

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p>transmission system or distribution system to which the generating unit is connected;</p> <p>"pre-disturbance level" means, in relation to a generating unit and a frequency disturbance, the generating unit's level of output just before the system frequency first exceeds the upper or lower limit of the normal operating frequency band during the frequency disturbance.</p> <p>(b) <u>Automatic access standard:</u></p> <p>(1b) <del>A Generator must ensure that in respect of each of its scheduled generating system units (1) its active power transfer to the power system must not does not;</del></p> <p>(i) <u>increase in response to a rise in system frequency; and</u></p> <p>(ii) <del>its active power transfer to the power system does not decrease in response to a fall in system frequency</del></p> <p>(3) <del>any oscillatory behaviour in respect of its active power transfer to the power system (other than authorised power system stabiliser action) is damped with a damping ratio of more than 0.4.</del></p> <p>(2e) <del>A Generator must ensure that each generating system of its scheduled generating units is must be capable of automatically reducing its active power transfer to the power system:</del></p> <p>(i1) <del>whenever the system frequency exceeds the upper limit of the normal operating frequency band;</del></p> <p>(ii2) <del>by an amount that equals or exceeds is at the least the smallest of:</del></p> <p>(A1) <del>twenty percent 20% of its maximum operating level times the percentage frequency difference between system</del></p>	<p>Reference to damping of oscillations has been moved to new clause S5.2.5.14.</p>	<p>Clause conflicts with S5.2.5.8</p> <p>And subject to a limit of its minimum operating level</p>

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	<p><i>frequency and the upper limit of the normal operating frequency band;</i></p> <p>(Bii) <del>ten percent</del> <u>10%</u> of its <i>maximum operating level</i>; and</p> <p>(Ciii) subject to the <i>frequency</i> recovering gradually, the difference between the <i>generating unit's pre-disturbance level</i> and <i>minimum operating level</i>, but zero if the difference is negative.</p> <p>(iii) sufficiently rapidly for the <i>Generator</i> to be in a position to offer measurable amounts of lower services to the <i>spot market for market ancillary services</i>.</p> <p>(3d) <del>A Generator must ensure that each of its scheduled generating units or generating system is must be capable of automatically increasing its output active power transfer to the power system:</del></p> <p>(i+) whenever the <i>system frequency</i> falls below the lower limit of the <i>normal operating frequency band</i>;</p> <p>(ii2) by the amount that is equal or exceeds <del>the at least the smallest of:</del></p> <p>(Ai) <del>twenty percent</del> <u>20%</u> of its <i>maximum operating level</i> times the percentage <i>frequency difference</i> between the lower limit of the <i>normal operating frequency band</i> and <i>system frequency</i>;</p> <p>(Bii) <del>five percent</del> <u>5%</u> of its <i>maximum operating level</i>; and</p>		<p>This is an ancillary service by definition, not a technical obligation and should be a commercial decision.</p> <p>And subject to a limit of its <i>maximum operating level</i></p> <p>Wind turbine output depends on wind conditions. Output cannot be raised automatically on demand.</p>

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	<p>(C#) subject to the frequency recovering gradually, one third of the difference between the generating unit's maximum operating level and pre-disturbance level, but zero if the difference is negative; and</p> <p>(iii) sufficiently rapidly for the Generator to be in a position to offer measurable amounts of raise services to the spot market for market ancillary services.</p> <p>(e) Minimum access standard:</p> <p><del>(e) A Generator must ensure that at each of its connection points in relation to its scheduled generating units:</del></p> <p>(1) <del>the active power transfer to the power system does not increase in response to a rise in system frequency;</del></p> <p>(2) <del>the active power transfer to the power system does not decrease more than 2 percent per Hz in response to a fall in system frequency;</del> and</p> <p>(3) <del>any oscillatory behaviour of active power transfer to the power system (other than authorised power system stabiliser action) is damped with a damping ratio of more than 0.4.</del></p> <p>For each <u>generating system</u>, <u>active power</u> transfer to the <u>power system</u> must not:</p> <p>(1) increase in response to a rise in <u>system frequency</u>; and</p> <p>(2) decrease more than 2% per Hz in response to a fall in <u>system frequency</u>.</p> <p>(f) Each control system used to satisfy clause S5.2.5.11 must <u>be adequately damped</u>.</p> <p>(g) A Generator proposing a negotiated access standard in</p>		<p>This is an ancillary service by definition, not a technical obligation and should be a commercial decision.</p> <p>Where is (c)?</p> <p>This clause must be interpreted 'in response to the system frequency' and not as a coincidental increase or fall in the wind</p> <p>Suggest the following words be added (or equivalent)</p> <p>'For each <u>generating system</u> under relatively stable input energy, <u>active power</u> transfer to the <u>power system</u> must not:'</p>

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	<p>respect of clause S5.2.5.11(c)(2) must demonstrate to NEMMCO that the proposed increase and decrease in <i>active power transfer to the power system</i> are as close as practicable to the <i>automatic access standard</i> for that <i>plant</i>.</p> <p>(h) The <i>access standard</i> must record the agreed values for <i>maximum operating level</i> and <i>minimum operating level</i>, and where relevant the method of determining the values. The values for a <i>generating system</i> must take into account its <i>in-service generating units</i>.</p> <p>(i) The amount of a relevant <i>market ancillary service</i> for which the <i>plant</i> may be registered must not exceed the amount that would be consistent with the <i>performance standard</i> registered in respect of this requirement.</p> <p>(j) NEMMCO must be involved in the negotiation of <i>access standards</i> under clause S5.2.5.11.</p> <p><i>Negotiated access standards:</i></p> <p>(f) If, in accordance with clause 5.3.4A of the <i>Rules</i>, the <i>Generator</i> and the <i>Network Service Provider</i> determine a <i>negotiated access standard</i> is to apply, the <i>Network Service Provider</i> must ensure that the <i>negotiated access standard</i> is equal to the value determined by NEMMCO as unlikely to materially adversely affect system security.</p> <p>(g) The negotiation of <i>access standards</i> in relation to this clause S5.2.5.11 must involve NEMMCO under clause 5.3.4A(b) of the <i>Rules</i>.</p>	<p>In paragraph (i), a link has been made between the performance standards that are registered in respect of this clause and the eligibility of the generator to participate in market ancillary services for frequency control. This means that the performance is subject to the compliance monitoring requirements of clause 5.12.</p> <p>A basis for negotiation has been added.</p>	<p>This implies a link between the obligations of the ancillary services market and technical standards. Not all participants are involved in the AS market.</p>
S5.2.5.12	<p><b>Stability Impact on network capability</b></p> <p>(a) <i>Automatic access standard:</i> Each <i>A generating unit</i> must have plant capabilities and <i>control systems</i>, including, but not limited to <i>inertia</i>, <i>short-circuit ratio</i> and <i>power system stabilisers</i>, sufficient not to:</p> <p>(1) <del>not cause any inter-regional or intra-regional power transfer capability based on:</del></p> <p>(i) <del>transient stability;</del></p>	<p>The requirement in the automatic access standard not to 'cause instability that would adversely impact other Registered Participants' has been moved to clause S5.2.5.13 to combine this requirement with the other power system stability requirement.</p> <p>The clause has been extended to include all types of network impact (including</p>	<p>Agreed subject to comments</p>

