AEMO* and follow *AEMO's* advice in determining a matter that is an *AEMO advisory matter*;

(3) requirements to co-operate with, or provide information to, the *Network Service Provider* do not apply; and

(4) references to the *connection point* of the *schedule 5.2 plant* are taken to refer to the interface between the *schedule 5.2 plant* and the rest of the *network*, as designated by the *Schedule 5.2 Participant* and recorded in the *performance standards*.

(b2) The application of some requirements in clauses S5.2.5 and S5.2.6 to *synchronous condensers* has been excluded or modified. Where exclusions or modifications, apply, they are noted in the first paragraph of the relevant sub-clauses.

(c) This schedule also sets out the requirements and conditions which subject to clause 5.2.5 or clause 5.2.5A of the *Rules* (as applicable), are obligations on *Schedule 5.2 Participants*~~*Generators and Integrated Resource Providers*~~:

(1) to co-operate with the relevant *Network Service Provider* on technical matters relating to *schedule 5.2 plant*~~when making a new connection~~; and

(2) to provide information to the *Network Service Provider* or *AEMO*.

(d) The equipment associated with each *schedule 5.2 plant* ~~*generating system or integrated resource system*~~ must be designed to withstand without damage the range of operating conditions which may arise consistent with the *system standards*.

(e) *Schedule 5.2 Participants* ~~*Generators and Integrated Resource Providers*~~ must comply with the *performance standards* and any attached terms or conditions of agreement agreed with the *Network Service Provider* or *AEMO* in accordance with a relevant provision of schedules 5.1a or 5.1.

(f) **[Deleted]**~~This schedule does not set out arrangements by which a *Generator* or *Integrated Resource Provider* may enter into an agreement or contract with *AEMO* to:~~

~~(1) provide additional services that are necessary to maintain *power system security*; or~~

~~(2) provide additional services to facilitate management of the *market*.~~

(g) The *Network Service Provider* must record all *access standards* determined for a *schedule 5.2 plant* under this schedule as the *plant's performance standards* in (as applicable): ~~This schedule provides for *automatic access standards* and the determination of *negotiated access standards* which once determined, must be recorded together with the *automatic access standards* in~~

(1) a *connection agreement* for the relevant *schedule 5.2 plant*; or

(2) where the *Schedule 5.2 Participant* is also the *Network Service Provider*, a standalone document that it must provide to *AEMO* and keep up to date.

~~and registered with *AEMO* as *performance standards*.~~

S5.2.2 Application of Settings

A *Schedule 5.2 Participant*~~*Generator or Integrated Resource Provider*~~ must only apply settings to a *control system* or a *protection system* that are necessary to comply with performance requirements of this schedule 5.2 if the settings have been approved in writing by the relevant *Network Service Provider* and, if the requirement is an *AEMO advisory matter*, ~~one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*,~~ also by *AEMO*. A *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ must not allow its *schedule 5.2 plant* ~~*production unit*~~ to supply electricity to, or take electricity from, the *power system* without such prior approval.

If a *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ seeks approval from the *Network Service Provider* to apply or change a setting, then (except in the case of settings to be applied or changed by the *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ in connection with an *emergency frequency control scheme*) approval must not be withheld unless the *Network Service Provider* or, if the requirement is an *AEMO advisory matter*, ~~one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*,~~ *AEMO*, reasonably determines that the changed setting would cause the *schedule 5.2 plant* ~~*production unit*~~ to not comply with the relevant *performance standard* or cause an *inter-regional* or *intra-regional power transfer capability* to be reduced.

If the *Network Service Provider* or, if the requirement is an *AEMO advisory matter*, ~~is one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*,~~ *AEMO*, reasonably determines that a setting of a *schedule 5.2 plant's* ~~*production unit's*~~ *control system* or *protection system* needs to change to comply with the relevant

performance standard or to maintain or restore an *inter-regional* or *intra-regional power transfer capability*, the *Network Service Provider* or *AEMO* (as applicable) must consult with the relevant *Schedule 5.2 Participant*~~*Generator or Integrated Resource Provider*~~, and the *Network Service Provider* may request in writing that a setting be applied in accordance with the determination.

The *Network Service Provider* may also request a test to verify the performance of the relevant *plant* with the new setting. The *Network Service Provider* must provide *AEMO* with a copy of its request to a *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ to apply a setting or to conduct a test, if it relates to an *AEMO advisory matter*.

A *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ who receives such a request must arrange for the notified setting to be applied as requested and for a test to be conducted as requested. After the test, the *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ must, on request, provide ~~both *AEMO* and~~ the *Network Service Provider* and, if applicable, *AEMO*, with a report of a requested test, including evidence of its success or failure. Such a report of a test is *confidential information*.

A *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ must not change a setting requested by the *Network Service Provider* without its prior written agreement. If the *Network Service Provider* requires a *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ to change a setting within 18 months of a previous request, the *Network Service Provider* must pay the *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ its reasonable costs of changing the setting and conducting the tests as requested.

S5.2.3 Technical matters to be coordinated

(a) A *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ and the relevant *Network Service Provider* must use all reasonable endeavours to agree upon relevant technical matters in respect of each new or altered *connection* of a *schedule 5.2 plant* ~~*generating system or integrated resource system to a network*~~ including:

(1) design at the *connection point*;

(2) physical layout adjacent to the *connection point*;

(3) primary protection and backup protection (clause S5.2.5);

(4) control characteristics (clause S5.2.5);

(5) communications *facilities* (clause S5.2.6);

(6) insulation co-ordination and lightning protection (paragraph (b));

(7) fault levels and fault clearance (clause S5.2.8);

(8) switching and *isolation* facilities (clause S5.2.8);

(9) interlocking and *synchronising* arrangements; and

(10) *metering installations*.

(b) A *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ must ensure that in designing the *schedule 5.2* ~~*a generating system's or integrated resource system's electrical*~~ *plant*, including any *substation* for its ~~the~~

connection ~~of the *generating system* or *integrated resource system*~~ to the *network*, to operate at the same *nominal voltage* as at the *connection point*:

(1) the *plant* complies with the relevant *Australian Standards* unless a provision of the *Rules* allows or requires otherwise;

(2) the earthing of the *plant* complies with the ENA EG1-2006: Substation Earthing Guide to reduce step and touch potentials to safe levels;

(3) the *plant* is capable of withstanding, without damage the ~~*voltage*~~ voltage impulse levels specified in the *connection agreement*;

(4) the insulation levels of the *plant* are co-ordinated with the insulation levels of the *network* to which the *plant* ~~*generating system* or *integrated resource system*~~ is *connected* as specified in the *connection agreement*;

(4A) operation of the *plant* does not cause *network* equipment or other *Network Users' facilities* to experience recurring slow front over-voltages (switching surges) of the type contemplated in the International Electrotechnical Commission standard IEC 60071-1, for voltages above those described in clause S5.1a.4 of the *system standards*; and

(5) safety provisions in respect of the *plant* comply with requirements applicable to the *participating jurisdiction* in which the plant ~~*generating system* or *integrated resource system*~~ is located, as notified by the *Network Service Provider*.

(c) If no relevant *Australian Standard* exists for the purposes of paragraph (b)(1), the *Schedule 5.2 Participant* ~~*Generator* or *Integrated Resource Provider*~~ must agree with the *Network Service Provider* for the *schedule 5.2 plant* ~~*Generator* or *Integrated Resource Provider*~~ to comply with another relevant standard.

S5.2.4 Provision of information

(a) A *Schedule 5.2 Participant* ~~*Generator*, *Integrated Resource Provider* or person who is negotiating a *connection agreement* with a *Network Service Provider*~~ must promptly on request by *AEMO* or the *Network Service Provider* provide all data in relation to its *schedule 5.2 plant* ~~that *generating system* or *integrated resource system*~~ specified in schedule 5.5.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b) A *Schedule 5.2 Participant* ~~*Generator*, *Integrated Resource Provider* or person required under the *Rules* to register as the *Generator* or *Integrated Resource Provider*~~ in respect of a~~: *generating system* comprised of *generating units* with a combined *nameplate rating* of 30 MW or more, or an *integrated resource system* that (to the extent it comprises *bidirectional units*) is~~

~~comprised of bidirectional units with a combined *nameplate rating* of 5 MW or more or (to the extent it comprises *generating units*) is comprised of *generating units* with a combined *nameplate rating* of 30 MW or more,~~

(1A) *production system* having *production units* with a combined *nameplate rating* of 30 MW or more; or

(1B) *synchronous condenser system* having *synchronous condensers* with a combined *nameplate rating* of 30 MVA or more,

by the earlier of:

(1) the day on which an *application to connect* is made under clause 5.3.4(a);

(2) the day on which amendments to *performance standards* are submitted under rule 4.14(p) or clause 5.3.9(b);

(3) three months before commissioning of ~~a~~ the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ or planned alteration to a *schedule 5.2 plant* ~~*generating system*~~; or

(4) 5 *business days* before commissioning of an alteration to the *schedule 5.2 plant* ~~a *generating system* or *integrated resource system* alteration~~ that is repairing *plant* after a *plant* failure, if *plant* performance after the alteration will differ from performance prior to the *plant* failure,

must provide:

(5) to *AEMO* and the relevant *Network Service Provider*(s) (including the relevant *Transmission Network Service Provider* in respect of a *distribution connected unit*):

(i) information about the *protection* ~~*protections*~~ *systems* of the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~;

(ii) information about the *control systems* of the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ including:

(A) a set of functional block diagrams, including all functions between feedback signals and *generating system* output or *integrated resource system* output or consumption;

(B) the parameters of each functional block, including all settings, gains, time constants, delays, deadbands and limits;

(C) the characteristics of non-linear elements;

(D) encrypted models in a form suitable for the software simulation products nominated by *AEMO* in the *Power System Model Guidelines*;

(6) to *AEMO*, the model source code (in the circumstances required by the *Power System Model Guidelines*) associated with the *power system* simulation model in subparagraph (ii)(D) in an unencrypted form suitable for at least one of the software simulation products nominated by *AEMO* in the *Power System Model Guidelines*, and in a form that

would allow conversion for use with other software products nominated by *AEMO* in the *Power System Model Guidelines*;

(7) **[Deleted]**

(7A) to *AEMO* and the relevant *Network Service Provider*(s), any other information specified in the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*; and

(8) to *AEMO* and the relevant *Network Service Providers* (including the relevant *Transmission Network Service Provider* in respect of a *distribution connected unit*) a *releasable user guide*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(b1) The information provided under paragraph (b) must contain sufficient detail for *AEMO* and the relevant *Network Service Provider*(s) to perform *power system* simulation studies in accordance with the requirements and circumstances specified in the *Power System Model Guidelines*.

(c) The information provided under paragraph (b) must:

(1) encompass all *control systems* that respond to ~~*voltage*~~ voltage or *frequency* disturbances on the *power system*, and which are either integral to the *production units* or otherwise part of the *schedule 5.2 plant*~~*generating system or integrated resource system*~~, including those applying to *reactive power* equipment that forms part of the *schedule 5.2 plant*~~*generating system or integrated resource system*~~; ~~and~~

(2) conform with the applicable models developed in accordance with the *Power System Model Guidelines*, or an alternative model agreed with *AEMO* to be necessary to adequately represent the relevant *plant* to carry out load flow and dynamic simulations and (where applicable) specialised *power system* studies; and

(3) reflect the *control system* tuning consistent with the range of:

(i) *three phase fault levels*; and

(ii) system impedance values,

specified by the *Network Service Provider* for the *connection point* consistent with clauses S5.2.5.5 and S5.2.5.13 respectively, and the *releasable user guide* must record the relevant levels used for tuning, including the X/R ratio of the *power system* observed from the *connection point*.

(d) The *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ must provide to *AEMO* information that updates the information provided under paragraph (b) and must provide to the relevant *Network Service*

Providers information that updates the information provided under subparagraph (b)(5):

(1) within 3 months after commissioning tests or other tests undertaken in accordance with clause 5.7.3 are completed;

(2) when the *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ becomes aware that the information is incomplete, inaccurate or out of date; or

(3) on request by *AEMO* or the relevant *Network Service Provider*, where *AEMO* or the relevant *Network Service Provider* considers that the information is ~~in~~ incomplete, inaccurate or out of date.

(d1) A *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ is only required to provide new information under clause S5.2.4(d) to the extent that it is different to the information previously provided under clause S5.2.4(b).

(e) For the purposes of clause S5.2.4(e1), a *Connection Applicant* must either:

(1) be registered as an *Intending Participant* in accordance with rule 2.7; or~~.~~

(2) if neither required nor intending to register in respect of the relevant *schedule 5.2 plant*, comply with rule 8.6 as if the *Connection Applicant* were a *Registered Participant* and, if required by the *Network Service Provider*, give an undertaking to that effect in a form satisfactory to the *Network Service Provider* as a condition of providing the technical information.

(e1) For the purposes of clause 5.3.2(f), the technical information that a *Network Service Provider* must, if requested, provide to a *Connection Applicant* in respect of a proposed *connection* for a *schedule 5.2 plant* ~~*generating system or integrated resource system*~~ includes:

(1) the highest and lowest expected single phase fault level and ~~three phase fault levels~~ *three phase fault level* at the *connection point* and the X/R ratio, with the *schedule 5.2 plant* ~~*generating system or integrated resource system*~~ not electrically *connected*;

(1A) the mid-point voltage for the purposes of clause S5.2.5.1;

(1B) the highest and typical expected system impedance levels at the *connection point* with the *schedule 5.2 plant* not electrically *connected*, as required for the purposes of clause S5.2.5.13;

(1C) any other matters that *AEMO* or the *Network Service Provider* may specify, nominate or require for the purposes of any *access standard* in this schedule 5.2;

(2) the clearing times of the existing *protection systems* that would clear a fault at the location at which the new *connection* would be *connected* into the existing *transmission system* or *distribution system*;

(3) the expected limits of ~~*voltage*~~voltage fluctuation, harmonic ~~*voltage*~~voltage distortion and ~~*voltage*~~voltage unbalance at the

connection point with the *schedule 5.2 plant ~~generating system or integrated resource system~~* not electrically *connected*;

(4) technical information relevant to the *connection point* with the *schedule 5.2 plant ~~generating system or integrated resource system~~* not electrically *connected ~~synchronised~~* including equivalent source impedance information, sufficient to estimate fault levels, ~~*voltage*~~voltage fluctuations, harmonic ~~*voltage*~~voltage distortion (for harmonics relevant to the *generating system* or *integrated resource system*) and ~~*voltage*~~voltage unbalance;

(5) other information relating to the performance of the *national grid* that is reasonably necessary for the *Connection Applicant* to prepare an *application to connect*, including:

(i) a model of the *power system*, including relevant *considered projects* and the range of expected operating conditions, sufficient to carry out load flow and dynamic simulations; and

(ii) information on *inter-regional* and *intra-regional power transfer capabilities* and relevant *plant* ratings; and

(6) the *Network Service Provider's* expected *three phase fault level* at the *connection point* for the *schedule 5.2 plant ~~generating system or integrated resource system~~* following the *connection* of the *schedule 5.2 plant~~generating system or integrated resource system~~*.

(f) All information provided under this clause S5.2.4 must be treated as *confidential information*. A *Schedule 5.2 Participant* who receives information under this clause and is not a *Registered Participant* must comply with rule 8.6 as if it were a *Registered Participant*.

S5.2.5 Technical requirements

S5.2.5.1 Reactive power capability

(a0) Only clause S5.2.5.1(f) applies to *synchronous condensers*.

(a00) In this clause S5.2.5.1:

(1) the **maximum active power** or **Pmax** of a *schedule 5.2 plant* refers to:

(i) for a *generating system*, the *active power capability* with all its *production units* in service; and

(ii) for an *integrated resource system*, both the *active power capability* and the *maximum demand* with all its *production units* in service;

in each case, less any applicable temperature derating;

(2) **mid-point voltage** is a voltage specified by the *Network Service Provider* for a *schedule 5.2 plant's connection point*, within the range of 95% to 105% of *nominal voltage* at the *connection point*, that accounts for typical operating conditions at the *connection point* and in the nearby *network*; and

(3) **temperature derating** is an amount (which may be calculated by reference to one or more inputs or measurements) by which:

(i) *active power capability* may be reduced if the relevant *plant's* production or consumption capacity is materially affected by ambient temperatures, and separate amounts may apply to *active power capability* and *maximum demand*; or

(ii) for a *synchronous condenser*, *reactive power capability* may be reduced if that capability is materially affected by ambient temperatures.

Automatic access standard

~~(a) The *automatic access standard* is a *generating system* or *integrated resource system* operating at:~~

~~(1) any level of *active power*; and~~

~~(2) any *voltage* at the *connection point* within the limits established under clause S5.1a.4 without a *contingency event*,~~

~~must be capable of supplying and absorbing continuously at its *connection point* an amount of *reactive power* of at least the amount equal to the product of the *rated active power* of the *generating system* or *integrated resource system* and 0.395.~~

(a) The *automatic access standard* is the requirements of paragraphs (a1) to (a3).

(a1) A *schedule 5.2 plant*, operating with all its *production units* in service at any level of *active power* and while meeting its other *performance standards* applicable to the voltage ranges specified below, must be capable of supplying or absorbing *reactive power* continuously at its *connection point* of the following amounts, with no temperature derating at ambient temperatures below 50°C:

(1) for a voltage range that is five percent of *nominal voltage* above and below the mid-point voltage, both supplying and absorbing an amount at least equal to the product of the maximum active power of the *schedule 5.2 plant* and 0.395; and

(2) for a voltage range from the upper limit of the range described in paragraph (1) to the upper limit established under clause S5.1a.4 without a *contingency event*:

(i) absorbing an amount at least equal to the product of the maximum active power of the *schedule 5.2 plant* and 0.395; and

(ii) supplying an amount at least equal to the amount specified under sub-paragraph (i) at the upper limit of the voltage range in paragraph (1), decreasing linearly to zero at the upper limit established under clause S5.1a.4 without a *contingency event*; and

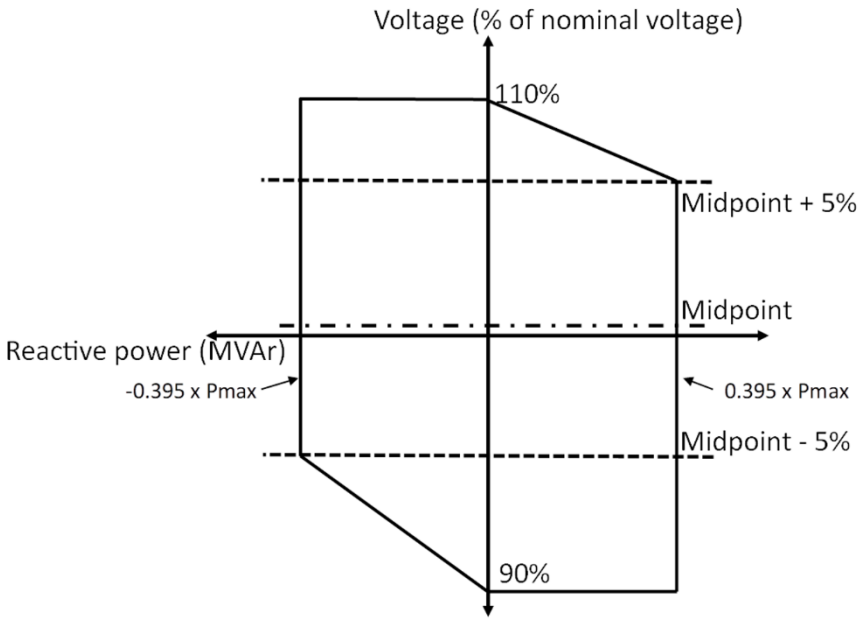
(3) for a voltage range from the lower limit of the voltage range in paragraph (1) to the lower limit established under clause S5.1a.4 without a *contingency event*:

(i) supplying an amount at least equal to the product of the maximum active power of the *schedule 5.2 plant* and 0.395; and

(ii) absorbing an amount at least equal to the amount specified under sub-paragraph (i) at the lower limit of the voltage range in paragraph (1), decreasing linearly to zero at the lower limit established under clause S5.1a.4 without a *contingency event*,

as illustrated in Figure S5.2.1.

Figure S5.2.1



(a2) A *schedule 5.2 plant* that is electrically *connected* to the *power system* but not otherwise in service except for any *reactive power* compensation under paragraph (h), must not change the voltage at the *connection point* from the voltage with the *schedule 5.2 plant* not electrically *connected*, in steady state conditions and for the highest system impedance nominated under clause S5.2.5.13(m).

Minimum access standard

(b) The *minimum access standard* is the requirements of paragraphs (b1) and (b2).

(b1) No ~~no~~ capability is required to supply or absorb *reactive power* at the *connection point*.

(b2) A *schedule 5.2 plant* that is electrically *connected* to the *power system* but not otherwise in service except for any *reactive power* compensation under paragraph (h), must not change the voltage at the *connection point* by more than 1% from the voltage with the *schedule 5.2 plant* not electrically *connected*, or a higher percentage agreed with the *Network Service Provider*, in steady state conditions and for the highest system impedance nominated under clause S5.2.5.13(m).

Negotiated access standard

(c) A *negotiated access standard* for *reactive power capability* under this clause S5.2.5.1: ~~When negotiating a *negotiated access standard*, the *Generator* or *Integrated Resource Provider*, the *Network Service Provider* and *AEMO*:~~

(1) ~~must,~~ subject to paragraph (d), must be established at or above a level that is consistent with achieving all relevant *system standards* ~~any agreement under subparagraph (d)(4), ensure that the *reactive power capability* of the *generating system* or *integrated resource system* is consistent with maintaining *power system security* and sufficient to ensure that all relevant *system standards* are met~~ before and after *credible contingency events* under normal and planned *outage* operating conditions of the *power system*~~, taking into account existing *power system* conditions, *considered projects* and any other project for the *connection* of a *Network User* for which:~~

~~(i) there is an existing *connection agreement*; or~~

~~(ii) the *Network Service Provider* and *AEMO* reasonably consider the *Network User* will *connect* to the *power system*;~~

(2) may include ~~negotiate~~ either a range of *reactive power* absorption and supply, or a range of *power factor*, at the *connection point*, within which the *plant* must be operated; and

(3) may include ~~negotiate~~ a limit that describes how the *reactive power capability* varies as a function of *active power* level due to a design characteristic of the *plant*.

(d) If the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ is not capable of the level of performance specified in ~~established under~~ paragraph (c)(1), the *Schedule 5.2 Participant*~~*Generator* or *Integrated Resource Provider*~~, depending on what is reasonable in the circumstances, must do one or more of the following:

(1) pay compensation to the *Network Service Provider* for the provision of the deficit of *reactive power* (supply and absorption) from within the *network*;

(2) install additional equipment *connecting* at the *schedule 5.2 plant's* ~~*generating system's* or *integrated resource system's*~~ *connection point* or another location, to provide the deficit of *reactive power* (supply and absorption), and such equipment is deemed to be part of the *schedule 5.2 plant*~~*generating system* or *integrated resource system*~~;

(3) reach a commercial arrangement with a *Registered Participant* to provide the deficit of *reactive power* (supply and absorption); or

(4) if the inability to meet the performance level only occurs for particular operating conditions, agree to and document as part of the ~~proposed *negotiated access standard*~~ *performance standards*, operational arrangements by which the *plant* can achieve an agreed level of performance for those operating conditions.

(d1) Unless otherwise agreed with the *Network Service Provider* and *AEMO*, any temperature derating must represent a proportional derating of *active power* and *reactive power* at equipment level, projected to the *connection point*.

(e) **[Deleted]**~~The *Generator* or *Integrated Resource Provider* may select one or more options referred to in paragraph (d).~~

General requirements

(e1) With fewer than all *production units* in service, the maximum active power and *reactive power capability* of a *production system* may be reduced in a manner consistent with the topology of the *plant* and of the operating *production units*, provided the *reactive power* performance of any individual *production unit* is not lower than its performance when all *production units* are in service.

(f) ~~*A performance standard* The~~ *performance standards* must record the agreed value~~s~~, ~~for *rated active power* and (for an *integrated resource system*) rated maximum demand~~ and where relevant the method of determining the value, of:~~.~~

(1) for a *production system*, the *active power capability* and, if applicable, the maximum temperature for operation;

(2) for a *synchronous condenser system* or a *synchronous condenser* within a *production system*, if applicable, the maximum temperature for operation;

(3) if applicable, the temperature derating for ambient temperatures below 50°C; and

(4) the *reactive power* supply and absorption capabilities of the *schedule 5.2 plant* while meeting its other performance standards; and

(5) any additional *reactive power* supply and absorption capabilities of the *schedule 5.2 plant*, including where these may result in *active power* reductions.

Note

Information on the full range of *reactive power capability* is used to confirm the agreed capability for the *performance standard*, and may be used by *AEMO* and the *Network Service Provider* for network support or emergency purposes.

~~(g) A *performance standard* for consumption of *energy* by a *generating system* or *integrated resource system* in respect of *auxiliary load* when not supplying or absorbing *reactive power* under an *ancillary services agreement* is to be established under clause S5.3.5 as if the *Generator* or *Integrated Resource Provider* were a *Market Customer*.~~

(g) For the purposes of the requirement referred to in paragraph (a2) or (b2), the *performance standards* must record:

(1) the required level or range of *reactive power* to meet the compensation requirement (in MVAr); and

(2) any operational arrangements necessary to meet the requirement.

(h) Where the requirement referred to in paragraph (a2) or (b2) is to be met by *reactive power* compensation from one or more *production units* that are not otherwise in service:

(1) a *performance standard* must be established for stability of the *control system* for *settling time* for a voltage step established under clause S5.2.5.13 for the relevant control mode (as if it were a secondary control mode); and

(2) the *performance standards* established under the following clauses will apply for operation in this mode:

(i) S5.2.5.2, S5.2.5.9, S5.2.5.10, S5.2.5.15, S5.2.6.1 and S5.2.6.2; and

(ii) S5.2.5.8 in respect of protection requirements.

S5.2.5.2 Quality of electricity generated

(a) For the purpose of this clause S5.2.5.2 in respect of a *synchronous production unit*, ~~AS 1359.101 and~~ International Electrotechnical Commission standard IEC 60034-1 is a *plant standard* ~~are *plant standards*~~ for harmonic ~~*voltage*~~ voltage distortion.

Automatic access standard

(b) The *automatic access standard* is a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ at all times when *connected* must not produce at ~~any of~~ its *connection point*~~s~~:

(1) ~~*voltage*~~voltage fluctuation greater than the limits allocated by the *Network Service Provider* under clause S5.1.5(a);

(2) harmonic ~~*voltage*~~voltage distortion greater than the emission limits specified by a *plant standard* under paragraph (a) or allocated by the *Network Service Provider* under clause S5.1.6(a); and

(3) ~~*voltage*~~voltage unbalance greater than the limits allocated by the *Network Service Provider* in accordance with clause S5.1.7(c).

Minimum access standard

(c) The *minimum access standard* is a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ at all times when *connected* must not produce at ~~any of its *connection points*~~ its *connection point*:

(1) ~~*voltage*~~voltage fluctuations greater than limits determined under clause S5.1.5(b);

(2) harmonic ~~*voltage*~~voltage distortion more than the lesser of the emission limits determined by the relevant *Network Service Provider* under clause S5.1.6(b) and specified by a *plant standard* under paragraph (a); and

(3) ~~*voltage*~~voltage unbalance more than limits determined under clause S5.1.7(c).

Negotiated access standard

(d) **[Deleted]**~~A *negotiated access standard* negotiated under this clause S5.2.5.2 must not prevent the *Network Service Provider* meeting the *system standards* or contractual obligations to existing *Network Users*.~~

S5.2.5.3 Response to frequency disturbances

(a) In ~~For the purposes of~~ this clause S5.2.5.3:

(1) **normal operating frequency band**, **operational frequency tolerance band**, or **extreme frequency excursion tolerance limits** are references to the widest range specified for those terms for any condition (including an "island" condition) in the *frequency operating standards* that apply to the *region* in which the *schedule 5.2 plant* ~~*production unit* is~~ located;~~.~~

(2) **stabilisation time** and **recovery time** mean the longest times allowable for the *frequency* of the *power system* to remain outside the operational frequency tolerance band and the normal operating frequency band, respectively, for any condition (including an "island" condition) in the *frequency operating standards* that apply to the *region* in which the *schedule 5.2 plant* ~~*production unit*~~ is located; and~~.~~

(3) **transient frequency limit** and **transient frequency time** mean the values of 47.5 Hz and 9 seconds respectively, or such other values determined by the *Reliability Panel*.

Automatic access standard

(b) The *automatic access standard* is a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ and where applicable each of its *production unit* must be capable of *continuous uninterrupted operation* for *frequencies* in the following ranges:

(1) the lower bound of the extreme frequency excursion tolerance limits to the lower bound of the operational frequency tolerance band for at least the stabilisation time;

(2) the lower bound of the operational frequency tolerance band to the lower bound of the normal operating frequency band, for at least the recovery time including any time spent in the range under subparagraph (1);

(3) the normal operating frequency band for an indefinite period;

(4) the upper bound of the normal operating frequency band to the upper bound of the operational frequency tolerance band, for at least the recovery time including any time spent in the range under subparagraph (5); and

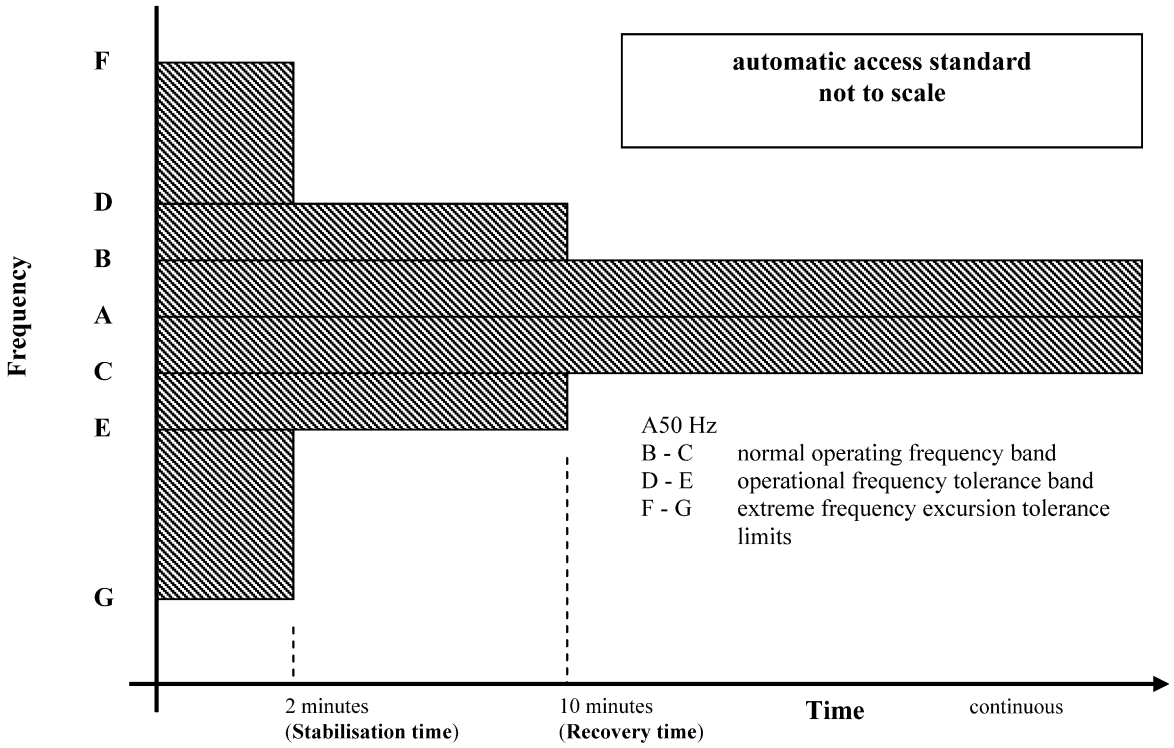
(5) the upper bound of the operational frequency tolerance band to the upper bound of the extreme frequency excursion tolerance limits for at least the stabilisation time,

unless the rate of change of *frequency* is outside the range of –4 Hz to 4 Hz per second for more than 0.25 seconds, -3 Hz to 3 Hz per second for more

than one second, or such other range as determined by the *Reliability Panel* from time to time.

Note:

The *automatic access standard* is illustrated in the following diagram. To the extent of any inconsistency between the diagram and paragraph (b), paragraph (b) prevails.



Minimum access standard

(c) The *minimum access standard* is a *schedule 5.2 plant ~~generating system or integrated resource system~~* and where applicable each of its *production units* and *synchronous condensers* must be capable of *continuous uninterrupted operation* for *frequencies* in the following ranges:

(1) the lower bound of the extreme frequency excursion tolerance limits to the transient frequency limit for at least the transient frequency time;

(2) the transient frequency limit to the lower bound of the operational frequency tolerance band for at least the stabilisation time;

(3) the lower bound of the operational frequency tolerance band to the lower bound of the normal operating frequency band for at least the recovery time including any time spent in the ranges under subparagraphs (1) and (2) unless (for an *integrated resource system*) it has a *protection system* to trip consumption by a *bidirectional unit* if the *frequency* falls below a level agreed with *AEMO*;

(4) the normal operating frequency band for an indefinite period;

(5) the upper bound of the normal operating frequency band to the upper bound of the operational frequency tolerance band for at least the recovery time including any time spent in the ranges under

subparagraph (6) unless (for a *production system*) the *plant ~~generating system~~* has a *protection system* to trip *generation* from a *production ~~generating~~ unit* if the *frequency* exceeds a level agreed with *AEMO* ~~or (for an *integrated resource system*) it has a *protection system* to trip *generation* from a *bidirectional unit* if the *frequency* exceeds a level agreed with *AEMO*~~; and

(6) in respect of a *production ~~generating system~~* or ~~*integrated resource system*~~:

(i) ~~(in each case)~~ having *production ~~generating~~ units* with a combined *nameplate rating* equal to or more than the lower of:

(A) 30 MW or ~~more;~~ 30 MVA (as applicable); or

(B) the amount (in MW or MVA as applicable) that is 5% of any maximum *credible contingency event* size specified in the *frequency operating standard* for the relevant *region*; and

(ia) **[Deleted]**~~(in the case of an *integrated resource system*) not satisfying subparagraph (6)(i), but having *bidirectional units* with a combined *nameplate rating* of 5 MW or more; and~~

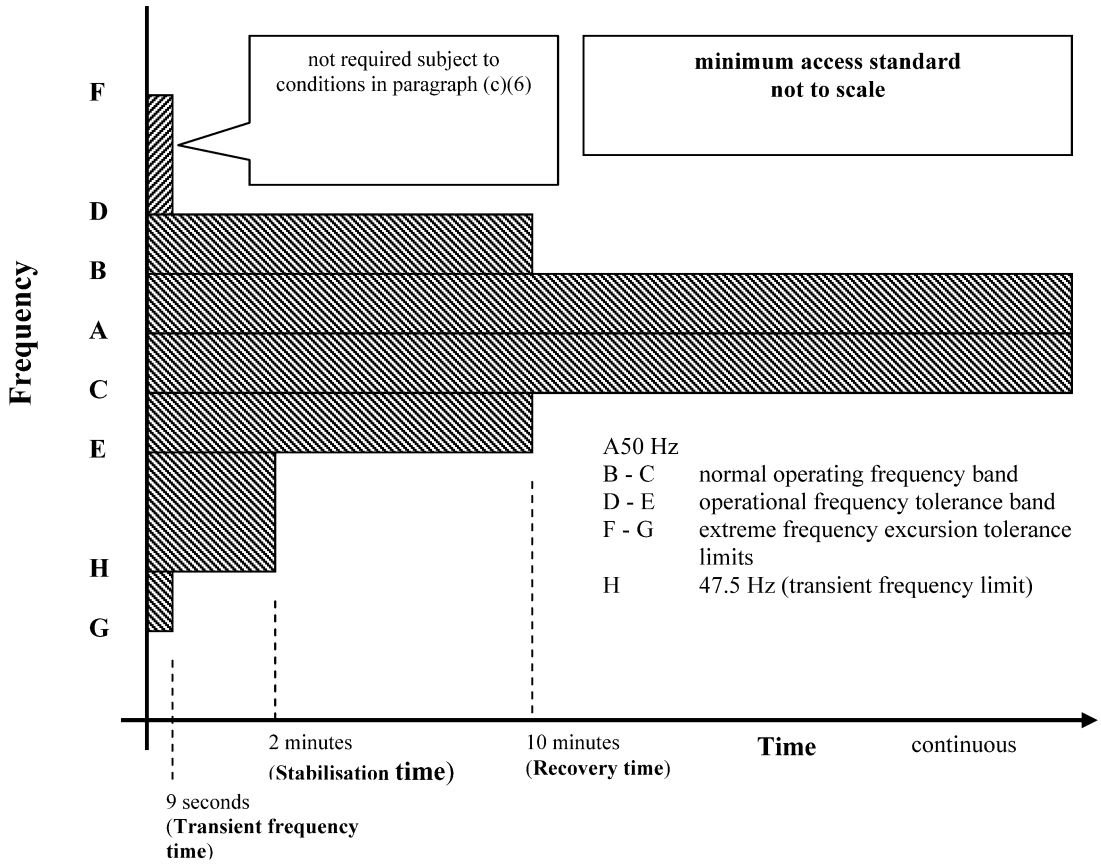
(ii) ~~(in each case)~~ that does not have a *protection system* to trip ~~the~~ *production units* if the *frequency* exceeds a level agreed with *AEMO* under subparagraph (5),

the upper bound of the operational frequency tolerance band to the upper bound of the extreme frequency excursion tolerance limits (including an "island" condition) for at least the transient frequency time,

unless the rate of change of *frequency* is outside the range of -2 Hz to 2 Hz per second for more than 0.25 seconds, -1 Hz to 1 Hz per second for more than one second or such other range as determined by the *Reliability Panel* from time to time.

Note:

The *minimum access standard* is illustrated in the following diagram. To the extent of any inconsistency between the diagram and paragraph (c), paragraph (c) prevails.