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	<p>(ii) <del>oscillatory stability; or</del></p> <p>(iii) <del>voltage stability;</del></p> <p>to be reduced below the level that would apply if the <del>generating unit were disconnected;</del></p> <p><u>reduce any inter-regional or intra-regional power transfer capability below the level that would apply if the generating unit were disconnected.</u></p> <p>(2) <del>not cause instability that would adversely impact on other Registered Participants.</del></p> <p>(b) <del>Minimum access standard: The generating unit system must have plant capabilities and control systems, including, but not limited to inertia, short-circuit ratio and power system stabilisers, sufficient to not reduce any inter-regional or intra-regional power transfer capability to import into the generating unit's region by more than its loading level whenever it is synchronised and operational arrangements sufficient to not reduce:</del></p> <p>(1) <del>the ability to supply Customer load as a result of a reduction in power transfer capability;</del></p> <p>(2) <del>power transfer capabilities into a region by more than the combined sent out generation of its generating units; and</del></p> <p>(3) <del>power transfer capabilities into another region by more than the lesser of 15 per cent of the combined nameplate rating of its generating units and 30 MW, unless NEMMCO considers that the connection of that generating system is likely to result in a net improvement in supply reliability across all regions.</del></p> <p>(c) <del>The relevant requirements for short-circuit ratio in IEC 60034-3 are a plant standard in relation to clause S5.2.5.12(a)(1)(b). In carrying out assessments of proposed access standards under clause S5.2.5.12, the Network Service Provider and NEMMCO must at least take into account, without limitation:</del></p>	<p>impact on thermal transfer limits). This arose out of situations arising with some new wind farm installations, in which generation from the wind farm reduced import capability (associated with a thermal limit) by a ratio greater than 1:1.)</p> <p>Clause (b)(2) relates to the impact on intra-regional flow paths.</p> <p>The clause has been extended in the minimum standard to cover a reduction in import capability into another region (where generation may reduce the reliability of another region.)</p> <p>The focus of this clause has been changed to be on equipment, facilities and control mechanisms that will achieve minimum</p>	<p>Need to ensure that consistent application of methodology is applied across all NSPs in assessing this requirement. There may be some contingencies, however unlikely that may prevent a generator from achieving the automatic access standard.</p> <p>Okay</p> <p>Clause (c) add (5) Australian Standards or International standard.</p>

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	<p>(1) the expected performance of existing <u>networks</u> and <u>network</u> developments that are <u>considered projects</u>.</p> <p>(2) the expected performance of existing <u>generating plant</u> and <u>generation</u> projects that are <u>considered projects</u>.</p> <p>(3) the expected range of <u>power system</u> operating conditions; and</p> <p>(4) the expected performance of <u>control systems</u> and <u>protection systems</u>, including <u>automatic reclose equipment</u>.</p> <p>(d) The <u>access standard</u> must include operational arrangements, including <u>curtailment of generation</u> if necessary, to the satisfaction of <u>NEMMCO</u>, to ensure that the <u>generating plant</u> is operated in a way that meets at least the <u>minimum access standard</u> under abnormal <u>network</u> and <u>generating system</u> conditions, so that <u>power system security</u> can be maintained.</p> <p>(e) The <u>Generator</u> must take measures, to the satisfaction of <u>NEMMCO</u> and the <u>Network Service Provider</u>, to minimise any reduction in <u>power transfer capabilities</u>. The following matters must be considered in the design of the <u>generation system</u>, and implemented, where they would have a material impact on <u>power transfer capability</u> to the extent that the total cost of mitigation measures does not exceed 5% of the capital cost of the <u>generation</u> project, where the capital cost is based on a project design that would at least meet the <u>minimum access standard</u>:</p> <p>(1) <u>control system</u> functions and settings;</p> <p>(2) <u>dynamic reactive power capability</u> of the <u>generating unit</u> or additional <u>plant</u> such as <u>SVC</u> or <u>STATCOM</u>;</p> <p>(3) choice of technology and <u>plant</u> parameters;</p> <p>(4) <u>transmission network augmentation</u> or <u>distribution network augmentation</u>; and</p>	<p>impact on network transfer capability.</p> <p>A problem with the original wording of the clause was that it applied an on-going risk to the Generator – on-going compliance with the clause depended on factors outside the Generator's control, including design and configuration of the network, new generation plant and load growth. To avoid this consequence the current wording makes it clear that the assessment is to be based on the current system, considered projects and expected network developments only. The access standard (and therefore the performance standard) documents the facilities equipment and control systems agreed to be provided.</p> <p>The clause also allows for the Network Service Provider and the Generator to negotiate for additional control system facilities on a commercial basis.</p>	<p>5% of the project cost is at risk, at the discretion of NEMMCO and NSP planning. The requirement for dynamic reactive power support would have to be directly related to the generation project and not an existing system shortfall.</p>

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	<p>(5) location and manner of <i>connection to the network</i>.</p> <p>(f) The <i>access standard</i> under clause S5.2.5.12 must detail the <i>plant capabilities</i>, <i>control systems</i> and operational arrangements that will be maintained by the <i>Generator</i>, notwithstanding that changes to the <i>power system</i>, but not changes to the <i>generating system</i>, may reduce the efficacy of the <i>plant capabilities</i>, <i>control systems</i> and operational arrangements over time.</p> <p>(g) If a <i>Network Service Provider</i> considers that <i>power transfer capabilities</i> of its <i>network</i> would be increased through provision of additional <i>control system</i> facilities to a <i>generating system</i> (such as a <i>power system</i> stabiliser), the <i>Network Service Provider</i> and the <i>Generator</i> may negotiate for the provision of such additional <i>control system</i> facilities as a commercial arrangement.</p> <p>(4h) The negotiation of access standards <del>in relation to</del> <u>under this</u> clause S5.2.5.12 must involve <i>NEMMCO</i> <del>in accordance with under</del> clause 5.3.4A(b) <del>of the Rules</del>.</p>		
S5.2.5.13	<p><b><u>Control systems and stability</u></b><del>Excitation control system</del></p> <p>[Replace entirely with the following]</p> <p>(a) For the purpose of clause S5.2.5.13:</p> <p><i>‘settling time’</i> means, in relation to a step response test or simulation of a <i>control system</i>, 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:</p> <p>(1) 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; and</p> <p>(2) otherwise the sustained change induced in that output quantity; and</p> <p><i>‘rise time’</i> means, in relation to a step response test or simulation of a <i>control system</i>, the time taken for an</p>	<p>Some of the definitions used in this clause were not fully specified in the previous clause, and have been amended so that they apply to a test or a simulation, and “settling time” can be applied to responses that are largely oscillatory.</p> <p>The automatic and minimum standards have been written in terms of scheduled and non-scheduled plant.</p>	Agreed subject to comments.