Negotiated access standard

(d) ~~A *negotiated access standard* can be accepted by the *Network Service Provider* provided that *AEMO* and the *Network Service Provider* agree that the *frequency* would be unlikely to fall below the lower bound of the operationalfrequency tolerance band as a result of over-frequency tripping of *production units* or rise above the upper bound of the operational frequency tolerance band as a result of under-frequency tripping of *bidirectional units*.~~A proposed *negotiated access standard* may be accepted if *AEMO* and the *Network Service Provider* consider the response of the *schedule 5.2 plant* is unlikely to cause tripping of *production units* to an extent that may result in a *power system frequency* outside the limits of the operational frequency tolerance band.

Note

This assessment may consider the effects of tripping of the *schedule 5.2 plant* itself and consequential tripping of other equipment due to under-*frequency*, over-*frequency*, rate of change of *frequency*, *three phase fault levels* or other resulting *power system* conditions.

S5.2.5.4 Response to voltage disturbances

(a0) In this clause S5.2.5.4:

(1) **T(ov)** means a point in time when the voltage first varied above 110% of *nominal voltage* before returning to between 90% and 110% of *nominal voltage*;

(2) **T(uv)** means a point in time when the voltage first varied below 90% of *nominal voltage* before returning to between 90% and 110% of *nominal voltage*;

(3) references to *nominal voltages* are *power system frequency* voltages at the *connection point*, measured as the average of the root mean square of the voltages between each pair of phases;

(4) references to *continuous uninterrupted operation* apply subject to paragraph (e1); and

(5) requirements referring to *active power* do not apply to *synchronous condensers*.

Automatic access standard

(a) The *automatic access standard* is a *schedule 5.2 plant ~~generating system or integrated resource system~~* and each of its operating *production units* and *synchronous condensers* must remain in ~~be capable of~~ *continuous uninterrupted operation* where a *power system* disturbance causes the ~~*voltage*~~ voltage at the *connection point* to vary within the following ranges:

(1) ~~over~~ at least marginally exceeding 130% of ~~*normal voltage*~~*nominal voltage* for a period of at least 0.02 seconds after T(ov);

(2) over 125% up to and including 130% of ~~*normal voltage*~~*nominal voltage* for a period of at least 0.2 seconds after T(ov);

(3) over 120% up to and including 125% of ~~*normal voltage*~~*nominal voltage* for a period of at least 2~~.0~~ seconds after T(ov);

(4) over 115% up to and including 120% of ~~*normal voltage*~~*nominal voltage* for a period of at least 20~~.0~~ seconds after T(ov);

(5) over 110% up to and including115% of ~~*normal voltage*~~*nominal voltage* for a period of at least 20 minutes after T(ov);

(6) subject to paragraphs (e1) and (e3), 90% to 110% of ~~*normal voltage*~~*nominal voltage* continuously;

(7) below 90% down to and including ~~80% to 90%~~ of ~~*normal voltage*~~*nominal voltage* for a period of at least 10 seconds after T(uv); and

(8) below 80% down to and including 70% ~~70% to 80%~~ of ~~*normal voltage*~~*nominal voltage* for a period of at least 2 seconds after T(uv).~~,~~

~~where T(ov) means a point in time when the *voltage* at the *connection point* first varied above 110% of *normal voltage* before returning to between 90% and 110% of *normal voltage*, and T(uv) means a point in time when the *voltage* at the *connection point* first varied below 90% of *normal voltage* before returning to between 90% and 110% of *normal voltage*.~~

Minimum access standard

(b) The *minimum access standard* is a *schedule 5.2 plant ~~generating system or integrated resource system~~* ~~including all~~ and each of its operating *production units* and *synchronous condensers* must remain in ~~be capable of~~ *continuous*

uninterrupted operation where a *power system* disturbance causes the ~~*voltage*~~ voltage at the *connection point* to vary within the following ranges:

(1) 115% to 120% of ~~*normal voltage*~~*nominal voltage* for a period of at least 0.1 seconds after T(ov);

(2) 110% to 115% of ~~*normal voltage*~~*nominal voltage* for a period of at least 0.9 seconds after T(ov);

(3) subject to paragraphs (e1) and (e3), 90% to 110% of ~~*normal voltage*~~*nominal voltage* continuously, provided that the ratio of ~~*voltage*~~voltage to *frequency* (as measured at the *connection point* and expressed as a percentage of ~~*normal voltage*~~*nominal voltage* and a percentage of 50 Hz) does not exceed:

(i) a value of 1.15 for more than 2 minutes; or

(ii) a value of 1.10 for more than 10 minutes;

(4) 80% to 90% of ~~*normal voltage*~~*nominal voltage* for a period of at least 5 seconds after T(uv); and

(5) 70% to 80% of ~~*normal voltage*~~*nominal voltage* for a period of at least 2 seconds after T(uv)~~,~~.

~~where T(ov) means a point in time when the *voltage* at the *connection point* first varied above 110% of *normal voltage* before returning to between 90% and 110% of *normal voltage*, and T(uv) means a point in time when the *voltage* at the *connection point* first varied below 90% of *normal voltage* before returning to between 90% and 110% of *normal voltage*.~~

Negotiated access standard

(c) [**Deleted**]~~In negotiating a *negotiated access standard*, a *generating system* or *integrated resource system* and each of its operating *production units* must be capable of *continuous uninterrupted operation* for the range of *voltages* specified in the *automatic access standard*, except where *AEMO* and the *Network Service Provider* agree that the total change in the level of *active power* in the *power system* as a result of any *voltage* excursion within levels specified by the *automatic access standard* would not exceed 100 MW, or a greater limit based on what *AEMO* and the *Network Service Provider* both consider to be reasonable in the circumstances.~~

(c1) If the *nominal voltage* at the *connection point* is less than 66 kV with no automatic *tap-changing transformer* between the *schedule 5.2 plant's production units* or *synchronous condensers* and the *connection point*, the *Network Service Provider* and *AEMO* may agree to measure voltage variations under this clause S5.2.5.4 at a specified point other than the *connection point*, being the electrically closest location with a *nominal voltage* of 66 kV or above.

(d) [**Deleted**]~~In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.5.4, *AEMO* and the *Network Service Provider* must at a minimum, in addition to the requirements of clauses 5.3.4A(d1) and 5.3.4A(g) respectively, take into account:~~

~~(1) the expected performance of existing *networks* and *considered projects*; and~~

~~(2) the expected performance of existing *generating plant* and other relevant projects.~~

(e) [**Deleted**]

General requirements

(e1) Subject to paragraph (e2) and for the purposes of subparagraphs S5.2.5.4(a)(6) and S5.2.5.4(b)(3), for a variation of up to 10% of *connection point* voltage, within the range of 90% to 110% of *nominal voltage*:

(1) *active power* output at the *connection point* must not reduce; and

(2) *reactive power capability* must be maintained in accordance with the *performance standard* established under clause S5.2.5.1.

(e2) For the purpose of paragraph (e1):

(1) reliance on onload *tap-changing transformers*, *plant* switching and overload capability is permitted;

(2) a transient response to any voltage disturbance or any consequential tap change or *plant* switching is to be disregarded;

(3) expected *plant* responses (consistent with *good electricity industry practice*) to conditions that may accompany a voltage disturbance, such as a *frequency* deviation or phase angle change, are to be disregarded; and

(4) reductions in *active power* or *reactive power capability* (as applicable) are permitted to the extent reasonably attributed to energy source availability, losses and any other factors agreed with the *Network Service Provider* and *AEMO*.

(e3) For *connection point* voltage variations greater than 10%, within the range of 90% to 110% of *nominal voltage*, reasonable temporary reductions in *active power* output and *reactive power capability*, corrected by *tap-changing transformer* action, are permitted.

(f) The ~~*access performance* *standard*~~s must record ~~include~~ any operational arrangements necessary to ensure the *schedule 5.2 plant* ~~*generating system* or *integrated resource system* and each of its *production units*~~ will meet its agreed performance levels under abnormal *network* *or plant*~~, *generating system* or *integrated resource system*~~ conditions.

S5.2.5.5 Disturbance ride-through capability~~Response to disturbances following contingency events~~

(a) In this clause S5.2.5.5, a disturbance is taken to end when the voltage at the *connection point* recovers to within 90% to 110 % of *nominal voltage* and remains within that range for at least 20 milliseconds.~~a fault includes a fault of the relevant type having a metallic conducting path.~~

Automatic access standard

(b) The *automatic access standard* is the requirements of paragraphs (c) and (d).~~:~~

~~(1) for a *generating system* or *integrated resource system* and each of its *production units*, the requirements of paragraphs (c) and (d);~~

~~(2) for a *generating system* or (to the extent it comprises *production units*) an *integrated resource system* that in either case is comprised solely of *synchronous production units*, the requirements of paragraph (e);~~

~~(3) for a *generating system* or (to the extent it comprises *production units*) an *integrated resource system* that in either case is comprised solely of *asynchronous production units*, the requirements of paragraphs (f) to (i);~~

~~(4) for a *generating system* or (to the extent it comprises *production units*) an *integrated resource system* that in either case is comprised of *synchronous production units* and *asynchronous production units*:~~

~~(i) for that part of the *generating system* or *integrated resource system* comprised of *synchronous production units*, the requirements of paragraph (e); and~~

~~(ii) for that part of the *generating system* or *integrated resource system* comprised of *asynchronous production units*, the requirements of paragraphs (f) to (i).~~

~~All generating systems and integrated resource systems~~

(c) A *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ and each of its operating *production units* and *synchronous condensers* must remain in *continuous uninterrupted operation* for any disturbance caused by:

(1) a *credible contingency event*;

(2) a three phase fault in a *transmission system* cleared by all relevant primary *protection systems*;

(3) a two phase to ground, phase to phase or phase to ground fault in a *transmission system* cleared in:

(i) the longest time expected to be taken for a relevant *breaker fail protection system* to clear the fault; or

(ii) if a *protection system* referred to in subparagraph (i) is not installed, the greater of the time specified in column 4 of Table S5.1a.2 (or if none is specified, 430 milliseconds) and the longest time expected to be taken for all relevant primary *protection systems* to clear the fault; or

(4) a three phase, two phase to ground, phase to phase or phase to ground fault in a *distribution network* cleared in:

(i) the longest time expected to be taken for the *breaker fail protection system* to clear the fault; or

(ii) if a *protection system* referred to in subparagraph (i) is not installed, the greater of 430 milliseconds and the longest time expected to be taken for all relevant primary *protection systems* to clear the fault,

Provided that the event is not one that would *disconnect* the *plant* ~~*production unit*~~ from the *power system* by removing *network elements* from service.

(d) A *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ and each of its operating *production units* and *synchronous condensers* must remain in *continuous uninterrupted operation* for a series of up to 15 disturbances within any five minute period caused by any combination of the events described in paragraph (c) where:

(1) up to six of the disturbances cause the ~~*voltage*~~ voltage at the *connection point* to drop below 50% of ~~*normal voltage*~~ *nominal voltage*;

(2) in parts of the *network* where three-phase automatic reclosure is permitted, up to two of the disturbances are three phase faults, and otherwise, up to one three phase fault where ~~*voltage*~~ voltage at the *connection point* drops below 50% of ~~*normal voltage*~~ *nominal voltage*;

(3) up to one disturbance is cleared by a *breaker fail protection system* or similar back-up *protection system*;

(4) up to one disturbance causes the ~~*voltage*~~ voltage at the *connection point* to vary within the ranges under clause S5.2.5.4(a)(7) and (a)(8);

(5) the ~~minimum clearance from~~ time difference between the end of one disturbance and commencement of the next disturbance may be zero milliseconds; and

(6) all remaining disturbances are caused by faults other than three phase faults,

provided that none of the events would result in:

(7) the islanding of the *plant* ~~*generating system* or *integrated resource system*~~ or cause a material reduction in *power transfer capability* by removing *network elements* from service;

(8) the cumulative time that ~~*voltage*~~ voltage at the *connection point* is lower than 90% of ~~*normal voltage*~~ *nominal voltage* exceeding 1,800 milliseconds within any five minute period; ~~or~~

(9) the time integral, within any five minute period, of the difference between 90% of ~~*normal voltage*~~ *nominal voltage* and the ~~*voltage*~~ voltage at the *connection point* when the ~~*voltage*~~ voltage at the *connection point* is lower than 90% of ~~*normal voltage*~~ *nominal voltage* exceeding 1 pu second; or

(10) the *three phase fault level* at the *connection point* being lower than the minimum level for which the *plant* must be tuned, as specified by the *Network Service Provider* and determined as the higher of:

(i) the *three phase fault level* derived from the agreed *short circuit ratio* value recorded in the *performance standard* for clause S5.2.5.15; and

(ii) the *minimum three phase fault level* at the electrically closest *system strength node*, in combination with the single *network element outage* that would cause the greatest reduction in the *three phase fault level* at the *connection point*.

~~Synchronous generating systems and synchronous integrated resource systems~~

(e) [**Deleted**] ~~Subject to any changed *power system* conditions or energy source availability beyond the *Generator's* or *Integrated Resource Provider's* reasonable control, a *generating system* or (to the extent comprised of *production units*) *integrated resource system* that in either case is comprised of *synchronous production units*, in respect of the types of fault described in subparagraphs (c)(2) to (4), must supply to or absorb from the *network*:~~

~~(1) to assist the maintenance of *power system voltages* during the fault, capacitive reactive current of at least the greater of its pre-disturbance reactive current and 4% of the *maximum continuous current* of all operating *synchronous production units* of the *generating system* or *integrated resource system* (in the absence of a disturbance) for each 1% reduction (from the level existing just prior to the fault) of *connection point voltage* during the fault;~~

~~(2) after clearance of the fault, *reactive power* sufficient to ensure that the *connection point voltage* is within the range for *continuous uninterrupted operation* under clause S5.2.5.4; and~~

~~(3) from 100 milliseconds after clearance of the fault, *active power* of at least 95% of the level existing just prior to the fault.~~

~~Asynchronous generating systems and synchronous integrated resource systems~~

~~(f)~~

(f) [**Deleted**] ~~Subject to any changed *power system* conditions or energy source availability beyond the *Generator's* or *Integrated Resource Provider's* reasonable control, a *generating system* or (to the extent comprised of *production units*) *integrated resource system* that in either case is comprised of *asynchronous production units*, in respect of the types of fault described in subparagraphs (c)(2) to (4), must have *facilities* capable of supplying to or absorbing from the *network*:~~

~~(1) to assist the maintenance of *power system voltages* during the fault:~~

~~(i) capacitive reactive current in addition to its pre-disturbance level of at least 4% of the *maximum continuous current* of all operating *asynchronous production units* of the *generating system* or *integrated resource system* (in the absence of a disturbance) for each 1% reduction of *voltage* at the *connection point* below the relevant range in which a reactive current response must commence, as identified in subparagraph (g)(1), with the *performance standards* to record the required response agreed with *AEMO* and the *Network Service Provider*; and~~

~~(ii) inductive reactive current in addition to its pre-disturbance level of at least 6% of the *maximum continuous current* of all operating *asynchronous production units* of the *generating system* or *integrated resource system* (in the absence of a disturbance) for each 1% increase of *voltage* at the *connection point* above the relevant range in which a reactive current response must~~

commence, as identified in subparagraph (g)(1), with the *performance standards* to record the required response agreed with *AEMO* and the *Network Service Provider*,

during the disturbance and maintained until *connection point voltage* recovers to between 90% and 110% of *normal voltage*, or such other range agreed with the *Network Service Provider* and *AEMO*, except for *voltages* below the relevant threshold identified in paragraph (h); and

(2) from 100 milliseconds after clearance of the fault, *active power* of at least 95% of the level existing just prior to the fault.

(g) [**Deleted**] For the purpose of paragraph (f):

(1) the *generating system* or *integrated resource system* must commence a response when the *voltage* is in an under-voltage range of 85% to 90% or an over-voltage range of 110% to 115% of *normal voltage*. These ranges may be varied with the agreement of the *Network Service Provider* and *AEMO* (provided the magnitude of the range between the upper and lower bounds remains at Δ5%); and

(2) the reactive current response must have a *rise time* of no greater than 40 milliseconds and a *settling time* of no greater than 70 milliseconds and must be *adequately damped*.

(h) [**Deleted**] Despite paragraph (f), a *generating system* or *integrated resource system* is not required to provide a capacitive reactive current response in accordance with subparagraph (f)(1)(i) where:

(1) the *generating system* is directly *connected* to the *power system* with no step-up or *connection transformer*; and

(2) *voltage* at the *connection point* is 5% or lower of *normal voltage*.

(i) [**Deleted**] Subject to paragraph (h), despite the amount of reactive current injected or absorbed during *voltage* disturbances, and subject to thermal limitations and energy source availability, a *generating system* or *integrated resource system* must make available at all times:

(1) sufficient current to maintain rated apparent power of the *generating system* including all operating *generating units* (in the absence of a disturbance), for all *connection point voltages* above 115% (or otherwise, above the over-voltage range agreed in accordance with subparagraph (g)(1)); and

(2) the *maximum continuous current* of all operating *production units* of the *generating system* or *integrated resource system* (in the absence of a disturbance) for all *connection point voltages* below 85% (or otherwise, below the under-voltage range agreed in accordance with subparagraph (g)(1)),

except that *AEMO* and the *Network Service Provider* may agree limits on active current injection where required to maintain *power system security* and/or the quality of *supply* to other *Network Users*.

Minimum access standard

(j) The *minimum access standard* is the requirements of paragraphs (k) and (l).~~:~~

~~(1) for a *generating system* or *integrated resource system* and each of its *production units*, the requirements of paragraphs (k) and (l);~~

~~(2) for a *generating system* or (to the extent comprised of *production units*) an *integrated resource system* that in either case is comprised solely of *synchronous production units*, the requirements of paragraph (m);~~

~~(3) for a *generating system* or (to the extent comprised of *production units*) an *integrated resource system* that in either case is comprised solely of *asynchronous production units*, the requirements of paragraphs (n) to (p);~~

~~(4) for *generating system* or (to the extent comprised of *production units*) an *integrated resource system* that in either case is comprised of *synchronous production units* and *asynchronous production units*:~~

~~(i) for that part of the *generating system* or *integrated resource system* comprised of *synchronous production units*, the requirements of paragraph (m); and~~

~~(ii) for that part of the *generating system* or *integrated resource system* comprised of *asynchronous production units*, the requirements of paragraphs (n) to (p).~~

~~**All generating systems and integrated resource systems**~~

(k) A *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ and each of its operating *production units* and *synchronous condensers* must remain in *continuous uninterrupted operation* for any disturbance caused by:

(1) a *credible contingency event*; or

(2) a single phase to ground, phase to phase or two phase to ground fault in a *transmission system* or *distribution network* cleared in the longest time expected to be taken for all relevant primary *protection systems* to clear the fault, unless *AEMO* and the *Network Service Provider* agree that the total impact on the *power system* due to that fault would not exceed 100 MW, or a greater limit based on what *AEMO* and the *Network Service Provider* both consider to be reasonable in the circumstances,

~~P~~provided that the event is not one that would *disconnect* the *plant* ~~*production unit*~~ from the *power system* by removing *network elements* from service.

(l) A *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ and each of its operating *production units* and *synchronous condensers* must remain in *continuous uninterrupted operation* for a series of up to six disturbances within any five minute period caused by any combination of the events described in paragraph (k) where:

(1) up to three of the disturbances cause the ~~*voltage*~~voltage at the *connection point* to drop below 50% of ~~*normal voltage*~~*nominal voltage*;

(2) up to one disturbance causes the ~~*voltage*~~voltage at the *connection point* to vary within the ranges agreed by *AEMO* and the *Network Service*

Provider under clause S5.2.5.4(a)(7), (a)(8), (b)(4) or (b)(5) (as appropriate);

(3) the time difference between the ~~clearance~~ end of one disturbance and commencement of the next disturbance exceeds 200 milliseconds;

(4) no more than three of the disturbances occur within 30 seconds; and

(5) all disturbances are caused by faults other than three phase faults,

provided that none of the events would result in:

(6) the islanding of the *plant* ~~*generating system* or *integrated resource system*~~ or cause a material reduction in *power transfer capability* by removing *network elements* from service;

(7) the cumulative time that ~~*voltage*~~voltage at the *connection point* is lower than 90% of ~~*normal voltage*~~*nominal voltage* exceeding 1,000 milliseconds within any five minute period; ~~or~~

(8) the time integral, within any five minute period, of the difference between 90% of ~~*normal voltage*~~*nominal voltage* and the ~~*voltage*~~voltage at the *connection point* when the ~~*voltage*~~voltage at the *connection point* is lower than 90% of ~~*normal voltage*~~*nominal voltage* exceeding 0.5 pu second,

(9) the *three phase fault level* at the *connection point* being lower than the minimum level for which the *plant* must be tuned, as specified by the *Network Service Provider* and determined as the higher of:

(i) the *three phase fault level* derived from the agreed *short circuit ratio* value recorded in the *performance standard* for clause S5.2.5.15; and

(ii) the *minimum three phase fault level* at the electrically closest *system strength node*, in combination with the single *network element outage* that would cause the greatest reduction in the *three phase fault level* at the *connection point*; or

(10) a condition specified in the *performance standards* in accordance with paragraph (r2),

and there is a minimum of 30 minutes where no disturbances occur following a five minute period of multiple disturbances.

~~Synchronous generating systems and synchronous integrated resource systems~~

(m) [**Deleted**] ~~Subject to any changed *power system* conditions or energy source availability beyond the *Generator's* or *Integrated Resource Provider's* reasonable control after clearance of the fault, a *generating system* or *integrated resource system* comprised of *synchronous production units*, in respect of the types of fault described in subparagraph (k)(2) must:~~

~~(1) deliver *active power* to the *network*, and supply or absorb leading or lagging *reactive power*, sufficient to ensure that the *connection point voltage* is within the range for *continuous uninterrupted operation* agreed under clause S5.2.5.4; and~~

(2) return to at least 95% of the pre-fault *active power* level, after clearance of the fault, within a period of time agreed by the *Connection Applicant*, *AEMO* and the *Network Service Provider*.

Asynchronous generating systems and asynchronous integrated resource systems

(n) [**Deleted**] Subject to any changed *power system* conditions or energy source availability beyond the *Generator's* or *Integrated Resource Provider's* reasonable control, a *generating system* or (to the extent comprised of *production units*) *integrated resource system* that in either case is comprised of *asynchronous production units* must:

(1) for the types of fault described in subparagraph (k)(2), and to assist the maintenance of *power system voltages* during the fault, have *facilities* capable of supplying to or absorbing from the *network*:

(i) capacitive reactive current in addition to its pre-disturbance level of a percentage greater than 0% of the *maximum continuous current* of including all operating *asynchronous production units* of the *generating system* or *integrated resource system* (in the absence of a disturbance) for each 1% reduction of *voltage* at the *connection point* below the relevant point at which a reactive current response must commence, as identified in or agreed under paragraph (o)(1); and

(ii) inductive reactive current in addition to its pre-disturbance level of a percentage greater than 0% of the *maximum continuous current* of including all operating *asynchronous production units* of the *generating system* or *integrated resource system* (in the absence of a disturbance) for each 1% increase of *voltage* at the *connection point* above the relevant point at which a reactive current response must commence, as identified in or agreed under paragraph (o)(1),

during the disturbance and maintained until *connection point voltage* recovers to between 90% and 110% of *normal voltage*, or such other range agreed with the *Network Service Provider* and *AEMO*, except for *voltages* below the relevant threshold identified in paragraph (p); and

(2) return to at least 95% of:

(i) the pre-fault *active power* level; or

(ii) during a frequency disturbance, a level of *active power* level consistent with the *generating system's or integrated resource system's performance standard* under clause S5.2.5.11,

after clearance of the fault and recovery of positive sequence *voltage* at the *connection point* to remain between 90% and 110% of *normal voltage*, within a period agreed by the *Connection Applicant*, *AEMO* and the *Network Service Provider*, which period may differ according to the type of fault.

(o) [**Deleted**]For the purpose of paragraph (n):

(1) the *generating system* or *integrated resource system* must commence a response when the *voltage*:

(i) falls to a threshold of 80% of *normal voltage* or other percentage threshold agreed with *AEMO* and the *Network Service Provider*; or

(ii) increases to a threshold of 120% of *normal voltage* or other percentage threshold agreed with *AEMO* and the *Network Service Provider*,

and in each case may commence a response before the threshold is reached;

(2) **[Deleted]**;

(2A) the response initiating conditions must be agreed with *AEMO* and the *Network Service Provider*;

(3) the reactive current *rise time* must be no longer than 80 milliseconds or a longer time agreed to by the *Network Service Provider* and *AEMO*;

(4) the reactive current response must be adequately controlled;

(5) the reactive current response must commence within a period after the response initiating condition of:

(i) 40 milliseconds; or

(ii) a longer time agreed to by the *Network Service Provider* and *AEMO*; and

(6) the time when the reactive current response commences may be measured at either:

(i) the *connection point*; or

(ii) if agreed by the *Network Service Provider* and *AEMO*, the *production unit* terminals or a point between the *production unit* terminals and the *connection point*.

(o1) [**Deleted**]For the purposes of paragraphs (n) and (o), the *performance standards* must record:

(1) the range applicable for subparagraph (n)(1);

(2) the period agreed for subparagraph (n)(2), where applicable for each type of fault;

(3) for subparagraph (o)(1), the percentage thresholds;

(4) for subparagraph (o)(2A), the response initiating condition;

(5) for subparagraph (o)(3), the reactive current *rise time*;

(6) for subparagraph (o)(5), the required response time; and

(7) for subparagraph (o)(6), where the time of commencement is to be measured.

(p) [**Deleted**]Despite paragraph (n), a *generating system* or *integrated resource system* is not required to provide a capacitive reactive current response in accordance with subparagraph (n)(1)(i) where:

(1) *voltage* at the *connection point* is 15% or lower of *normal voltage*; or

(2) where the *generating system* or *integrated resource system* is directly *connected* to the *power system* with no step-up or *connection transformer*, *voltage* at the *connection point* is 20% or lower of *normal voltage*.

Provision of minimum access standard

(p1) [**Deleted**]For the purposes of providing *minimum access standards* under clauses 5.3.3(b1)(4) and S5.4B(b)(2) in respect of reactive current response, and for the purposes of clause 5.3.4A(b), a *Network Service Provider* may provide the times in paragraphs (o)(3) and (o)(5)(i) or other longer times it may be prepared to agree.

(p2) [**Deleted**]For the purposes of clause 5.3.4A, and subject to clauses 5.3.4A(b1) and 5.3.4A(b2), when proposing a *negotiated access standard* in respect of reactive current response, the *Connection Applicant* may propose the times in paragraphs (o)(3) and (o)(5)(i) or other longer times it is seeking to agree.

(p3) [**Deleted**]A *negotiated access standard* with a lower standard or longer time agreed to by the *Network Service Provider* and *AEMO* in accordance with paragraph (o) is taken to satisfy the requirements of clause 5.3.4A(b)(1) for a *negotiated access standard* to be no less onerous than the corresponding *minimum access standard* provided by the *Network Service Provider* under clauses 5.3.3(b1)(4) or S5.4B(b)(2).

Negotiated access standard

(q) [**Deleted**]In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.5.5, the *Network Service Provider* and *AEMO* must take into account, without limitation:

(1) the expected performance of:

(i) existing *networks* and *considered projects*;

(ii) existing *generating plant* and other relevant projects; and

(iii) *control systems* and *protection systems*, including auxiliary systems and *automatic reclose equipment*; and

(2) the expected range of *power system* operating conditions.

(r) A proposed *negotiated access standard* may be accepted if the *connection* of the *plant* at the proposed access level would not cause other *plant* to trip as a result of an event, when they would otherwise not have tripped for the same event.

(r1) In carrying out assessments of assessing proposed *negotiated access standards* under this clause S5.2.5.5 where the *Schedule 5.2 Participant Connection Applicant* has elected in accordance with clause 5.3.4B(b1) to pay the *system strength charge* in relation to the *connection*, the *Network Service Provider* and *AEMO* must take into account the performance required to be provided by the *System Strength Service Provider* at the relevant *system strength node* in accordance with clause S5.1.14.

(r2) A *negotiated access standard* may include:

(1) a specified *plant* limitation in respect of which the *Network Service Provider* and *AEMO* agree that the *schedule 5.2 plant* is not required to remain in *continuous uninterrupted operation* for a specified combination of *power system* disturbances or associated conditions; and

(2) the required response of the *schedule 5.2 plant* for each combination of *power system* disturbances or conditions specified under sub-paragraph (1), which should be as close to *continuous uninterrupted operation* as is reasonably practicable,

provided that any agreed *plant* limitations must not reduce the overall number of disturbances in a given period for which the *schedule 5.2 plant* is required to remain in *continuous uninterrupted operation* below the level specified in paragraph (l).

General requirements

All generating systems and integrated resource systems

(s) The *performance standard* must include any operational arrangements to ensure the *schedule 5.2 plant* ~~*generating system* or *integrated resource system* including all operating *generating units*~~ and all operating *bidirectional units* will meet its agreed performance levels under abnormal *network* or *plant* ~~*network, generating system* or *integrated resource system*~~ conditions.

(t) When assessing multiple disturbances, a fault that is re-established following operation of *automatic reclose equipment* shall be counted as a separate disturbance.

~~**Asynchronous generating systems and asynchronous integrated resource systems**~~

(u) [**Deleted**]~~For the purpose of paragraphs (f) and (n):~~

~~(1) the reactive current contribution may be limited to the *maximum continuous current* of all operating *asynchronous production units* of the *generating system* or *integrated resource system*;~~

~~(1A) the reactive current contribution must not contribute excessively to *voltage* rise on unfaulted phases during unbalanced faults;~~

~~(2) the reactive current contribution and *voltage* deviation described may be measured at a location other than the *connection point* (including within the relevant *generating system* or *integrated resource system*) where agreed with *AEMO* and the *Network Service Provider*, in which case the level of injection and absorption will be assessed at that agreed location;~~

~~(3) the reactive current contribution required may be calculated using phase to phase, phase to ground or sequence components of *voltages*. The ratio of the negative sequence to positive sequence components of the reactive current contribution must be agreed with *AEMO* and the *Network Service Provider* for the types of disturbances listed in this clause S5.2.5.5; and~~

~~(4) the *performance standards* must record:~~

~~(i) all conditions (which may include temperature) considered relevant by *AEMO* and the *Network Service Provider* under which the reactive current response is required; and~~

~~(ii) the maximum reactive current contribution to each phase.~~

~~Synchronous generating systems and synchronous integrated resource systems~~

(v) [**Deleted**]~~For a *generating system* or (to the extent comprised of *production units*) *integrated resource system* that in either case is comprised solely of *synchronous production units*, the reactive current contribution may be limited to 250% of the maximum continuous current of the *generating system* or *integrated resource system*.~~

(w) [**Deleted**]~~For a *synchronous production unit* within a *generating system* or *integrated resource system* (other than a *generating system* or *integrated resource system* described in paragraph (v)), the reactive current contribution may be limited to 250% of the maximum continuous current of that *synchronous production unit*.~~

S5.2.5.5A Responses to disturbances following contingency events

(a) This clause applies to *synchronous condensers* with the following modifications:

(1) paragraphs (d)(3) and (k)(2) do not apply, and there is no *access standard* requirement for the recovery of *active power* levels after a disturbance; and

(2) paragraph (k)(1) applies as if the words "deliver *active power* to the *network*, and" were deleted.

(b) In this clause S5.2.5.5A:

(1) **adequately controlled** means that the response of the *schedule 5.2 plant* to transient over-voltage or transient under-voltage achieves the agreed level of reactive current injection or absorption within the duration of the relevant disturbance, considering:

(i) expected positive and negative sequence reactive current response;

(ii) expected active current response; and

(iii) stable control when operating at and transitioning into and out of limits,

and does not cause or exacerbate:

(iv) voltages beyond the levels or durations specified in the *system standards* or (if more restrictive) agreed under clause S5.2.5.4; or

(v) voltage oscillations that could adversely affect the ability of other *schedule 5.2 plant* to remain in operation during the disturbance;

(2) **control objective** means, for balanced and unbalanced faults and transient over-voltages, to minimise the deviation of voltage on each

phase from pre-disturbance values, while maintaining stable control; and

(3) a disturbance (other than a *frequency* disturbance) is taken to end when the voltage at the *connection point* recovers to within 90% to 110 % of *nominal voltage* and remains within that range for at least 20 milliseconds.

Automatic access standard

(c) The *automatic access standard* is:

(1) for a *schedule 5.2 plant* to the extent it comprises *synchronous production units* and *synchronous condensers*, the requirements of paragraphs (ed) and (e); and

(2) for a *production system* to the extent it comprises *asynchronous production units*, the requirements of paragraphs (f) to (i).

Synchronous plant only

(d) Subject to paragraph (e), a *schedule 5.2 plant* for disturbances caused by a type of fault described in clause S5.2.5.5(c)(2) to (4), must:

(1) to assist the maintenance of *power system* voltages during the disturbance, supply or absorb capacitive reactive current at the *connection point*, in addition to its pre-disturbance reactive current, of 4% of the *maximum continuous current* of all operating *synchronous production units* and *synchronous condensers* (in the absence of a disturbance) for each 1% reduction (from the level existing just prior to the disturbance) of *connection point* voltage during the disturbance;

(2) after clearance of the fault, supply or absorb *reactive power* at the *connection point*, sufficient to ensure that the *connection point* voltage is within the range for *continuous uninterrupted operation* under clause S5.2.5.4; and

(3) within 100 milliseconds after the end of the disturbance, reach at least 95% of:

(i) the pre-disturbance *active power* level; or

(ii) during a *frequency* disturbance, a level of *active power* consistent with the *performance standard* established under clause S5.2.5.11 and the operation of the *plant* in accordance with clause 4.4.2(c1).

(e) A *schedule 5.2 plant* is not required to provide a response under paragraph (d) to the extent it is prevented from doing so by changed *power system* conditions or energy source availability beyond the *Schedule 5.2 Participant's* reasonable control.

Asynchronous plant only

(f) Subject to paragraph (h), a *schedule 5.2 plant*, for disturbances caused by a type of fault described in clause S5.2.5.5(c)(2) to (4), must:

(1) to assist the maintenance of *power system* voltages during the disturbance, have *facilities* capable of supplying or absorbing at the *connection point*:

(i) capacitive reactive current in addition to its pre-disturbance level of at least 4% of the *maximum continuous current* of all operating *asynchronous production units* (in the absence of a disturbance) for each 1% reduction of positive sequence voltage at the *connection point* below the voltage at which the reactive current response commences;

(ii) inductive reactive current in addition to its pre-disturbance level of at least 6% of the *maximum continuous current* of all operating *asynchronous production units* (in the absence of a disturbance) for each 1% increase of positive sequence voltage at the *connection point* above the relevant percentage of *nominal voltage* at which the reactive current response commences; and

(iii) negative sequence current or equivalent contributions to oppose unbalanced voltages during a disturbance,

Note

Active current is considered in addition to reactive current, as active current affects voltage for low X/R ratios.

with the required responses (within the range of capabilities expressed in this paragraph (f)(1)) to be agreed with the *Network Service Provider* and *AEMO* at levels consistent with achieving the control objective;

(2) substantially maintain a response required under sub-paragraph (1) until the end of the disturbance, or until another point agreed with the *Network Service Provider* and *AEMO*; and

(3) within 100 milliseconds after the end of the disturbance, reach at least 95% of:

(i) the pre-disturbance *active power* level; or

(ii) during a *frequency* disturbance, a level of *active power* consistent with the *performance standard* established under clause S5.2.5.11 and the operation of the *plant* in accordance with clause 4.4.2(c1).

(g) For the purpose of paragraph (f):

(1) the *schedule 5.2 plant* must commence the required response when or before the voltage reaches:

(i) for an under-voltage disturbance, 85% of *nominal voltage*; or

(ii) for an over-voltage disturbance, 115% of *nominal voltage*,

with the specific response initiating conditions being agreed with the *Network Service Provider* and *AEMO*, consistent with achieving the control objective; and

(2) the reactive current response opposing the voltage change must commence within 10 milliseconds of the response initiating conditions

being met, be adequately controlled and, for a step-like voltage profile at the *connection point*, have a *rise time* of no greater than 40 milliseconds.

(h) A *schedule 5.2 plant*:

(1) is not required to provide a response under paragraph (f) to the extent it is prevented from doing so by changed *power system* conditions or energy source availability beyond the *Schedule 5.2 Participant's* reasonable control; and

(2) is not required to provide a capacitive reactive current response in accordance with subparagraph (f)(1)(i) where:

(i) the *plant* is directly *connected* to the *power system* with no step-up or *connection transformer*; and

(ii) voltage at the *connection point* is 5% or lower of *nominal voltage*.

(i) Subject to paragraph (h), despite the amount of reactive current injected or absorbed during voltage disturbances, a *schedule 5.2 plant* must make available at all times:

(1) sufficient current to maintain rated apparent power of all operating *asynchronous production units* (in the absence of a disturbance), for all *connection point* voltages above 115% of *nominal voltage*; and

(2) the *maximum continuous current* of all operating *asynchronous production units* (in the absence of a disturbance) for all *connection point* voltages below 85% of *nominal voltage*,

except that *AEMO* and the *Network Service Provider* may agree limits on active current injection where required to maintain *power system security* and/or the quality of *supply* to other *Network Users*.

Minimum access standard

(j) The *minimum access standard* is:

(1) for a *schedule 5.2 plant* to the extent it comprises *synchronous production units* or *synchronous condensers*, the requirements of paragraph (k) and (l); and

(2) for a *production system* to the extent it comprises *asynchronous production units*, the requirements of paragraphs (m) to (o).

Synchronous plant only

(k) Subject to paragraph (l), a *schedule 5.2 plant*, for disturbances caused by a type of fault described in clause S5.2.5.5(k)(2), must:

(1) after clearance of the fault, deliver *active power* to the *network*, and supply or absorb leading or lagging *reactive power*, sufficient to ensure that the *connection point* voltage is within the range for *continuous uninterrupted operation* agreed under clause S5.2.5.4; and

(2) within a period after the end of the disturbance agreed with the *Network Service Provider* and *AEMO* (which period may differ according to the type of fault and should account for expected *plant*

responses (consistent with *good electricity industry practice*), to conditions that may accompany a voltage disturbance, such as a *frequency* deviation or phase angle change), reach at least 95% of:

(i) the pre-disturbance *active power* level; or

(ii) during a *frequency* disturbance, a level of *active power* consistent with the *performance standard* established under clause S5.2.5.11 and the operation of the *plant* in accordance with clause 4.4.2(c1).

(l) A *schedule 5.2 plant* is not required to provide a response under paragraph (k) to the extent it is prevented from doing so by changed *power system* conditions or energy source availability beyond the *Schedule 5.2 Participant's* reasonable control.

Asynchronous plant only

(m) Subject to paragraph (o), a *schedule 5.2 plant*, for disturbances caused by a type of fault described in clause S5.2.5.5(k)(2), must:

(1) to assist the maintenance of *power system* voltages during the fault disturbance, have *facilities* capable of supplying or absorbing at the *connection point*:

(i) capacitive reactive current in addition to its pre-disturbance level of a percentage greater than 0% of the *maximum continuous current* of all operating *asynchronous production units* (in the absence of a disturbance) for each 1% reduction of voltage at the *connection point* below the relevant point at which a reactive current response must commence, as identified in or agreed under paragraph (n)(1); and

(ii) inductive reactive current in addition to its pre-disturbance level of a percentage greater than 0% of the *maximum continuous current* of all operating *asynchronous production units* (in the absence of a disturbance) for each 1% increase of voltage at the *connection point* above the relevant point at which a reactive current response must commence, as identified in or agreed under paragraph (n)(1),

with the required responses (within the range of capabilities expressed in this paragraph (m)(1)) to be agreed with the *Network Service Provider* and *AEMO* at levels consistent with achieving the control objective, and without contributing excessively to voltage rise on unfaulted phases during unbalanced faults;

(2) substantially maintain a response required under sub-paragraph (1) until the end of the disturbance, or until another point agreed with the *Network Service Provider* and *AEMO*; and

(3) within a period after the end of the disturbance agreed with the *Network Service Provider* and *AEMO* (which period may differ according to the type of fault and should account for expected *plant* responses (consistent with *good electricity industry practice*), to

conditions that may accompany a voltage disturbance, such as a *frequency* deviation or phase angle change), reach at least 95% of:

(i) the pre-disturbance *active power* level; or

(ii) during a *frequency* disturbance, a level of *active power* consistent with the *performance standard* established under clause S5.2.5.11 and the operation of the *plant* in accordance with clause 4.4.2(c1).

(n) For the purpose of paragraph (m):

(1) the *schedule 5.2 plant* must commence a response when or before the voltage reaches:

(i) for under-voltage, 80% of *nominal voltage* or another percentage agreed with *AEMO* and the *Network Service Provider*; or

(ii) for over-voltage, 120% of *nominal voltage* or another percentage agreed with *AEMO* and the *Network Service Provider*,

with the specific response initiating conditions being agreed with the *Network Service Provider* and *AEMO*, consistent with achieving the control objective;

(2) the reactive current *rise time* must be no longer than 80 milliseconds or a longer time agreed with the *Network Service Provider* and *AEMO*;

(3) the reactive current response must be adequately controlled;

(4) the reactive current response opposing the voltage disturbance must commence within 40 milliseconds of the response initiating conditions being met, or a longer period agreed with the *Network Service Provider* and *AEMO*.

(o) A *schedule 5.2 plant*:

(1) is not required to provide a response under paragraph (m) to the extent it is prevented from doing so by changed *power system* conditions or energy source availability beyond the *Schedule 5.2 Participant's* reasonable control; and

(2) is not required to provide a capacitive reactive current response in accordance with subparagraph (m)(1)(i) where:

(i) voltage at the *connection point* is 15% or lower of *nominal voltage*; or

(ii) the *schedule 5.2 plant* is directly *connected* to the *power system* with no step-up or *connection transformer*, and voltage at the *connection point* is 20% or lower of *nominal voltage*.

Provision of minimum access standard

(p) For the purposes of providing *minimum access standards* under clauses 5.3.3(b1)(4) and S5.4B(b)(2) in respect of reactive current response, and for the purposes of clause 5.3.4A(b), a *Network Service Provider* may provide

the times in paragraphs (n)(2) and (n)(4) or other longer times it may be prepared to agree.

(q) For the purposes of clause 5.3.4A, and subject to clauses 5.3.4A(b1) and (b2), when proposing a *negotiated access standard* in respect of reactive current response, the *Schedule 5.2 Participant* may propose the times in paragraphs (n)(2) and (n)(4) or other longer times it is seeking to agree.

General requirements

(r) The *performance standard* must include any operational arrangements to ensure the *schedule 5.2 plant* will meet its agreed performance levels under abnormal *network* or *plant* conditions.

(s) In respect of reactive current response:

(1) for a *schedule 5.2 plant* to the extent it comprises *asynchronous production units*:

(i) the reactive current contribution may be limited to the *maximum continuous current* of its operating *asynchronous production units*; and

(ii) the reactive current response commencement time and *rise time* may be measured at a location other than the *connection point* (including within the *schedule 5.2 plant*) where agreed with the *Network Service Provider* and *AEMO*;

(2) for any *schedule 5.2 plant*, the reactive current contribution and voltage deviation may be measured at a location other than the *connection point* (including within the *schedule 5.2 plant*) where agreed with *AEMO* and the *Network Service Provider*, in which case the required injection and absorption will be calculated for that agreed location, at levels consistent with the *access standard* at the *connection point*; and

(3) for a *schedule 5.2 plant* to the extent it comprises *synchronous production units* or *synchronous condensers*, the reactive current contribution may be limited to 250% of the *maximum continuous current* of its operating *synchronous production units* or *synchronous condensers*.

(t) The *performance standards* must record, as applicable to the *schedule 5.2 plant*:

(1) the response to balanced and unbalanced faults and balanced and unbalanced transient over-voltages, which may be different for different types of disturbance, including:

(i) the positive sequence reactive current response as a function of positive sequence voltage deviation and the negative sequence current response as a function of negative sequence voltage deviation; or

(ii) the reactive current response, on a per phase (or phase to phase) basis as a function of voltage deviation per phase (or phase to phase); or

(iii) another method agreed with the *Network Service Provider* that describes the response effectively and concisely; and

(iv) the method of prioritising response on reaching a current limit, such as active current versus reactive current priority or positive sequence versus negative sequence current priority;

(2) for subparagraph (f)(1) or (m)(1), the range of response capabilities of the *facilities*, the required reactive current responses and any agreed point or voltage range for maintaining a response;

(3) for subparagraph (f)(2), (k)(2), (m)(2) or (m)(3), any agreed periods;

(4) for subparagraph (g)(1) or (n)(1), the response initiating conditions;

(5) for a *negotiated access standard*, the reactive current response commencement time and *rise time*;

(6) for subparagraphs (s)(1)(iii) and (s)(2), any agreed locations;

(7) all conditions (which may include temperature) considered relevant by *AEMO* and the *Network Service Provider* under which the reactive current response is required; and

(8) the maximum reactive current contribution to each phase.

S5.2.5.6 Response to abnormal voltage quality ~~Quality of electricity generated and continuous uninterrupted operation~~

Minimum access standard

The *minimum access standard* is a *schedule 5.2 plant* ~~*generating system* and an *integrated resource system*~~ including each of its operating *production units*, *synchronous condensers* and *reactive plant*, must not *disconnect* from the *power system* as a result of ~~*voltage*~~ voltage fluctuation, harmonic ~~*voltage*~~ voltage distortion and ~~*voltage*~~ voltage unbalance conditions at the *connection point* within the levels specified in clauses S5.1a.5, S5.1a.6 and S5.1a.7.

S5.2.5.7 Partial load rejection for synchronous generation

(a0) This clause applies only to *synchronous production units*, and to a *production system* only to the extent of its *synchronous production units* (if any).

(a) In ~~For the purposes of~~ this clause S5.2.5.7 ~~**minimum generation** means minimum *sent out generation* for continuous stable operation.~~, a **relevant system** means a *production system* having *synchronous production units* with a combined *nameplate rating* equal to or more than the lower of:

(1) 30 MW; or

(2) the amount (in MW) that is 5% of any maximum *credible contingency event* size specified in the *frequency operating standard* for the relevant *region*.

(b) [**Deleted**]

Automatic access standard

(c) The *automatic access standard* is a relevant system ~~*generating system* or an *integrated resource system*~~ must ~~be capable of~~ remain in *continuous*

uninterrupted operation during and following a *power system load* reduction of 30% ~~from its pre-disturbance level~~ or equivalent impact from separation of part of the *power system* in less than 10 seconds, provided that the combined *loading level* of the operating *synchronous production units* remains above their combined minimum operating level~~minimum generation~~.

Minimum access standard

(d) The *minimum access standard* is a relevant system ~~*generating system* or an *integrated resource system*~~ must ~~be capable of~~ remain in *continuous uninterrupted operation* during and following a *power system load* reduction of 5% or equivalent impact from separation of part of the *power system* in less than 10 seconds provided that the combined *loading level* of the operating *synchronous production units* remains above their combined *minimum operating level*~~minimum generation~~.

~~**[Deleted]**~~

(e) [**Deleted**]

(f) [**Deleted**]

General requirements

(g) The agreed partial load rejection performance must be recorded in the *performance standards*.

(h) A relevant system is permitted to vary its *active power* and *reactive power* to the extent required to oppose a voltage variation or *frequency* variation.

S5.2.5.8 Protection from power system disturbances

(a0) Paragraphs (a)(1), (b)(1), (b1), (b2) and (b3) of this clause S5.2.5.8 do not apply to *synchronous condensers*.

(a00) In this clause S5.2.5.8:

(1) **droop** has the meaning given in clause S5.2.5.11(a);

(2) a **relevant system** means a *production system* or (where applicable) a *synchronous condenser system*, having *production units* or *synchronous condensers* respectively with a combined *nameplate rating* equal to or more than the lower of:

(i) 30 MW or 30 MVA (as applicable); or

(ii) the amount (in MW or MVA as applicable) that is 5% of any maximum *credible contingency event* size specified in the *frequency operating standard* for the relevant *region*.

~~**Minimum access standard**~~

~~(a) The *minimum access standard* is:~~

~~(1) subject to subparagraph (2) and paragraph (e), for a *generating system* or *integrated resource system* or any of its *production units* that is required by a *Generator*, *Integrated Resource Provider* or *Network Service Provider* to be automatically *disconnected* from the *power system* in response to abnormal conditions arising from the *power*~~

~~*system*, the relevant *protection system* or *control system* must not *disconnect* the *generating system* or *integrated resource system* for:~~

~~(i) conditions for which it must remain in *continuous uninterrupted operation*; or~~

~~(ii) conditions it must withstand under the *Rules*; and~~

~~(2) a relevant system (as defined in paragraph (a1)) *connected* to a *transmission system* must have *facilities* to automatically and rapidly reduce its *generation*:~~

~~(i) by at least half, if the *frequency* at the *connection point* exceeds a level nominated by *AEMO* (not less than the upper limit of the *operational frequency tolerance band*) and the duration above this *frequency* exceeds a value nominated by *AEMO* where the reduction may be achieved:~~

~~(A) by reducing the output of the *generating system* or *integrated resource system* within 3 seconds, and holding the output at the reduced level until the *frequency* returns to within the *normal operating frequency band*; or~~

~~(B) by disconnecting the *generating system* or *integrated resource system* from the *power system* within 1 second; or~~

~~(ii) in proportion to the difference between the *frequency* at the *connection point* and a level nominated by *AEMO* (not less than the upper limit of the *operational frequency tolerance band*), such that the *generation* is reduced by at least half, within 3 seconds of the *frequency* reaching the upper limit of the *extreme frequency excursion tolerance limits*.~~

~~(a1) For subparagraph (a)(2), a relevant system means any of the following:~~

~~(1) a *generating system* with a *nameplate rating* of 30MW or more;~~

~~(2) a *generating system* comprised of *generating units* with a combined *nameplate rating* of 30 MW or more;~~

~~(3) an *integrated resource system* that (to the extent it comprises *bidirectional units*) is comprised of *bidirectional units* with a combined *nameplate rating* of 5 MW or more; and~~

~~(4) an *integrated resource system* that (to the extent it comprises *generating units*) is comprised of *generating units* with a combined *nameplate rating* of 30 MW or more.~~

~~[Deleted]~~

~~(b) [**Deleted**]~~

Automatic access standard

(a) The *automatic access standard* is the requirements of paragraphs (a1) and (a2).

(a1) A relevant system must have an automatic droop response to an increase in *frequency* at the *connection point*, so as to have reduced the *active power*

output of the relevant system from the level of output had there been no *frequency* disturbance, by:

(1) at least 50%; or

(2) if applicable, such lesser amount as is required to maintain the *minimum operating level* of its operating *production units*;

before the expiry of 3 seconds after the *frequency* reaches a level that is 0.5 Hz below the upper limit of the *extreme frequency excursion tolerance limits*, for a rate of change of *frequency* up to the maximum established for its *performance standard* under clause S5.2.5.3.

(a2) Any voltage-related *protection systems* must not act to *disconnect* the relevant system or any of its operating *production units* within 20 milliseconds of an over-voltage disturbance at the *connection point*.

Minimum access standard

(b) The *minimum access standard* is a relevant system must automatically *disconnect* operating *production units* so as to reduce *active power* output from the level of output had there been no *frequency* disturbance, by:

(1) at least 50% within 3 seconds; or

(2) a lesser amount or longer period agreed with the *Network Service Provider* and *AEMO*,

if the *frequency* at the *connection point* exceeds a level nominated by *AEMO* (above the upper limit of the *normal operating frequency band*) for a duration nominated by *AEMO*.

Negotiated access standard

(b1) A proposed *negotiated access standard* for a relevant system may be accepted only to the extent that physical *plant* limitations prevent compliance with the *automatic access standard* in paragraph (a)(1).

(b2) For the purposes of paragraph (b1), a *negotiated access standard* may include:

(1) a reasonable reduction of less than 50% or a reasonable period in excess of 3 seconds to achieve a reduction in *generation* proportional to the *frequency* deviation; or

(2) a requirement to reduce *active power* output by a reasonable amount within a reasonable period after the *frequency* has exceeded a level nominated by *AEMO* (above the upper limit of the *normal operating frequency band*) for a duration nominated by *AEMO*, and hold output at the reduced level until the *frequency* returns to within the *normal operating frequency band*.

(b3) In determining a reasonable time period or reduction amount under paragraph (b2), the *Schedule 5.2 Participant*, the *Network Service Provider* and *AEMO* must have regard to the maximum rate of change of *frequency* established for the *plant's performance standard* under clause S5.2.5.3, in addition to physical *plant* limitations.

(b4) A reduction in *active power* output should generally be achieved by fast ramping in preference to *disconnection* of *production units*.

General requirements

(b5) The *schedule 5.2 plant's* protection settings must be set:

(1) so that the *plant* remains in operation as required under the *performance standards* relevant to the type of protection; and

(2) except as otherwise required by *AEMO* or the *Network Service Provider*, to maximise the *plant's* capability to remain in operation for abnormal *power system* conditions for which the *plant* is not required to *disconnect* under any *performance standard*, while maintaining safe and stable operation of the *plant* within safety margins consistent with *good electricity industry practice*.

Note

While a *schedule 5.2 plant* is permitted to *disconnect* for conditions that exceed the requirements for it to remain in *continuous uninterrupted operation* under any one or more of clauses SS5.2.5.3, S5.2.5.4, S5.2.5.5, S5.2.5.6 or S5.2.5.7, sub-paragraph (2) confirms that protection settings should allow for operation beyond those limits where reasonable. This does not affect other requirements to *disconnect* that may apply, for example, to the provision of *ancillary services*.

(b6) Vector shift protection or similar protective functions must not operate for phase shifts less than 20 degrees.

(c) *AEMO* or the *Network Service Provider* may require that the *performance standard* ~~an access standard~~ include a requirement for the *schedule 5.2 plant* ~~generating system or integrated resource system~~ to be automatically *disconnected* by a local or remote control scheme whenever the part of the *network* to which it is *connected* has been *disconnected* from the *national grid*, forming an island that *supplies load*.

(d) The *performance standards* must record any ~~access standard must include specification of~~ conditions for which the *schedule 5.2 plant*: ~~generating unit, generating system, bidirectional unit or integrated resource system~~

(1) must trip , where it would otherwise be required to remain in *continuous uninterrupted operation*; or ~~and~~

(2) must not trip, where it would otherwise be permitted to trip,

considering the arrangements described under paragraph (e)..

(e) Notwithstanding clauses S5.2.5.3, S5.2.5.4, S5.2.5.5, S5.2.5.6 and S5.2.5.7, a *schedule 5.2 plant* ~~generating system or integrated resource system~~ may be automatically *disconnected* from the *power system* under any of the following conditions:

(1) in accordance with an *ancillary services agreement* between the *Schedule 5.2 Participant*~~Generator or Integrated Resource Provider~~ and *AEMO* or a *Network Service Provider*;

(2) where a ~~source of~~ *load* that is not part of the *schedule 5.2 plant* ~~generating system or integrated resource system~~ has the same *connection point* as the *schedule 5.2 plant* ~~generating system~~ and

AEMO and the *Network Service Provider* agree that the *disconnection* would in effect be under-frequency *load shedding*;

(3) where the *schedule 5.2 plant ~~generating system or integrated resource system~~* is automatically *disconnected* under its *performance standard* for this clause S5.2.5.8~~paragraph (a)~~, clause S5.2.5.9 or clause S5.2.5.10; ~~or by an *emergency frequency control scheme*;~~

(4) where the *schedule 5.2 plant ~~generating system or integrated resource system~~* is automatically *disconnected* by an *emergency frequency control scheme*; ~~under clause S5.2.5.10; or~~

(5) in accordance with an agreement between the *Schedule 5.2 Participant ~~Generator or Integrated Resource Provider~~* and a *Network Service Provider* (including an agreement in relation to an emergency control scheme under clause S5.1.8) to provide a service that *AEMO* agrees is necessary to maintain or restore *power system security* in the event of a specified *contingency event*; or

(6) where required for a special protection scheme, or run-back scheme established by a *Network Service Provider*, with the agreement of *AEMO*.

(f) [**Deleted**]~~The *Network Service Provider* is not liable for any loss or damage incurred by the *Generator* or *Integrated Resource Provider* or any other person as a consequence of a fault on either the *power system*, or within the *Generator's* or *Integrated Resource Provider's facility*.~~

S5.2.5.9 Protection systems that impact on power system security

Automatic access standard

(a) The *automatic access standard* is:

(1) subject to clauses S5.1.9(k) and S5.1.9(l), primary *protection systems* must be provided to *disconnect* from the *power system* any faulted element in a *schedule 5.2 plant ~~generating system or integrated resource system~~* and in protection zones that include the *connection point* within the applicable *fault clearance time* determined under clause S5.1.9(a)(1);

(2) each primary *protection system* must have sufficient redundancy to ensure that a faulted element within its protection zone is *disconnected* from the *power system* within the applicable *fault clearance time* with any single protection element (including any communications *facility* upon which that *protection system* depends) out of service; and

(3) *breaker fail protection systems* must be provided to clear faults that are not cleared by the circuit breakers controlled by the primary *protection system* within the applicable *fault clearance time* determined under clause S5.1.9(a)(1).

(b) In relation to an *automatic access standard* under this clause S5.2.5.9, the *Schedule 5.2 Participant ~~Generator or Integrated Resource Provider~~* must provide redundancy in the primary *protection systems* under paragraph (a)(2) and provide *breaker fail protection systems* under paragraph (a)(3) if *AEMO*

or the *Network Service Provider* consider that a lack of these *facilities* could result in:

(1) a material adverse impact on *power system security* or quality of *supply* to other *Network Users*; or

(2) a reduction in *inter-regional* or *intra-regional power transfer capability*,

through any mechanism including:

(3) consequential tripping of, or damage to, other *network* equipment or *facilities* of other *Network Users*, that would have a *power system security* impact; or

(4) instability that would not be detected by other *protection systems* in the *network*.

Minimum access standard

(c) The *minimum access standard* is:

(1) subject to clauses S5.1.9(k) and S5.1.9(l), *protection systems* must be provided to *disconnect* from the *power system* any faulted element within a *schedule 5.2 plant ~~generating system or integrated resource system~~* and in protection zones that include the *connection point* within the applicable *fault clearance time* determined under clause S5.1.9(a)(2); and

(2) if a *fault clearance time* determined under clause S5.1.9(a)(2) for a protection zone is less than 10 seconds, a *breaker fail protection system* must be provided to clear from the *power system* any fault within that protection zone that is not cleared by the circuit breakers controlled by the primary *protection system* within the applicable *fault clearance time* determined under clause S5.1.9(a)(3).

[Deleted]

(d) [**Deleted**]

General requirements

(e) The *Network Service Provider* and the *Schedule 5.2 Participant ~~Generator or Integrated Resource Provider~~* must cooperate in the design and implementation of *protection systems* to comply with this clause S5.2.5.9, including cooperation on:

(1) the use of *current transformer* and voltage*~~voltage~~ transformer* secondary circuits (or equivalent) of one party by the *protection system* of the other;

(2) tripping of one party's circuit breakers by a *protection system* of the other party; and

(3) co-ordination of *protection system* settings to ensure inter-operation.

(f) The *protection system* design referred to in paragraphs (a) and (c) must:

(1) be coordinated with other *protection systems*;

(2) avoid consequential *disconnection* of other *Network Users' facilities*; and

(3) take into account existing obligations of the *Network Service Provider* under *connection agreements* with other *Network Users*.

S5.2.5.10 ~~Protection to trip plant for~~ Detection and response to unstable operation

Automatic access standard

(a) The *automatic access standard* is a *schedule 5.2 plant* ~~*generating system* and an *integrated resource system*~~ must ~~have~~:

(1) for its *synchronous production units* and *synchronous condensers*, have, a *protection system* to *disconnect* ~~it~~ units promptly when a condition that would lead to pole slipping is detected, to prevent pole slipping or other conditions where a ~~*production unitt*~~ *unit* causes *active power*, *reactive power* or ~~*voltage*~~ voltage at the *connection point* to become unstable as assessed in accordance with the *power system* stability guidelines established under clause 4.3.4(h); ~~and~~

(2) for its *asynchronous production units*:~~, a *protection system* to *disconnect* it promptly for conditions where the *active power*, *reactive power* or *voltage* at the *connection point* becomes unstable as assessed in accordance with the guidelines for *power system* stability established under clause 4.3.4(h).~~

(i) have *facilities* to detect instability in voltage, *reactive power* and *active power* at the *connection point*;

(ii) have *facilities* capable of *disconnecting* units for unstable behaviour, with configurable enablement conditions and settings agreed with the *Network Service Provider* and *AEMO*; and

(iii) on detection of instability, execute a hierarchy of actions based on configurable trigger conditions, thresholds and timeframes agreed with the *Network Service Provider* and *AEMO*, where:

(A) any hierarchy of actions that includes *disconnection* of units must account for available automated information on the *plant's* contribution to the instability; and

(B) actions are automatically and promptly executed; and

(3) for a *production system* with *active power capability* of 100 MW or more or a *synchronous condenser system* of 100MVA or more, have:

(i) access to a phasor measurement unit with capability to send data for the system to *AEMO* and the *Network Service Provider*; and

(ii) the capability to receive information from *AEMO* relating to the system's contribution to instability, when available, in a form nominated by *AEMO*.

Minimum access standard

(b) The *minimum access standard* is: ~~a *generating system* or an *integrated resource system* must not cause a *voltage* disturbance at the *connection point* due to sustained unstable behaviour of more than the maximum level specified in Table 7 of *Australian Standard* AS/NZS 61000.3.7:2001.~~

(1) a *schedule 5.2 plant* that, under normal or planned *outage* conditions of the *power system* and considering the range of *reactive power* and *active power* capability established under clause S5.2.5.1, can change voltage at its *connection point* by more than 1% from the voltage with the *plant* not electrically *connected*, must have:

(i) *facilities* to detect instability in voltage, *reactive power* and where relevant *active power* at the *connection point*;

(ii) for its *asynchronous production units*, a process to manage instability promptly on detection, in a manner to be agreed with the *Network Service Provider* and *AEMO*; and

(iii) for its *synchronous production units* or *synchronous condensers*, a *protection system* to disconnect the *plant* for sustained pole slipping if required by the *Network Service Provider* or *AEMO*; and

(2) a *production system* with *active power capability* of 100 MW or more, or a *synchronous condenser system* having *synchronous condensers* with a combined *nameplate rating* of 100 MVA or more, must have:

(i) if required by the *Network Service Provider* or *AEMO*, access to a phasor measurement unit with capability to send data for the system to *AEMO* and the *Network Service Provider*; and

(ii) if required by *AEMO*, the capability to receive information from *AEMO* relating to the system's contribution to instability, when available, in a form nominated by *AEMO*.

~~Negotiated access standard~~General requirements

(c) The hierarchy of actions under paragraph (a)(2)(iii) or process under paragraph (b)(1)(ii) must prioritise measures to eliminate the instability over *disconnecting* the *plant*.

(d) Requirements and capabilities referable to instability are to be determined having regard to the *power system* stability guidelines *published* under clause 4.3.4(h).

(e) If required by the *Network Service Provider* or *AEMO*, a *schedule 5.2 plant* must have the capability to communicate information from its detection system to their respective *control centres*.

(f) If required by the *Network Service Provider*, a *schedule 5.2 plant* must have the capability to receive a remote tripping signal from the *Network Service Provider*.

~~(c) If the *Network Service Provider* and the *Generator* agree, a *protection system* may also trip any other part of the *generating system* or *integrated resource system* to cease the instability.~~

(d) Notwithstanding paragraph (c), a *protection system* must be provided in the *access standard* to trip the affected *production unit* where:

(1) the *Network Service Provider* considers it necessary to prevent consequential tripping of, or damage to, other *production units*, *network* equipment or other *Network Users' facilities*, or

(2) *AEMO* considers it necessary to prevent unstable operation having an adverse impact on *power system security*.

S5.2.5.11 Frequency control

(a0) This clause does not apply to *synchronous condensers*.

(a) For the purpose of this clause S5.2.5.11:

droop means, in relation to *frequency response mode*, the percentage change in *power system frequency* as measured at the *connection point*, divided by the percentage change in *power transfer* of the *schedule 5.2 plant* *generating system* or *integrated resource system*, to the extent it comprises *production units*, expressed as a percentage of its *active power capability* the maximum operating level of the *generating system* or *integrated resource system*. Droop must be measured:

(1) at *frequencies* that are outside the deadband; and

(2) within the *power transfer capability* across the *connection point*, considering the operating *production units* of the *schedule 5.2 plant*. within the limits of *power transfer*.

maximum operating level means in relation to:

(1) a *non-scheduled generating unit* or *non-scheduled bidirectional unit*, the maximum *sent out generation* consistent with its *nameplate rating*;

(2) a *scheduled generating unit*, *scheduled bidirectional unit*, or *semi-scheduled generating unit*, the maximum *generation* to which it may be *dispatched* and as provided to *AEMO* in the most recent *bid validation data*;

(3) a *non-scheduled generating system* or *non-scheduled integrated resource system*, the combined maximum *sent out generation* consistent with the *nameplate ratings* of its in-service *production units* (if any);

(4) a *scheduled generating system* or *semi-scheduled generating system*, the combined maximum *generation* to which its in-service *generating units* may be *dispatched* and as provided to *AEMO* in the most recent *bid validation data*; and

(5) a *scheduled integrated resource system*, the combined maximum *sent out generation* to which its in-service *production units* and in-service *generating units* may be *dispatched* and as provided to *AEMO* in the most recent *bid validation data*.

minimum operating level means in relation to:

~~(1) a *non-scheduled generating unit*, its minimum *sent out generation* for continuous stable operation;~~

~~(2) a *scheduled generating unit* or *semi-scheduled generating unit*, its minimum *sent out generation* for continuous stable operation;~~

~~(2A) a *scheduled bidirectional unit* or *non-scheduled bidirectional unit*, its minimum *active power* level for continuous stable operation;~~

~~(3) a *non-scheduled generating system*, the combined *minimum operating level* of its in-service *generating units*;~~

~~(4) a *scheduled generating system* or *semi-scheduled generating system*, the combined minimum *sent out generation* of its in-service *generating units*; and~~

~~(5) a *scheduled integrated resource system* or a *non-scheduled integrated resource system* the combined minimum operating level of its in-service *production units*.~~

Automatic access standard

(b) The *automatic access standard* is:

(1) *power transfer* to the *power system* from a *schedule 5.2 plant*, ~~*generating system* or, to the extent it comprises *production units*, an *integrated resource system*~~ under relatively stable input energy, must not:

(i) increase in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; or

(ii) decrease in response to a fall in the *frequency* of the *power system* as measured at the *connection point*;

(1A) *power transfer* from the *power system* to any *bidirectional units* of a *schedule 5.2 plant* must not:

(i) subject to energy absorption capability, decrease in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; or

(ii) increase in response to a fall in the *frequency* of the *power system* as measured at the *connection point*; and

(2) a *schedule 5.2 plant* ~~*generating system*~~ must be capable of operating in *frequency response mode* such that its operating *production units* automatically provides a proportional:

(i) decrease in *power transfer* to the *power system* (or increase in *power transfer* from the *power system*) in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; and

(ii) increase in *power transfer* to the *power system* (or decrease in *power transfer* from the *power system*) in response to a fall in the *frequency* of the *power system* as measured at the *connection point*,

sufficiently rapidly and sustained for a sufficient period for the *Schedule 5.2 Participant* ~~*Generator* or *Integrated Resource Provider* (as relevant)~~ to be in a position to offer measurable amounts of all *market ancillary services* for the provision of *power system frequency* control (and, for *bidirectional units*, incorporates a smooth change in *bidirectional unit* operating mode between production and consumption).~~; and~~

(3) [**Deleted**]~~an *integrated resource system*, to the extent it comprises *production units*, must be capable of operating in *frequency response mode* such that it automatically provides a proportional:~~

~~(i) decrease in *power transfer* to the *power system*, with a continuous shift from one to the other mode, in response to a rise in the *frequency* of the *power system* as measured at the *connection point* accompanied by a smooth change in *bidirectional unit* operating mode between production and consumption; and~~

~~(ii) increase in *power transfer* to the *power system* in response to a fall in the *frequency* of the *power system* as measured at the *connection point* accompanied by a smooth change in *bidirectional unit* operating mode between production and consumption,~~

~~sufficiently rapidly and sustained for a sufficient period for the *Integrated Resource Provider* (as relevant) to be in a position to offer measurable amounts of all *market ancillary services* for the provision of *power system frequency* control.~~

Note

Clause 4.4.2(b) of the *Rules* sets out the obligations on *Generators* and *Integrated Resource Providers* in relation to compliance with the technical requirements in clause S5.2.5.11, including being capable of operating in *frequency response mode*. Clause 4.4.2(c1) of the *Rules* sets out the obligations on *Scheduled* and *Semi-Scheduled Generators* and *Integrated Resource Providers* in relation to the operation of their *scheduled generating units*, *semi-scheduled generating units* and *scheduled bidirectional units* in accordance with the *Primary Frequency Response Requirements*.

Minimum access standard

(c) The *minimum access standard* is:

(1) *power transfer* to the *power system* from a *schedule 5.2 plant* ~~for a *generating system* or, to the extent it comprises *production units*, an *integrated resource system*~~ under relatively stable input energy, ~~*power transfer* to the *power system*~~ must not:

(i) increase by more than 2% per Hz in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; or~~and~~

(ii) decrease by more than 2% per Hz in response to a fall in the *frequency* of the *power system* as measured at the *connection point*;

(1A) *power transfer* from the *power system* to any *bidirectional units* of a *schedule 5.2 plant* must not:

(i) subject to energy absorption capability, decrease by more than 2% per Hz in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; or

(ii) increase by more than 2% per Hz in response to a fall in the *frequency* of the *power system* as measured at the *connection point*; and

(2) a *schedule 5.2 plant* ~~*generating system*~~ must be capable of operating in *frequency response mode* such that, subject to energy source availability or energy absorption capability (as applicable), its operating *production units* automatically provide~~s~~:

(i) a decrease in *power transfer* to the *power system* (or increase in *power transfer* from the *power system*) in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; and~~or~~

(ii) an increase in *power transfer* to the *power system* (or decrease in *power transfer* from the *power system*) in response to a fall in the *frequency* of the *power system* as measured at the *connection point*,

Where the change in *active power* is either proportional or otherwise as agreed with *AEMO* and the *Network Service Provider*.~~; and~~

(3) [**Deleted**] ~~an *integrated resource system*, to the extent it comprises *production units*, must be capable of operating in *frequency response mode* such that, subject to energy source availability, it automatically provides:~~

~~(i) a decrease in *power transfer* to the *power system*, in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; and~~

~~(ii) increase in *power transfer* to the *power system* in response to a fall in the *frequency* of the *power system* as measured at the *connection point*,~~

~~where the change in *active power* is either proportional or otherwise as agreed with *AEMO* and the *Network Service Provider*.~~

Note

Clause 4.4.2(b) of the *Rules* sets out the obligations on *Generators* and *Integrated Resource Providers* in relation to compliance with the technical requirements in clause S5.2.5.11, including being capable of operating in *frequency response mode*. Clause 4.4.2(c1) of the *Rules* sets out the obligations on *Scheduled* and *Semi-Scheduled Generators* and *Integrated Resource Providers* in relation to the operation of their *scheduled generating units*, *semi-scheduled generating units* and *scheduled bidirectional units* in accordance with the *Primary Frequency Response Requirements*.

(d) [**Deleted**]

(e) [**Deleted**]

(f) [**Deleted**]

General requirements

(g) Each *control system* used to satisfy this clause S5.2.5.11 must be *adequately damped*.

(h) The amount of a relevant *market ancillary service* for which the *plant* may be registered must not exceed the amount that would be consistent with the *performance standard* registered in respect of this requirement.

(i) For the purposes of subparagraph~~s~~ (b)(2)~~ and (b)(3)~~, and with respect to a *negotiated access standard* proposed for the technical requirements relevant to this clause S5.2.5.11:

(1) the change in *power transfer* ~~to the *power system* ~~must occur with no delay beyond that required for stable operation, or inherent in the *plant* controls, once the *frequency* of the *power system* as measured at the *connection point* leaves a deadband around 50 Hz;

(2) a *schedule 5.2 plant* ~~*generating system* or *integrated resource system* ~~must be capable of setting the deadband and droop within the following ranges:

(i) the deadband referred to in subparagraph (1) must be set within the range of 0 to ± 1.0 Hz. Different deadband settings may be applied for a rise or fall in the *frequency* of the *power system* as measured at the *connection point*; and

(ii) the droop must be set within the range of 2% to 10%, or such other settings as agreed with the *Network Service Provider* and *AEMO*;

(3) nothing in subparagraph (b)(2) or (c)(2) ~~(b)(3) ~~is taken to require a *production unit* ~~*generating system* or, to the extent it comprises *production units*, an *integrated resource system* ~~to operate at a level of *active power* output or consumption:

(i) below its *minimum operating level*; or

(ii) above the maximum determined by reference to its *nameplate rating* and any operating limits consistent with the *performance standards* of the relevant *production system* under clauses S5.2.5.1 or S5.2.5.4; and

~~below its minimum operating level in response to a rise in the *frequency* of the *power system* as measured at the *connection point*, or above its maximum operating level in response to a fall in the *frequency* of the *power system* as measured at the *connection point*;~~

(4) [**Deleted**]

(5) the *performance standards* must record:

(i) agreed values for the *minimum operating level* ~~maximum operating level and minimum operating level, ~~of the *production units* where applicable and where relevant the method of determining the values~~;~~ and~~ the values for:~~

~~(A) a *generating system* must take into account its in-service *generating units*; and~~

~~(B) an *integrated resource system* must take into account its in-service *production units*; and~~

(ii) for the purpose of subparagraph~~s~~ (b)(2) ~~and (b)(3)~~, or a *negotiated access standard* offering measurable ~~measureable~~ amounts of *market ancillary services* under this clause S5.2.5.11, the *market ancillary services*, including the performance parameters and requirements that apply to each such *market ancillary service*.

(j) If the *Network Service Provider* agrees that droop response may reasonably be controlled at *production unit* terminals (rather than the *connection point*), the *performance standards* must record the method of calculation of droop to satisfy this clause S5.2.5.11.

S5.2.5.12 Impact on network capability

(a0) Paragraph (b)(2) of this clause S5.2.5.12 does not apply to *synchronous condensers*.

Automatic access standard

(a) The *automatic access standard* is a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ must have *plant* capabilities and *control systems* that are sufficient so that when *connected* it does not reduce any *inter-regional* or *intra-regional power transfer capability* below the level that would apply if the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ were not electrically *connected*.

Minimum access standard

(b) The *minimum access standard* is a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ must have *plant* capabilities, *control systems* and operational arrangements sufficient to ensure there is no reduction in:

(1) the ability to *supply* to *load* as a result of a reduction in *power transfer capability*; and

(2) *power transfer capabilities* into a *region* by more than the combined *sent out generation* of its *production units*.

Negotiated access standard

(c) **[Deleted]** ~~In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.5.12, the *Network Service Provider* and *AEMO* must take into account:~~

~~(1) the expected performance of:~~

~~(i) existing *networks* and *considered projects*;~~

~~(ii) existing *generating plant* and other relevant projects; and~~

~~(iii) *control systems* and *protection systems*, including *automatic reclose equipment*; and~~

~~(2) the expected range of *power system* operating conditions.~~

(d) ~~The~~ A *negotiated access standard* must include:

(1) *control systems* to minimise any reduction in *power transfer capabilities*; and

(2) operational arrangements, including curtailment of the *schedule 5.2 plant's ~~generating system's~~ or ~~integrated resource system's~~* output or consumption if necessary to ensure that the *plant* is operated in a way that meets at least the *minimum access standard* under abnormal *network* or *plant ~~network, generating system~~* and *~~integrated resource system~~* conditions, so that *power system security* can be maintained.