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	<p>output quantity to rise from 10% to 90% of the maximum change induced in that quantity by a step change of an input quantity.</p> <p>(b) <u>The automatic access standard is:</u></p> <p>(1) <u>Each generating unit must have plant capabilities and control systems sufficient to ensure that:</u></p> <p>(i) <u>power system oscillations, for the frequencies of oscillation of the generating unit against any other generating unit, are adequately damped.</u></p> <p>(ii) <u>operation of the generating unit does not degrade the damping of any mode of oscillation of the power system; and</u></p> <p>(iii) <u>operation of the generating unit does not cause instability (including hunting of tap-changing transformer control systems) that would adversely impact other Registered Participants.</u></p> <p>(2) <u>Each control system must have:</u></p> <p>(i) <u>permanently installed and operational monitoring and recording facilities for key variables including each input and output, for disturbance monitoring and testing purposes; and</u></p> <p>(ii) <u>facilities for testing the control system sufficient to establish its dynamic operational characteristics.</u></p> <p>(3) <u>Each synchronous generating unit must have an excitation control system that:</u></p> <p>(i) <u>regulates voltage at the connection point or another agreed location in the power system (including within the generating system) to within 0.5% of</u></p>	<p>The mandatory requirements have been translated into the automatic access standard requirements. (The exception to this is ceiling voltage which is slightly higher in the automatic and slightly lower in the minimum standard than the original mandatory standard.)</p> <p>A power system stabiliser specification has been added for the automatic access standard.</p> <p>The existing version of this clause is written around synchronous generating units. The criteria for synchronous plant are well developed, and equivalent subclauses for asynchronous plant which will usually apply to wind farms have been added, rather than attempting to make the existing clauses non-technology specific.</p> <p>The clause was written previously with most of the requirements mandatory.</p> <p>The clause has been reworded as automatic and minimum access standards.</p> <p>The previous automatic access standard requirement from S5.2.5.12 not to cause instability that would adversely affect other Registered Participants has been moved to this clause, and has been included in both minimum and automatic access, because the causing of instability that would adversely affect other participants is not acceptable even at</p>	<p>How will "instability" and "impact" in (ii) be defined?</p> <p>Agree with the approach set out in the comment.</p> <p>For large synchronous machines this okay.</p> <p>The automatic standard is written at the generating unit level. In (1) and (2) what if a generating system can meet the automatic standard through a combination of unit control and connection point control?</p> <p>All inputs and outputs are not key variables. Overly onerous for individual wind turbines.</p>

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	<p><u>the setpoint.</u></p> <p>(ii) <u>is able to operate the stator continuously at 105% of nominal voltage with rated active power output;</u></p> <p>(iii) <u>regulates voltage in a manner that helps to support network voltages during faults and does not prevent the Network Service Provider from achieving the requirements of clause S5.1a.3 and S5.1a.4;</u></p> <p>(iv) <u>allows the voltage setpoint to be continuously controllable in the range of at least 95% to 105% of normal voltage at the connection point or the agreed location, without reliance on a tap-changing transformer;</u></p> <p>(v) <u>has limiting devices to ensure that a voltage disturbance does not cause the generating unit to trip at the limits of its operating capability;</u></p> <p>(vi) <u>has an excitation ceiling voltage of at least 2 times the excitation required to achieve generation at nameplate rating for rated power factor, rated speed and nominal voltage;</u></p> <p>(vii) <u>has settling times for a step change of voltage setpoint or voltage at the location agreed under clause S5.2.5.13(b)(3)(i) of:</u></p> <p>(A) <u>generated voltage less than 2.5 seconds for a 5% voltage disturbance with the generating unit not synchronised.</u></p> <p>(B) <u>active power, reactive power and voltage less than 5.0</u></p>	<p>minimum access level.</p>	<p>How can will reference in (iii) "helps to support" be quantified or tested?</p>

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	<p>seconds for a 5% voltage disturbance with the <i>generating unit synchronised</i>, from an operating point where the voltage disturbance would not cause any limiting device to operate; and</p> <p>(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 <i>generating unit synchronised</i>, 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;</p> <p>(viii) is able to increase field voltage from rated field voltage to the excitation ceiling voltage in less than 0.5 second;</p> <p>(ix) has a <i>power system</i> stabiliser with sufficient flexibility to enable damping performance to be maximised, with characteristics as described in clause S5.2.5.13(d); and</p> <p>(x) has reactive current compensation settable for boost or droop.</p> <p>(4) Each <i>generating unit</i>, other than a <i>synchronous generating unit</i>, must have a voltage control system that:</p> <p>(i) regulates voltage at the <i>connection point</i> or an agreed location in the <i>power system</i> (including within the <i>generating system</i>) to within 0.5% of its setpoint;</p> <p>(ii) regulates voltage in a manner that helps to support <i>network</i> voltages during</p>		<p>This clause ignores the flexibility to meet the connection point requirement. The Rules must allow for a greater system variation, as in wind generation projects there are multitudes of generating unit and not one generating unit therefore greater flexibility must be permitted.</p> <p>Wind farms implement voltage control at the</p>

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	<p>faults and does not prevent the <i>Network Service Provider</i> from achieving the requirements of clauses S5.1a.3 and S5.1a.4;</p> <p>(iii) allows the voltage setpoint to be continuously controllable in the range of at least 95% to 105% of <i>normal voltage</i> at the <i>connection point</i> or agreed location in the <i>power system</i>, without reliance on a <i>tap changing transformer</i>;</p> <p>(iv) has limiting devices to ensure that a voltage disturbance does not cause the <i>generating unit</i> to trip at the limits of its operating capability;</p> <p>(v) with the <i>generating system</i> connected to the <i>power system</i>, has <i>settling times</i> for active power, reactive power and voltage due to a step change of voltage setpoint or voltage at the location agreed under clause S5.2.5.13(b)(4)(i), of less than:</p> <p>(A) 5.0 seconds for a 5% voltage disturbance with the <i>generating unit connected to the power system</i>, from an operating point where the voltage disturbance would not cause any limiting device to operate; and</p> <p>(B) 7.5 seconds for a 5% voltage disturbance with the <i>generating unit connected to the power system</i>, when operating into any limiting device from an operating point where a voltage disturbance of 2.5% would just cause the</p>		<p>connection point if it is required.</p> <p>Why should NEMMCO be concerned with the regulation of voltage within the generating system?</p> <p>How can will reference in (4)(ii) "helps to support" be quantified or tested?</p> <p>The current technology available to comply with this requirement for a generation system consisting of many generating units is not capable of complying with this new requirement.</p> <p>The wording in (B) can be improved, currently somewhat confusing requires several readings.</p>

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	<p>limiting device to operate:</p> <p>(vi) has reactive power rise time, for a 5% step change in the voltage set point, of less than 2 seconds;</p> <p>(vii) has a power system stabiliser with sufficient flexibility to enable damping performance to be maximised, with characteristics as described in clause S5.2.5.13(d); and</p> <p>(viii) has reactive current compensation.</p> <p>(c) The minimum access standard is:</p> <p>(1) Each generating unit must have plant capabilities and control systems, including, if appropriate, a power system stabiliser, sufficient to ensure that:</p> <p>(i) power system oscillations, for the frequencies of oscillation of the generating unit against any other generating unit, are adequately damped;</p> <p>(ii) operation of the generating unit does not degrade any mode of oscillation that is within 0.3 nepers per second of being unstable, by more than 0.01 nepers per second and does not degrade any other mode of oscillation to within 0.29 nepers per second of being unstable; and</p> <p>(iii) operation of the generating unit does not cause instability (including hunting of tap-changing transformer control systems) that would adversely impact other Registered Participants.</p> <p>(2) Each generating system comprised of generating units with combined nameplate rating of 30</p>	<p>In the minimum standard, the control system parameters are specified only for generating systems &gt;30 MW, and taking into account the allowance for plant connected at voltages below 100 kV to have power factor control. Models are not required for plant less than 30 MW, and therefore it is not possible to assess (as part of the access standards) whether the plant is capable of complying with these performance levels. Allowance is made in the minimum standard for plant that is distribution-connected (&lt;100 kV) to operate with power factor control or reactive power control instead of voltage control.</p>	<p>The current technology available to comply with this Rule for a generation system consisting of many generating units is not capable of complying with this new requirement.</p>

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	<p>MW or more must have <i>facilities</i> for testing its <i>control systems</i> sufficient to establish their dynamic operational characteristics.</p> <p>(3) Each <i>generating unit</i> or <i>generating system</i> must have facilities:</p> <p>(i) where the <i>connection point nominal voltage</i> is 100 kV or more, to regulate voltage in a manner that does not prevent the <i>Network Service Provider</i> from achieving the requirements of clauses S5.1a.3 and S5.1a.4;</p> <p>(ii) where the <i>connection point nominal voltage</i> is less than 100 kV, to regulate voltage or reactive power or power factor in a manner that does not prevent the <i>Network Service Provider</i> from achieving the requirements of clauses S5.1a.3 and S5.1a.4; and</p> <p>(iii) in either case, sufficient to achieve the performance agreed in respect of clauses S5.2.5.1, S5.2.5.2, S5.2.5.3A, S5.2.5.3B, S5.2.5.3C and S5.2.5.12.</p> <p>(4) Each <i>synchronous generating unit</i>, that is part of a <i>generating system</i> comprised of <i>generating units</i> with a combined <i>nameplate rating</i> of 30 MW or more, must have an <i>excitation control system</i> that:</p> <p>(i) regulates voltage at the <i>connection point</i> or an agreed location in the <i>power system</i> (including within the <i>generating system</i>), to within 0.5% of its setpoint or, where the <i>connection point nominal voltage</i> is less than 100 kV, regulates voltage, power factor or reactive power as agreed with the <i>Network Service Provider</i> and NEMMCO;</p> <p>(ii) has excitation ceiling voltage of at least</p>		<p>If transmission connected is intended then this should be stated rather than a voltage level. There are 132kV distribution lines in the network.</p>

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	<p>1.5 times the excitation required to achieve <i>generation</i> at the <i>nameplate rating</i> for rated power factor, rated speed and <i>nominal voltage</i> ;</p> <p>(iii) subject to coordination under clause S5.2.5.13(g), has a <i>settling time</i> of less than 5.0 seconds for a 5% voltage disturbance with the <i>generating unit</i> synchronised, from an operating point where such a voltage disturbance would not cause any limiting device to operate; and</p> <p>(iv) has over- and under-excitation limiting devices sufficient to ensure that a voltage disturbance does not cause the <i>generating unit</i> to trip at the limits of its operating capability.</p> <p>(5) Each <i>generating system</i> comprised of <i>generating units</i> with combined <i>nameplate rating</i> of 30 MW or more and which are not <i>synchronous generating units</i>, must have a <i>control system</i> that:</p> <p>(i) regulates voltage at the <i>connection point</i> or an agreed location in the <i>power system</i> (including within the <i>generating system</i>) to within 0.5% of its setpoint or, where the <i>connection point nominal voltage</i> is less than 100 kV, regulates voltage, power factor or reactive power as agreed with the <i>Network Service Provider</i> and <i>NEMMCO</i>.</p> <p>(ii) subject to coordination under clause S5.2.5.13(g), has settling time less than 7.5 seconds for a 5% voltage disturbance with the <i>generating unit</i> electrically connected to the <i>power system</i> from an operating point where such a voltage disturbance would not</p>		