(e) A *negotiated access standard* ~~under this clause S5.2.5.12~~ must detail the *plant* capabilities, *control systems* and operational arrangements that will be maintained by the *Schedule 5.2 Participant~~Generator or Integrated Resource Provider~~*, notwithstanding that changes to the *power system*, but not changes to the *generating system* or *integrated resource system*, may reduce the efficacy of the *plant* capabilities, *control systems* and operational arrangements over time.

(f) [**Deleted**]

General requirement

(g) If a *Network Service Provider* considers that *power transfer capabilities* of its *network* would be increased through provision of additional *control system facilities* to a *schedule 5.2 plant ~~generating system or integrated resource system~~* (such as a *~~power system~~* power system stabiliser), the *Network Service Provider* and the *Schedule 5.2 Participant ~~Generator or Integrated Resource Provider (as the case may be)~~* may negotiate for the provision of such additional *control system facilities* as a commercial arrangement.

S5.2.5.13 Voltage and reactive power control

(a) **~~[Deleted]~~**This clause S5.2.5.13 applies to *synchronous condensers* with the following modifications:

(1) references to *power factor* controls or *power factor* setpoints are not applicable; and

(2) *settling times* for *active power* do not apply.

(a1) In this clause S5.2.5.13, a **relevant system** means a *production system* or (where applicable) a *synchronous condenser system*, having *production units* or *synchronous condensers* respectively with a combined *nameplate rating* equal to or more than the lower of:

(1) 30 MW or 30 MVA (as applicable); or

(2) the amount (in MW or MVA as applicable) that is 5% of any maximum *credible contingency event* size specified in the *frequency operating standard* for the relevant *region*.

Automatic access standard

(b) The *automatic access standard* is:

(1) subject to paragraph (o), a *schedule 5.2 plant ~~generating system or integrated resource system~~* must have *plant* capabilities and *control systems* sufficient to ensure that:

(i) *power system* oscillations, for the frequencies of oscillation of each of its ~~the~~ *production units* and *synchronous condensers* against any other *production unit* or *synchronous condenser*, are *adequately damped*;

(ii) operation of the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ does not degrade the damping of any critical mode of oscillation of the *power system*; and

(iii) operation of the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ does not cause instability (including hunting of *tap-changing transformer control systems*) that would adversely impact other *Network Users*~~*Registered Participants*~~;

(2) a *control system* must have:

(i) for the purposes of disturbance monitoring and testing, permanently installed and operational, monitoring and recording *facilities* for key variables including each input and output; and

(ii) *facilities* for testing the *control system* sufficient to establish its dynamic operational characteristics;

(2A) a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ must have ~~*facilities* with~~ a *control system* ~~to regulate *voltage*, *reactive power* and *power factor*,~~ with the ability to:

(i) ~~operate in any control mode; and~~regulate voltage, either as a primary control mode or, if the *Network Service Provider* requires a different primary control mode, as a secondary control mode;

(ia) where voltage is regulated as a primary control mode, regulate either *reactive power* or *power factor* as a secondary control mode; and

(ii) switch between control modes,

where the *plant* must operate in its primary control mode in normal operation, and may operate in secondary control mode as part of testing, for abnormal *power system* conditions or for abnormal *plant* operating conditions as agreed with ~~as shown in the manufacturer's and/or design specifications of the relevant equipment and demonstrated to the reasonable satisfaction of~~ the *Network Service Provider* and *AEMO*;

(2B) a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ must have a ~~*voltage*~~ voltage *control system* that, within at least the *reactive power* response range agreed in a *performance standard* under clause S5.2.5.1:

(i) regulates ~~*voltage*~~voltage at the *connection point* or another agreed location in the *power system* (including within the *schedule 5.2 plant*~~*generating system* or *integrated resource system*~~) to within 0.5% of the setpoint, where that setpoint may be adjusted to incorporate any ~~*voltage*~~voltage droop or reactive current compensation agreed with *AEMO* and the *Network Service Provider*;

(ii) regulates ~~*voltage*~~voltage in a manner that helps to support *network* ~~*voltage*~~voltages during faults and does not prevent the *Network Service Provider* from achieving the requirements of clauses S5.1a.3 and S5.1a.4;

(iii) allows the ~~*voltage*~~voltage setpoint to be ~~continuously controllable~~ configurable in the range of at least ~~95% to 105%~~ 5% of *nominal voltage* above and below ~~of~~ the target ~~*voltage*~~voltage (as determined by the *Network Service Provider* in accordance with clause S5.1.4(c)~~; and recorded in the *connection agreement* in accordance with clause S5.1.4) at the *connection point* or agreed location on the *power system*,~~

(iiiA) does not rely ~~without reliance~~ on a *tap-changing transformer* as the means of voltage regulation~~and subject to the *reactive power* capability agreed with *AEMO* and the *Network Service Provider* under clause S5.2.5.1~~; and

(iv) has limiting devices that:

(A) allow the *plant* to achieve at least the *reactive power* response range agreed in the *performance standard* under clause S5.2.5.1; and

~~(A)~~(B) ~~to~~ ensure that a ~~*voltage*~~voltage disturbance does not cause the *plant* ~~a *production unit*~~ to trip at the limits of its operating capability;

(3) ~~a *generating system* or (to the extent it comprises *production units*) *integrated resource system* that is comprised of~~ in respect of its *synchronous production units* and *synchronous condensers*, a *schedule 5.2 plant* must have an *excitation control system* that:

(i) [**Deleted**]

(ii) can operate the stator continuously at 105% of *nominal voltage* ~~with *rated active power* output~~ up to the *schedule 5.2 plant's active power capability*;

Note

Active power capability is not considered for *synchronous condensers*.

(iii) [**Deleted**]

(iv) [**Deleted**]

(v) [**Deleted**]

(vi) has an excitation ceiling ~~*voltage*~~ voltage of at least:

(A) for a *static excitation system*, 2.3 times; or

(B) for other *excitation control systems*, 1.5 times,

the excitation required to achieve *apparent power* output ~~transfer of power~~ at the *nameplate rating* for rated *power factor*, at rated speed and *nominal voltage*;

Note

Power factor is not considered for *synchronous condensers*.

(vii) for the range of system impedances nominated by the *Network Service Provider* under paragraph (m) and subject to paragraph (l), has ~~settling~~ *settling times* within the applicable periods set out in Table S5.2.1 for a step change of ~~*voltage*~~ voltage setpoint or ~~*voltage*~~ step-like change in voltage at the location agreed under subparagraph (2B)(i) of~~:~~;

~~(A) generated *voltage* less than 2.5 seconds for a 5% *voltage* disturbance with the *production unit* not *synchronised*;~~

~~(B) *active power*, *reactive power* and *voltage* less than 5.0 seconds for a 5% *voltage* disturbance with the *generating unit synchronised*, from an operating point where the *voltage* disturbance would not cause any limiting device to operate; and~~

~~(C) in respect of each limiting device, *active power*, *reactive power* and *voltage* less than 7.5 seconds for a 5% *voltage* disturbance with the *production unit synchronised*, when operating into a limiting device from an operating point where a *voltage* disturbance of 2.5% would just cause the limiting device to operate;~~

(viii) can increase field ~~*voltage*~~voltage from rated field ~~*voltage*~~voltage to the excitation ceiling ~~*voltage*~~voltage in less than:

(A) 0.05 second for a *static excitation system*; or

(B) 0.5 second for other *excitation control systems*; and

(ix) has a ~~*power system*~~ power system stabiliser or power oscillation damper with sufficient flexibility to enable damping performance to be maximised, with a power system stabiliser having the characteristics as described in paragraph (c);

(4) in respect of its *asynchronous production units*, a *schedule 5.2 plant* ~~a *a generating system* or *integrated resource system*, other than one comprised of *synchronous production units*,~~ must have a ~~*voltage*~~ voltage *control system* that:

(i) [**Deleted**]

(ii) [**Deleted**]

(iii) [**Deleted**]

(iv) [**Deleted**]

(v) for the range of system impedances nominated by the *Network Service Provider* under paragraph (m) and subject to paragraph (l), with the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ *connected* to the *power system*, has ~~settling~~ *settling times* and rise times within the applicable periods set out in Table S5.2.1 for ~~*active power*, *reactive power* and *voltage* due to~~ a step change of ~~*voltage*~~ voltage setpoint or step-like change in ~~or *voltage*~~ voltage at the location agreed under ~~clause~~ subparagraph (2B)(i); and~~, of less than:~~

~~(A) 5.0 seconds for a 5% *voltage* disturbance with the *generating system* or *integrated resource system connected* to the *power system*, from an operating point where the *voltage* disturbance would not cause any limiting device to operate; and~~

~~(B) 7.5 seconds for a 5% *voltage* disturbance with the *generating system* or *integrated resource system connected* to the *power system*, when operating into any limiting device from an operating point where a *voltage* disturbance of 2.5% would just cause the limiting device to operate;~~

(vi) **[Deleted]** ~~has *reactive power* rise time, for a 5% step change in the *voltage* setpoint, of less than 2 seconds; and~~

(vii) has a power oscillation damping capability with sufficient flexibility to enable damping performance to be maximised:

(A) with characteristics as described in paragraph (c); or

(B) where *AEMO* has published characteristics for a *schedule 5.2 plant* comprising *asynchronous production units*, ~~*generating system* or *integrated resource system* other than a system comprised of *synchronous production units*,~~ following consultation in accordance with the *Rules consultation procedures*, with characteristics as published by *AEMO*.

(c) A *power system* stabiliser provided under paragraph (b) must have:

(1) for a *synchronous production unit*, measurements of rotor speed and *active power* level of the *production unit* as inputs, and otherwise, measurements of *power system frequency* and *active power* level of the *production unit* as inputs;

(2) two washout filters for each input, with ability to bypass one of them if necessary;

(3) sufficient (and not less than two) lead-lag transfer function blocks (or equivalent number of complex poles and zeros) with adjustable gain and time-constants, to compensate fully for the phase lags due to the ~~*generating* *plant*~~;

(4) an output limiter, which for a *synchronous production unit* is continually adjustable over the range of –10% to +10% of stator ~~*voltage*~~voltage;

(5) monitoring and recording *facilities* for key variables including inputs, output and the inputs to the lead-lag transfer function blocks; and

(6) *facilities* to permit testing of the *power system* stabiliser in isolation from the *power system* by injection of test signals, sufficient to establish the transfer function of the *power system* stabiliser.

(c1) A *reactive power* or *power factor control system* provided under paragraph (b)(2A) must:

(1) regulate *reactive power* or *power factor* (as applicable) at the *connection point* or another agreed location in the *power system* (including within the *schedule 5.2 plant*~~*generating system* or *integrated resource system*~~), to within:

(i) for a *schedule 5.2 plant* ~~*generating system*~~ operating in *reactive power* mode, 2% of the rating (in MVA) of the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ (expressed in MVAr); or

(ii) for a *schedule 5.2 plant* ~~*generating system*~~ operating in *power factor* mode, a *power factor* equivalent to 2% of the rating (in MVA) of the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ (expressed in MVAr);

(2) allow the *reactive power* or *power factor* setpoint to be continuously controllable across the *reactive power* *capability* ~~capability~~ range established under clause S5.2.5.1; and

(3) ~~with the *generating system* or *integrated resource system connected* to the *power system*, and for a step change in setpoint of at least 50% of the *reactive power* capability agreed with *AEMO* and the *Network Service Provider* under clause S5.2.5.1, or a 5% *voltage* disturbance at the location agreed under subparagraph (1):~~for the range of system impedances nominated by the *Network Service Provider* under paragraph (m) and subject to paragraph (l), with the *schedule 5.2 plant* *connected* to the *power system*, have *settling times* within the applicable periods set out in Table S5.2.1 for a step change of voltage setpoint or step-like change in voltage at the location agreed under subparagraph (2B)(i).

~~(i) have *settling times* for *active power*, *reactive power* and *voltage* of less than 5.0 seconds from an operating point where the *voltage* disturbance would not cause any limiting device to operate; and~~

~~(ii) have *settling times* for *active power*, *reactive power* and *voltage* of less than 7.5 seconds when operating into any limiting device from an operating point where a *voltage* disturbance of 2.5% would just cause the limiting device to operate.~~

~~The *Network Service Provider* may determine whether to use a setpoint step test or a 5% *voltage* disturbance test for the purposes of this subparagraph (c1)(3).~~

Table S5.2.1 Automatic access standard for rise and settling times

In this table, **limiting device condition** means either:

- a setpoint change or voltage disturbance equal to half of any percentage change specified in the relevant requirement would just cause a limiting device to operate; or
- a limiting device is operating when the setpoint change is made or the voltage disturbance commences.

Control mode	Maximum rise time	Maximum settling time -	Maximum settling time

		setpoint change	**– voltage disturbance**
Voltage as primary – not *synchronised*[1]	No requirement	*Synchronous production units* and *synchronous condensers* only: < 2.5 seconds for: • voltage • 5% voltage disturbance typical to highest impedance.	No requirement
Voltage as primary	*Asynchronous production units* only: < 3 seconds without limiting device condition for: • *reactive power* • 2-5% voltage disturbance • typical to highest impedance.	< 5 seconds without limiting device condition < 7.5 seconds with limiting device condition In both cases, for: • voltage, *reactive power* and *active power* • 5% setpoint change • typical to highest impedance • setpoint input ramp rate limit, if applicable, may be disabled for test purposes.	< 5 seconds without limiting device condition < 7.5 seconds with limiting device condition In both cases, for: • voltage, *reactive power* and *active power* • voltage disturbance between 2% and 5% • typical to highest impedance.
Voltage as secondary	No requirement	No requirement	< 5 seconds without limiting device condition < 7.5 seconds with limiting device condition In both cases, for: • voltage, *reactive power* and *active power* • 5% voltage disturbance • typical impedance.

Power factor as primary	No requirement	Without limiting device condition: • < 5 seconds in conditions where response overshoots the sustained change or response is oscillatory • < 30 seconds otherwise for: • reactive power and active power • a setpoint change equivalent to at least half of the reactive power range (absorbing to injecting) established under clause S5.2.5.1 • typical to highest impedance.	< 5 seconds without limiting device condition < 7.5 seconds with limiting device condition In both cases, for: • reactive power and active power • voltage disturbance between 2% and 5% • typical to highest impedance.
Power factor as secondary	No requirement	No requirement	< 5 seconds without limiting device condition < 7.5 seconds with limiting device condition In both cases, for: • reactive power and active power • 5% voltage disturbance • typical impedance.
Reactive power as primary	No requirement	If limiting device does not operate: • < 5 seconds in conditions where response overshoots the sustained change or response is oscillatory • < 30 seconds otherwise for: • reactive power • a setpoint change equivalent to at least half of the reactive power range (absorbing to injecting) established under clause S5.2.5.1 • typical to	< 5 seconds without limiting device condition < 7.5 seconds with limiting device condition In both cases, for: • reactive power • voltage disturbance between 2% and 5% • typical to highest impedance.

		highest impedance.	
Reactive power as secondary	No requirement	No requirement	< 5 seconds without limiting device condition < 7.5 seconds with limiting device condition In both cases, for: • reactive power • 5% voltage disturbance • typical impedance.

Minimum access standard

(d) The *minimum access standard* is:

(1) subject to paragraph (o), a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~must have *plant* capabilities and *control systems*, including, if appropriate, a ~~*power system*~~ power system stabiliser or power oscillation damper, sufficient to ensure that:

(i) *power system* oscillations, for the frequencies of oscillation of each of its *production units* and *synchronous condensers* ~~the *production unit*~~ against any other *production unit* or *synchronous condenser*, are *adequately damped*;

(ii) operation of the *schedule 5.2 plant* ~~*production unit*~~ does not degrade:

(A) any mode of oscillation that is within 0.3 nepers per second of being unstable, by more than 0.01 nepers per second; and

(B) any other mode of oscillation to within 0.29 nepers per second of being unstable; and

(iii) operation of the *schedule 5.2 plant* ~~*production unit*~~ does not cause instability (including hunting of *tap-changing transformer control systems*) that would adversely impact other *Network Users*~~*Registered Participants*~~;

(1A) [**Deleted**]~~an *integrated resource system* (to the extent it comprises *production units*) that is comprised of:~~

~~(i) *bidirectional units* with a combined *nameplate rating* of 5 MW or more; or~~

~~(ii) *generating units* with a combined *nameplate rating* of 30 MW or more,~~

~~must have *facilities* for testing its *control systems* sufficient to establish their dynamic operational characteristics;~~

(2) ~~a *generating system* comprised of *generating units* with a combined *nameplate rating* of 30 MW or more~~ a relevant system must have *facilities* for testing its *control systems* sufficient to establish their dynamic operational characteristics;

(2A) a ~~*schedule 5.2 plant generating system or integrated resource system*~~ must have ~~*facilities with*~~ a *control system* to regulate:

(i) ~~*voltage*~~voltage; or

(ii) either of *reactive power* or *power factor* with the agreement of *AEMO* and the *Network Service Provider*;

(2B) a ~~*voltage*~~voltage *control system* for a ~~*schedule 5.2 plant generating system or integrated resource system*~~ must , within the *reactive power* response range agreed in a *performance standard* under clause S5.2.5.1:

(i) regulate ~~*voltage*~~voltage at the *connection point* or another agreed location in the *power system* (including within the ~~*schedule 5.2 plantgenerating system or integrated resource system*~~), to within 2% of the setpoint, where that setpoint may be adjusted to incorporate any ~~*voltage*~~voltage droop or reactive current compensation agreed with *AEMO* and the *Network Service Provider*; and

(ii) allow the ~~*voltage*~~voltage setpoint to be controllable in the range of at least 98% to 102% of the target ~~*voltage*~~voltage (as determined by the *Network Service Provider* in accordance with clause S5.1.4(c) and recorded in the *performance standards*~~*connection agreement* in accordance with clause S5.1.4~~) at the *connection point* or the agreed location~~, subject to the *reactive power* capability agreed with *AEMO* and the *Network Service Provider* under clause S5.2.5.1~~;

(3) a ~~*schedule 5.2 plant's generating system's or integrated resource system's*~~ *reactive power* or *power factor control system* must , within at least the *reactive power* response range agreed in a *performance standard* under clause S5.2.5.1:

(i) regulate *reactive power* or *power factor* (as applicable) at the *connection point* or another agreed location in the *power system* (including within the ~~*schedule 5.2 plantgenerating system or integrated resource system*~~), to within:

(A) for a ~~*schedule 5.2 plant generating system or integrated resource system*~~ operating in *reactive power* mode, 5% of the rating (in MVA) of the ~~*schedule 5.2 plant generating system or integrated resource system*~~ (expressed in MVAr); or

(B) for a ~~*schedule 5.2 plant generating system or integrated resource system*~~ operating in *power factor* mode, a *power factor* equivalent to 5% of the rating (in MVA) of the ~~*schedule 5.2 plant generating system or integrated resource system*~~ (expressed in MVAr); and

(ii) allow the *reactive power* or *power factor* setpoint to be continuously controllable across the *reactive power* ~~capability~~ *capability* range established under clause S5.2.5.1;

(4) a relevant system (measured for the purpose of this requirement by reference to its *synchronous production units* and *synchronous condensers* only) ~~*generating system* with *synchronous generating units* with a *nameplate rating* of 30 MW or more, or an *integrated resource system* (to the extent it comprises *production units*) comprising *synchronous bidirectional units* with a *nameplate rating* of 5 MW or more or *synchronous generating units* with a *nameplate rating* of 30 MW or more, in any case~~ with an *excitation control system* required to regulate ~~*voltage*~~ voltage under subparagraph (d)(2A)(i) must:

(i) [**Deleted**]

(ii) have excitation ceiling ~~*voltage*~~ voltage of at least 1.5 times the excitation required to achieve ~~transfer of power~~ apparent power *output* at the *nameplate rating* for rated *power factor*, at rated speed and *nominal voltage*; and

Note

Power factor is not considered for *synchronous condensers*.

(iii) [**Deleted**]~~subject to co-ordination under paragraph (i), have a *settling time* of less than 7.5 seconds for a 5% *voltage* disturbance with the *production unit synchronised*, from an operating point where such a *voltage* disturbance would not cause any limiting device to operate; and~~

(iv) [**Deleted**]~~have over and under excitation limiting devices sufficient to ensure that a *voltage* disturbance does not cause the *production unit* to trip at the limits of its operating capability;~~

(5) any relevant system ~~*generating system* comprised of *asynchronous generating units* with a *nameplate rating* of 30 MW or more,~~ with an *excitation*~~*voltage*~~ *control system* required to regulate ~~*voltage*~~ voltage under subparagraph (d)(2A)(i) must:

(i) [**Deleted**]

(ii) for the range of system impedances nominated by the *Network Service Provider* under paragraph (m) and subject to paragraphs (i) and (l), with the *schedule 5.2 plant connected* to the *power system*, have *settling times* within the applicable periods set out in Table S5.2.2 for a step-like change in voltage at the location agreed under subparagraph (2B)(i); and

~~subject to co-ordination under paragraph (i), have a *settling time* less than 7.5 seconds for a 5% *voltage* disturbance with the *generating unit* electrically connected to the *power system* from an operating point where such a *voltage* disturbance would not cause any limiting device to operate; and~~

(iii) have limiting devices to ensure that a ~~*voltage*~~ voltage disturbance would not cause the *generating unit* to trip at the limits of its operating capability.~~; and~~

(6) [**Deleted**] ~~an *integrated resource system* (to the extent it comprises *production units*) comprised of *asynchronous bidirectional units* with a~~

~~*nameplate rating* of 5 MW or more, or *synchronous generating units* with a *nameplate rating* of 30 MW or more, in either case with a *voltage control system* required to regulate *voltage* under subparagraph (d)(2A)(i) must:~~

~~(i) subject to co-ordination under paragraph (i), have a *settling time* less than 7.5 seconds for a 5% *voltage* disturbance with the *production unit* electrically connected to the *power system* from an operating point where such a *voltage* disturbance would not cause any limiting device to operate; and~~

~~(ii) have limiting devices to ensure that a *voltage* disturbance would not cause the *production unit* to trip at the limits of its operating capability.~~

Table S5.2.2 Minimum access standard for rise and settling times

Control mode	Maximum settling time without operation of limiting device – voltage disturbance
Voltage as primary	< 7.5 seconds or longer time agreed with the *Network Service Provider*, for: • voltage • 5% voltage disturbance • typical to highest impedance.
Power factor as primary	< 7.5 seconds or longer time agreed with the *Network Service Provider*, for: • *reactive power* and *active power* • 5% voltage disturbance • typical to highest impedance.
Reactive power as primary	< 7.5 seconds or longer time agreed with the *Network Service Provider*, for: • *reactive power* • 5% voltage disturbance • typical to highest impedance.

Negotiated access standard

(e) [**Deleted**]

(f) ~~The *negotiated access standard* proposed by the *Generator* or *Integrated Resource Provider* under clause 5.3.4A(b1) must be the highest level that the *generating system* or *integrated resource system* can reasonably achieve, including by installation of additional dynamic *reactive power* equipment, and through optimising its *control systems*.~~For a *negotiated access standard* where the *schedule 5.2 plant* cannot reasonably meet the *automatic access standard* at the highest or typical system impedance under paragraph (m), controls must be tuned to achieve performance as close as reasonably practicable to the *automatic access standard*, prioritising stability of response under high impedance conditions in the primary operating mode.

(g) [**Deleted**]

General requirements

(g1) ~~For the purposes of subparagraph (b)(2A), the *Network Service Provider* and *AEMO* will nominate one or more control modes to be implemented when the *generating system* or *integrated resource system* is commissioned, and may require additional control modes to be commissioned after *connection* if the *Network Service Provider* or *AEMO* reasonably considers such additional modes to be necessary to ensure *power system security* or quality of *supply*.~~ Where a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ has been commissioned for more than one control mode, the *Schedule 5.2 Participant* ~~*Generator* or *Integrated Resource Provider*~~ (as relevant), *Network Service Provider* and *AEMO* must agree on a procedure for switching between control modes. The initial operating mode, other available modes and the procedure for switching between modes must be recorded in the *performance standards* ~~as part of the *performance standard*~~.

(h) A limiting device provided under paragraphs (b) and (d) must:

(1) not detract from the performance of any power system stabiliser or power oscillation damping capability; and

(2) be co-ordinated with all *protection systems*.

(i) The *Network Service Provider* may require that the design and operation of the *control systems* of a *schedule 5.2 plant* ~~*production unit*~~ be coordinated with the existing ~~*voltage*~~ voltage *control systems* of the *Network Service Provider* and of other *Network Users*, in order to avoid or manage interactions that would adversely impact on the *Network Service Provider* and other *Network Users*.

(j) Any requirements imposed by the *Network Service Provider* under paragraph (i) must be recorded in the *performance standard*.

(k) The ~~assessment of~~ impact of the *schedule 5.2 plant* ~~*production units*~~ on *power system* stability and damping of *power system* oscillations must be assessed ~~shall be~~ in accordance with the guidelines for *power system* stability established under clause 4.3.4(h).

(l) A *settling time* requirement under this clause S5.2.5.13 is taken to be met if, for a voltage step in any mode or for a voltage setpoint step, the magnitude of error does not exceed the greater of:

(1) the value calculated under the definition of *settling time*; and

(2) the higher of the following values, as applicable:

(i) for *active power*, ±0.5 MW or ±2% of the maximum active power (Pmax) recorded in the *performance standard* for clause S5.2.5.1;

(ii) for *reactive power*, ±0.5 MVAr or ±2% of the *reactive power capability* recorded in the *performance standard* for clause S5.2.5.1; or

(iii) for voltage, ±0.5% of *nominal voltage*.

(m) The *Network Service Provider* must nominate, and the *Schedule 5.2 Participant* must record in the relevant *releasable user guide*, the highest and

typical system impedances for tuning of controls and assessment of compliance for the purposes of this clause S5.2.5.13, where:

(1) highest system impedance must be consistent with the system impedance at voltage close to nominal for a typical *dispatch* pattern and *network* configuration that corresponds to the *minimum three phase fault level* at the electrically closest *system strength node*, in combination with the *network outage* that would cause the greatest reduction in the *three phase fault level* at the *connection point*; and

(2) typical system impedance is a value that the *Network Service Provider* considers representative of a typical *network* configuration and typical levels of *schedule 5.2 plant* in service.

(n) Limits on the rate of change of setpoint (rate limits) may be applied to a *schedule 5.2 plant* for normal operating conditions and, if so, the *performance standards* must record details of the rate limits applied.

(o) Where the *Schedule 5.2 Participant* has elected in accordance with clause 5.3.4B(b1) to pay the *system strength charge* in relation to the *schedule 5.2 plant*, assessments under this clause S5.2.5.13 must take into account the performance required to be provided by the *System Strength Service Provider* at the relevant *system strength node* in accordance with clause S5.1.14.

S5.2.5.14 Active power control

(a0) This clause S5.2.5.14 does not apply to *synchronous condensers*.

(a) The *automatic access standard* is a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ must have an *active power control system* capable of:

(1) for any *scheduled generating units* or *scheduled bidirectional units*:~~a *scheduled generating unit*, a *scheduled generating system*, *scheduled bidirectional unit* or *scheduled integrated resource system*:~~

(i) maintaining and changing ~~its~~ the *active power* level in accordance with ~~its~~ the *dispatch instructions*;

(ii) ramping ~~its~~ the *active power* level linearly from one level of *dispatch* to another; and

(iii) receiving and automatically responding to signals delivered from the *AGC*, as updated at a rate of once every 4 seconds (or such other period specified by *AEMO* as required);

(2) subject to energy source availability, for any *non-scheduled generating units* or *non-scheduled bidirectional units*: ~~a *non-scheduled generating unit*, *non-scheduled generating system*, *non-scheduled bidirectional unit* or *non-scheduled integrated resource system*:~~

(i) automatically reducing or increasing ~~its~~ the *active power* level within 5 minutes, at a constant rate, to or below the level specified in an instruction electronically issued by a *control centre*, subject to subparagraph (iii);

(ii) automatically limiting ~~its~~ the *active power* level, to below the level specified in subparagraph (i); and

(iii) not changing ~~its~~ the *active power* level within 5 minutes by more than the raise and lower amounts specified in an instruction electronically issued by a *control centre*; and

(3) subject to energy source availability, for any ~~a~~ *semi-scheduled generating unit*s ~~or a *semi-scheduled generating system*~~:

(i) automatically reducing or increasing ~~its~~ the *active power* level within 5 minutes at a constant rate, to or below the level specified in an instruction electronically issued by a *control centre*;

(ii) automatically limiting ~~its~~ the *active power* level, to or below the level specified in subparagraph (i);

(iii) not changing ~~its~~ the *active power* level within 5 minutes by more than the raise and lower amounts specified in an instruction electronically issued by a *control centre*;

(iv) ramping the~~its~~ *active power* level linearly from one level of *dispatch* to another; and

(v) receiving and automatically responding to signals delivered from the *AGC*, as updated at a rate of once every 4 seconds (or such other period specified by *AEMO* as required).

Minimum access standard

(b) The *minimum access standard* is a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ must have an *active power control system* capable of:

(1) for any *scheduled generating units* or *scheduled bidirectional units*: ~~a~~ a ~~*scheduled generating unit*, a *scheduled generating system*, *scheduled bidirectional unit* or *scheduled integrated resource system*~~:

(i) maintaining and changing ~~its~~ the *active power* level in accordance with its *dispatch instructions*; and

(ii) receiving and automatically responding to signals delivered from the *AGC*, as updated at a rate of once every four seconds (or such other period specified by *AEMO* as required);

(2) for any *non-scheduled generating units* or *non-scheduled bidirectional units*:~~a *non-scheduled generating system* or *non-scheduled integrated resource system*~~:

(i) reducing ~~its~~ the *active power* level, within 5 minutes, to or below the level required to manage *network* flows that is specified in a verbal instruction issued by the *control centre*;

(ii) limiting ~~its~~ the *active power* level, to or below the level specified in subparagraph (i); and

(iii) subject to energy source availability, ensuring that the change of *active power* level in a 5 minute period does not exceed a value agreed with *AEMO* and the *Network Service Provider*; and

(3) subject to energy source availability, for any ~~a~~ *semi-scheduled generating unit*s ~~or a *semi-scheduled generating system*~~:

(i) maintaining and changing ~~its~~ the *active power* level in accordance with its *dispatch instructions*;

(ii) not changing ~~its~~ the *active power* level within five minutes by more than the rise and lower amounts specified in an instruction electronically issued by a *control centre*; and

(iii) receiving and automatically responding to signals delivered from the *AGC*, as updated at a rate of once every 4 seconds (or such other period specified by *AEMO* as required).

Negotiated access standard

(c) A *negotiated access standard* may provide that if the number or frequency of verbal instructions becomes difficult for a *control centre* to manage, *AEMO* may require the *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ to upgrade its *facilities* to receive electronic instructions and fully implement them within 5 minutes.

(d) A ~~The~~ *negotiated access standard* must document to *AEMO's* satisfaction any operational arrangements necessary to manage *network* flows that may include a requirement for the *schedule 5.2 plant* ~~*generating system or integrated resource system*~~ to be operated in a manner that prevents its *active power* level changing within 5 minutes by more than an amount specified by a *control centre*.

(e) [**Deleted**]

General requirements

(f) Each *control system* used to satisfy the requirements of paragraphs (a) and (b) must be *adequately damped*.

S5.2.5.15 Short circuit ratio

(a) This clause S5.2.5.15 applies only to *asynchronous production units*, and to a *production system* only to the extent of its *asynchronous production units* (if any).~~:~~

~~(1) applies to a *generating system* and (to the extent it comprises *production units*) an *integrated resource system* that in either case is comprised solely of *asynchronous production units*;~~

~~(2) does not apply to a *generating system* or (to the extent it comprises *production units*) an *integrated resource system* that in either case is comprised solely of *synchronous production units*; and~~

~~(3) for a *generating system* or (to the extent it comprises *production units*) an *integrated resource system* that is comprised of both *synchronous production units* and *asynchronous production units*, applies only to the *asynchronous production units* and to the *generating system* or *integrated resource system* to the extent it relates to its *asynchronous production units*.~~

Minimum access standard

(b) The *minimum access standard* is a *production system* ~~*generating system* or (to the extent it comprises *production units*) an *integrated resource system* that is comprised of *asynchronous production units*~~ must have *plant* capability sufficient for its *asynchronous production units* to operate stably and remain *connected* at a *short circuit ratio* of 3.0, assessed in accordance with the methodology prescribed in the *system strength impact assessment guidelines* and subject to paragraph (e).

General requirements

(c) The *performance standards* ~~in the *connection agreement*~~ must record:

(1) the agreed value of the *short circuit ratio* which must be the minimum of 3.0 and the value at which the *production* ~~*generating system* or *integrated resource*~~ *system* has, subject to paragraph (e), *plant* capability sufficient to operate stably and remain *connected*;

(2) the ~~*rated active power*~~ *active power capability* used to calculate the value of the *short circuit ratio*; and

(3) any arrangements agreed under paragraph (e).

(d) The *plant* capability referred to in paragraph (c)(1) may be demonstrated with any appropriate *control system* and/or *protection system* settings. The settings used may be different to the setting required for compliance with other *performance standards* established under this clause S5.2.5.

(e) If the *production* ~~*generating system* or *integrated resource*~~ *system* is not otherwise capable of meeting the *minimum access standard*, the *Schedule 5.2 Participant* ~~*Generator* or *Integrated Resource Provider*~~ may, if agreed by *AEMO*, the *Network Service Provider* and the *System Strength Service Provider*, achieve compliance by demonstrating it has:

(1) in accordance with paragraph (f), legally binding commitments to make additional investment in its *plant* or for the supply to it of services to remedy, at its cost, the shortfall in capability, either on *connection* or in agreed circumstances (such as the occurrence of an event that results in a change to the *three phase fault level* at the *connection point*); together with

(2) operational arrangements agreed with the *Network Service Provider* that apply when the investment or services referred to in subparagraph (1) have not yet been made or are not available.

(f) For paragraph (e)(1), the *Schedule 5.2 Participant* ~~*Generator*~~ may:

(1) reach agreement with the *Network Service Provider* for the *Schedule 5.2 Participant* ~~*Generator* or *Integrated Resource Provider*~~ to undertake investment in its *plant* to achieve *plant* capability sufficient to operate stably and remain *connected* at a *short circuit ratio* of 3.0; or

(2) procure from the *Network Service Provider*, the *System Strength Service Provider* or another *Registered Participant*, services to enable the *generating system* or *integrated resource system* to operate stably and remain *connected* at a *short circuit ratio* of 3.0 but calculated using

a *three phase fault level* at the *connection point* that excludes any contribution from the facilities providing the service.

S5.2.5.16 [Deleted]~~Voltage phase angle shift~~

~~(a) This clause S5.2.5.16:~~

~~(1) applies to a *generating system* and (to the extent it comprises *production units*) an *integrated resource system* that in either case is comprised solely of *asynchronous production units*;~~

~~(2) does not apply to a *generating system* or (to the extent it comprises *production units*) an *integrated resource system* that in either case is comprised solely of *synchronous production units*; and~~

~~(3) for a *generating system* or (to the extent it comprises *production units*) an *integrated resource system* that is comprised of both *synchronous production units* and *asynchronous production units*, applies only to the *asynchronous production units* and to the *generating system* or *integrated resource system* to the extent it relates to its *asynchronous production units*.~~

~~**Minimum access standard**~~

~~(b) The *minimum access standard* is a *generating system* or *integrated resource system* and each of its *asynchronous production units* must not include any vector shift or similar relay or protective function that acts upon *voltage* phase angle which might operate for phase angle changes less than 20 degrees at the *connection point*.~~

~~**General requirements**~~

~~(c) The agreed value of the settings of any *protection system* must be recorded in the *performance standards*.~~

S5.2.6 Monitoring and control requirements

S5.2.6.1 Remote Monitoring

(a0) This clause S5.2.6.1 applies to *synchronous condensers* with the following modifications:

(1) *active power* quantities are to be monitored at the *connection point* only; and

(2) other *active power*-related quantities, *AGC* and turbine-related quantities are not required.

Automatic access standard

(a) The *automatic access standard* is a Schedule 5.2 plant ~~:~~

~~(1) *scheduled generating unit*;~~

~~(2) *scheduled generating system*;~~

~~(3) *non-scheduled generating unit*;~~

~~(4) *non-scheduled generating system*;~~

~~(5) *semi-scheduled generating unit*;~~

~~(6) *semi-scheduled generating system*;~~

~~(7) *scheduled bidirectional unit*;~~

~~(8) *scheduled integrated resource system*;~~

~~(9) *non-scheduled bidirectional unit*; or~~

~~(10) *non-scheduled integrated resource system*,~~

must have *remote monitoring equipment* and *remote control equipment* to transmit to, and receive from, *AEMO's control centres* in real time in accordance with rule 4.11 the quantities that *AEMO* reasonably requires to discharge its *market* and *power system security* functions set out in Chapters 3 and 4.