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	<p>cause any limiting device to operate; and</p> <p>(iii) has limiting devices to ensure that a voltage disturbance would not cause the <i>generating unit</i> to trip at the limits of its operating capability.</p> <p>(d) A <i>power system</i> stabiliser provided under clause S5.2.5.13(b) must have the following characteristics:</p> <p>(i) for a <i>synchronous generating unit</i>, measurements of rotor speed and active power output of the <i>generating unit</i> as inputs, and otherwise measurements of <i>power system frequency</i> and active power output of the <i>generating unit</i> as inputs;</p> <p>(ii) two washout filters for each input, with ability to bypass one of them if necessary;</p> <p>(iii) 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 <i>generating plant</i>;</p> <p>(iv) an output limiter, which for a <i>synchronous generating unit</i> is continually adjustable over the range of –10% to +10% of stator voltage;</p> <p>(v) monitoring and recording facilities for key variables including inputs, output and the inputs to the lead-lag transfer function blocks; and</p> <p>(vi) facilities to permit testing of the <i>power system</i> stabiliser in isolation from the <i>power system</i> by injection of test signals, sufficient to establish the transfer function of the <i>power system</i> stabiliser.</p> <p>(e) A limiting device provided under clauses S5.2.5.13(b) or S5.2.5.13 (c) must:</p> <p>(1) not detract from the performance of any <i>power</i></p>		<p>The requirement to regulate the voltage possibly within the generating system and not at the connection point removes the flexibility with which a voltage control system could be implemented on a wind farm.</p>

Affected clause	Clause, with proposed amendments	Reason	Auswind Comments
	<p style="text-align: center;">system stabiliser, and</p> <p>(2) be coordinated with all <i>protection systems</i>.</p> <p>(f) If a <i>generating unit</i> cannot meet the <i>automatic access standard</i>, the <i>Generator</i> must demonstrate why that standard could not be reasonably achieved. The <i>negotiated access standard</i> proposed by the <i>Generator</i> must then be the highest level that the <i>generating system</i> can reasonably achieve, including by installation of additional dynamic reactive power equipment, and through optimising its <i>control systems</i>.</p> <p>(g) The <i>Network Service Provider</i> may require that the design and operation of the <i>control systems</i> of a <i>generating unit</i> or <i>generating system</i> be coordinated with the existing <i>voltage control systems</i> of the <i>Network Service Provider</i> and of other <i>Network Users</i>, in order to avoid or manage interactions that would adversely impact on the <i>Network Service Provider</i> and other <i>Network Users</i>. The <i>access standards</i> must record such requirements.</p> <p>(h) The assessment of impact of the <i>generating units</i> on <i>power system</i> stability and damping of <i>power system</i> oscillations shall be in accordance with the <i>power system</i> stability guidelines established under clause 4.3.4(h).</p> <p>(i) <i>NEMMCO</i> must be involved in the negotiation of <i>access standards</i> under clause S5.2.5.13.</p>		<p>The application of the automatic standard is written solely for generating units. There are a number of wind turbines that would not individually contain the control systems referred to in the automatic standard, however there are wind farm control systems that would provide the control and response to connection point.</p> <p>Agreed this is the single most important voltage control requirement.</p>



Affected clause	Clause with proposed amendments	Reason	Auswind Comments
<p><b><u>S5.2.5.14</u></b></p>	<p><b>Active power control</b></p> <p>(a) <u>Automatic access standard</u>: A <u>generating system</u> comprised of <u>generating units</u> with a combined <u>nameplate rating</u> of 30 MW or more must have an active <u>power control system</u> capable of:</p> <p>(1) <u>for each <i>scheduled generating unit</i> or, if subject to aggregation approved by NEMMO under clause 3.8.3, <i>scheduled generating system</i></u>:</p> <p>(i) <u>maintaining and changing its active power output in accordance with its <i>dispatch instructions</i>; and</u></p> <p>(ii) <u>ramping its active power output linearly from one dispatch level to another; and</u></p> <p>(2) <u>for each <i>non-scheduled generating unit</i> or <i>non-scheduled generating system</i>, subject to the <i>energy source availability</i></u>:</p> <p>(i) <u>subject to clause S5.2.5.14(a)(2)(iii), automatically reducing or increasing its active power output within five minutes, at a constant rate, to below the level specified in an instruction electronically issued by a <i>control centre</i>;</u></p> <p>(ii) <u>automatically limiting its active power output, to below the level specified in</u></p>	<p>The requirement for active power control is currently implied in the dispatch requirements for scheduled generating units, but has not previously been expressed as a technical requirement. A number of concerns have been raised about the lack of active power control from wind farms – particularly with respect to control of line loading and reduction in reliability as a result of ramp rate limitations in scheduled plant that is regulating output to compensate for load and wind farm variability. Therefore it is necessary to formalise in technical requirements a requirement for active power control.</p> <p>The requirements for scheduled generating units are consistent with existing dispatch arrangements.</p>	<p>Agreed subject to comment on (b)(2)(iv)</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p>clause S5.2.5.14(a)(2)(i); and</p> <p>(iii) <u>not changing its active power output within five minutes by more than the raise and lower amounts specified in an instruction electronically issued by a control centre.</u></p> <p>(b) <u>Minimum access standard: A generating system comprised of generating units with combined nameplate rating of 30 MW or more must have an active power control system capable of:</u></p> <p>(1) <u>for each scheduled generating unit or, if subject to aggregation approved by NEMMCO under clause 3.8.3, scheduled generating system, maintaining and changing its active power output in accordance with its dispatch instructions.</u></p> <p>(2) <u>for each non-scheduled generating system:</u></p> <p>(i) <u>reducing its active power output, within five minutes, to or below the level required to manage network flows that is specified in a verbal instruction issued by the control centre;</u></p> <p>(ii) <u>limiting its active power output to or below the level specified in clause S5.2.5.14(b)(2)(i);</u></p> <p>(iii) <u>ensuring that the change of active power output in a five minute period does not exceed a value specified in a verbal instruction issued by the control centre; and</u></p> <p>(iv) <u>being upgraded to receive electronic instructions from the control centre and respond within five minutes.</u></p> <p>(c) <u>Each control system used to satisfy the requirements of clauses S5.2.5.14(a) and S5.2.5.14(b) must be adequately</u></p>		