(b) The remote monitoring quantities referred to under paragraph (a) that *AEMO* may request include:

(1) in respect of all relevant *schedule 5.2 plant*~~a *generating system* or *integrated resource system* of a type referred to in subparagraphs (a)(1) to (10)~~:

(i) the status of all switching devices that carry ~~the~~ *generation* or *load*;

(ii) *tap-changing transformer* tap position(s) and voltages~~*voltages*~~;

(iii) *active power* and *reactive power* aggregated for groups of identical *production units* or *synchronous condensers*;

(iv) either the number of identical *production units* or *synchronous condensers* operating or the operating status of each non-identical *production unit* or *synchronous condensers*;

(v) *active power* and *reactive power* for the *schedule 5.2 plant*~~*generating system* or *integrated resource system*~~; and

(vi) voltage ~~*voltage*~~ *control system* setpoint and mode (as applicable);

(2) in respect of:

(i) a *generating unit* with a *nameplate rating* of 30 MW or more; ~~or~~

(ii) a *bidirectional unit* with a *nameplate rating* of 5MW or more; or

(iii) a *synchronous condenser* with a *nameplate rating* of 30 MVA or more,

current, ~~*voltage*~~voltage, *active power* and *reactive power* in respect of *production unit* or *synchronous condenser* ~~*generating unit* or *bidirectional unit*~~ stators or power conversion systems (as applicable);

(3) in respect of an auxiliary supply system with a capacity of 30 MW or more associated with a *schedule 5 plant*~~*generating unit*, *generating system*, *bidirectional unit* or *integrated resource system*~~, *active power* and *reactive power*;

(4) in respect of *reactive power* equipment that is part of a *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ but not part of a

particular *production unit* or *synchronous condenser*, its *reactive power*;

(5) in respect of ~~a *semi-scheduled generating system*, or a~~ *semi-scheduled generating unit*s, ~~in an *integrated resource system*,~~ all data specified as mandatory in the relevant *energy conversion model* applicable to the corresponding ~~that~~ type of *semi-scheduled generating unit*~~*system*~~;

(6) in respect of a *schedule 5.2 plant* to the extent that it is a *scheduled resource*: ~~*scheduled generating system*, *semi-scheduled generating system*, *scheduled integrated resource system* or *scheduled bidirectional unit*:~~

(i) maximum *active power* limit;

(ii) minimum *active power* limit;

(iii) maximum *active power* raise *ramp rate*; and

(iv) maximum *active power* lower *ramp rate*;

(7) in respect of a run-back scheme agreed with the *Network Service Provider*:

(i) run-back scheme status; and

(ii) *active power*, *reactive power* or other control limit, as applicable;

(8) the mode of operation of *each production unit* or *production system* ~~the *generating unit*, *generating system*, *bidirectional unit*, or *integrated resource system*~~ including the status of the frequency controller, turbine control limits, or other information required to reasonably predict the *active power* response of the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ to a change in *power system frequency* at the *connection point*; and

(9) any other quantity that *AEMO* reasonably requires to discharge its *market* and *power system security* functions as set out in Chapters 3 and 4.

(b1) The remote control quantities referred to under paragraph (a) that *AEMO* may request include:

(1) in respect of any *schedule 5.2 plant*:~~a *generating system* or *integrated resource system*:~~

(i) ~~*voltage*~~ voltage *control* setpoint; and

(ii) ~~*voltage*~~ voltage *control* mode (where applicable);

(2) in respect of a *schedule 5.2 plant* to the extent that it is a *scheduled resource*, ~~*scheduled generating system*, *semi-scheduled generating system* or *scheduled integrated resource system*,~~ the *AGC* signal; and

(3) in respect of a *schedule 5.2 plant* that is non-scheduled, ~~*non-scheduled generating system* or *non-scheduled integrated resource system*,~~ to the extent required to manage *network* flows:

(i) *active power* limit; and

(ii) *active power* ramp limit.

Minimum access standard

(c) The *minimum access standard* is a *schedule 5.2 plant*~~:~~

~~(1) *scheduled generating unit;*~~

~~(2) *scheduled generating system;*~~

~~(3) *non-scheduled generating system;*~~

~~(4) *semi-scheduled generating unit;*~~

~~(5) *semi-scheduled generating system;*~~

~~(6) *scheduled bidirectional unit;*~~

~~(7) *scheduled integrated resource system;*~~

~~(8) *non-scheduled bidirectional unit;* or~~

~~(9) *non-scheduled integrated resource system,*~~

must have *remote monitoring equipment* to transmit to *AEMO's control centres* in real time in accordance with rule 4.11 the quantities that *AEMO* reasonably requires to discharge its *market* and *power system security* functions set out in Chapters 3 and 4.

(d) The quantities referred to under paragraph (c) that *AEMO* may request include:

(1) the *active power* level of the *schedule 5.2 plant*~~*generating unit* or *generating system* (as applicable)~~;

(2) if *connected* to a *transmission system*, the *reactive power* level of the *schedule 5.2 plant*~~*generating unit* or *generating system* (as applicable)~~; and

(3) in respect of~~if a *semi-scheduled generating system* or a~~ *semi-scheduled generating unit*s, ~~in an *integrated resource system*,~~ all data specified as mandatory in the relevant *energy conversion model* applicable to the corresponding ~~that~~ type of ~~*semi-scheduled generating system* or~~ *semi-scheduled generating unit*;

(4) [**Deleted**]~~the *active power* level of the *bidirectional unit* or *integrated resource system* (as applicable); and~~

(5) [**Deleted**]~~if *connected* to a *transmission system*, the *reactive power* level of the *bidirectional unit* or *integrated resource system* (as applicable).~~

S5.2.6.2 Communications equipment

Automatic access standard

(a) The *automatic access standard* is a *Schedule 5.2 Participant* ~~*Generator* or *Integrated Resource Provider*~~ must:

(1) provide and maintain two separate telephone *facilities* using independent telecommunications service providers, for the purposes of *operational communications* between the *Schedule 5.2 Participant's*

~~*Generator's or Integrated Resource Provider's*~~ responsible operator under clause 4.11.3(a) and *AEMO's control centre*; and

(2) provide electricity supplies for *remote monitoring equipment* and *remote control equipment* installed in relation to its *schedule 5.2 plant* ~~*generating system or integrated resource system*~~ capable of keeping such equipment available for at least 3 hours following total loss of *supply* at the *connection point* for the relevant *schedule 5.2 plant*~~*production unit*~~.

Minimum access standard

(b) The *minimum access standard* is a *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ must:

(1) provide and maintain a telephone facility for the purposes of *operational communications* between the *Schedule 5.2 Participant's* ~~*Generator's or Integrated Resource Provider's*~~ responsible operator under clause 4.11.3(a) and *AEMO's control centre*; and

(2) provide electricity supplies for *remote monitoring equipment* and *remote control equipment* installed in relation to its *schedule 5.2 plant* ~~*generating system or integrated resource system*~~ capable of keeping such equipment available for at least 1 hour following total loss of *supply* at the *connection point* for the relevant *schedule 5.2 plant*~~*production unit*~~.

Negotiated access standard

(c) A *negotiated access standard* must include, where the *Network Service Provider* or *AEMO* reasonably require, a back-up telephone facility be independent of commercial telephone service providers, and the *Network Service Provider* must provide and maintain the separate facility on a cost-recovery basis only through the charge for *connection*.

(d) A *negotiated access standard* must include that a *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider*~~ must provide communications paths (with appropriate redundancy) from the *remote monitoring equipment* or *remote control equipment* installed for ~~each of~~ its *schedule 5.2 plant*~~*generating systems or integrated resource systems as appropriate,*~~ to an interface for communication purposes in a location reasonably acceptable to the *Network Service Provider* at the relevant *schedule 5.2 plant*~~*generation facility*~~.

(e) Communications systems between the interface for communication purposes under paragraph (d) and the *control centre* must be the responsibility of the *Network Service Provider* unless otherwise agreed by the *Schedule 5.2 Participant* ~~*Generator or Integrated Resource Provider (as the case may be)*~~ and the *Network Service Provider*.

(f) A *negotiated access standard* must include a requirement that the *Schedule 5.2 Participant*~~*Generator or Integrated Resource Provider*~~ provide accommodation and secure power supplies for communications *facilities* provided by the *Network Service Provider* under this clause S5.2.6.2.

S5.2.7 ~~Power station~~ Generation auxiliary supplies

In cases where a *production system* ~~*generating system* or *integrated resource system*~~ takes its *auxiliary load* via a *connection point* through which its *generation* is not transferred to the *network*, the *access standards* for the *auxiliary load connection point* must be established under clause S5.3.5 as if the *Schedule 5.2 Participant* ~~*Generator* or *Integrated Resource Provider*~~ (as the case may be) were a *Schedule 5.3 Participant*~~*Market Customer*~~.

S5.2.8 Fault current

Automatic access standard

(a) The *automatic access standard* is:

(1) the contribution of the *schedule 5.2 plant* ~~*generating system* or *integrated resource system*~~ to the fault current on the *connecting network* through its *connection point* must not exceed the contribution level that will ensure that the total fault current can be safely interrupted by the circuit breakers of the *connecting network* and safely carried by the *connecting network* for the duration of the applicable *breaker fail protection system fault clearance times*, as specified for the relevant *connection point* by the *Network Service Provider*;

(2) a *schedule 5.2 plant* ~~*generating system's* or *integrated resource system's connected plant*~~ must be capable of withstanding fault current through the *connection point* up to the higher of:

(i) the level specified in clause S5.2.4(e1)(1) ; and

(ii) the highest level of current at the *connection point* that can be safely interrupted by the circuit breakers of the *connecting network* and safely carried by the *connecting network* for the duration of the applicable *breaker fail protection system fault clearance times*, as specified by the *Network Service Provider*; and

(3) a circuit breaker provided to isolate a *schedule 5.2 plant* or any of its *production units* and *synchronous condensers* ~~*generating unit*, *generating system*, *bidirectional unit* or *integrated resource system*~~ from the *network* must be capable of breaking, without damage or restrike, the maximum fault currents that could reasonably be expected to flow through the circuit breaker for any fault in the *network* or in the relevant *plant*~~*generating unit*, *generating system*, *bidirectional unit* or *integrated resource system*~~, as specified in the *connection agreement*.

Minimum access standard

(b) The *minimum access standard* is:

(1) the *schedule 5.2 plant* ~~*generating system* "or *integrated resource system*~~ does not need to limit fault current contribution;

(2) a *schedule 5.2 plant* ~~*generating system's* or *integrated resource system's connected plant*~~ must be capable of withstanding fault current through the *connection point* up to the level specified in clause S5.2.4(e1)(1)~~.~~; and

(3) a circuit breaker provided to isolate a *schedule 5.2 plant* or any of its *production units* or *synchronous condensers* ~~*generating unit, generating system, bidirectional unit* or *integrated resource system*~~ from the *network* must be capable of breaking, without damage or restrike, the maximum fault currents that could reasonably be expected to flow through the circuit breaker for any fault in the *network* or in the relevant *plant*~~*generating unit, generating system, bidirectional unit* or *integrated resource system*~~, as specified in the *connection agreement*.

Negotiated access standard

(c) In negotiating a *negotiated access standard*, the *Network Service Provider* must consider alternative *network* configurations in the determination of the applicable fault current level and must prefer those options that maintain an equivalent level of service to other *Network Users* and which, in the opinion of the *Schedule 5.2 Participant*~~*Generator* or *Integrated Resource Provider* (as the case may be)~~, impose the least obligation on the *Schedule 5.2 Participant*~~*Generator* or *Integrated Resource Provider*~~.

(d) [**Deleted**]~~In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.8, the *Network Service Provider* must take into account, without limitation:~~

~~(1) the expected performance of existing *networks* and *considered projects*;~~

~~(2) the expected performance of existing *generating plant* and other relevant projects; and~~

~~(3) the expected range of *power system* operating conditions.~~

Schedule 5.3 Technical connection requirements for loads~~Conditions for Connection of Customers~~

S5.3.1a Application of the schedule ~~Introduction to the schedule~~

(a) ~~This schedule applies to the following classes of *Network User*:~~ This schedule sets out details of additional requirements and conditions that a person to whom this schedule applies (described in paragraph (a1)) must satisfy as a condition of *connection* to the *power system* of *plant* that consumes electricity from a *network*, including a *distribution network* or a source of *load* in an *integrated resource system*, but excluding *schedule 5.2 plant* and *schedule 5.3a plant* ("*schedule 5.3 plant*").

~~(1) [**Deleted**];~~

~~(2) [**Deleted**];~~

~~(3) a *Market Customer* in respect of its *market connection points*;~~

~~(4) a *Non-Registered Customer* in respect of its *connection* to a *network*; and~~

~~(5) a *Distribution Network Service Provider* in respect of its *distribution network*.~~

(a1) This schedule applies to a person ("*Schedule 5.3 Participant*") in respect of *schedule 5.3 plant* if that person is one of the following:

(1) the *Connection Applicant* in respect of a *schedule 5.3 plant*, who:

(i) is or intends to be the *Registered Participant* for that *plant*;

(ii) has appointed or intends to appoint an *intermediary* for that *plant*; or

(iii) wishes to establish a *connection* to a *transmission network*; or

(2) the *Connection Applicant* in respect of a *schedule 5.3 plant* other than a person referred to in paragraph (1), but only to the extent that the *Network Service Provider* considers that the *connection* or operation of the *schedule 5.3 plant* would otherwise adversely affect the quality or security of *network service* to other *Network Users*.

(b) For the purposes of this schedule 5.3 the term ***Network Service Provider*** means ~~must be interpreted to mean~~ the *Network Service Provider* with whom the *Connection Applicant* has sought, or is seeking, a *connection* ~~in accordance with clause 5.3.2 of the *Rules*~~.

(c) [**Deleted**] ~~All *Network Users* must comply with the requirements for the establishment of *performance standards* in accordance with provisions contained in schedule 5.1a for *system standards* or schedule 5.1 for *Network Service Providers* and this schedule 5.3 for *Customers*.~~

(d) ~~If the *Connection Applicant* is a *Registered Participant* in relation to the proposed *connection*, the *Network Service Provider* may include as terms and conditions of the *connection agreement* any provision of this schedule that is expressed as an obligation on a *Network User*. If the *Connection Applicant* is not a *Registered Participant* in relation to the proposed *connection*, t~~The *Network Service Provider* must include as terms and conditions of the *connection agreement* with a *Schedule 5.3 Participant*, as applicable to its *schedule 5.3 plant*:

(1) the relevant provisions ~~each provision~~ of this schedule ~~that is~~ expressed as ~~an~~ obligations on a *Schedule 5.3 Participant*~~*Network User*~~; and

(2) ~~each~~ the relevant agreed *performance standards* with which the *Schedule 5.3 Participant* must comply. ~~and an obligation to comply with it.~~

(e) [**Deleted**]~~The purpose of this schedule is to:~~

~~(1) describe the information that must be exchanged for the *connection* enquiry and *application to connect* processes described in rule 5.3 of the *Rules*;~~

~~(2) establish the *automatic access standards* and *minimum access standards* that will apply to the process of negotiating access standards under clause 5.3.4A of the *Rules*; and~~

~~(3) establish obligations to apply prudent design standards for the *plant* to be *connected*.~~

(f) This schedule does not apply to a *Network Service Provider* or a *Network User* in relation to a *connection* to a *regulated SAPS*.

S5.3.1 Information

(a) Before a *Schedule 5.3 Participant ~~Network User~~ connects* any new or additional equipment to a *network*, the *Schedule 5.3 Participant ~~Network User~~* must submit the following kinds of information to the *Network Service Provider*:

(1) a single line diagram with the protection details;

(2) *metering system* design details for any metering equipment being provided by the *Schedule 5.3 Participant~~Network User~~*;

(3) a general arrangement locating all the equipment on the site;

(4) a general arrangement for each new or altered *substation* showing all exits and the position of all electrical equipment;

(5) type test certificates for all new switchgear and *transformers*, including measurement *transformers* to be used for metering purposes in accordance with Chapter 7 of the *Rules*;

(6) earthing details;

(7) the proposed methods of earthing cables and other equipment to comply with the regulations of the relevant *participating jurisdiction*;

(8) *plant* and earth grid test certificates from approved test authorities;

(9) a secondary injection and trip test certificate on all circuit breakers;

(10) certification that all new equipment has been inspected before being *connected* to the *supply*; and

(11) operational arrangements.

(a1) Before a *Schedule 5.3 Participant ~~Network User~~ connects* any new or additional equipment to a *network* or if earlier, in accordance with the requirements of this Chapter, the *Schedule 5.3 Participant~~Network User~~* must submit:

(1) to *AEMO* and the relevant *Network Service Provider*(s), information about the *protection systems* of the equipment;

(2) to *AEMO* and the relevant *Network Service Provider*(s), information about the *control systems* of the equipment including:

(i) a set of functional block diagrams, including all functions between feedback signals and output;

(ii) the parameters of each functional block, including all settings, gains, time constants, delays, deadbands and limits;

(iii) the characteristics of non-linear elements;

(iv) encrypted models in a form suitable for the software simulation products nominated by *AEMO* in the *Power System Model Guidelines*;

(3) to *AEMO* and the relevant *Network Service Provider*(s), any other information specified in the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*;

(4) to *AEMO*, model source code (in the circumstances required by the *Power System Model Guidelines*) associated with the model in subparagraph (2)(iv) in an unencrypted form suitable for at least one of the software simulation products nominated by *AEMO* in the *Power System Model Guidelines* and in a form that would allow conversion for use with other software simulation products nominated by *AEMO* in the *Power System Model Guidelines*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(a2) The information provided under paragraph (a1) must contain sufficient detail for *AEMO* and the relevant *Network Service Provider*(s) to perform *power system* simulation studies in accordance with the requirements and circumstances specified in the *Power System Model Guidelines*.

(a3) Notwithstanding paragraph (a1), *AEMO* may exempt a *Schedule 5.3 Participant* ~~*Network User*~~ or class of *Schedule 5.3 Participants* ~~*Network Users*~~ from the requirement to provide some or all of the information specified in paragraph (a1), and must do so in accordance with the circumstances set out in the *Power System Model Guidelines*.

(a4) All information provided to *AEMO* and the relevant *Network Service Provider*(s) under paragraph (a1) or pursuant to paragraph (a3) must be treated as *confidential information* by those recipients. A *Schedule 5.3 Participant* who receives information under this clause and is not a *Registered Participant* must comply with rule 8.6 as if it were a *Registered Participant*.

(b) For the purposes of clause 5.3.2(f) ~~of the *Rules*~~, the technical information that a *Network Service Provider* must, if requested, provide to a *Connection Applicant* in respect of the proposed *connection* includes:

(1) the highest expected single phase and three phase fault levels at the *connection point* without the proposed *connection*;

(2) the clearing times of the existing *protection systems* that would clear a fault at the location at which the new *connection* would be connected into the existing *transmission system* or *distribution system*;

(3) the expected limits of ~~*voltage*~~ voltage fluctuation, harmonic ~~*voltage*~~ voltage distortion and ~~*voltage*~~ voltage unbalance at the *connection point* without the proposed *connection*;

(4) technical information relevant to the *connection point* without the proposed *connection* including equivalent source impedance information, sufficient to estimate fault levels, ~~*voltage*~~ voltage fluctuations, harmonic ~~*voltage*~~ voltage distortion and ~~*voltage*~~ voltage unbalance; and

(5) any other information or data not being *confidential information* relating to the performance of the *Network Service Provider's facilities* that is reasonably necessary for the *Connection Applicant* to prepare an *application to connect*;

except where the *Schedule 5.3 Participant* ~~*Connection Applicant*~~ agrees the *Network Service Provider* may provide alternative or less detailed technical information in satisfaction of this clause S5.3.1~~.~~(b).

S5.3.2 Design standards

A *Schedule 5.3 Participant* ~~*Network User*~~ must ensure that:

(a) the electrical *plant* within the *schedule 5.3 plant* ~~in its *facility*~~ complies with the relevant *Australian Standards* as applicable at the time of first installation ~~of that electrical *plant* in the *facility*~~;

(b) circuit breakers provided to isolate the *schedule 5.3 plant* ~~*Network User's facilities*~~ from the *Network Service Provider's facilities* are capable of breaking, without damage or restrike, fault currents nominated by the *Network Service Provider* in the relevant *connection agreement*; and

(c) new equipment including circuit breakers provided to isolate the *schedule 5.3 plant* ~~*Network User's facilities*~~ from the *Network Service Provider's facilities* is capable of withstanding, without damage, power *frequency* ~~*voltages*~~ voltages and impulse levels nominated by the *Network Service Provider* to apply at the *connection point* in accordance with the relevant provisions of the *system standards* and recorded in the relevant *connection agreement*.

S5.3.3 Protection systems and settings

A *Schedule 5.3 Participant* ~~*Network User*~~ must ensure that all *connections* to the *network* are protected by protection devices which effectively and safely *disconnect* any faulty circuit automatically within a time period specified by the *Network Service Provider* in accordance with the following provisions:

(a) The *automatic access standard* is:

(1) Primary *protection systems* must be provided to *disconnect* any faulted element from the *power system* within the applicable *fault clearance time* determined under clause S5.1.9(a)(1), but subject to clauses S5.1.9(k) and S5.1.9(l).

(2) Each primary *protection system* must have sufficient redundancy to ensure that a faulted element within its protection zone is *disconnected* from the *power system* within the applicable *fault clearance time* with any single protection element (including any communications facility upon which that *protection system* depends) out of service.

(3) *Breaker fail protection systems* must be provided to clear faults that are not cleared by the circuit breakers controlled by the primary *protection system*, within the applicable *fault clearance time* determined under clause S5.1.9(a)(1).

(b) The *minimum access standard* is:

(1) Primary *protection systems* must be provided to *disconnect* from the *power system* any faulted element within their respective protection zones within the applicable *fault clearance time* determined under clause S5.1.9(a)(2), but subject to clauses S5.1.9(k) and S5.1.9(l).

(2) If a *fault clearance time* determined under clause S5.1.9(a)(2) for a protection zone is less than 10 seconds, a *breaker fail protection system* must be provided to clear from the *power system* any fault within that protection zone that is not cleared by the circuit breakers controlled by the primary *protection system*, within the applicable *fault clearance time* determined under clause S5.1.9(a)(3).

(c) The *Network Service Provider* and the *Schedule 5.3 Participant* ~~*Network User*~~ must cooperate in the design and implementation of *protection systems* to comply with this clause, including cooperation with regard to:

(1) the use of *current transformer* and ~~*voltage*~~voltage *transformer* secondary circuits (or equivalent) of one party by the *protection system* of the other;

(2) tripping of one party's circuit breakers by a *protection system* of the other party; and

(3) co-ordination of *protection system* settings to ensure inter-operation.

Before the *schedule 5.3 plant* ~~*Network User's* installation~~ is *connected* to the *Network Service Provider's transmission system* or *distribution system* its ~~the *Network User's*~~ *protection system* must be tested and the *Schedule 5.3 Participant* ~~*Network User*~~ must submit the appropriate test certificate to the *Network Service Provider*.

The application of settings of the protection scheme must be undertaken in accordance with clause S5.3.4.

S5.3.4 Settings of protection and control systems

A *Schedule 5.3 Participant* ~~*Network User*~~ must only apply settings to a *control system* or a *protection system* that are necessary to comply with performance requirements of this schedule 5.3 if the settings have been approved in writing by the *Network Service Provider* and, if the requirement is one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*, also by *AEMO*. A *Schedule 5.3 Participant* ~~*Network User*~~ must not allow its *plant* to take *supply* of electricity from the *power system* without such prior approval.

If a *Schedule 5.3 Participant* ~~*Network User*~~ seeks approval from the *Network Service Provider* to apply or change a setting, approval must not be withheld unless the *Network Service Provider* or, if the requirement is one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*, *AEMO*, reasonably determines that the changed setting would cause the *plant* to not comply with the relevant *performance standard* or cause an *inter-regional* or *intra-regional power transfer capability* to be reduced.

If the *Network Service Provider* or, if the requirement is one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*, *AEMO*, reasonably determines that a setting of a *control system* or *protection system* of the *plant* needs to change to comply with the relevant *performance standard* or to maintain or restore an *inter-*

regional or *intra-regional power transfer capability*, the *Network Service Provider* or *AEMO* (as applicable) must consult with the *Schedule 5.3 Participant* ~~*Network User*~~, and the *Network Service Provider* may request in writing that a setting be applied in accordance with the determination.

The *Network Service Provider* may also request a test to verify the performance of the relevant *plant* with the new setting.

A *Schedule 5.3 Participant* ~~*Network User*~~ who receives such a request must arrange for the notified setting to be applied as requested and for a test to be conducted as requested. After the test, the *Schedule 5.3 Participant* ~~*Network User*~~ must, on request, provide both *AEMO* and the *Network Service Provider* with a report of a requested test, including evidence of its success or failure. Such a report of a test is *confidential information*.

A *Schedule 5.3 Participant* ~~*Network User*~~ must not change a setting requested by the *Network Service Provider* without its prior written agreement. If the *Network Service Provider* requires a *Schedule 5.3 Participant* ~~*Network User*~~ to change a setting within 18 months of a previous request, the *Network Service Provider* must pay the *Schedule 5.3 Participant* ~~*Network User*~~ its reasonable costs of changing the setting and conducting the tests as requested.

S5.3.5 Power factor requirements

Automatic access standard: For *loads* equal to or greater than 30 percent of the *maximum demand* at the *connection point* the *power factors* for *schedule 5.3 plant* ~~*Network Users*~~ and for *distribution networks connected* to another *transmission network* or *distribution network* are shown in Table S5.3.1:

Table S5.3.1

Permissible Range	
Supply Voltage (nominal)	**Power Factor Range**
> 400 kV	0.98 lagging to unity
250 kV - 400 kV	0.96 lagging to unity
50 kV - 250 kV	0.95 lagging to unity
1 kV < 50 kV	0.90 lagging to 0.90 leading

For *load* less than 30 percent of the *maximum demand* at the *connection point* a *Network Service Provider* may accept a *power factor* outside the range stipulated in Table S5.3.1 provided this does not cause the *system standards* to be violated.

Minimum access standard: A *Network Service Provider* may permit a lower lagging or leading *power factor* where the *Network Service Provider* is advised by *AEMO* that this will not detrimentally affect *power system security* or reduce *intra-regional* or *inter-regional power transfer capability*.

General:

If the *power factor* falls outside the relevant *performance standard* over any critical loading period nominated by the *Network Service Provider*, the *Schedule 5.3*

Participant ~~Network User~~ must, where required by the *Network Service Provider* in order to maintain satisfactory ~~*voltage*~~ voltage levels at the *connection point* or to restore *intra-regional* or *inter-regional power transfer capability*, take action to ensure that the *power factor* falls within range as soon as reasonably practicable. This may be achieved by installing additional *reactive plant* or reaching a commercial agreement with the *Network Service Provider* to install, operate and maintain equivalent *reactive plant* as part of the *connection assets* or by alternative commercial arrangements with another party.

A *Schedule 5.3 Participant ~~Registered Participant~~* who installs *shunt capacitors* to comply with *power factor* requirements must comply with the *Network Service Provider's* reasonable requirements to ensure that the design does not severely attenuate audio *frequency* signals used for *load* control or operations, or adversely impact on harmonic ~~*voltage*~~ voltage levels at the *connection point*.

S5.3.6 Balancing of load currents

A *Network Service Provider* may require a *schedule 5.3 plant's ~~connected Registered Participant's~~ load* to be balanced across all phases in order to maintain the negative sequence ~~*voltage*~~ voltage at each *connection point* at less than or equal to the limits set out in Table S5.1a.1 of the *system standards* for the applicable nominal *supply* ~~*voltage*~~ voltage level.

Automatic access standard: A *Schedule 5.3 Participant ~~Network User~~* must ensure that:

(a) for *connections* at 30 kV or higher ~~*voltage*~~ voltage, the current in any phase is not greater than 102 percent or less than 98 percent of the average of the currents in the three phases; and

(b) for *connections* at ~~*voltages*~~ voltages less than 30 kV, that the current in any phase is not greater than 105 percent or less than 95 percent of the average of the currents in the three phases.

Minimum access standard: Where agreed with the relevant *Network Service Provider* and subject to any specific conditions imposed, a *schedule 5.3 plant ~~Network User~~* may cause current unbalance greater than that specified in the *automatic access standard* provided the *schedule 5.3 plant ~~Network User~~* does not cause the limits specified in clause S5.1a.7 to be exceeded at any point in the *network*.

General:

The limit to *load* current unbalance must be included in the *connection agreement* and is subject to verification of compliance by the *Network Service Provider*.

Where these requirements cannot be met the *Schedule 5.3 Participant ~~Registered Participant~~* may enter into a commercial arrangement with the *Network Service Provider* for the installation of equipment to correct the phase unbalance. Such equipment must be considered as part of the *connection assets* for the *schedule 5.3 plant~~Registered Participant~~*.

The limit to *load* current unbalance must be included in the *performance standards ~~connection agreement~~* and is subject to verification of compliance by the *Network Service Provider*.

S5.3.7 Voltage fluctuations

(a) *Automatic access standard*: The ~~*voltage*~~ voltage fluctuations caused by variations in *loading level* at the *connection point*, including those arising from *energisation*, de-energisation or other operation of *plant*, must not exceed the limits determined under clause S5.1.5(a).

(b) *Minimum access standard*: The ~~*voltage*~~ voltage fluctuations caused by variations in *loading level* at the *connection point*, including those arising from *energisation*, de-energisation or other operation of *plant*, must not exceed the limits determined under clause S5.1.5(b).

The ~~*voltage*~~ voltage fluctuation emission limits and any specified conditions must be included in the *performance standards*~~*connection agreement*~~, and are subject to verification of compliance by the *Network Service Provider*.

S5.3.8 Harmonics and voltage notching

(a) *Automatic access standard*: The harmonic ~~*voltage*~~ voltage distortion caused by non-linearity, commutation of power electronic equipment, harmonic resonance and other effects within the *plant*, must not exceed the limits determined under clause S5.1.6(a).

(b) *Minimum access standard*: The harmonic ~~*voltage*~~ voltage distortion caused by non-linearity, commutation of power electronic equipment, harmonic resonance and other effects within the *plant*, must not exceed the limits determined under clause S5.1.6(b).

The harmonic ~~*voltage*~~ voltage distortion emission limits and any special conditions must be included in the *performance standards*~~*connection agreement*~~, and is subject to verification of compliance by the *Network Service Provider*.

S5.3.9 Design requirements for Network Users' substations

A *Schedule 5.3 Participant* ~~*Network User*~~ must comply with the following requirements applicable to the design, station layout and choice of equipment for a *substation*:

(a) safety provisions must comply with requirements applicable to the *participating jurisdiction* notified by the *Network Service Provider*;

(b) where required by the *Network Service Provider*, appropriate interfaces and accommodation must be incorporated for communication *facilities*, remote monitoring and control and protection of *plant* which is to be installed in the *substation*;

(c) a *substation* must be capable of continuous uninterrupted operation with the levels of ~~*voltage*~~ voltage, harmonics, unbalance and ~~*voltage*~~ voltage fluctuation specified in the *system standards* as modified in accordance with the relevant provisions of schedule 5.1;

(d) earthing of primary *plant* in the *substation* must be in accordance with the Electricity Supply Association of Australia Safe Earthing Guide and must reduce step and touch potentials to safe levels;

(e) *synchronisation facilities* or reclose blocking must be provided if a *generating unit* is *connected* through the *substation*;

(f) secure electricity supplies of adequate capacity must be provided for *plant* performing communication, monitoring, control and protection functions;

(g) *plant* must be tested to ensure that the *substation* complies with the approved design and specifications as included in a *connection agreement*;

(h) the protection equipment required would normally include protection schemes for individual items of *plant*, back-up arrangements, auxiliary DC supplies and instrumentation *transformers*; and

(i) insulation levels of *plant* in the *substation* must co-ordinate with the insulation levels of the *network* to which the *substation* is *connected* as nominated in the *connection agreement*.

S5.3.10 Load shedding facilities

Schedule 5.3 Participants ~~*Network Users* who are *Market Customers* and~~ who have expected peak demands in excess of 10MW must provide automatic *interruptible load* in accordance with clause 4.3.5 of the *Rules*.

Load shedding procedures may be applied by *AEMO*, or *EFCS settings schedules* may be determined, in accordance with the provisions of clause 4.3.2 of the *Rules* for the shedding of all *loads* including *sensitive loads*.

S5.3.11 Short circuit ratio ~~**(customers)**~~

(a) This clause S5.3.11 applies to *schedule 5.3 plant* that ~~a *Network User* where the *plant* to be *connected*~~ includes any *inverter based resource.*

Minimum access standard

(b) The *minimum access standard* is electrical *plant* must have *plant* capability sufficient to operate stably and remain *connected* at a *short circuit ratio* of 3.0, assessed in accordance with the methodology prescribed in the *system strength impact assessment guidelines*.

General requirements

(c) The *performance standards* ~~in the *connection agreement*~~ must record:

(1) the agreed value of the *short circuit ratio* which must be the minimum of 3.0 and the value at which the *plant* has *plant* capability sufficient to operate stably and remain *connected*; and

(2) the *maximum demand* used to calculate the agreed value.

(d) For paragraphs (b) and (c), the *plant* capability may be demonstrated with any appropriate *control system* and/or *protection system* settings. The settings used may be different to the setting required for compliance with other *performance standards* established under this schedule.

Schedule 5.3a ~~Conditions for connection of Market Network Services~~Technical requirements for high voltage direct current networks

S5.3a.1a Application of the schedule ~~Introduction to the schedule~~

~~This schedule sets out obligations of *Market Network Service Providers* who *connect* to either a *transmission network* or a *distribution network*. It represents the requirements to be met for access to a *network*. Particular provisions may be varied by the *Network Service Provider* under the provisions of the *Rules* for the application of *minimum access standards* and *automatic access standards*.~~

~~This schedule includes specific provisions for the determination of *automatic access standards* and *negotiated access standards* which, once determined, must be recorded together with the *automatic access standards* in a *connection agreement* and registered with *AEMO* as *performance standards*.~~

~~In this schedule, the term *Network Service Provider* applies only to the *Network Service Provider* with whom the *Market Network Service Provider* has lodged, or is considering lodging, an *application to connect*.~~

~~(a) The schedule includes, in respect of each *market network service*, provisions regarding the capability to:~~

~~(1) automatically control the transfer of real power at the *connection point* for any given set of system conditions within the limits permitted under the *Rules*;~~

~~(2) respond to control requirements under expected normal and abnormal conditions;~~

~~(3) comply with general requirements to meet quality of *supply* obligations in accordance with clauses S5.3a.9, S5.3a.10 and S5.3a.11 and to maintain security of *supply* to other *Registered Participants*; and~~

~~(4) automatically *disconnect* itself when necessary to prevent any damage to the *market network service facilities* or threat to *power system security*.~~

~~(b) This schedule also sets out the requirements and conditions, which (subject to clause 5.2.3 of the *Rules*) are obligations of *Market Network Service Providers* to:~~

~~(1) co-operate with the relevant *Network Service Provider* on technical matters when making a new *connection*;~~

~~(2) provide information to the *Network Service Provider* or *AEMO*; and~~

~~(3) observe and apply the relevant provisions of the *system standards* contained in schedule 5.1a in relation to the planning, design and operation of its *market network service facilities*.~~

~~(c) This schedule does not set out arrangements by which a *Market Network Service Provider* may enter into an agreement or contract with *AEMO* to:~~

~~(1) provide additional services that are necessary to maintain *power system security*; or~~

~~(2) provide additional service to facilitate management of the *market*.~~

(a) This schedule sets out details of additional requirements and conditions that a person to whom this schedule applies (described in paragraph (b)) must satisfy as a condition of *connection* to the *power system* of a *schedule 5.3a plant*.

(b) This schedule applies to a person ("*Schedule 5.3a Participant*") in respect of *schedule 5.3a plant* if that person is:

(1) the person who is, or intends to be, registered as a *Market Network Service Provider* in respect of that *plant*; or

(2) any other *Network Service Provider*, or a person exempted under clause 2.5.1(d) from the requirement to register as a *Network Service Provider*, in respect of a *schedule 5.3a plant* that:

(i) is, or will be, *connected* to the alternating current *network* of a registered *Network Service Provider*; or

(ii) is, or will be, interfaced only with alternating current sections of the person's own *network*.

(c) This schedule applies to a *Schedule 5.3a Participant* described in paragraph (b)(2)(ii) with the following modifications:

(1) where this schedule contemplates that a matter is to be agreed with or approved by the *Network Service Provider*, the *Schedule 5.3a Participant* must determine that matter in a manner consistent with achieving all relevant *system standards* and the performance requirements of schedule 5.1 for the broader *network*, and subject to any requirement for *AEMO's* agreement or approval;

(2) the *Schedule 5.3a Participant* must consult with *AEMO* on *AEMO advisory matters* and determine those matters consistently with *AEMO's* advice;

(3) requirements to co-operate with, or provide information to, the *Network Service Provider* do not apply; and

(4) references to the *connection point* of the *schedule 5.3a plant* are taken to refer to each of the interfaces between the *schedule 5.3a plant* and the alternating current *network elements*, as designated by the *Schedule 5.3a Participant* and recorded in the *performance standards*.

(d) In this schedule:

(1) except in paragraph (b), the term *Network Service Provider* refers to each *Network Service Provider* to whose alternating current *network* the *schedule 5.3a plant* is or will be *connected*, and not to a *Network Service Provider* in its capacity as a *Schedule 5.3a Participant*; and

(2) except where paragraph (c)(4) applies, references to a *connection point* are to each of the *connection points* agreed with the relevant *Network Service Provider* and *AEMO* for the purposes of applying the requirements in this schedule 5.3a.

(e) This schedule also sets out the requirements and conditions which, subject to clause 5.2.3 or 5.2.3A of the *Rules* (as applicable), are obligations on *Schedule 5.3a Participants*:

(1) to co-operate with the relevant *Network Service Provider* on technical matters relating to *schedule 5.3a plant*;

(2) to provide information to the *Network Service Provider* or *AEMO*; and

(3) to observe and apply the relevant provisions of the *system standards* contained in schedule 5.1a in relation to the planning, design and operation of *schedule 5.3a plant*.

(f) The *Network Service Provider* must record all *access standards* determined for a *schedule 5.3a plant* under this schedule as the *plant's performance standards* in (as applicable):

(1) a *connection agreement* for the relevant *schedule 5.3a plant*; or

(2) where the *Schedule 5.3a Participant* is a person described in paragraph (b)(2)(ii), a standalone document that it must provide to AEMO and keep up to date.