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p><i>damped.</i></p> <p>(d) <u>The access standard must document to NEMMCO's satisfaction any operational arrangements necessary to manage network flows, that may include a requirement for the generating system to be operated in a manner that prevents its output changing within five minutes by more than an amount specified by a control centre.</u></p> <p>(e) <u>A negotiated access standard may provide that if the number or frequency of verbal instructions becomes difficult for a control centre to manage, NEMMCO may require the Generator to upgrade its facilities to receive electronic instructions and act automatically on those instructions.</u></p> <p>(f) <u>NEMMCO must be involved in the negotiation of access standards under clause S5.2.5.14.</u></p>		<p>'automatically' should be removed and aligned with the 5 minute requirement in the minimum point (b) (2) (iv)</p>
S5.2.6.1	<p><b>Replace clause S5.2.6.1 with the following:</b></p> <p><b><u>Remote Monitoring</u></b></p> <p>(a) <u>The automatic access standard is:</u></p> <p>(1) <u>Each scheduled generating unit or non-scheduled generating unit with a nameplate rating of 30MW or more or non-scheduled generating system with a combined nameplate rating of 30MW or more, must have remote monitoring equipment to transmit to NEMMCO's control centres in real time in accordance with clause 4.11, the quantities that NEMMCO reasonable requires to discharge its market and power system security functions set out in Chapters 3 and 4.</u></p> <p>(2) <u>The quantities that NEMMCO may request include:</u></p> <p>(i) <u>in respect of each scheduled generating unit or non-scheduled generating unit with a nameplate rating of 30MW or more, current, voltage, active power and reactive power in respect of generating unit stators or power conversion systems (as applicable), that status of all switching devices</u></p>		<p>Agreed - see comment on (a) (2) (ii)</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p>that carry the <u>generation, tap-changing transformer tap position, and aggregate power</u> if subject to aggregation approved by <u>NEMMCO</u> under clause 3.8.3;</p> <p>(ii) in respect of each <u>non-scheduled generating system</u> that includes a <u>generating unit</u> with a <u>nameplate rating</u> of less than 30MW, its connected status, <u>tap-changing transformer tap position and voltages</u>, active power and reactive power aggregated for groups of identical <u>generating units</u>, and either the numbers of identical <u>generating units</u> operating or the operating status of each non-identical <u>generating units</u>;</p> <p>(iii) in respect of each auxiliary system with capacity of 30MW or more associated with a <u>generating unit</u> or <u>generating system</u>, active power and reactive power;</p> <p>(iv) in respect of reactive power equipment that is part of a <u>generating system</u> but not part of a particular <u>generating unit</u>, its reactive power;</p> <p>(v) in respect of each wind farm, wind speed, wind direction and ambient temperature; and</p> <p>(vi) any other quantity that <u>NEMMCO</u> reasonable requires to discharge its <u>market and power system security functions</u> as set out in Chapters 3 and 4.</p> <p>(b) <u>Minimum Access Standard</u>: Each <u>scheduled generating unit</u> or, if subject to aggregation approved by <u>NEMMCO</u> under clause 3.8.3, <u>scheduled generating system</u>, or <u>non-scheduled generating system</u> with a combined <u>nameplate rating</u> of 30MW or more must have <u>remote monitoring equipment</u> to transmit to <u>NEMMCO's control centres</u> in real time in accordance with clause 4.11:</p> <p>(1) the active power output of the <u>generating unit, scheduled generating system, or non-scheduled generating system</u> (as applicable);</p>		<p>For systems less than 30 MW this appears to require more information for those greater than 30 MW.</p>

Affected clause	Clause with proposed amendments	Reason	Answer and Comments
	<p>(2) if connected to a <i>transmission system</i>, the reactive power output of the <i>generating unit</i>, <i>scheduled generating system</i>, or <i>non-scheduled generating system</i> (as applicable);</p> <p>(3) if a wind farm, number of units operating, wind speed and wind direction.</p> <p>(c) <i>NEMMCO</i> must be involved in the negotiation of <i>access standards</i> under clause S5.2.6.1</p>		
S5.2.6.3	<p><b>Replace clause S5.2.6.3 with the following:</b></p> <p><b><u>Communications Equipment</u></b></p> <p>(a) <u>The automatic access standard is:</u></p> <p>(1) A generator must provide and maintain two separate telephone facilities using independent telecommunications service providers, for the purposes of <i>operational communications</i> between the <i>Generator's</i> responsible operator under clause 4.11.3(a) and <i>NEMMCO's control centre</i>.</p> <p>(2) A <i>Generator</i> must provide electricity supplies for <i>remote monitoring equipment</i> and <i>remote control equipment</i> installed in relation to its <i>generating units</i> or <i>generating system</i> capable of keeping such equipment available for at least three hours following total loss of supply at the <i>connection point</i> for the relevant <i>generating unit</i></p> <p>(b) <u>The minimum access standard is:</u></p> <p>(1) A generator must provide and maintain a telephone facility for the purposes of <i>operational communications</i> between the <i>Generator's</i> responsible operator under clause 4.11.3(a) and <i>NEMMCO's control centre</i>.</p> <p>(2) A <i>Generator</i> must provide electricity supplies for <i>remote monitoring equipment</i> and <i>remote control equipment</i> installed in relation to its <i>generating units</i> or <i>generating system</i> capable of keeping such equipment available for</p>		Agreed

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p>at least one hour following total loss of supply at the <u>connection point</u> for the relevant <u>generating unit</u></p> <p>(c) Where the <u>Network Service Provider</u> or <u>NEMMCO</u> reasonably requires that a back-up telephone facility be independent of commercial telephone service providers, the <u>Network Service Provider</u> must provide and maintain the separate facility on a cost-recovery basis only through the charge for <u>connection</u>.</p> <p>(d) A <u>Generator</u> must provide communications paths (with appropriate redundancy) from the <u>remote monitoring equipment</u> or <u>remote control equipment</u> installed for each of its <u>generating units</u>, or <u>generating system</u> as appropriate, to a communications interface in a location reasonably acceptable to the <u>Network Service Provider</u> at the relevant <u>generation facility</u>. Communications systems between this communications interface and the <u>control centre</u> must be the responsibility of the <u>Network Service Provider</u> unless otherwise agreed by the <u>Generator</u> and the <u>Network Service Provider</u>. The <u>Generator</u> must supply accommodation and secure power supplies for communications facilities provided by the <u>Network Service Provider</u> under clause S5.2.6.3</p> <p>(e) <u>NEMMCO</u> must be involved in the negotiation of access standards under clause S5.2.6.3</p>		
S5.2.8	<p>Replace clause S5.2.8 with the following:</p> <p><u>Power station auxiliary supplies</u></p> <p>In cases where a <u>generating system</u> takes its auxiliary supplies via a <u>connection point</u> through which its <u>generation</u> is not transferred to the <u>network</u>, the <u>access standards</u> must be established under clause S5.3.5 as if the <u>Generator</u> were a <u>Market Customer</u>.</p>		Agreed
S5.2.9	<p>Replace clause S5.2.9 with the following:</p> <p><u>Fault Current</u></p> <p>(a) The <u>automatic access standard</u> is:</p>		NEMMCO have not provided comment on why they want to replace this clause. This change has nothing to do with the integration of wind power. There are no known issues with S5.2.9 as it is currently drafted. There

Affected clause	Clause with proposed amendments	Reason	Auswind Comment
	<p>(1) <u>The contribution for the generating system to the fault current on the connecting network through its connection point must not exceed the lesser of:</u></p> <p>(i) <u>three times the combined maximum continuous current of the operating generating units of the generating system; and</u></p> <p>(ii) <u>the level 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 for the relevant connection point by the Network Service Provider.</u></p> <p>(2) <u>A generating system's connected plant must be capable of withstanding fault current through the connection point up to the higher of:</u></p> <p>(i) <u>the level specified in clause S5.2.4(c)(1); and</u></p> <p>(ii) <u>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.</u></p> <p>(3) <u>A circuit breaker provided to isolate a generating unit or generating system from the network must be capable of breaking, without damage or restrike, the maximum fault currents that could be reasonably expected to flow through the circuit breaker for a fault in the network or in the generating unit, or generating system, as specified in the connection agreement.</u></p> <p>(b) <u>The minimum access standard is:</u></p> <p>(1) <u>The generating system does not need to limit fault current contribution.</u></p> <p>(2) <u>A generating system's connected plant must be capable</u></p>		<p>is no justification for changing the rule.</p> <p>The NGF have commented that this represents substantial changes to structure –it should be deferred</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p>of withstanding fault current through the <i>connection point</i> up to the level specified in clause S5.2.4(c)(1)</p> <p>(3) <u>A circuit breaker provided to isolate a <i>generating unit</i> or <i>generating system</i> from the <i>network</i> must be capable of breaking, without damage or restrike, the maximum fault currents that could be reasonably expected to flow through the circuit breaker for a fault in the <i>network</i> or in the <i>generating unit</i>, or <i>generating system</i>, as specified in the <i>connection agreement</i>.</u></p> <p>(c) <u>The <i>Network Service Provider</i> must consider alternate <i>network</i> configurations in the determination of the applicable fault current level and must prefer those options that maintain an equivalent level of service to other <i>Network Users</i>, and which in the opinion of the <i>Generator</i>, impose the least obligation on the <i>Generator</i>.</u></p> <p>(d) <u>In carrying out assessments of proposed <i>access standards</i> under clause S5.2.9, the <i>Network Service Provider</i> must take into account, without limitation:</u></p> <p>(1) <u>The expected performance of the existing <i>networks</i> and <i>network</i> developments that are <i>considered projects</i>;</u></p> <p>(2) <u>The expected performance of existing <i>generating plant</i> and <i>generation projects</i> that are <i>considered projects</i>; and</u></p> <p>(3) <u>The expected range of <i>power system</i> operating conditions.</u></p> <p>(e) <u>The <i>Network Service Provider</i> is not liable for any loss or damage incurred by the <i>Generator</i> or any other person as a consequence of a fault on either the <i>power system</i>, or within the <i>Generator's facility</i>.</u></p>		<p>It is inappropriate that a clause referring to a NSP's liability to everyone exists in a Generator standard.</p>