S5.3a.1 Provision of Information

(a) Before a *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ *connects* any new or additional equipment to a *network*, the *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must submit the following kinds of information to the *Network Service Provider*:

(1) a single line diagram with the protection details;

(2) *metering system* design details for any metering equipment being provided by the *Schedule 5.3a Participant*~~*Market Network Service Provider*~~;

(3) a general arrangement locating all relevant equipment on the site;

(4) a general arrangement for each new or altered *substation* showing all exits and the position of all electrical equipment;

(5) type test certificates for all new switchgear and *transformers*, including measurement *transformers* to be used for *metering* purposes in accordance with Chapter 7 of the *Rules*;

(6) earthing details;

(7) the proposed methods of earthing cables and other equipment to comply with the regulations of the relevant *participating jurisdiction*;

(8) *plant* and earth grid test certificates from approved test authorities;

(9) a secondary injection and trip test certificate on all circuit breakers;

(10) certification that all new equipment has been inspected before being *connected* to the *supply*; and

(11) operational arrangements.

(a1) Before a *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ *connects* any new or additional equipment to a *network*, the *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must submit:

(1) to *AEMO* and the relevant *Network Service Provider*(s), information about the *protection systems* of the equipment;

(2) to *AEMO* and the relevant *Network Service Provider*(s), information about the *control systems* of the equipment including:

(i) a set of functional block diagrams, including all functions between feedback signals and output;

(ii) the parameters of each functional block, including all settings, gains, time constraints, delays, deadbands and limits;

(iii) the characteristics of non-linear elements;

(iv) encrypted models in a form suitable for the software simulation products nominated by *AEMO* in the *Power System Model Guidelines*;

(3) to *AEMO* and the relevant *Network Service Provider*(s), any other information specified in the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*;

(4) to *AEMO*, model source code (in the circumstances required by the *Power System Model Guidelines*) associated with the model in subparagraph (2)(iv) in an unencrypted form suitable for at least one of the software simulation products nominated by *AEMO* in the *Power System Model Guidelines* and in a form that would allow conversion for use with other software simulation products nominated by *AEMO* in the *Power System Model Guidelines*.

Note

The AEMC proposes to recommend that this paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

~~**Note**~~

~~This paragraph is classified as a tier 2 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)~~

(a2) The information provided under paragraph (a1) must contain sufficient detail for *AEMO* and the relevant *Network Service Provider*(s) to perform *power system* simulation studies in accordance with the requirements and circumstances specified in the *Power System Model Guidelines*.

(a3) **[Deleted]** ~~All information provided to *AEMO* and the relevant *Network Service Provider*(s) under paragraph (a1) must be treated as *confidential information* by those recipients.~~

(b) For the purposes of clause 5.3.2(f) ~~of the *Rules*~~, the technical information that a *Network Service Provider* must, if requested, provide to a *Connection Applicant* in respect of the proposed *connection* of a *schedule 5.3a plant* ~~*market network service facility*~~ includes:

(1) the highest and lowest expected single phase fault level and *three phase fault level* at the *connection point* and the X/R ratio, with the *schedule 5.3a plant* not electrically *connected*;

(2) the mid-point voltage for the purposes of clause S5.3a.8;

(3) the highest and typical expected system impedance levels at the *connection point* with the *schedule 5.3a plant* not *connected*, as required for the purposes of clause S5.3a.15;

(4) any other matters that *AEMO* or the *Network Service Provider* may specify, nominate or require for the purposes of any *access standard* in this schedule 5.3a;

(5) the clearing times of the existing *protection systems* that would clear a fault at the location at which the new *connection* would be *connected* into the existing *transmission system* or *distribution system*;

(6) the expected limits of voltage fluctuation, harmonic voltage distortion and voltage unbalance at the *connection point* with the *schedule 5.3a plant* not *connected*;

(7) technical information relevant to the *connection point* with the *schedule 5.3a plant* not electrically *connected* including equivalent source impedance information, sufficient to estimate fault levels, voltage fluctuations, harmonic voltage distortion (for harmonics relevant to the *generating system*) and voltage unbalance;

(8) other information relating to the performance of the *national grid* that is reasonably necessary for the *Connection Applicant* to prepare an *application to connect*, including:

(i) a model of the *power system*, including relevant *considered projects* and the range of expected operating conditions, sufficient to carry out load flow and dynamic simulations; and

(ii) information on *inter-regional* and *intra-regional power transfer capabilities* and relevant *plant* ratings; and

(9) the *Network Service Provider's* expected *three phase fault level* at the *connection point* for the *schedule 5.3a plant* following the *connection* of the *schedule 5.3a plant*.

(c) All information provided under this clause S5.3a.1 must be treated as *confidential information*. A *Schedule 5.3a Participant* who receives information under this clause and is not a *Registered Participant* must comply with rule 8.6 as if it were a *Registered Participant*.

~~(1) the highest expected single phase and three phase fault levels at the *connection point* without the proposed *connection*;~~

~~(2) the clearing times of the existing *protection systems* that would clear a fault at the location at which the new *connection* would be connected into the existing *transmission system* or *distribution system*;~~

~~(3) the expected limits of *voltage* fluctuation, harmonic *voltage* distortion and *voltage* unbalance at the *connection point* without the proposed *connection*;~~

~~(4) technical information relevant to the *connection point* without the proposed *connection* including equivalent source impedance information, sufficient to estimate fault levels, *voltage* fluctuations, harmonic *voltage* distortion and *voltage* unbalance; and~~

~~(5) any other information or data not being *confidential information* relating to the performance of the *Network Service Provider's facilities* that is reasonably necessary for the *Connection Applicant* to prepare an *application to connect*;~~

~~except where the *Connection Applicant* agrees the *Network Service Provider* may provide alternative or less detailed technical information in satisfaction of this clause S5.3a.1(b).~~

S5.3a.2 Application of settings

A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must only apply settings to a *control system* or a *protection system* that are necessary to comply with performance requirements of this schedule 5.3a if the settings have been approved in writing by the *Network Service Provider* and, if the requirement is an *AEMO advisory matter*, ~~one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*,~~ also by *AEMO*. A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must not allow its *schedule 5.3a plant* ~~*market network service facilities*~~ to supply electricity to, or take electricity from the *power system* without such prior approval.

If a *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ seeks approval from the *Network Service Provider* to apply or change a setting, approval must not be withheld unless the *Network Service Provider* or, if the requirement is an *AEMO advisory matter*, ~~one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*,~~ *AEMO*, reasonably determines that the changed setting would cause the *schedule 5.3a plant* ~~*market network service facilities*~~ to not comply with the relevant *performance standard* or cause an *inter-regional* or *intra-regional power transfer capability* to be reduced.

If the *Network Service Provider* or, if the requirement is an *AEMO advisory matter*, ~~one that would involve *AEMO* under clause 5.3.4A(c) of the *Rules*,~~ *AEMO*, reasonably determines that a setting of a *schedule 5.3a plant's* ~~*market network service facility's*~~ *control system* or *protection system* needs to change to comply with the relevant *performance standard* or to maintain or restore an *inter-regional* or *intra-regional power transfer capability*, the *Network Service Provider* or *AEMO* (as applicable) must consult with the *Schedule 5.3a Participant*~~*Market Network Service Provider*~~, and may request in writing that a setting be applied in accordance with the determination.

The *Network Service Provider* may also request a test to verify the performance of the relevant *plant* with the new setting. The *Network Service Provider* must provide *AEMO* with a copy of its request to a *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ to apply a setting or to conduct a test.

A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ who receives such a request must arrange for the notified setting to be applied as requested and for a test to be conducted as requested. After the test, the *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must, on request, provide both *AEMO* and the

Network Service Provider with a report of a requested test, including evidence of its success or failure. Such a report of a test is *confidential information*.

A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must not change a setting requested by the *Network Service Provider* without its prior written agreement. If the *Network Service Provider* requires a *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ to change a setting within 18 months of a previous request, the *Network Service Provider* must pay the *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ its reasonable costs of changing the setting and conducting the tests as requested.

S5.3a.3 Technical matters to be co-ordinated

A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ and the relevant *Network Service Provider* must use all reasonable endeavours to agree upon the following matters in respect of each new or altered *connection* of a *schedule 5.3a plant* ~~*market network service facility*~~ to another *network*:

(a) design at the *connection point*;

(b) physical layout adjacent to the *connection point*;

(c) primary protection and backup protection (clause S5.3a.6);

(d) control characteristics (clause S5.3a.4);

(e) communications and alarms (clause S5.3a.4);

(f) insulation co-ordination and lightning protection;

(g) fault levels and *fault clearance times*;

(h) switching and *isolation facilities*;

(i) interlocking arrangements; and

(j) *metering installations* as described in Chapter 7 of the *Rules*.

S5.3a.4 Monitoring and control requirements

S5.3a.4.1 Remote Monitoring

Automatic access standard

(a) The *automatic* ~~*Automatic*~~ *access standard* is:

(1) ~~Each~~ a *schedule 5.3a plant* ~~*market network service facility*~~ must have in respect of each *connection point* or pole (as applicable):

(i) *remote monitoring equipment* to transmit to *AEMO's control centres* in real time, all ~~the~~ quantities that *AEMO* reasonably requires to discharge its *market* and *power system security* functions as set out in Chapters 3 and 4 of the *Rules* respectively.

(ii) access to a phasor measurement unit with capability to send data for the *schedule 5.3a plant* to *AEMO* and the *Network Service Provider*;

(iii) the capability to receive information from *AEMO* relating to the *schedule 5.3a plant's* contribution to instability, when available, in a form nominated by *AEMO*; and

(iv) if required by the *Network Service Provider*, the capability to receive a remote tripping signal from the *Network Service Provider*.

(2) [**Deleted**] ~~The quantities may include such data as current, *voltage*, *active power*, *reactive power*, operational limits and critical temperatures in respect of *connection points* and power conversion systems.~~

Minimum access standard

(b) The *minimum* ~~*Minimum* *access standard* is :~~

~~(1) Each~~ a *schedule 5.3a plant* ~~*market network service facility*~~ must have:

(1) *remote monitoring equipment* to transmit to *AEMO's control centres* in real time in respect of each *connection point* or pole (as applicable):

(~~A~~i) *connection point active power* flow, *reactive power* flow and ~~*voltage*~~ voltage;

(~~B~~ii) *active power*, *reactive power* and ~~*voltage*~~ voltage for AC power lines, *transformers* and *busbars*~~, and power and *voltage* (or alternatively current) for DC power lines~~; ~~and~~

(~~C~~iii) the status of circuit breakers, transformer tap positions, and blocking mode;

(iv) alternating current voltage control mode; and

(v) direct current control mode and the associated voltage, power, current and angle; and

(2) if required by the *Network Service Provider* or *AEMO*, access to a phasor measurement unit with capability to send data for the *schedule 5.3a plant* to the *Network Service Provider* and *AEMO*;

(3) if required by *AEMO*, the capability to receive information from *AEMO* relating to the *schedule 5.3a plant's* contribution to instability, when available, in a form nominated by *AEMO*; and

(4) if required by the *Network Service Provider*, the capability to receive a remote tripping signal from the *Network Service Provider*.

(c) [**Deleted**]

S5.3a.4.2 ~~[Deleted]~~Detection and response to unstable operation

Automatic access standard

(a) The *automatic access standard* is a *schedule 5.3a plant* must:

(1) have *facilities* to detect instability in voltage, *reactive power* or *active power* at each *connection point*;

(2) have *facilities* capable of managing the *schedule 5.3a plant* for unstable behaviour, with the capabilities, configurable enablement conditions and settings to be agreed with the *Network Service Provider* and *AEMO*;

(3) on detection of instability, execute a hierarchy of actions based on configurable trigger conditions, thresholds and timeframes agreed with the *Network Service Provider* and *AEMO*, where:

(i) any hierarchy of actions that includes *disconnection* of the *schedule 5.3a plant* must account for available automated information on the *plant's* contribution to the instability; and

(ii) actions are automatically and promptly executed; and

(4) have the capability to send information from the detection system to a *control centre*.

Minimum access standard

(b) The *minimum access standard* is a *schedule 5.3a plant* must have:

(1) the capability to detect instability of voltage, *reactive power* and *active power* at each *connection point*;

(2) a process to manage instability promptly on detection, in a manner to be agreed with the *Network Service Provider* and *AEMO*; and

(3) if required by the *Network Service Provider* or *AEMO*, the capability to send information from the detection system to a *control centre*.

General requirements

(c) The hierarchy of actions under paragraph (a)(2) or process under paragraph (b)(2) must prioritise measures to eliminate the instability over *disconnecting* the *plant*.

(d) Requirements and capabilities referable to instability are to be determined having regard to the *power system* stability guidelines *published* under clause 4.3.4(h).

S5.3a.4.3 Communications equipment

A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must provide electricity *supplies* for *remote monitoring equipment* and *remote control equipment* installed in relation to its *schedule 5.3a plant* ~~*market network service facilities*~~ capable of keeping such equipment available for at least three hours following total loss of *supply* at the *connection point* for the relevant *schedule 5.3a plant*~~*market network service facility*~~.

A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must provide communications paths (with appropriate redundancy) from the *remote monitoring equipment* or *remote control equipment* installed at ~~any of~~ its *schedule 5.3a plant* ~~*market network service facilities*~~ to a interface for communication purposes in a location reasonably acceptable to the *Network Service Provider* at the relevant *connection point*. Communications systems between this interface for communication purposes and the *control centre* are the responsibility of the *Network Service Provider* unless otherwise agreed by the *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ and the *Network Service Provider*.

Telecommunications between *Network Service Providers* and *Schedule 5.3a Participants* ~~*Market Network Service Providers*~~ for *operational communications* must be established in accordance with the requirements set down below.

(a) ~~–~~**Primary Speech Facility**

The relevant *Network Service Provider* must provide and maintain equipment by means of which routine and emergency control telephone calls may be established between the *Schedule 5.3a Participant* ~~*Market Network Service Provider's* responsible Engineer/Operator~~ and *AEMO* *control centres*.

The *facilities* to be provided, including the interface requirement between the *Network Service Provider's* equipment and the *Schedule 5.3a Participant's* ~~*Market Network Service Provider's*~~ equipment, must be specified by the *Network Service Provider*.

The costs of the equipment must be recovered by the *Network Service Provider* only through the charge for *connection*.

(b) ~~–~~**Back-up Speech Facility**

Where the *Network Service Provider* or *AEMO* reasonably determines that a back-up speech *facility* to the primary *facility* is required, the *Network Service Provider* must provide and maintain a separate telephone link or radio installation on a cost-recovery basis only through the charge for *connection*.

The *Network Service Provider* is responsible for radio system planning and for obtaining all necessary radio licences.

S5.3a.5 Design standards

A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must ensure that:

(a) the electrical *plant* in its *facility* complies with the relevant *Australian Standards* as applicable at the time of first installation of that electrical *plant* in the *facility*;

(b) circuit breakers provided to isolate the *schedule 5.3a plant* ~~*Market Network Service Provider's facilities*~~ from the *Network Service Provider's facilities* are capable of breaking, without damage or restrike, fault currents nominated by the *Network Service Provider* in the relevant *connection agreement*; and

(c) all new equipment including circuit breakers provided to isolate the *schedule 5.3a plant* ~~*Market Network Service Provider's facilities*~~ from the *Network Service Provider's facilities* is capable of withstanding, without damage, power *frequency* ~~*voltages*~~ voltages and impulse levels nominated by the *Network Service Provider* in accordance with the relevant provisions of the *system standards* and recorded in the *performance standards*~~relevant connection agreement~~.

S5.3a.6 Protection systems and settings

(a0) A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must ensure that all *connections* of the *schedule 5.3a plant* to the *Network Service Provider's* *network* are protected by protection devices which effectively and safely *disconnect* any faulty circuit automatically within a time period specified by the *Network Service Provider* in accordance with the requirements of this clause S5.3a.6.~~following provisions:~~

Automatic access standard

(a) The *automatic access standard* is:

(1) ~~P~~primary *protection systems* must be provided to *disconnect* any faulted element from the *power system* within the applicable *fault clearance time* determined under clause S5.1.9(a)(1), but subject to clauses S5.1.9(k) and S5.1.9(l)~~.~~;

(2) ~~E~~each primary *protection system* must have sufficient redundancy to ensure that a faulted element within its protection zone is *disconnected* from the *power system* within the applicable *fault clearance time* with any single protection element (including any communications facility upon which that *protection system* depends) out of service~~.~~; and

(3) ~~B~~*breaker fail protection systems* must be provided to clear faults that are not cleared by the circuit breakers controlled by the primary *protection system*, within the applicable *fault clearance time* determined under clause S5.1.9(a)(1).

Minimum access standard

(b) The *minimum access standard* is:

(1) ~~P~~primary *protection systems* must be provided to *disconnect* from the *power system* any faulted element within their respective protection zones within the applicable *fault clearance time* determined under clause S5.1.9(a)(2), but subject to clauses S5.1.9(k) and S5.1.9(l)~~.~~; and

(2) ~~I~~if a *fault clearance time* determined under clause S5.1.9(a)(2) for a protection zone is less than 10 seconds, a *breaker fail protection system* must be provided to clear from the *power system* any fault within that protection zone that is not cleared by the circuit breakers controlled by the primary *protection system*, within the applicable *fault clearance time* determined under clause S5.1.9(a)(3).

General requirements

(c) The *Network Service Provider* and the *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must cooperate in the design and implementation of *protection systems* to comply with this clause, including cooperation with regard to:

(1) the use of *current transformer* and ~~*voltage*~~ voltage *transformer* secondary circuits (or equivalent) of one party by the *protection system* of the other;

(2) tripping of one party's circuit breakers by a *protection system* of the other party; and

(3) co-ordination of *protection system* settings to ensure inter-operation.

(d) The *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must ensure that the protection settings of its protective equipment grade with the *Network Service Provider's transmission system* or *distribution system* protection settings. Similarly the grading requirements of fuses must be co-ordinated with the *Network Service Provider*. The *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must provide details of the protection scheme implemented for the *schedule 5.3a plant* ~~by the *Market Network Service*~~

~~*Provider*~~ to the *Network Service Provider* and must liaise with the *Network Service Provider* when determining gradings and settings.

(e) The application of settings of the protection scheme must be undertaken in accordance with clause S5.3a.2.

(f) Before the *schedule 5.3a plant* ~~*Market Network Service Provider's installation*~~ is *connected* to the *Network Service Provider's transmission system* or *distribution system* the ~~*Market Network Service Provider's protection system*~~ must be tested and the *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must submit the appropriate test certificate to the *Network Service Provider*.

S5.3a.7 Short circuit ratio

(a) **[Deleted]** ~~This clause S5.3a.7 applies to all *Market Network Service Providers* specified in clause S5.3a.1a.~~

Minimum access standard

(b) The *minimum access standard* is an installation comprised of electrical *plant* must have *plant* capability sufficient to operate stably and remain *connected* at a *short circuit ratio* of 3.0, assessed in accordance with the methodology prescribed in the *system strength impact assessment guidelines*.

General requirements

(c) The *performance standards* in the *connection agreement* must record:

(1) the agreed value of the *short circuit ratio* which must be the minimum of 3.0 and the value at which the *plant* has *plant* capability sufficient to operate stably and remain *connected*; and

(2) the ~~rated~~ *power transfer capability* used to calculate the value.

(d) For paragraphs (b) and (c), the *plant* capability may be demonstrated with any appropriate *control system* and/or *protection system* settings. The settings used may be different to the setting required for compliance with other *performance standards* established under this schedule.

S5.3a.8 Reactive power capability

~~Subject to the access standards stated in this clause S5.3a.8, if additional *reactive power* is required as a result of the *connection* or operation of the *network elements* which provide a *market network service* then the requisite *reactive power* must be supplied or paid for by the *Market Network Service Provider*.~~

~~Additional *reactive power* is required if, at rated power output as measured at the *connection point* of the *market network service* the *market network service* has a lagging power factor of less than 0.9 or a leading power factor of less than 0.95.~~

~~*Automatic access standard*: For power export, at rated power output and target *network voltage* as determined in accordance with clause S5.1a.4 of the *system standards* when measured at the *connection point* of the *market network service*, the *market network service* must be capable of operation in the range from a lagging power factor of 0.9 to a leading power factor of 0.95. For power import, the power factor must satisfy the requirements of clause S5.3.5 of schedule 5.3.~~

~~*Minimum access standard*: With the agreement of *AEMO* and the *Network Service Provider*, a power factor capability less than that defined by the *automatic access standard* may be provided if the requirements of the *system standards* are satisfied under all operating conditions of the *market network service*.~~

(a) In this clause S5.3a.8:

(1) the **maximum active power** of a *schedule 5.3a plant* refers to its *power transfer capability* (disregarding for the purpose of this clause any *network* limitations on that capability), less any applicable temperature derating; and

Note

Maximum active power should reflect the capacity of the *schedule 5.3a plant* itself, because its *reactive power capability* should not be reduced if the level of *active power* is reduced (through network limitations or otherwise)

(2) **temperature derating** is an amount (which may be calculated by reference to one or more inputs or measurements) by which *power transfer capability* may be reduced if the relevant *plant's* production or consumption capacity is materially affected by ambient or operating temperatures.

Automatic access standard

(b) The *automatic access standard* is a *schedule 5.3a plant*, operating at any level of *power transfer*, must be capable of supplying or absorbing *reactive power* continuously at its *connection point* of amounts at least equal to those specified as the *automatic access standard* for *schedule 5.2 plant* in clause S5.2.5.1, for equivalent conditions and by reference to the maximum active power of the *schedule 5.3a plant*.

Minimum access standard

(c) The *minimum access standard* is a *schedule 5.3a plant* must meet requirements equivalent to those specified as the *minimum access standard* for *schedule 5.2 plant* in clause S5.2.5.1, and a reference in those requirements to clause S5.2.5.13 is taken to refer to the equivalent provision as applied to the *schedule 5.3a plant* under clause S5.3a.15.

Negotiated access standard

(d) The provisions applicable to *negotiated access standards* for *schedule 5.2 plant* in clause S5.2.5.1 apply to the *Schedule 5.3a Participant*, the *Network Service Provider* and *AEMO* in respect of the *schedule 5.3a plant*, to the extent relevant to that *plant*.

General requirements

(e) The general requirements applicable to *schedule 5.2 plant* in clause S5.2.5.1 apply in respect of the *schedule 5.3a plant* to the extent relevant to that *plant*, and a reference in those requirements to any other clause of schedule 5.2 is taken to refer to the corresponding clause of this schedule 5.3a.

S5.3a.9 Balancing of load currents

(a) A *Network Service Provider* may require a *schedule 5.3a plant's* ~~*Market Network Service Provider's*~~ *power transfer* to be balanced at a *connection point* in order to maintain the negative sequence ~~*voltage*~~ voltage at each *connection point* at less than or equal to the limits set out in Table S5.1a.1 of the *system standards* for the applicable nominal *supply* ~~*voltage*~~ voltage level.

Automatic access standard

(b) ~~*Automatic access standard: A Market Network Service Provider*~~ The *automatic access standard* is a *Schedule 5.3a Participant* must ensure that for *connections* at 11kV or higher ~~*voltage*~~ voltage, the current in any phase drawn by its equipment from the *Network Service Provider's network* is not greater than 102 percent or less than 98 percent of the average of the currents in the three phases.

Minimum access standard

(c) ~~*Minimum access standard: Where*~~ The *minimum access standard* is, where agreed with the relevant *Network Service Provider* and subject to any specific conditions imposed, a *schedule 5.3a plant* ~~*Market Network Service Provider*~~ may cause current unbalance greater than that specified in the *automatic access standard* provided the *schedule 5.3a plant* ~~*Market Network Service Provider*~~ does not cause the limits specified in clause S5.1a.7 of the *system standards* to be exceeded at any point in the *network*.

Negotiated access standard

(d) ~~Where these requirements cannot be met the *Market Network Service Provider*~~ To meet the requirements of a *negotiated access standard*, a *Schedule 5.3a Participant* may enter into a commercial arrangement with the *Network Service Provider* for the installation of equipment to correct the phase unbalance. Such equipment must be considered as part of the *connection assets* for the *schedule 5.3a plant*~~*Market Network Service Provider*~~.

General requirement

(e) The *performance standards* must record the limit to *power transfer* current unbalance, which ~~must be included in the *connection agreement* and~~ is subject to verification of compliance by the *Network Service Provider*.

S5.3a.10 Voltage fluctuations

Automatic access standard

(a) ~~*Automatic access standard: The voltage*~~ The *automatic access standard* is the voltage fluctuations caused by variations in *loading level* at the *connection point*, including those arising from *energisation*, de-energisation or other operation of the *schedule 5.3a plant*, must not exceed the limits determined under clause S5.1.5(a).

Minimum access standard

(b) ~~*Minimum access standard*: The *voltage*~~ The *minimum access standard* is the voltage fluctuations caused by variations in *loading level* at the *connection point*, including those arising from *energisation*, de-energisation or other operation of the *schedule 5.3a plant*, must not exceed the limits determined under clause S5.1.5(b).

General requirement

The *performance standards* must record the ~~*voltage*~~ voltage fluctuation emission limits and any specified conditions, which ~~must be included in the *connection agreement*, and~~ are subject to verification of compliance by the *Network Service Provider*.

S5.3a.11 Harmonics and voltage notching

Automatic access standard

(a) ~~*Automatic access standard*: The~~ The *automatic access standard* is the harmonic ~~*voltage*~~ voltage distortion caused by non-linearity, commutation of power electronic equipment, harmonic resonance and other effects within the *schedule 5.3a plant*, must not exceed the limits determined under clause S5.1.6(a).

Minimum access standard

(b) The *minimum access standard* is the ~~*Minimum access standard*: The~~ harmonic ~~*voltage*~~ voltage distortion caused by non-linearity, commutation of power electronic equipment, harmonic resonance and other effects within the *schedule 5.3a plant*, must not exceed the limits determined under clause S5.1.6(b).

General requirements

(c) A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must ensure that ~~all of~~ its *schedule 5.3a plant* ~~*plant connected to a transmission network or distribution network*~~ is capable of withstanding the effects of harmonic levels produced by that *plant* plus those imposed from the *network*.

(d) The *performance standards* must record the harmonic ~~*voltage*~~ voltage distortion emission limits and any special conditions, which ~~must be included in the *connection agreement*, and~~ are subject to verification of compliance by the *Network Service Provider*.

S5.3a.12 Design requirements for ~~Market Network Service Providers'~~ substations

A *Schedule 5.3a Participant* ~~*Market Network Service Provider*~~ must comply with the following requirements applicable to the design, station layout and choice of equipment for a *substation*:

(a) safety provisions must comply with requirements applicable to the *participating jurisdiction* notified by the *Network Service Provider*;

(b) where required by the *Network Service Provider*, appropriate interfaces and accommodation must be incorporated for communication *facilities*, remote

monitoring and control and protection of *plant* which is to be installed in the *substation*;

(c) a *substation* must be capable of continuous uninterrupted operation with the levels of ~~*voltage*,~~ harmonics, unbalance and ~~*voltage*~~ voltage fluctuation specified in the *system standards* as modified in accordance with the relevant provisions of schedule 5.1;

(d) earthing of primary *plant* in the *substation* must be in accordance with the Electricity Supply Association of Australia Safe Earthing Guide and must reduce step and touch potentials to safe levels;

(e) *synchronisation facilities* or reclose blocking must be provided if necessary;

(f) secure electricity supplies of adequate capacity must be provided for *plant* performing communication, monitoring, control and protection functions;

(g) *plant* must be tested to ensure that the *substation* complies with the approved design and specifications as included in a *connection agreement*;

(h) the protection equipment required would normally include protection schemes for individual items of *plant*, back-up arrangements, auxiliary DC supplies and instrumentation *transformers*; and

(i) insulation levels of *plant* in the *substation* must co-ordinate with the insulation levels of the *network* to which the *substation* is *connected* as nominated in the *connection agreement*.

S5.3a.13 ~~Market network service response~~ Response to disturbances in the power system

Automatic access standard

~~(a) Each *market network service* must be capable of continuous uninterrupted operation during the occurrence of:~~

~~(1) *power system frequency* within the *frequency operating standards*; or~~

~~(2) the range of *voltage* variation conditions permitted by the *system standards*.~~

(a) The *automatic access standard* is a *schedule 5.3a plant* must remain in *continuous uninterrupted operation*:

(1) for *frequencies* and rate of change of *frequency* in the ranges specified for the *automatic access standard* for *schedule 5.2 plant* in clause S5.2.5.3(b); and

(2) for voltage variations within the ranges specified for the *automatic access standard* for *schedule 5.2 plant* in clause S5.2.5.4(a).

Minimum access standard

(b) The *minimum access standard* is a *schedule 5.3a plant* must remain in *continuous uninterrupted operation*:

(1) for *frequencies* and rate of change of *frequency* in the ranges specified for the *minimum access standard* for *schedule 5.2 plant* in clause

S5.2.5.3(c) (which apply irrespective of the *schedule 5.3a plant's power transfer capability*); and

(2) for voltage variations within the ranges specified for the *minimum access standard* for *schedule 5.2 plant* in clause S5.2.5.4(b).

General requirements

(c) The general requirements applicable to *schedule 5.2 plant* in clause S5.2.5.4 apply in respect of the *schedule 5.3a plant* to the extent relevant to that *plant*, and a reference in those requirements to any other clause of schedule 5.2 is taken to refer to the corresponding clause of this schedule 5.3a.

(d) If required by the *Network Service Provider* or *AEMO*, the *performance standard* must include any operational arrangements necessary to minimise the *power system* impacts of tripping of the *schedule 5.3a plant*.

(e)~~(b)~~ The equipment associated with each *schedule 5.3a plant* ~~*market network service*~~ must be designed to withstand without damage or reduction in life expectancy the harmonic distortion and ~~*voltage*~~ voltage unbalance conditions determined to apply in accordance with the provisions of schedule 5.1, clauses S5.1.6 and S5.1.7, respectively, at each ~~the~~ *connection point*.

S5.3a.14 ~~Protection of market network services from power system disturbances~~Disturbance ride through and response capability

(a) For the purpose of this clause S5.3a.14, a disturbance (other than a *frequency* disturbance) is taken to end when the voltage at the *connection point* recovers to within 90% to 110 % of *nominal voltage* and remains within that range for at least 20 milliseconds.

Automatic access standard

(b) The *automatic access standard* is a *schedule 5.3a plant* must:

(1) remain in *continuous uninterrupted operation* for the types of disturbances specified for the *automatic access standard* for *schedule 5.2 plant* in clauses S5.2.5.5(c) and (d);

(2) have *facilities* capable of supplying or absorbing capacitive reactive current and inductive reactive current at each *connection point* at levels equivalent to those specified for the *automatic access standard* for *schedule 5.2 plant* in clauses S5.2.5.5A(f)(1) and (f)(2), in the conditions specified in those clauses; and

(3) within 100 milliseconds after the end of the disturbance, reach at least 95% of:

(i) the pre-disturbance *power transfer* level; or

(ii) during a *frequency* disturbance, a level of *power transfer* agreed with *AEMO* and the *Network Service Provider*, consistent with the *schedule 5.3a plant's frequency* control arrangements (if applicable),

with, in the case of subparagraphs (2) and (3), equivalent requirements, conditions and exclusions as those specified in clauses S5.2.5.5A(f), (g), (h) and (i).

Minimum access standard

(c) The *minimum access standard* is a *schedule 5.3a plant* must:

(1) remain in *continuous uninterrupted operation* for the types of disturbances specified for the *minimum access standard* for *schedule 5.2 plant* in clauses S5.2.5.5(k) and (l);

(2) have *facilities* capable of supplying or absorbing capacitive reactive current and inductive reactive current at each *connection point* at levels equivalent to those specified for the *minimum access standard* for *schedule 5.2 plant* in clauses S5.2.5.5A(m)(1) and (m)(2) in the conditions specified in those clauses; and

(3) from a period after the end of the disturbance agreed with the *Network Service Provider* and *AEMO* (which period may differ according to the type of fault), return to at least 95% of:

(i) the pre-disturbance *power transfer* level; or

(ii) during a *frequency* disturbance, a level of *power transfer* agreed with *AEMO* and the *Network Service Provider*, consistent with the *schedule 5.3a plant's frequency* control arrangements (if applicable),

with, in the case of subparagraphs (2) and (3), equivalent requirements, conditions and exclusions as those specified in clauses S5.2.5.5A(m), (n) and (o).

Negotiated access standard

(d) The provisions applicable to *negotiated access standards* for *schedule 5.2 plant* in clause S5.2.5.5 apply to the *Schedule 5.3a Participant*, the *Network Service Provider* and *AEMO* in respect of the *schedule 5.3a plant*, to the extent relevant to that *plant*.

General requirements

(e) The general requirements applicable to *schedule 5.2 plant* in clauses S5.2.5.5 and S5.2.5.5A apply in respect of the *schedule 5.3a plant*, to the extent relevant to that *plant*, and a reference in those requirements to any other clause of schedule 5.2 is taken to refer to the corresponding clause of this schedule 5.3a.

~~(a) *Minimum access standard*: If a *Connection Applicant* requires that its *market network service facility* be automatically *disconnected* from the *power system* in response to abnormal conditions arising from the *power system*, the relevant *protection system* or *control system* must not *disconnect* the *facility* for conditions under which it must continuously operate or must withstand under a provision of the *Rules*.~~

~~(b) There is no *automatic access standard* for this technical requirement.~~

~~(c) For the purposes of this clause S5.3a.14, the abnormal conditions include:~~

~~(1) *frequency* outside the *extreme frequency excursion tolerance limits*;~~

~~(2) sustained and uncontrollable DC current beyond a short term *current rating* for the period assigned to that rating;~~

~~(3) DC *voltage* above the *voltage* maximum rating or sustained below any lower limit for stable operation;~~

~~(4) *voltage* to *frequency* ratio beyond a *transformer* magnetic flux based *voltage* to *frequency* rating;~~

~~(5) sustained *voltage* fluctuations at the *connection point* beyond the level determined under clause S5.1.5(a);~~

~~(6) sustained harmonic *voltage* distortion at the *connection point* beyond the level determined under clause S5.1.6(a);~~

~~(7) sustained negative phase sequence *voltage* at the *connection point* beyond the level determined under clause S5.1.7(a); and~~

~~(8) any similar condition agreed between the *Market Network Service Provider* and *AEMO* after consultation with each relevant *Network Service Provider*.~~

~~(d) [**Deleted**]~~

~~(e) The *Network Service Provider* is not liable for any loss or damage incurred by the *Market Network Service Provider* or any other person as a consequence of a fault on either the *power system*, or within the *Market Network Service Provider's facility*.~~

S5.3a.15 Voltage and reactive power control

Automatic access standard

(a) The *automatic access standard* is the *plant* capabilities, equipment and *control systems* of a *schedule 5.3a plant* must meet requirements equivalent to those specified as the *automatic access standard* for *schedule 5.2 plant* in clauses S5.2.5.13(b), S5.2.5.13(c) and S5.2.5.13(c1), except that:

(1) requirements expressed to apply only to *synchronous production units* and *synchronous condensers* do not apply to a *schedule 5.3a plant*; and

(2) a reference to clause S5.2.5.1 is taken to refer to clause S5.3a.8.

Minimum access standard

(b) The *minimum access standard* is the *plant* capabilities, equipment and *control systems* of a *schedule 5.3a plant* must meet requirements equivalent to those specified as the *minimum access standard* for *schedule 5.2 plant* in clause S5.2.5.13(d), except that:

(1) requirements expressed to apply only to *synchronous production units* and *synchronous condensers* do not apply to a *schedule 5.3a plant*;

(2) clause S5.2.5.13(d)(5) applies to all *schedule 5.3a plant*; and

(3) a reference to clause S5.2.5.1 is taken to refer to clause S5.3a.8.

Negotiated access standard

(c) For a *negotiated access standard* where the *schedule 5.3a plant* cannot reasonably meet the *automatic access standard* at the highest or typical system impedance established in an equivalent manner to clause S5.2.5.13(m), controls must be tuned to achieve performance as close as

reasonably practicable to the *automatic access standard*, prioritising stability of response under high impedance conditions in the primary operating mode.

General requirements

(d) The general requirements applicable to *schedule 5.2 plant* in clause S5.2.5.13 apply in respect of the *schedule 5.3a plant*, to the extent relevant to that *plant*, and a reference in those requirements to any other clause of schedule 5.2 is taken to refer to the corresponding clause of this schedule 5.3a.

S5.3a.16 Active power control

Automatic access standard

(a) The *automatic access standard* is a *schedule 5.3a plant* must have an *active power control system* capable of:

(1) maintaining and changing the level and direction of *power transfer* in accordance with *dispatch* targets;

(2) ramping the *power transfer* linearly from one level of *dispatch* to another, including between each direction of transfer; and

(3) receiving and automatically responding to signals delivered from the *AGC*, as updated at a rate of once every 4 seconds (or such other period specified by *AEMO* as required).

Minimum access standard

(b) The *minimum access standard* is a *schedule 5.3a plant* must have an *active power control system* capable of:

(1) maintaining and changing the level and direction of *power transfer* in accordance with *dispatch* targets; and

(2) receiving and automatically responding to signals delivered from the *AGC*, as updated at a rate of once every four seconds (or such other period specified by *AEMO* as required).

Negotiated access standard

(c) A *negotiated access standard* may include additional requirements, such as operation in response to changes in *frequency* or phase angle changes, which may otherwise prevent *power transfer* changing in accordance with a *dispatch instruction*.

(d) A *negotiated access standard* must document to *AEMO's* satisfaction any operational arrangements necessary to manage *network* flows for the purpose of achieving compliance with *dispatch instructions*.

General requirements

(e) Each *control system* used to meet the requirements of this clause S5.3a.16 must be *adequately damped*.

Schedule 5.4A Preliminary Response

For the purposes of clause 5.3A.7(a), the following information must be included in the preliminary response:

(a) relevant technical information about the *Distribution Network Service Provider's distribution network*, including guidance on how the *Connection Applicant* may meet the following requirements if it were to proceed to prepare an *application to connect*:

(1) primary protection and backup protection;

(2) other protection and control requirements applicable to *distribution connected units* and associated *plant*;

(3) *remote monitoring equipment* and control communications *facilities*;

(4) insulation co-ordination and lightning protection;

(5) existing maximum and minimum fault levels and *fault clearance times* of relevant local *zone substations*";

(6) switching and *isolation* facilities;

(7) interlocking and *synchronising* arrangements;

(8) *metering installations*; and

(9) remedy or avoid a *general system strength impact* caused by the *connection*;

(b) if not otherwise provided in accordance with paragraph (a), to the extent the *Distribution Network Service Provider* holds technical information necessary to prepare an *application to connect*, that information;

(c) information relevant to each technical requirement of the proposed *plant* as relevant to:

(1) the *automatic access standards*;

(2) any relevant *minimum access standards*; and

(3) any applicable *plant standards*; ~~and~~

(4) [**Deleted**]~~the *normal voltage* level, if it is expected to change from the *nominal voltage* level;~~

(d) the identity of other parties that the *Distribution Network Service Provider* considers:

(1) will need to be involved in planning to make the *connection* or must be involved under clause 5.3A.10(c); and

(2) must be paid for *transmission services* or *distribution services*;

(e) whether it will be necessary for any of the parties identified in subparagraph (d) to enter into an agreement with the *Connection Applicant* in respect of the provision of *connection services* or other *transmission services* or *distribution services* or both, to the *Connection Applicant*;

(f) where relevant the *Distribution Network Service Provider* is to identify whether any service required to *establish a connection* is *contestable* in the relevant *participating jurisdiction*;

(g) worked examples of *connection service* charges relevant to the enquiry and an explanation of the factors on which the charges depend;

(h) information regarding the *Distribution Network Service Provider* and its *network*, system limitations for *sub-transmission lines* and *zone substations* and other information relevant to constraints on the *network* as such information is relevant to the *application to connect*;

(i) an indication of whether *network augmentation* may be required and if required, what work the *network augmentation* may involve;

(i1) an indication of whether the new *connection* is expected in the reasonable opinion of a *Network Service Provider* to have a *general system strength impact* and whether a *system strength locational factor* can be calculated in relation to the new *connection*;

(j) a hyperlink to the *Distribution Network Service Provider's information pack*;

(k) the contact details for the relevant point of contact within the *Distribution Network Service Provider* managing the *connection* enquiry;

(l) the *Distribution Network Service Provider's* response to the objectives of the *connection* sought as included by the *Connection Applicant* in its enquiry under clause 5.3A.5(c)(1);

(m) a description of the process for the provision of the *detailed response*, including the further information to be provided by the *Connection Applicant* and analysis to be undertaken by the *Distribution Network Service Provider* as part of the preparation of the *detailed response*;

(n) an overview of any available options for *connection* to the *Distribution Network Service Provider's network*, as relevant to an enquiry lodged, at more than one *connection point* in a *network*, including:

(1) example single line diagram and relevant *protection systems* and *control systems* used by existing *connection* arrangements;

(2) a description of the characteristics of supply; and

(3) an indication of the likely impact on terms and conditions of *connection*,

as relevant to each optional differing *connection point*;

(o) a statement of further information required from the *Connection Applicant* for the preparation of the *detailed response*, including:

(1) details of the *Connection Applicant's connection* requirements, and the *Connection Applicant's* specifications of the *facility* to be *connected*, consistent with the requirements advised in accordance with paragraphs (a) to (c); and

(2) details of the *Connection Applicant's* reasonable expectations of the level and standard of service of *power transfer capability* that the *network* should provide;

(3) the *Connection Applicant's* proposal for any *system strength remediation scheme*;

(p) an estimate of the enquiry fee payable by the *Connection Applicant* for the *detailed response*, including details of how components of the fee were calculated;

(q) the component of the estimate of the enquiry fee payable by the *Connection Applicant* to request the *detailed response*;

(r) an estimate of the application fee which is payable on submitting an *application to connect*; and

(s) any additional information relevant to the enquiry.

Schedule 5.4B Detailed Response to Enquiry

For the purposes of clause 5.3A.8(g), the following information must be included in the *detailed response*:

(a) the contact details for the relevant point of contact within the *Distribution Network Service Provider* who will manage the *application to connect*;

(b) written details of each technical requirement relevant to the proposed *plant* as relevant to ~~the~~:

(1) the *automatic access standards*;

(2) the *minimum access standards*; and

(3) any applicable *plant standards*,~~; and~~

(4) [**Deleted**]~~*normal voltage* level, if that is to change from the *nominal voltage* level;~~

together with the technical information to be provided by the *Distribution Network Service Provider* in accordance with the relevant requirements of schedule 5.2, 5.3 or 5.3a;

(c) details of the *connection* requirements based on the *Connection Applicant's* specifications of the *facility* to be *connected*;

(d) details of the level and standard of service of *power transfer capability* that the *Distribution Network Service Provider*, with reasonable endeavours, considers the *network* provides at the location of the *connection point* or *connection points*, if options have been made available under clause S5.4A(n);

(e) *negotiated access standards* that will require *AEMO's* involvement in accordance with clause 5.3.4A(c);

(e1) written details of:

(1) the minimum *three phase fault level* at the *connection point*;

(2) the results of the *Network Service Provider's* preliminary assessment of the impact of the new *connection* undertaken in accordance with the *system strength impact assessment guidelines* and clause 5.3.4B; and

(3) except where, under clause 5.3.4B(a3), the *Network Service Provider* is not required to calculate the *system strength locational factor*:

(i) the indicative *system strength quantity* for the *connection point*;

(ii) the *system strength locational factor* for the *connection point*; and

(iii) the relevant *system strength node* and the indicative *system strength charge* for the *connection point* using the then applicable *system strength unit price*.

(f) a list of the technical data to be included with the *application to connect*, which may vary depending on the *connection* requirements and the type, rating and location of the *facility* to be *connected*. The list provided under this paragraph (f) will generally be in the nature of the information set out in schedule 5.5 but may be varied by the *Distribution Network Service Provider* as appropriate to suit the size and complexity of the proposed *facility* to be *connected*;

(g) commercial information to be supplied by the *Connection Applicant* to allow a *Network Service Provider* (as is relevant) to make an assessment of the ability of the *Connection Applicant* to satisfy the prudential requirements set out in rules 6.21 and 6A.28;

(h) so far as is relevant, and in relation to services that the *Distribution Network Service Provider* intends to provide, an itemised estimate of *connection* costs including:

(1) *connection services* charges;

(2) costs associated with the proposed metering requirements for the *connection*;

(3) costs of any *network extension*;

(4) details of *augmentation* required to provide the *connection* and associated costs;

(5) details of the interface equipment required to provide the *connection* and associated costs;

(6) details of any ongoing operation and maintenance costs and charges to be undertaken by the *Distribution Network Service Provider*; and

(7) other incidental costs and their basis of calculation;

(i) an explanation of the factors affecting each component of the itemised estimate of *connection* costs and the further information that will be taken into account by the *Distribution Network Service Provider* in preparing the final itemised statement of *connection* costs to be provided under clause 5.3.6(b2)(1);

(j) using reasonable endeavours, all risks and obligations in respect of the proposed *connection* associated with planning and environmental laws not contained in the *Rules*;

(k) a draft *connection agreement* that contains the proposed terms and conditions for *connection* to the *network* including those of the kind set out in schedule 5.6 and:

(1) an explanation of the terms and conditions in the *connection agreement* that need to be finalised; and

(2) if relevant, further information necessary from the *Connection Applicant* to finalise the *connection agreement*;

(l) a description of the process for lodging the *application to connect*, including:

(1) the options open to the *Connection Applicant* in submitting an *application to connect* in accordance with clause 5.3A.9;

(2) the further analysis to be undertaken by the *Distribution Network Service Provider* as part of the *Distribution Network Service Provider's* assessment of the *application to connect*;

(3) further information required from the *Connection Applicant* for the *Distribution Network Service Provider* to assess the *application to connect*; and

(4) an outline of proposed milestones (and their timeframes) for *connection* and access activities which may be modified from time to time by agreement of the parties, where such agreement must not be unreasonably withheld;

(m) the application fee payable when submitting an *application to connect*;

(n) whether the *Distribution Network Service Provider* agrees to the *detailed response* remaining valid for a specified period of time to allow the *Connection Applicant* to lodge an *application to connect* within that time; and

(o) any additional information relevant to the *application to connect*.

Schedule 5.5 Technical Details to Support Application for Connection and Connection Agreement

S5.5.1 Introduction to the schedule

Various sections of the *Rules* require that *Registered Participants* submit technical data to the *Network Service Provider*. This schedule lists the range of data which may be required. The actual data required will be advised by the *Network Service Provider*, and will form part of the technical specification in the *connection agreement*. These data will also be made available to *AEMO* and to other *Network Service Providers* by the *Network Service Provider* at the appropriate time.

S5.5.2 Categories of data

Data is coded in categories, according to the stage at which it is available in the build-up of data during the process of forming a *connection* or obtaining access to a *network*, with data acquired at each stage being carried forward, or enhanced in subsequent stages, eg. by testing.

The *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet* identify for each type of data, its category in terms of clause S5.5.2.

Codes:

S = Standard Planning Data;

D = Detailed Planning Data;

R = Registered Data (R1 pre-*connection*, R2 post-*connection*)

Preliminary system planning data

Preliminary system planning data is required for submission with the *application to connect*, to allow the *Network Service Provider* to prepare an offer of terms and conditions for a *connection agreement* and to assess the requirement for, and effect of, *network augmentation* or *extension* options. Such data is normally limited to the

items denoted as Standard Planning Data (S) in the *Power System Model Guidelines*, *Power System Design Data Sheet*, *Power System Setting Data Sheet* and in schedules 5.5.3 to 5.5.5.

The *Network Service Provider* may, in cases where there is reasonable doubt as to the viability of a proposal, require the submission of other data before making an offer to *connect* or to amend a *connection agreement*.

Registered system planning data

Registered system planning data is the class of data which will be included in the *connection agreement* signed by both parties. It consists of the preliminary system planning data plus those items denoted in the attached schedules as Detailed Planning Data (D). The latter must be submitted by the *Registered Participant* in time for inclusion in the *connection agreement*.

Registered data

Registered Data consists of data validated and agreed between the *Network Service Provider* and the *Registered Participant*, such data being:

(a) prior to actual *connection* and provision of access, data derived from manufacturers' data, detailed design calculations, works or site tests etc. (R1); and

(b) after connection, data derived from on-system testing (R2).

All of the data will, from this stage, be categorised and referred to as Registered Data; but for convenience the schedules omit placing a higher ranked code next to items which are expected to already be valid at an earlier stage.

S5.5.3 Review, change and supply of data

Data will be subject to review at reasonable intervals to ensure its continued accuracy and relevance. The *Network Service Provider* must initiate this review. A *Registered Participant* may change any data item at a time other than when that item would normally be reviewed or updated by submission to the *Network Service Provider* of the revised data, together with authentication documents, eg. test reports.

The *Network Service Provider* must supply data relating to its system to other *Network Service Providers* for planning purposes and to other *Registered Participants* and *AEMO* as specified in the various sections of the *Rules*, including through the *statement of opportunities*.

S5.5.4 Data Requirements

(a) Schedules 5.5.3 to 5.5.5 cover the following data areas:

(1~~a~~) schedule 5.5.3 - Network Plant Technical Data. This comprises fixed electrical parameters.

(2~~b~~) schedule 5.5.4 - Plant and Apparatus Setting Data. This comprises settings which can be varied by agreement or by direction of the *Network Service Provider* or *AEMO*.

(3~~c~~) schedule 5.5.5 - *Load* Characteristics. This comprises the estimated design parameters of *loads*.

(b) The documents and schedules applicable to each class of *Registered Participant* are as follows:

(1~~a~~) *Generators*: the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*;

(2~~b~~) *Customers* and *Network Service Providers*: schedules 5.5.3, 5.5.4 and the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*;

(3~~c~~) *Customers*: schedule 5.5.5 and the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*; and

(4~~d~~) ~~*Market* *Network Service Providers* (in respect of *schedule 5.3a plant*)~~: schedules 5.5.3 and 5.5.4 and the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*.

S5.5.5 Asynchronous production unit data

A *Schedule 5.2 Participant*~~*Generator* or an *Integrated Resource Provider*~~ that *connects* a *schedule 5.2 plant* that includes ~~*generating system*, that comprises~~ any *asynchronous production units* ~~*generating unit*, or an *Integrated Resource Provider* that *connects* an *integrated resource system* that (to the extent it comprises *production units*) comprises any *asynchronous bidirectional units*,~~ must be given exemption from complying with those parts of the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Design Data Sheet* that are determined by the *Network Service Provider* to be not relevant to that *schedule 5.2 plant*~~such *generating systems* or *integrated resource systems*~~, but must comply with those parts of schedules 5.5.3, 5.5.4, and 5.5.5 that are relevant to that *schedule 5.2 plant*~~such *generating systems* or *integrated resource systems*~~, as determined by the *Network Service Provider*.

S5.5.6 Generating units smaller than 30MW data

A *Schedule 5.2 Participant* ~~*Generator* or an *Integrated Resource Provider*~~ that *connects* a *generating unit* smaller than 30 MW or *generating units* totalling less than 30 MW to a *connection point* to a *distribution network* must submit registered system planning data and registered data to *AEMO* and the relevant *Network Service Provider* in accordance with the requirements specified in the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*.

Codes:

S = Standard Planning Data

D = Detailed Planning Data

R = Registered Data (R1 pre-*connection*, R2 post-*connection*)

S5.5.6A Bidirectional units smaller than 5MW data

An *Integrated Resource Provider* that *connects* a *bidirectional unit* smaller than 5 MW or *bidirectional units* totalling less than 5 MW to a *connection point* to a *distribution network* must submit registered system planning data and registered data to *AEMO* and the relevant *Network Service Provider* in accordance with the

requirements specified in the *Power System Model Guidelines*, *Power System Design Data Sheet* and *Power System Setting Data Sheet*.

Codes:

S = Standard Planning Data

D = Detailed Planning Data

R = Registered Data (R1 pre-*connection*, R2 post-*connection*)

S5.5.7 Power System Design Data Sheet, Power System Setting Data Sheet and Power System Model Guidelines

(a) *AEMO* must, subject to paragraphs (b) and (c), develop, *publish* and maintain, in accordance with the *Rules consultation procedures*:

(1) a *Power System Design Data Sheet* describing, for relevant *plant technologies*, *plant* design parameters including *plant* configurations, impedances, time constants, non-linearities, ratings and capabilities to be provided under clauses 3.11.5(b)(5), 3.11.9(g), 4.3.4(o), 5.2.3(j), 5.2.3(k), 5.2.3A(a), 5.2.4(c), 5.2.4(d), 5.2.5(d), 5.2.5(e), 5.2.5A(d), 5.2.5A(e), 5.3.9(b)(2), ~~5.3.9(b)(2A),~~ 5.3.12(b)(2), S5.2.4, S5.3.1, S5.3a.1 and this schedule 5.5;

(2) a *Power System Setting Data Sheet* describing, for relevant *power systems* and *control system* technologies, the *protection system* and *control system* functions and their settings, including configurations, gains, time constants, delays, deadbands, non-linearities and limits to be provided under clauses 3.11.5(b)(5), 3.11.9(g), 4.3.4(o), 5.2.3(j), 5.2.3(k), 5.2.3A(a), 5.2.3A(b), 5.2.4(c), 5.2.4(d), 5.2.5(d), 5.2.5(e), 5.2.5A(d), 5.2.5A(e), 5.3.9(b)(2), ~~5.3.9(b)(2A),~~ 5.3.12(b)(2), S5.2.4, S5.3.1, S5.3a.1 and this schedule 5.5; and

(3) *Power System Model Guidelines* describing, for relevant *power system* technologies at the *transmission system* and *distribution system* level, *AEMO's* requirements when developing mathematical models for *plant*, including the impact of their *control systems* and *protection systems* on *power system security* to be provided under clauses 3.11.5(b)(5), 3.11.9(g), 4.3.4(o), 5.2.3(j), 5.2.3(k), 5.2.3A(a), 5.2.3A(b), 5.2.4(c), 5.2.4(d), 5.2.5(d), 5.2.5(e), 5.2.5A(d), 5.2.5A(e), 5.3.9(b)(2), ~~5.3.9(b)(2A),~~ 5.3.12(b)(2), S5.2.4, S5.3.1, S5.3a.1 and this schedule 5.5.

(b) When developing, *publishing* and maintaining the *Power System Model Guidelines*, the *Power System Design Data Sheet* and the *Power System Setting Data Sheet* under paragraph (a), *AEMO* must have regard to the purpose of the *Power System Model Guidelines*, the *Power System Design Data Sheet* and the *Power System Setting Data Sheet*, which is to:

(1) allow *plant* and equipment to be mathematically modelled by *AEMO* with sufficient accuracy to permit:

(i) the *power system* operating limits for ensuring *power system security* to be quantified with the lowest practical safety margins;

(ii) the assessment of proposed *negotiated access standards*;

(iii) settings of *control systems* and *protection systems* of *plant* and *networks* to be assessed and quantified for maximum practical performance of the *power system*; and

(iv) the efficient procurement of *SRASs* and *NSCASs*; and

(2) identify for each type of data its category in terms of clause S5.5.2.

(b1) The *Power System Model Guidelines* must specify:

(1) the information, including the types of models, that:

(i) *Generators* and *Integrated Resource Providers* must provide under clause 5.2.5(d), clause 5.2.5(e), clause 5.2.5A(d), clause 5.2.5A(e), ~~clause 5.3.9(b)(2), 5.3.9(b)(2A), clause S5.2.4~~ and clause S5.5.6 (as applicable);

(ii) *Schedule 5.2 Participants* must provide under clause 5.3.9(b)(2) and clause S5.2.4;

(iii) *Network Service Providers* must provide under clause 4.3.4(o), clause 5.2.3(j) and clause 5.2.3(k);

(iv~~ii~~) *Customer~~Network Users~~* must provide under clause 5.2.4(c) and~~,~~ clause 5.2.4(d);~~, clause 5.3.12(b)(2)clause 5.3.12(b)(2) and clause S5.3.1(a1);~~

(~~i~~v) *Market Network Service Providers* must provide under clause 5.2.3A(a) and~~,~~ clause 5.2.3A(b)~~, clause 5.3.12(b)(2) and clause S5.3a.1(a1)~~;

(vi) *Schedule 5.3 Participant* or *Schedule 5.3a Participant* must provide under clause 5.3.12(b)(2), clause S5.3.1(a1) and clause S5.3a.1(a1) (as applicable);

(vii) prospective *NSCAS* tenderers must provide under clause 3.11.5(b)(5); and

(viii~~i~~) prospective *SRAS Providers* must provide under clause 3.11.9(g);

(2) the model accuracy requirements that are applicable to each type of model provided, as well as the types of *generating systems*, *integrated resource systems* and *plant* and equipment that the model accuracy requirements apply to;

(3) when information to which the *Power System Model Guidelines* relates must be provided;

(4) a process to be followed in circumstances where a person is unable to provide information required to be provided under clauses 3.11.5(b)(5), 3.11.9(g), 4.3.4(o), 5.2.3(j), 5.2.3(k), 5.2.3A(a), 5.2.3A(b), 5.2.4(c), 5.2.4(d), 5.2.5(d), 5.2.5~~4~~(e), 5.2.5A(d), 5.2.5A(e), 5.3.9(b)(2), ~~5.3.9(b)(2A),~~ 5.3.12(b)(2), S5.2.4, S5.3.1, S5.3a.1, S5.5.6, schedule 5.5 or as otherwise required by the *Power System Model Guidelines*, *Power System Design Data Sheet* or *Power System Setting Data Sheet*;

(5) guidance on the factors that *AEMO* will take into account when determining the circumstances under which *AEMO* will request information to be provided, including the *power system* conditions that

necessitate the usage of a certain type of model in order to achieve the desired level of accuracy;

(6) the format in which information must be provided and any material *AEMO* requires to assess the accuracy of information provided to it; and

(7) the circumstances in which model source code is required to be provided.

(c) In developing and amending the *Power System Model Guidelines*, the *Power System Design Data Sheet* and the *Power System Setting Data Sheet*, *AEMO* must:

(1) have regard to the reasonable costs of efficient compliance by *Registered Participants* with those guidelines and data sheets compared to the likely benefits from the use of the information provided under the guidelines and data sheets;

(2) have regard to any requirements to protect the intellectual property and confidential information of third parties, including where those third parties are not *Registered Participants*; and

(3) have regard to *Distribution Network Service Providers*' and *Transmission Network Service Providers*' requirements for data and modelling information that is reasonably necessary for the relevant provider to fulfil its obligations under the *Rules* or *jurisdictional electricity legislation*.

(d) *AEMO* may amend the *Power System Model Guidelines*, the *Power System Design Data Sheet* or the *Power System Setting Data Sheet* from time to time.

(e) Any person may submit a written request (with reasons) for *AEMO* to amend the *Power System Model Guidelines*, the *Power System Design Data Sheet* or the *Power System Setting Data Sheet* from time to time.

(f) In developing and amending the *Power System Model Guidelines*, the *Power System Design Data Sheet* or the *Power System Setting Data Sheet*, *AEMO* must, subject to paragraph (g), consult with *Registered Participants* and such other persons who, in *AEMO*'s reasonable opinion have, or have identified themselves as having, an interest in the *Power System Model Guidelines*, in accordance with the *Rules consultation procedures*.

(g) *AEMO* is not required to comply with the *Rules consultation procedures* when making minor or administrative amendments to the *Power System Model Guidelines*, the *Power System Design Data Sheet* or the *Power System Setting Data Sheet*.

(h) *AEMO* may at the conclusion of the *Rules consultation procedures* under paragraph (f) or otherwise under paragraph (g), amend the relevant data sheet or guidelines (if necessary).

Schedule 5.5.1 [Deleted]

Schedule 5.5.2 [Deleted]

Schedule 5.5.3 Network and plant technical data of equipment at or near connection point

Data Description	Units	Data Category
Voltage Rating		
Nominal voltage	kV	S, D
Highest voltage~~*voltage*~~	kV	D
Insulation Co-ordination		
Rated lightning impulse withstand voltage~~*voltage*~~	kVp	D
Rated short duration power *frequency* withstand voltage~~*voltage*~~	kV	D
Rated Currents		
Circuit maximum current	kA	S, D
Rated Short Time Withstand Current	kA for seconds	D
Ambient conditions under which above current applies	Text	S,D
Earthing		
System Earthing Method	Text	S, D
Earth grid rated current	kA for seconds	D
Insulation Pollution Performance		
Minimum total creepage	mm	D
Pollution level	Level of IEC 815	D

Data Description	Units	Data Category
Controls		
Remote control and data transmission arrangements	Text	D
Metering Provided by Customer		
Measurement *transformer* ratios:		D
Current transformers	A/A	D
Voltage transformers	V/kV	D
Measurement *Transformer* Test Certification details	Text	R1
Network Configuration		
Operation Diagrams showing the electrical circuits of the existing and proposed main *facilities* within the *Registered Participant's* ownership including *busbar* arrangements, phasing arrangements, earthing arrangements, switching *facilities* and operating voltages~~*voltages*~~.	Single line Diagrams	S, D, R1
Network Impedance		
For each item of *plant*: details of the positive, negative and zero sequence series and shunt impedance, including mutual coupling between physically adjacent elements.	% on 100 MVA base	S, D, R1
Short Circuit Infeed to the Network		
Maximum generator 3-phase short circuit infeed including infeeds from *production units connected* to the *Registered Participant's* system, calculated by method of AS 3851 (1991).	kA symmetrical	S, D, R1
The total infeed at the instant of fault (including contribution of induction motors).	kA	D, R1

Data Description	Units	Data Category
Minimum zero sequence impedance of *Registered Participant's network* at *connection point*.	% on 100 MVA base	D, R1
Minimum negative sequence impedance of *Registered Participant's network* at *connection point*.	% on 100 MVA base	D, R1
Load Transfer Capability:		
Where a *load*, or group of *loads*, may be fed from alternative *connection points*:		
Load normally taken from *connection point* X	MW	D, R1
Load normally taken from *connection point* Y	MW	D, R1
Arrangements for transfer under planned or fault *outage* conditions	Text	D
Circuits Connecting Distribution Connected Units to the Network:		
For all *production ~~generating~~ units*, all connecting lines/cables, *transformers* etc.		
Series Resistance	% on 100 MVA base	D, R
Series Reactance	% on 100 MVA base	D, R
Shunt Susceptance	% on 100 MVA base	D, R
Normal and short-time emergency ratings	MVA	D,R
Technical Details of *generating units* , *generating systems*, *bidirectional units* and *integrated resource systems* as per the *Power System Design Data Sheet*, *Power System Setting Data Sheet* and the *Power System Model Guidelines* where such details are not *confidential information*		
***Transformers* at *connection points*:**		

Data Description	Units	Data Category
Saturation curve	Diagram	R
Equipment associated with DC Links		
Number of poles	MVA	D,R
Converters per station	Quantity	D,R
Reactive Power consumption of converters	MCAr	D,R
Location and Rating of A.C. Filters	MVAr	D,R
Location and Rating of Shunt Capacitors	MVAr	D,R
Location and Rating of Smoothing *Reactor*	MVAr	D,R
Location and Rating of DC Filter	MVAr	D,R

Schedule 5.5.4 Network Plant and Apparatus Setting Data

Data Description	Units	Data Category
Protection Data for Protection relevant to Connection Point:		
Reach of all protections on *transmission lines*, or cables	ohms or % on 100 MVA base	S, D
Number of protections on each item	Text	S, D
Total fault clearing times for near and remote faults	ms	S, D, R1
Line reclosure sequence details	Text	S, D, R1
Tap Change Control Data:		
Time delay settings of all *transformer* tap changers.	Seconds	D, R1
Reactive Compensation:		
Location and Rating of individual *shunt reactors*	MVAr	D, R1
Location and Rating of individual *shunt capacitor* banks	MVAr	D, R1

Data Description	Units	Data Category
Capacitor bank capacitance	microfarads	D
Inductance of switching *reactor* (if fitted)	millihenries	D
Resistance of capacitor plus *reactor*	Ohms	D
Details of special controls (e.g. Point-on-wave switching)	Text	D
For each shunt reactor or capacitor bank:		
Method of switching	Text	S
Details of automatic control logic such that operating characteristics can be determined	Text	D, R1
FACTS Installation:		
Data sufficient to enable static and dynamic performance of the installation to be modelled	Text, diagrams control settings	S, D, R1
Transmission line flow control device Details of the operation of the control device under normal operation conditions (including startup and shutdown of the line) and during a fault (close up and remote)	Text, diagrams	D
Models for the control device and transmission line appropriate for load flow, small signal stability and transient stability analysis	Text, diagrams	D
Capability of the line flow control device	KA, MVA, MW	D
Details of the rate of change of flow capability of the control device	Text	D
Details of the capability of the control device to provide frequency and voltage control	Text	D
Description of possible failure modes of control device	Text	D
Details of performance of the control device under disturbance conditions including changes in AC	Text	D

Data Description	Units	Data Category
frequency, variations in AC system voltages and Ac system waveform distortion.		
For DC control devices, contribution to the AC system short circuit level	KA, MVA	D
Short circuit ratio		
The value of the *short circuit ratio* in the *minimum access standard* in clause S5.2.5.15(b), clause S5.3.11(b) or clause S5.3a.7(b) (as applicable) or if the procedures in clause 5.3.4A have been followed, a *negotiated access standard* agreed pursuant to clause S5.2.5.15(c), clause S5.3.11(c) or clause S5.3a.7(c) (as applicable).	Numeric ratio	S, D, R1

Schedule 5.5.5 Load Characteristics at Connection Point

Data Description	Units	Data Category
For all Types of Load		
Type of *Load* eg controlled rectifiers or large motor drives	Text	S
For Fluctuating Loads		
Cyclic variation of *active power* over period	Graph MW/time	S
Cyclic variation of *reactive power* over period	Graph MVAr/time	S
Maximum rate of change of *active power*	MW/s	S
Maximum rate of change of *reactive power*	MVAr/s	S
Shortest Repetitive time interval between fluctuations in active and *reactive power* reviewed annually	s	S

Data Description	Units	Data Category
Largest Step Change:		
In *active power*	MW	S
In *reactive power*	MVAr	S

Schedule 5.6 Terms and Conditions of Connection agreements and network operating agreements

Part A Connection agreements

~~The *connection agreements*~~ A *connection agreement* must contain the specific conditions that have been agreed to for *connection* and access to the *transmission network* or *distribution network*, including but not limited to:

(a) details of the *connection point* including the *distribution network* coupling points where appropriate;

(b) metering arrangements and adjustments for losses where the point of metering is significantly different to the *connection point*;

(c) authorised demand which may be taken or supplied at the *connection point* (under specified conditions);

(c1) details of each *access standard* agreed between the *Network Service Provider* and the *Connection Applicant* ~~*Registered Participant*~~ and all related conditions of agreement resulting from the application of any access provisions contained in schedule 5.1, 5.2, 5.3 or 5.3a, as applicable; ~~schedule 5.1 for *Network Service Providers*, or schedule 5.2 for *Generators*, and *Integrated Resource Providers* or schedule 5.3 for *Customers*, or schedule 5.3a for *Market Network Service Providers*;~~

(c2) details of any *system strength remediation scheme* agreed, determined or modified in accordance with clause 5.3.4B and associated terms and conditions;

(c3) details of any *system strength connection works*;

(d) *connection service* charges;

(e) payment conditions;

(f) duration and termination conditions of the *connection agreement*;

(g) terms, conditions and *constraints* that have been agreed to for *connection* to the *network* to protect the legitimate interest of the *Network Service Providers* including rights to *disconnect* the *Registered Participant*'s facility for breach of commercial undertakings;

(g1) terms confirming that the *Network Service Provider* is not liable for any loss or damage incurred by the *Connection Applicant* or any other person as a consequence of a fault on either the *power system*, or within the *Connection Applicant's facility*;

(h) details of any agreed standards of *reliability* of *transmission service* or *distribution service* at the *connection points* or within the *network*;

(i) testing intervals for *protection systems* associated with the *connection point*;

(j) agreed protocols for maintenance co-ordination;

(k) where an expected *load* or *bidirectional unit*, to be connected to a *network*, has a *peak load* requirement in excess of 10 MW, the provision, installation, operation and maintenance of automatic *load shedding* ~~shedding~~ facilities for 60 percent of the *load* at any time~~anytime~~;

(l) terms and conditions of access to the *metering installation* for the *Metering Provider* and access to *metering installations* type 4A, 5 and 6 for the *Metering Data Provider*;

(m) the arrangements for the provision of services relating to *non-contestable IUSA components* (if applicable);

(n) the functional specifications for the *contestable IUSA components*; and

(o) if the *Connection Applicant* has obtained services related to a *contestable IUSA components* other than from the *Primary Transmission Network Service Provider* and intends to transfer ownership of some or all of those components to the *Primary Transmission Network Service Provider*, arrangements for the transfer of ownership of those components upon energisation of the *identified user shared asset* to the *Primary Transmission Network Service Provider* (if applicable) and how any defects liabilities will be managed.

~~The *connection agreements*~~ A *connection agreement* may include other technical, commercial and legal conditions governing works required for the *connection* or *extension* to the *network* which the parties have negotiated and agreed to. The circumstances under which the terms of the *connection agreement* would require renegotiation may also be included.

Schedule 5.8 Distribution Annual Planning Report

For the purposes of clause 5.13.2(c), the following information must be included in a *Distribution Annual Planning Report*:

(a) information regarding the *Distribution Network Service Provider* and its *network*, including:

(1) a description of its *network*;

(2) a description of its operating environment;

(3) the number and types of its *distribution assets*;

(4) methodologies used in preparing the *Distribution Annual Planning Report*, including methodologies used to identify *system limitations* and any assumptions applied; and

(5) analysis and explanation of any aspects of forecasts and information provided in the *Distribution Annual Planning Report* that have changed significantly from previous forecasts and information provided in the preceding year;

(b) forecasts for the *forward planning period*, including at least:

(1) a description of the forecasting methodology used, sources of input information, and the assumptions applied;

(2) *load* forecasts:

(i) at the *transmission-distribution connection points*;

(ii) for *sub-transmission lines*; and

(iii) for *zone substations*,

including, where applicable, for each item specified above:

(iv) *total capacity*;

(v) *firm delivery capacity* for summer periods and winter periods;

(vi) *peak load* (summer or winter and an estimate of the number of hours per year that 95% of *peak load* is expected to be reached);

(vii) *power factor* at time of *peak load*;

(viii) load transfer capacities; and

(ix) *generation* capacity of known *distribution connected units*;

(2A) forecast use of *distribution services* by *distribution connected units*:

(i) at the *transmission-distribution connection points*;

(ii) for *sub-transmission lines*; and

(iii) for *zone substations*,

including, where applicable, for each item specified above:

(iv) *total capacity* to accept *supply* from *distribution connected units*;

(v) *firm delivery capacity* for each period during the year;

(vi) peak *supply* into the *distribution network* from *distribution connected units* (at any time during the year) and an estimate of the number of hours per year that 95% of the peak is expected to be reached; and

(vii) *power factor* at time of peak *supply* into the *distribution network*;

(3) forecasts of future *transmission-distribution connection points* (and any associated *connection assets*), *sub-transmission lines* and *zone substations*, including for each future *transmission-distribution connection point* and *zone substation*:

(i) location;

(ii) future *loading level*; and

(iii) proposed commissioning time (estimate of month and year);

(4) forecasts of the *Distribution Network Service Provider's* performance against any applicable performance targets in a *service target performance incentive scheme*; and

(5) a description of any factors that may have a material impact on its *network*, including factors affecting;

(i) fault levels;

(ii) voltage~~*voltage*~~ levels;

(iii) other *power system security* requirements;

(iv) the quality of *supply* to other *Network Users* (where relevant); and

(v) ageing and potentially unreliable assets;

(b1) for all *network* asset retirements, and for all *network* asset de-ratings that would result in a system limitation, that are planned over the *forward planning period*, the following information in sufficient detail relative to the size or significance of the asset:

(1) a description of the *network* asset, including location;

(2) the reasons, including methodologies and assumptions used by the *Distribution Network Service Provider*, for deciding that it is necessary or prudent for the *network* asset to be retired or *de-rated*, taking into account factors such as the condition of the *network* asset;

(3) the date from which the *Distribution Network Service Provider* proposes that the *network* asset will be retired or *de-rated*; and

(4) if the date to retire or *de-rate* the *network* asset has changed since the previous *Distribution Annual Planning Report*, an explanation of why this has occurred;

(b2) for the purposes of subparagraph (b1), where two or more *network* assets are:

(1) of the same type;

(2) to be retired or *de-rated* across more than one location;

(3) to be retired or *de-rated* in the same calendar year; and

(4) each expected to have a replacement cost less than $200,000 (as varied by a *cost threshold determination*),

those assets can be reported together by setting out in the *Distribution Annual Planning Report*:

(5) a description of the *network* assets, including a summarised description of their locations;

(6) the reasons, including methodologies and assumptions used by the *Distribution Network Service Provider*, for deciding that it is necessary or prudent for the *network* assets to be retired or *de-rated*, taking into account factors such as the condition of the *network* assets;

(7) the date from which the *Distribution Network Service Provider* proposes that the *network* assets will be retired or *de-rated*; and

(8) if the calendar year to retire or *de-rate* the *network* assets has changed since the previous *Distribution Annual Planning Report*, an explanation of why this has occurred;

(c) information on *system limitations* for *sub-transmission lines* and *zone substations*, including at least:

(1) estimates of the location and timing (month(s) and year) of the system limitation;

(2) analysis of any potential for *load transfer capacity* between *supply* points that may decrease the impact of the *system limitation* or defer the requirement for investment;

(3) impact of the *system limitation*, if any, on the capacity at *transmission-distribution connection points*;

(4) a brief discussion of the types of potential solutions that may address the *system limitation* in the *forward planning period*, if a solution is required; and

(5) where an estimated change in forecast *load* or forecast *generation* from *distribution connected units* would defer a forecast *system limitation* for a period of at least 12 months, include:

(i) an estimate of the month and year in which a *system limitation* is forecast to occur as required under subparagraph (1);

(ii) the relevant *connection points* at which the estimated change in forecast *load* or forecast *generation* may occur; and

(iii) the estimated change in forecast *load* or forecast *generation* in MW or improvements in *power factor* needed to defer the forecast *system limitation*;

(d) for any *primary distribution feeders* for which a *Distribution Network Service Provider* has prepared forecasts of *maximum demands* under clause 5.13.1(d)(1)(iii) and which are currently experiencing an overload, or are forecast to experience an overload in the next two years the *Distribution Network Service Provider* must set out:

(1) the location of the *primary distribution feeder*;

(2) the extent to which load exceeds, or is forecast to exceed, 100% (or lower utilisation factor, as appropriate) of the *normal cyclic rating* under normal conditions (in summer periods or winter periods);

(3) the types of potential solutions that may address the overload or forecast overload; and

(4) where an estimated reduction in forecast *load* would defer a forecast overload for a period of 12 months, include:

(i) estimate of the month and year in which the overload is forecast to occur;

(ii) a summary of the location of relevant *connection points* at which the estimated reduction in forecast *load* would defer the overload;

(iii) the estimated reduction in forecast *load* in MW needed to defer the forecast *system limitation*;

(d1) for any *primary distribution feeders* for which a *Distribution Network Service Provider* has prepared forecasts of demand for *distribution services* by *distribution connected units* under clause 5.13.1(d1)(3) and which are currently experiencing a *system limitation*, or are forecast to experience a *system limitation* in the next two years, the *Distribution Network Service Provider* must set out:

(1) the location of the *primary distribution feeder*;

(2) the extent to which demand for *distribution services* by *distribution connected units* exceeds, or is forecast to exceed, 100% (or lower utilisation factor, as appropriate) of the normal capacity to provide those *distribution services* under normal conditions;

(3) the types of potential solutions that may address the *system limitation* or forecast *system limitation*;

(4) where an estimated reduction in demand for *distribution services* by *distribution connected units* would defer a forecast *system limitation* for a period of 12 months, include:

(i) an estimate of the month and year in which the *system limitation* is forecast to occur;

(ii) a summary of the location of relevant *connection points* at which the estimated reduction in demand for *distribution services* by *distribution connected units* would defer the *system limitation*; and

(iii) the estimated reduction in demand for *distribution services* by *distribution connected units* in MW needed to defer the forecast *system limitation*;

(d2) for a *SAPS enabled network*, information on *system limitations* in the *forward planning period* for which a potential solution is a *regulated SAPS*, including at least:

(1) estimates of the location and timing (month(s) and year) of the *system limitation*; and

(2) a brief discussion of the types of potential *stand-alone power systems* that may address the *system limitation*;

(e) a high-level summary of each *RIT-D project* for which the *regulatory investment test for distribution* has been completed in the preceding year or is in progress, including:

(1) if the *regulatory investment test for distribution* is in progress, the current stage in the process;

(2) a brief description of the *identified need*;

(3) a list of the *credible options* assessed or being assessed (to the extent reasonably practicable);

(4) if the *regulatory investment test for distribution* has been completed a brief description of the conclusion, including:

(i) the *net economic benefit* of each *credible option*;

(ii) the estimated capital cost of the *preferred option*; and

(iii) the estimated construction timetable and commissioning date (where relevant) of the *preferred option*; and

(5) any impacts on *Network Users*, including any potential material impacts on *connection* charges and *distribution use of system* charges that have been estimated;

(f) for each identified *system limitation* which a *Distribution Network Service Provider* has determined will require a *regulatory investment test for distribution*, provide an estimate of the month and year when the test is expected to commence;

(g) a summary of all committed investments to be carried out within the *forward planning period* with an estimated capital cost of $2 million or more (as varied by a *cost threshold determination*) that are to address an urgent and unforeseen *network* issue as described in clause 5.17.3(a)(1), including:

(1) a brief description of the investment, including its purpose, its location, the estimated capital cost of the investment and an estimate of the date (month and year) the investment is expected to become operational;

(2) a brief description of the alternative options considered by the *Distribution Network Service Provider* in deciding on the preferred investment, including an explanation of the ranking of these options to the committed project. Alternative options could include, but are not limited to, *generation* options, demand side options, and options involving other *distribution* or *transmission networks*;

(h) the results of any joint planning undertaken with a *Transmission Network Service Provider* in the preceding year, including:

(1) a summary of the process and methodology used by the *Distribution Network Service Provider* and relevant *Transmission Network Service Providers* to undertake joint planning;

(2) a brief description of any investments that have been planned through this process, including the estimated capital costs of the investment and an estimate of the timing (month and year) of the investment; and

(3) where additional information on the investments may be obtained;

(i) the results of any joint planning undertaken with other *Distribution Network Service Providers* in the preceding year, including:

(1) a summary of the process and methodology used by the *Distribution Network Service Providers* to undertake joint planning;

(2) a brief description of any investments that have been planned through this process, including the estimated capital cost of the investment and an estimate of the timing (month and year) of the investment; and

(3) where additional information on the investments may be obtained;

(j) information on the performance of the *Distribution Network Service Provider's network*, including:

(1) a summary description of reliability measures and standards in *applicable regulatory instruments*;

(2) a summary description of the quality of *supply* standards that apply, including the relevant codes, standards and guidelines;

(3) a summary description of the performance of the *distribution network* against the measures and standards described under subparagraphs (1) and (2) for the preceding year;

(4) where the measures and standards described under subparagraphs (1) and (2) were not met in the preceding year, information on the corrective action taken or planned;

(5) a summary description of the *Distribution Network Service Provider's* processes to ensure compliance with the measures and standards described under subparagraphs (1) and (2); and

(6) an outline of the information contained in the *Distribution Network Service Provider's* most recent submission to the *AER* under the *service target performance incentive scheme*;

(k) information on the *Distribution Network Service Provider's asset management* approach, including:

(1) a summary of any *asset management* strategy employed by the *Distribution Network Service Provider*;

(1A) an explanation of how the *Distribution Network Service Provider* takes into account the cost of *distribution losses* when developing and implementing its *asset management* and investment strategy;

(2) a summary of any issues that may impact on the *system limitations* identified in the *Distribution Annual Planning Report* that has been identified through carrying out *asset management*; and

(3) information about where further information on the *asset management* strategy and methodology adopted by the *Distribution Network Service Provider* may be obtained;

(l) information on the *Distribution Network Service Provider's* demand management activities and activities relating to *distribution connected units*, including:

(1) a qualitative summary of:

(i) *non-network options* that have been considered in the past year, including *generation* from *distribution connected units*;

(ii) key issues arising from *applications to connect distribution connected units* received in the past year;

(iii) actions taken to promote non-*network* proposals or (for a *SAPS enabled network*) SAPS proposals in the preceding year, including *generation* from *distribution connected units*; and

(iv) the *Distribution Network Service Provider's* plans for demand management and *generation* from *distribution connected units* over the *forward planning period*;

(2) a quantitative summary of:

(i) *connection* enquiries received under clause 5.3A.5 and of the total, the number for *non-registered DER providers*;

(ii) *applications to connect* received under clause 5.3A.9 and of the total, the number for *non-registered DER providers*; and

(iii) the average time taken to complete *applications to connect*; and

(3) a quantitative summary of:

(i) *enquiries* under clause 5A.D.2 in relation to the *connection* of *micro resource operators* or *non-registered DER providers*; and

(ii) applications for a *connection service* under clause 5A.D.3 in relation to the *connection* of *micro resource operators* or *non-registered DER providers*;

(m) information on the *Distribution Network Service Provider's* investments in information technology and communication systems which occurred in the preceding year, and planned investments in information technology and communication systems related to management of *network* assets in the *forward planning period*; and

(n) a regional development plan consisting of a map of the *Distribution Network Service Provider's network* as a whole, or maps by regions, in accordance with the *Distribution Network Service Provider's* planning methodology or as required under any *regulatory obligation or requirement*, identifying:

(1) *sub-transmission lines*, *zone substations* and *transmission-distribution connection points*; and

(2) any system limitations that have been forecast to occur in the *forward planning period*, including, where they have been identified, overloaded *primary distribution feeders*;

(o) the analysis of the known and potential interactions between:

(1) any *emergency frequency control schemes*, or emergency controls in place under clause S5.1.8, on its *network*; and

(2) *protection systems* or *control systems* of *plant connected* to its *network* (including consideration of whether the settings of those systems are fit for purpose for the future operation of its *network*),

undertaken under clause 5.13.1(d)(6), including a description of proposed actions to be undertaken to address any adverse interactions; and

(p) for a *SAPS enabled network*, information on the *Distribution Network Service Provider's* activities in relation to *DNSP-led SAPS projects* including:

(1) opportunities to develop *DNSP-led SAPS projects* that have been considered in the past year;

(2) committed projects to implement a *regulated SAPS* over the *forward planning period*; and

(3) a quantitative summary of:

(i) the total number of *regulated SAPS* in the *network*; and

(ii) the total number of premises of *retail customers* supplied by means of those *regulated SAPS*.

(q) the *system strength locational factor* for each *system strength connection point* for which it is the *Network Service Provider* and the corresponding *system strength node*.

Schedule 5.13 SAPS Performance Requirements to be defined by Distribution Network Service Providers

(a) The *SAPS performance and supply standards* of a *Distribution Network Service Provider* must specify:

(1) the standards for the performance of its *regulated SAPS* covering each of the parameters in table S5.13.1 and including at a minimum the information specified in that table;

(2) the planning, design and operating standards and requirements for coordination with *Network Users* that the *Distribution Network Service Provider* will apply in relation to its *regulated SAPS* to:

(i) achieve adequate levels of *network power transfer capability* and quality of *supply* in its *regulated SAPS*;

(ii) achieve a specific level of *network service* at an individual *connection point* in a *regulated SAPS*; and

(iii) observe and apply the relevant provisions of the quality of supply and system standards specified in accordance with subparagraph (1); and

(3) the contingencies taken into account by the *Distribution Network Service Provider* in the planning and design of a *regulated SAPS*.

(b) The standards, approaches and other matters in schedule 5.1a and schedule 5.1 must where relevant be considered in the development of *SAPS performance and supply standards.*

Table S5.13.1

Parameter	Minimum content of standards
Frequency	*Frequency* band in normal operation *Frequency* band following a contingency and the maximum permitted time for excursions outside this band
System stability	Transient, oscillatory or voltage stability requirements to ensure stable *supply* in a *regulated SAPS*
Power frequency voltage	~~*Normal*~~ *Nominal voltage* of *supply* at *connection points* Acceptable limits of supply voltage~~*voltage*~~ variation from ~~*normal*~~ *nominal voltage* in normal operation and following a contingency Maximum time for which voltage~~*voltage*~~ may vary from ~~*normal*~~ *nominal voltage* for any given variation from ~~*normal*~~ *nominal voltage*

Parameter	Minimum content of standards
	These are to be set to achieve distortion free ~~*voltage*~~ voltage supply for the efficient and safe operation of equipment in customer installations
Voltage fluctuations (flicker)	Maximum ~~*voltage*~~ voltage fluctuation level of *supply*
Voltage waveform distortion	Permitted ~~*voltage*~~ voltage distortion (harmonics)
Voltage unbalance (if applicable)	~~*Voltage*~~ Voltage unbalance is to be measured as negative sequence ~~*voltage*~~voltage Maximum average ~~*voltage*~~ voltage unbalance in normal operation, measured at a *connection point*, over a specified averaging period Maximum average ~~*voltage*~~ voltage unbalance following a contingency
Fault clearance times	Maximum allowed fault clearance times at ~~nominal~~ *nominal voltage* levels Fault ride through requirements as necessary to meet stability requirements These must be reasonable and sufficiently fast that they ensure stability and safety with respect to a *regulated SAPS*
Reliability	Performance targets for frequency and duration of *supply* interruptions in a *regulated SAPS* Performance targets for expected *load* not served in a *regulated SAPS*

CHAPTER 6A

6A. Economic Regulation of Transmission Services

Part A Introduction

6A.1 Introduction to Chapter 6A

6A.1.4 National regulatory arrangements

(a) The *AER* is, in accordance with this Chapter 6A, responsible for the economic regulation of *prescribed transmission services* provided by *Transmission Network Service Providers* by means of, or in connection with, *transmission systems* that form part of the *national grid*.

(b) Subject to any contrary determination by the *AER*, those parts of a *transmission network* operating at nominal *voltages* between 66kV and 220kV that:

(1) do not operate in parallel to; and

(2) do not provide support to,

the higher ~~*voltage*~~ voltage *transmission network* may be deemed by the relevant *Transmission Network Service Provider* to be subject to the regulatory arrangements for *distribution service* pricing set out in Chapter 6.

Part F Information Disclosure

6A.17 Information disclosure by Transmission Network Service Providers

6A.17.2 Information Guidelines

Preparation, publication and amendment of Information Guidelines

(a) The *AER* must, in accordance with the *transmission consultation procedures*, make and *publish* guidelines (*information guidelines*) that comply with this clause 6A.17.2.

(b) [**Deleted**]

(c) The *AER* must *publish* the first *information guidelines* by 28 September 2007, and there must be *information guidelines* in force at all times after that date.

Contents of information guidelines

(d) The *information guidelines* must provide for the manner and form in which *Transmission Network Service Providers* must submit certified annual statements to the *AER*, including the date each year by which those statements must be submitted to the *AER*.

(e) The *information guidelines* may only require the inclusion in the certified annual statements of:

(1) such information as the *AER* reasonably requires for a purpose set out in clause 6A.17.1(d);

(2) information on the amount of each instance, during the relevant reporting period, of a reduction under clause 6A.26.1(c) in the prices payable by a *Transmission Customer* for *prescribed TUOS services* or *prescribed common transmission services* provided by the *Transmission Network Service Provider*;

(3) information on each instance, during the relevant reporting period, of a reduction in the prices payable by a *Transmission Customer* for *prescribed TUOS services* or *prescribed common transmission services* (or both) that were recovered under rule 6A.26 from other *Transmission Customers* for *prescribed TUOS services* or *prescribed common transmission services*; and

(4) information to substantiate any claim by the *Transmission Network Service Provider* that the information provided to the *AER* with respect to reductions in the prices payable by a *Transmission Customer* for the relevant *prescribed transmission services* under subparagraph (2) or (3) is confidential information.

(f) [**Deleted**].

(g) The *information guidelines* may specify the information that must be submitted with any application made under clause 6A.26.2(b), including:

(1) details of the circumstances in which a discount amount has arisen and of the calculation of the proposed recovery amount; and

(2) the information necessary to substantiate how the requirements of clause 6A.26.1(f) are satisfied.

(h) The *information guidelines* may provide, for the purposes of rule 6A.27, rule 6A.28 and rule 6A.29, for:

(1) the information that each *Transmission Network Service Provider* must supply to a *Co-ordinating Network Service Provider* and other *Transmission Network Service Providers* for the purposes of cost allocation under the provider's *pricing methodology*, including:

(i) electrical parameters for each optimised element of the *network* and the *network* configuration;

(ii) hourly *load* data for each exit point for the *survey period*;

(iii) hourly *generation* data for each entry point for the *survey period*;

(iv) ~~*voltage*~~ voltage control arrangements and ~~*voltage*~~ voltage profile; and

(v) the *ASRR* for the categories of *prescribed TUOS services* and *prescribed common transmission services*.

(2) the derivation of hourly *load* data from *metering data* by the aggregation of the *energy meter* reading figures in respect of each hour.

(i) The *information guidelines* are binding on the *AER* and each *Transmission Network Service Provider* to which they apply.

Part J Prescribed Transmission Services - Regulation of Pricing

6A.23 Pricing Principles for Prescribed Transmission Services

6A.23.5 System strength charge

(a) This clause applies to a *Transmission Network Service Provider* who is a *System Strength Service Provider*.

(b) In this clause:

system strength charging period means, for a *System Strength Service Provider*, each period running from the start of the second *regulatory year* in a *regulatory control period* of the *System Strength Service Provider* to the end of the first *regulatory year* in its next *regulatory control period.*

(c) The *pricing methodology* of a *Transmission Network Service Provider* who is a *System Strength Service Provider* must provide for the *System Strength Transmission Service User* for a *system strength connection point* to pay an *annual system strength charge* for the *system strength connection point* determined in accordance with this rule, in equal monthly instalments from the time determined in accordance with the *pricing methodology guidelines*.

(d) If the obligation to pay the *system strength charge* in relation to a *system strength connection point* commences part way through a *regulatory year*, the *System Strength Service Provider* must calculate the monthly instalments of the *annual system strength charge* for the remaining months of the *regulatory year* on a pro rata basis.

(e) The *annual system strength charge* for a *system strength connection point* for a *regulatory year* must be calculated in accordance with the following formula:

$$SSC = SSUP \times SSL \times SSQ$$

where:

SSC	is the *annual system strength charge* for the *regulatory year* (in $);
SSUP	is the *system strength unit price* of the *System Strength Service Provider* for the *system strength charging period* in which the *regulatory year* falls (in $/MVA) and for the *system strength node* used to determine the *system strength locational factor* for the *system strength connection point*;
SSL	is the *system strength locational factor* applicable to the *system strength connection point* for the *system strength charging period* in which the *regulatory year* falls, determined in accordance with paragraph (h); and

SSQ	is the *system strength quantity* for the *system strength connection point*, determined in accordance with paragraph (j) (in MVA).

(f) The *system strength unit price* of a *System Strength Service Provider* for a *system strength node* must be the same for each *regulatory year* in a *system strength charging period* except to the extent the *pricing methodology guidelines* permit indexation.

(g) A *System Strength Service Provider* must determine the *system strength node* used to determine the *system strength locational factor* for a *system strength connection point* in accordance with the *system strength impact assessment guidelines.*

(h) The *system strength locational factor* applicable to a *system strength connection point* is determined by the *Network Service Provider* for the *system strength connection point*. Where:

(1) the *System Strength Service Provider* is also the *Network Service Provider* for the *system strength connection point*, the *System Strength Service Provider* must calculate the *system strength locational factor* applicable to each *system strength connection point* for which it is the *Network Service Provider* for each year of a *system strength charging period* in accordance with the *system strength impact assessment guidelines*; and

(2) the *System Strength Service Provider* is not the *Network Service Provider* for the *system strength connection point*, the *System Strength Service Provider* must request the relevant *Network Service Provider* under clause 5.3.4C(c) to calculate and notify to the *System Strength Service Provider* the *system strength locational factor.*

(i) A *System Strength Service Provider* must not change the *system strength locational factor* used to calculate the *system strength charge* for a *system strength connection point* during a *system strength charging period*.

(j) Subject to paragraph (k), the *system strength quantity* for a *system strength connection point* must be calculated by the *System Strength Service Provider* for the *system strength connection point* in accordance with the methodology in the applicable version of the *system strength impact assessment guidelines* as determined under paragraph (j1), using:

(1) the *short circuit ratio*; and

(2) the ~~*rated active power, rated*~~ *active power capability, power transfer capability* or *maximum demand* for the *system strength connection point*,

each as agreed in accordance with clause S5.2.5.15, clause S5.3.11 or clause S5.3a.7 (as applicable) and recorded in the relevant *performance standards* for the *plant connected* at the *system strength connection point.*

(j1) The applicable version of the *system strength impact assessment guidelines* for a *system strength connection point* is the version that was in effect:

(1) subject to subparagraph (2), at the time the election to pay the *system strength charge* was notified under clause 5.3.4B(b1) in respect of the *system strength connection point*; or

(2) where the *connected plant* has been altered and clause 5.3.9 or 5.3.12 applied in respect of that alteration, at the time the latest election to pay the *system strength charge* was notified under clause 5.3.4B(b1) in respect of the *system strength connection point*.

(k) If a change to the *short circuit ratio*, ~~*rated active power*, rated~~ *active power capability*, *power transfer capability* or *maximum demand* (as applicable) for a *system strength connection point* (as recorded in the *performance standards* applicable to the *plant connected* at the *system strength connection point*) comes into effect part way through a *regulatory year*, the *System Strength Service Provider* must calculate the monthly instalments of the *annual system strength charge* for the remaining months of the *regulatory year* using the new *system strength quantity*.

CHAPTER 10

10. Glossary

access standard

Either an *automatic access standard* or a *negotiated access standard* for a particular technical requirement ~~as recorded in a *connection agreement*~~.

active energy

A measure of electrical energy flow, being the time integral of the product of ~~*voltage*~~ voltage and the in-phase component of current flow across a *connection point*, expressed in watthour (Wh).

active power

The rate at which *active energy* is transferred.

active power capability

The maximum amount of *active power* that ~~rate at which *active energy*~~ may be transferred to a *connection point* from a ~~*generating unit* or a *bidirectional unit*~~ *generating system* or *integrated resource system* ~~to a *connection point*~~ as specified or proposed to be specified in a *performance standard* or *connection agreement* ~~(as the case may be)~~.

For a *generating system* or *integrated resource system* that is a *scheduled resource*, the *active power capability* is equivalent to the aggregate of the maximum *generation* quantities specified in the *bid validation data* for all its *production units*, after accounting for *auxiliary load* and losses within the relevant system.

adverse system strength impact

An adverse impact, assessed in accordance with the *system strength impact assessment guidelines*, on the ability under different operating conditions of:

(a) the *power system* to maintain system stability in accordance with clause S5.1a.3; or

(b) *plant* ~~a *generating system*, *integrated resource system*, *market network service facility* or *inverter based load* forming part of the *power system*~~ to maintain stable operation including following any *credible contingency event* or *protected event*,

so as to maintain the power system in a *secure operating state*.

AEMO advisory matter

A matter that relates to *AEMO*'s functions under the *NEL* and a matter in which *AEMO* has a role under clause 5.3.4B or in schedules 5.1a, 5.1, 5.2, 5.3 and 5.3a. Advice on the acceptability of *negotiated access standards* under the following clauses are deemed to be *AEMO advisory matters*: S5.1.9, S5.2.5.1, S5.2.5.3 to S5.2.5.5, S5.2.5.7 to S5.2.5.15~~S5.2.5.16~~, S5.2.6.1, S5.2.6.2, S5.3.5, S5.3.11, S5.3a.4.1, S5.3a.4.2, S5.3a.7, S5.3a.8 and S5.3a.13 to S5.3a.16 ~~and S5.3a.7~~.

bidirectional unit

(a) Subject to paragraphs (b) and (c), a *production unit* that also consumes electricity.

Note:

Consumption of electricity includes the use of electricity to charge a *production unit* or to pump water for a pumped hydro *production unit*.

(b) For paragraph (a), disregard *auxiliary load*.

(c) A *bidirectional unit* within the meaning of paragraph (a) of this definition, that has been classified as a *scheduled generating unit* under clause 2.2.2(b2), is taken for the purposes of the *Rules* (except rules 2.1A and 2.1B and clauses 2.2.2(a) to (b4) or as otherwise provided in the *Rules*) to be a *generating unit* (and not a *bidirectional unit*) and a *scheduled load*.

Note:

Clause 2.2.2(b2) provides for the classification of a *bidirectional unit* that is not capable of transitioning linearly from consuming to producing electricity and vice versa. In general terms, these units are *bidirectional units* for registration and classification purposes and otherwise, are *generating units* and *scheduled loads.* Unless the system the unit is part of would satisfy the definition of *integrated resource system* for other reasons, in general terms the system will be an *integrated resource system* for registration and classification purposes and otherwise, a *generating system* and a *scheduled load*.

black system

The absence of ~~*voltage*~~ voltage on all or a significant part of the *transmission system* or within a *region* during a *major supply disruption* affecting a significant number of customers.

capacitor bank

Electrical equipment used to generate *reactive power* and therefore support ~~*voltage*~~ voltage levels on *transmission line* or *distribution line* in periods of high *load*.

continuous uninterrupted operation

In respect of a *schedule 5.2 plant or a schedule 5.3a plant* ~~*generating system, generating unit, integrated resource system* or *bidirectional unit*~~ operating immediately prior to a *power system* disturbance:

(a) not *disconnecting* from the rest of the *power system* except as required or permitted under its *performance standards* ~~established under clauses S5.2.5.8 and S5.2.5.9~~;

(b) during the disturbance contributing active and reactive current or *active power* and *reactive power* as required or permitted by its *performance standards* ~~established under clause S5.2.5.5~~;

(c) after clearance of any electrical fault that caused the disturbance, not ~~only~~ substantially varying its *active power* and *reactive power* except as required or permitted by its *performance standards* ~~established under clauses S5.2.5.5, S5.2.5.11, S5.2.5.13 and S5.2.5.14~~; and

(d) not exacerbating or prolonging the disturbance or causing a subsequent disturbance for other *connected plant*, except as required or permitted by its *performance standards*,

with all essential auxiliary and *reactive plant* remaining in service and accounting for, where applicable:

(e) inherent or programmed responses, in accordance with *good electricity industry practice*, opposing rate of change of *frequency* (inertial response) or opposing phase angle jumps; and

(f) responses consistent with the operation of the *plant* in accordance with clause 4.4.2(c1) (primary *frequency* response).

disconnect

The operation of switching equipment or other action so as to prevent the flow of electricity to or from *connected* equipment~~at a *connection point*~~.

distribution use of system, distribution use of system service

A service provided to a *Distribution Network User* for use of the *distribution network* for the conveyance of electricity that can be reasonably allocated on a locational and/or ~~*voltage*~~ voltage basis.

energise

The act of operation of switching equipment or the start-up of a *production unit*, which results in there being a non-zero ~~*voltage*~~ voltage beyond a *connection point* or part of the *transmission network* or *distribution network*.

generating system

(a) Subject to paragraph (b), for the purposes of the *Rules*, a system comprising one or more *generating units*, other than an *integrated resource system*.

(b) For the purposes of clause 2.1B.1(c), clause 2.1B.2(b)(4), clause 4.9.2, Chapter 5 and a *jurisdictional derogation* from Chapter 5, a system comprising one or more *generating units*, other than an *integrated resource system*, and includes auxiliary or *reactive plant* that is located on the *Generator's* side of the *connection point* and is necessary for the *generating system* to meet its *performance standards*.

(c) For the purposes of the *Rules* (except rules 2.1A, 2.1B and 2.2 and except as otherwise provided under the *Rules*), a reference to a *generating unit* in paragraph (a) or (b) of this definition is taken to include a *bidirectional unit* that has been classified as a *scheduled generating unit* as provided for in clause 2.2.2(b2).

Note

In relation to paragraph (c), refer to the note to *bidirectional unit*.

generating unit

(a) Subject to paragraph (b), a *production unit* that is not a *bidirectional unit*.

(b) A *bidirectional unit* within the meaning of paragraph (a) of the definition of *bidirectional unit*, that has been classified as a *scheduled generating unit* under clause 2.2.2(b2), is taken for the purposes of the *Rules* (except rules 2.1A and 2.1B and clauses 2.2.2(a) to (b4) and except as otherwise provided in the *Rules*) to be a *generating unit* (and not a *bidirectional unit*).

Note

In relation to paragraph (b), refer to the note to *bidirectional unit*.

high voltage (HV)

A ~~*voltage*~~ voltage greater than 1 kV.

major supply disruption

The unplanned absence of ~~*voltage*~~ voltage on a part of the *transmission system* affecting one or more *power stations* and which leads to a loss of *supply* to one or more *loads*.

maximum continuous current

In respect of a *schedule 5.2 plant*~~*generating system or integrated resource system*~~:

(a) where ~~assessed~~ measured at the *connection point*, the current at the *connection point* corresponding to the largest amount of *apparent* ~~power~~ *power* required by the *generating system's* or *integrated resource system's performance standard* ~~under~~ for clause S5.2.5.1, at the ~~*normal*~~ *nominal voltage*; and

(b) where ~~assessed~~ measured at any other point, the current at that point assessed in the manner agreed by the *Network Service Provider* for the *transmission system* or *distribution system* to which the *generating system* or *integrated resource system* is *connected* and recorded in the *performance standards*~~and recorded in the *connection agreement*~~.

minimum operating level

In relation to a *generating unit*, the minimum *generation* required for its continuous stable operation.

nameplate rating

In relation to an item of equipment, its ~~The~~ maximum continuous output or consumption in MW, or *apparent power* in MVA for *synchronous condensers*, ~~of an item of equipment~~ as specified by the manufacturer, or as subsequently modified.

In relation to *bidirectional units*, for the purposes of the *Rules* the *nameplate rating* is measured separately for output and consumption and a *nameplate rating* threshold in the *Rules* will be met or exceeded by:

(a) a *bidirectional unit*, if it is met or exceeded with respect to either output or consumption of the *bidirectional unit* (or both); and

(b) a group of *bidirectional units*, if it is met or exceeded with respect to either the combined *nameplate rating* of the *bidirectional units* for output or the combined *nameplate rating* of the *bidirectional units* for consumption (or both).

negotiated access standard

In relation to a technical requirement of access in a schedule of Chapter 5, a standard of performance for a particular *plant* that is agreed in accordance with the requirements for negotiated access standards identified in clause 5.3.4A and the applicable schedule~~, an agreed standard of performance determined in accordance with clause 5.3.4A and identified as a negotiated access standard for that technical requirement in a *connection agreement*~~.

nominal voltage

The design voltage~~*voltage*~~ level, nominated for a particular location on the *power system*, such that power lines and circuits that are electrically connected other than through *transformers* have the same *nominal voltage* regardless of operating voltage~~*voltage* and *normal voltage*~~.

~~***normal voltage***~~

~~In respect of a *connection point*, its *nominal voltage* or such other *voltage* up to 10% higher or lower than *nominal voltage*, as approved by *AEMO*, for that *connection point* at the request of the *Network Service Provider* who provides *connection* to the *power system*.~~

performance standard

A standard of performance for a particular *plant* that, as applicable:

(a) is ~~established as a result of it being~~ taken to be an applicable performance standard in accordance with clause 5.3.4A(i); ~~or~~

(b) is included in the register of *performance standards* established and maintained by *AEMO* under rule 4.14(n),

(c) is documented in the *connection agreement* for a *Schedule 5.2 Participant*, *Schedule 5.3 Participant* or *Schedule 5.3a Participant*, where the *connection* and access process set out in rule 5.3 or rule 5.3A is not applicable to that *plant*; or

(d) is documented by a *Network Service Provider* in respect of its own relevant *plant* and provided to *AEMO* under clause 5.2.3(c1).

~~as the case may be.~~

plant

(a) In relation to a *connection point*, includes all equipment involved in, or supporting, the *generation*, consumption or conveyance of electricity. ~~generating, consuming or transmitting electrical *energy*.~~

(b) In relation to *dispatch bids*, *scheduled resources*.

(c) In relation to the *statement of opportunities* prepared by *AEMO*, individually controllable generating and bidirectional facilities registered or capable of being registered with *AEMO*.

(d) In relation to the *regulatory investment test for transmission*, any of the definitions of *plant* in paragraphs (a) to (c) relevant to the application of the *regulatory investment test for transmission* to a RIT-T project.

(e) In relation to the *regulatory investment test for distribution*, any of the definitions of *plant* in paragraphs (a) to (c) relevant to the application of the *regulatory investment test for distribution* to a RIT-D project.

(f) In relation to a *system strength remediation scheme*, includes all equipment involved in the implementation of the scheme.

(g) In relation to the *power system*, includes all equipment involved in the *generation*, *transmission* or *distribution* of electrical *energy*.

(h) In relation to a *market ancillary service*, includes all equipment involved in providing the *market ancillary service*.

power transfer

The instantaneous rate at which *active energy* is transferred across a *connection point* or *network element*, or between locations in one or more networks~~*connection points*~~.

production system

A term used in schedule 5.2 to refer to either:

(a) a *generating system*; or

(b) an *integrated resource system*, but only to the extent of its *production units* and *synchronous condensers* (as applicable), and any auxiliary or *reactive plant* located on the *Integrated Resource Provider's* side of the *connection point* and necessary for the *integrated resource system* to meet its *performance standards*.

Note

Plant that is part of an *integrated resource system*, but is neither a *production unit* nor consuming *auxiliary load*, may be *schedule 5.3 plant* under clause S5.3.1a.

production unit

Plant used in the production of electricity and all related equipment essential to its functioning as a single entity.

Note

Generating units and *bidirectional units* are *production units*.

~~***rated active power***~~

~~(a) In relation to a *production unit*, the maximum amount of *active power* that the *production unit* can continuously deliver at the *connection point* when operating at its *nameplate rating*;~~

~~(b) In relation to a *generating system* or *integrated resource system*, the combined maximum amount of *active power* that its in-service *production units* can deliver at the *connection point*, when its in-service *production units* are operating at their *nameplate ratings*.~~

~~***rated maximum demand***~~

~~(a) In relation to a *bidirectional unit*, the maximum amount of *active power* that the *plant* can continuously consume at the *connection point* when operating at its *nameplate rating*.~~

~~(b) In relation to an *integrated resource system*, the combined maximum amount of *active power* that its in-service *bidirectional units* can consume at the *connection point*, when its in-service *bidirectional units* are operating at their *nameplate ratings*.~~

reactive energy

A measure, in varhour (varh), of the alternating exchange of stored energy in inductors and capacitors, which is the time-integral of the product of ~~*voltage*~~ voltage and the out-of-phase component of current flow across a *connection point*.

reactive plant

Plant which is normally specifically provided to be capable of providing or absorbing *reactive power* and includes the *plant* identified in clause 4.5.1(g).

reactive power

The rate at which *reactive energy* is transferred.

Reactive power is a necessary component of alternating current electricity which is separate from *active power* and is predominantly consumed in the creation of magnetic fields in motors and *transformers* and produced by *plant* such as:

(a) alternating current generators;

(b) capacitors, including the capacitive effect of parallel *transmission* wires; and

(c) *synchronous condensers*.

reactive power capability

The ~~maximum~~ amount of *reactive power* that a *plant* is capable of supplying to or absorbing from the *network* at its ~~rate at which *reactive energy* may be transferred from a *production unit* to a~~ *connection point* ~~as specified or proposed to be specified in a *connection agreement* (as the case may be)~~.

reactive power reserve

Unutilised sources of *reactive power* arranged to be available to cater for the possibility of the unavailability of another source of *reactive power* or increased requirements for *reactive power*.

reactor

A device, similar to a *transformer*, specifically arranged to be *connected* into the *transmission system* during periods of low *load* demand or low *reactive power* demand to counteract the natural capacitive effects of long *transmission lines* in generating excess *reactive power* and so correct any *transmission* voltage~~*voltage*~~ effects during these periods.

rise time

In relation to a *control system*, the time taken for an output quantity to rise from 10% to 90% of the ~~maximum~~ mean sustained change induced in that quantity by a step change of an input quantity, disregarding longer-term dynamics and influences external to the *generating system* following the step change.

~~***RMS phase voltage***~~

~~The *voltage* of *supply* measured as the average of the root mean square of the *voltages* between each pair of phases.~~

Schedule 5 Participant

A *Schedule 5.2 Participant*, *Schedule 5.3 Participant* or *Schedule 5.3a Participant*.

Schedule 5.2 Participant

A person described in clause S5.2.1(b) in respect of a *schedule 5.2 plant*.

schedule 5.2 plant

Plant described in clause S5.2.1(a) to which some or all *access standards* in schedule 5.2 apply.

Schedule 5.3 Participant

A person described in clause S5.3.1a(a1) in respect of a *schedule 5.3 plant*.

schedule 5.3 plant

Plant described in clause S5.3.1a to which some or all *access standards* in schedule 5.3 apply.

Schedule 5.3a Participant

A person described in clause S5.3a.1a(b) in respect of a *schedule 5.3a plant*.

schedule 5.3a plant

A system comprising high voltage direct current technology with a *power transfer capability* of 5 MW or more, used to transfer electricity to, from or between one or more alternating current networks (or parts of an alternating current *network*) of a *Network Service Provider*.

scheduled integrated resource system

An *integrated resource system* that~~, to the extent it is comprised of *production units*,~~ is comprised of *scheduled bidirectional units* or a combination of *scheduled bidirectional units* and other *plant*.

settling time

In relation to a *control system*, the time measured from initiation of a step change in an input quantity to the time when the magnitude of error between the output quantity and its final settling value remains less than 10% of the sustained change induced in that output quantity.~~:~~

~~(a) if the sustained change in the quantity is less than half of the maximum change in that output quantity, the maximum change induced in that output quantity; or~~

~~(b) the sustained change induced in that output quantity.~~

short circuit ratio

For a *connection point* for *plant*, the synchronous *three phase fault level* (expressed in MVA) at the *connection point* for the *plant* divided by:

(a) in the case of a *generating system* or *integrated resource system*, its ~~*rated active power*~~ *active power capability* (expressed in MW);

(b) in the case of a *schedule 5.3a plant*, ~~*market network service facility*,~~ its ~~rated~~ *power transfer capability* (expressed in MW); and

(c) in the case of an *inverter based load*, its *maximum demand* at the *connection point* (expressed in MW)~~; and~~

(d) [**Deleted**]~~in the case of an *integrated resource system*, its *rated active power* (expressed in MW).~~

to avoid doubt, in each case excluding any *fault current contribution* from the *plant* side of the *connection point* when calculating the *three phase fault level*.

For the purpose of clauses S5.2.5.15(b), S5.3.11(b) and S5.3a.7(b), the *short circuit ratio* must be assessed in accordance with the methodology prescribed in the *system strength impact assessment guidelines*.

static VAR compensator

A device specifically provided on a *network* to provide the ability to generate and absorb *reactive power* and to respond automatically and rapidly to voltage~~*voltage*~~ fluctuations or voltage~~*voltage*~~ instability arising from a disturbance or disruption on the *network*.

synchronous bidirectional unit

A *bidirectional unit* that is a *synchronous production unit*.

synchronous condenser~~condensers~~

~~Apparatus or equipment~~ *Plant* similar in construction to a *synchronous generating unit*, which operates at the equivalent speed of the *frequency* of the *power system*, and, when operating in steady state conditions, neither generates nor consumes *active power* other than consumption for losses within the *plant*.

synchronous condenser system

A system comprising one or more *synchronous condensers* that are not part of a *generating system* or *integrated resource system* including, for the purposes of Chapter 5, auxiliary or *reactive plant* that is necessary for the system to meet its *performance standards*.

Note

Where a *synchronous condenser* is located with a *generating system* or *integrated resource system* on the same side of its *connection point* and operated in conjunction with that system, it is considered to be part of the relevant *generating system* or *integrated resource system*.

synchronous generating unit

A *generating unit* that is a *synchronous production unit*.

synchronous generator voltage control

The automatic voltage~~*voltage*~~ *control system* of a *production unit* which changes the output voltage~~*voltage*~~ of the *production unit* through the adjustment of the generator rotor current and effectively changes the *reactive power* level from that *production unit*.

synchronous production unit

A *production unit* comprising alternating current generators which operate at a speed which is synchronised to the *frequency* of the *power system*.

tap-changing transformer

A *transformer* with the capability to allow internal adjustment of output voltages~~*voltages*~~ which can be automatically or manually initiated and which is used as a major component in the control of the voltage~~*voltage*~~ of *transmission* and *distribution networks* in conjunction with the operation of *reactive plant*. The *connection point* of a *production unit* may have an associated tap-changing transformer, usually provided by the *Generator* or *Integrated Resource Provider*.

transformer

A *plant* or device that reduces or increases the voltage~~*voltage*~~ of alternating current.

transformer tap position

Where a tap changer is fitted to a *transformer*, each tap position represents a change in voltage~~*voltage*~~ ratio of the *transformer* which can be manually or automatically adjusted to change the *transformer* output -voltage~~*voltage*~~. The tap position is used as a reference for the output voltage~~*voltage*~~ of the *transformer*.

~~***voltage***~~

~~The electronic force or electric potential between two points that gives rise to the flow of electricity.~~

voltage transformer (VT)

A *transformer* for use with *meters* and/or protection devices in which the voltage~~*voltage*~~ across the secondary terminals is, within prescribed error limits, proportional to and in phase with the voltage~~*voltage*~~ across the primary terminals.