Affected clause	Clause with proposed amendments	Reason	Auswind Comments
S5.5.2	<p><b>Under the heading “Preliminary system planning data”:</b></p> <p>This data is required for submission with the <i>application to connect</i>, to allow the <i>Network Service Provider</i> to prepare an offer of terms for a <i>connection agreement</i> and to assess the requirement for, and effect of, <i>network augmentation</i> or <i>extension</i> options. Such data is normally limited to the items denoted as Standard Planning Data (S) in the <del>technical data</del> <i>schedules 5.5.1 to 5.5.5 Generating System Model Guidelines Generating System Design Data Sheet, Generating System Setting Data Sheet</i> and in <i>schedules 5.5.3 to 5.5.5.</i></p> <p>The <i>Network Service Provider</i> 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 <i>connect</i> or to amend a <i>connection agreement</i>.</p>	<p>The references to schedules 5.5.1 and 5.5.2 (implied) have been amended to refer to the documents to be prepared under clause S5.5.7.</p>	<p>Agree</p>
S5.5.4	<p>Schedules 5.5.3 to 5.5.5 cover the following data areas:</p> <p>(a) <del>schedule 5.5.1 - Generating Unit Design Data. This comprises generating unit fixed design parameters.</del></p> <p><del>(b) schedule 5.5.2 - Generating Unit Setting Data. This comprises settings which can be varied by agreement or by direction of the Network Service Provider or NEMMCO.</del></p> <p>(e) <del>schedule 5.5.3 - Network Plant Technical Data. This comprises fixed electrical parameters.</del></p> <p>(db) <del>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 NEMMCO.</del></p> <p>(e) <del>schedule 5.5.5 - Load Characteristics. This comprises the estimated parameters of loads groups in respect of, for example, harmonic content and response to frequency and voltage variations.</del></p> <p>The <u>documents and</u> <u>schedules</u> applicable to each class of <i>Registered Participant</i> are as follows:</p>	<p>The references to schedules 5.5.1 and 5.5.2 have been removed or amended to refer to the documents to be prepared under clause S5.5.7.</p>	<p>Agree</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p>(1) <u>Generators: schedules 5.5.1 and 5.5.2 the Generating System Model Guidelines, Generating System Design Data Sheet and Generating System Setting Data Sheet.</u></p> <p>(2) <u>Customers and Network Service Providers: schedules 5.5.3 and 5.5.4; and</u></p> <p>(3) <u>Customers: schedule 5.5.5.</u></p>		
S5.5.5	<p><b>Replace clause S5.5.5 with the following:</b></p> <p>S5.5.5 A Generator that connects a generating unit, that is not a synchronous generating unit, must be given an exemption from complying with those parts of <del>schedules 5.5.1 and 5.5.2</del> the <u>Generating System Model Guidelines Generating System Design Data Sheet and Generating System Setting Data Sheet</u> that are determined by the Network Service Provider to be not relevant to such generating units, but must comply with those parts of schedules 5.5.3, 5.5.4, and 5.5.5 that are relevant to such generating units, as determined by the Network Service Provider.</p>	<p>The references to schedules 5.5.1 and 5.5.2 have been amended to refer to the documents to be prepared under clause S5.5.7.</p>	<p>Agree</p>
S5.5.6	<p><b>Replace clause S5.5.6 with the following:</b></p> <p>S5.5.6 A Generator that connects a synchronous generating unit equal to or smaller than 30 MW or a number of synchronous generating units totalling less than 30 MW to a connection point to a distribution network will usually be required to submit less registered system planning data and less registered data than is indicated in <del>schedule 5.5.1</del> the <u>Generating System Model Guidelines Generating System Design Data Sheet and Generating System Setting Data Sheet</u>. In general these data will be limited to confirmation of the preliminary system planning data, marked (S), but other data must be supplied if required by the Network Service Provider or NEMMCO.</p> <p>Codes:</p>	<p>The reference to schedules 5.5.1 has been amended to refer to the documents to be prepared under clause S5.5.7.</p>	<p>Agree</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p>S = Standard Planning Data D = Detailed Planning Data R = Registered Data (R1 pre-connection, R2 post-connection)</p>		
<p><b>S5.5.7</b></p>	<p>(a) <u>NEMMCO must, subject to clause S5.7.7(b), publish in accordance with the Rules consultation procedures:</u></p> <p>(1) <u>a <i>Generating System Design Data Sheet</i> describing, for relevant technologies, the <i>generating system</i> design parameters of <i>generating units</i> and <i>generating systems</i> including, without limitation, <i>plant</i> configurations, impedances, time constants, non-linearities, ratings and capabilities, to be provided under clauses S5.2.4 and S5.5.</u></p> <p>(2) <u>a <i>Generating System Setting Data Sheet</i> describing, for relevant <i>generation</i> and <i>control system</i> technologies, the <i>protection system</i> and <i>control system</i> settings of <i>generating units</i> and <i>generating systems</i> including, without limitation, configurations, gains, time constants, delays, deadbands, non-linearities and limits, to be provided under clauses S5.2.4 and S5.5; and</u></p> <p>(3) <u><i>Generating System Model Guidelines</i>, describing, for relevant <i>generation</i> and <i>control system</i> technologies, NEMMCO's requirements when developing mathematical models for <i>generating units</i> and <i>generating systems</i>, including, without limitation, the impact of their <i>control systems</i> and <i>protection systems</i> on <i>power system</i> security.</u></p> <p>(b) <u>If the first version of:</u></p> <p>(1) <u>the <i>Generating System Design Data Sheet</i> published under paragraph (a) is identical to schedule 5.5.1;</u></p> <p>(2) <u>the <i>Generating System Setting Data Sheet</i></u></p>	<p>This modification removes the data schedules S5.5.1 and S5.5.2 and allows their replacements to be changed outside of the Rule change process. This is because the data requirements need to change from time to time to reflect changes in technology. Currently the data schedules are heavily biased toward thermal synchronous plant, and some of the requirements are not applicable to asynchronous plant. It is proposed that changes to these schedules will be made through a Rules consultation process. Because of the urgency of replacing these schedules with documents covering wind generation technologies, NEMMCO would like to be able to commence the Rules consultation process before these changes come into effect.</p>	<p>Agree</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p><u>published under paragraph (a) is identical to schedule 5.5.2.</u></p> <p>as each of those respective schedules existed one day before the <i>Rules</i> changes that give effect to this clause S5.5.7 take effect, <i>NEMMCO</i> is not required to comply with the <i>Rules consultation procedures</i> in publishing them.</p> <p>(c) <u>The purpose of making the <i>Generating System Design Data Sheet, Generating System Setting Data Sheet</i> and <i>Generating System Model Guidelines</i>, is to:</u></p> <p>(1) <u>allow <i>generating units</i> and <i>generating systems</i> to be mathematically modelled by <i>NEMMCO</i> and relevant <i>Registered Participants</i> in load flow and dynamic stability assessments with sufficient accuracy to permit:</u></p> <p>(i) <u>the <i>power system</i> operating limits for ensuring <i>power system security</i> to be quantified with the lowest practical safety margins;</u></p> <p>(ii) <u>proposed access standards and performance standards of <i>generating units</i> and <i>generating systems</i> to be assessed; and</u></p> <p>(iii) <u>settings of <i>control systems</i> and <i>protection systems</i> of <i>generating units, generating systems</i> and <i>networks</i> to be assessed and quantified for maximum practical performance of the <i>power system</i>; and</u></p> <p>(2) <u>identify for each type of data its category in terms of clause S5.5.2.</u></p> <p>(d) <u>Any consultation commenced by <i>NEMMCO</i> in accordance with the <i>Rules consultation procedures</i> prior to this clause coming into effect is taken to have been</u></p>		

Affected clause	Clause with proposed amendments	Reason	Outstanding Comments
	conducted in accordance this clause S5.7.7.		
schedules 5.5.1 & 5.5.2	Delete		Agree to deletion.
schedule 5.6(c1)	(c1) details of each <i>access standard</i> agreed between the <i>Network Service Provider</i> and the <i>Registered Participant</i> and all related conditions of agreement resulting from the application of any of the <i>access provisions</i> for <i>access</i> contained in schedule 5.1 for <i>Network Service Providers</i> , or schedule 5.2 for <i>Generators</i> , or schedule 5.3 for <i>Customers</i> , or schedule 5.3a for <i>Market Network Service Providers</i>	This amendment is required to correct an incorrect reference to the term <i>performance standard</i> . Access standards are what are agreed between <i>Network Service Providers</i> and <i>Registered Participants</i> .	Agree
8.6.2(m)	(m) <b>(modelling):</b> the disclosure, use or reproduction of data held by <i>NEMMCO</i> or a <i>Network Service Provider</i> for the purpose of modelling the operation of the <i>power system</i> , to the extent reasonably necessary to enable a <i>Network User Connection Applicant</i> to develop an <i>application to connect</i> .	The change here corrects an error in the previous formulation of this clause by replacing the term <i>Network User</i> , which relates to people already connected to the network, with the term <i>Connection Applicant</i> , which relates to people wanting to develop an application to connect.	Agree
8.6.2(n)	(n) the disclosure of a <i>performance standard</i> to a <i>Network Service Provider</i> for the purpose of establishing a <i>compliance monitoring program</i> , or if <i>connection at that performance standard</i> , in <i>NEMMCO's</i> opinion, affects, or is likely to affect, the <i>performance of that Network Service Provider's network</i> .	This is necessary so that <i>NEMMCO</i> can provide the <i>performance standards</i> to other <i>NSPs</i>	Performance Standards are between the Generator, the NSP and NEMMCO, not with all other NSPs. Specific permission should be sought for this to happen on a case by case basis as required.
Chapter 10	<b><u>access standard</u></b> Either an <i>automatic access standard</i> or a <i>negotiated access standard</i> for a particular technical requirement as recorded in a <i>connection agreement</i> .	The concept of access standard is used extensively in the technical requirements in Schedule 5.2.	Agree

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p><b><u>adequately damped</u></b></p> <p>In relation to a <i>control system</i>, when tested with a step change of a feedback input or corresponding reference, or otherwise observed, any oscillatory response at a frequency of:</p> <p>(a) <u>0.05 Hz or less has a damping ratio of at least 0.4;</u></p> <p>(b) <u>between 0.05 Hz and 0.6 Hz has a halving time of 5 seconds or less (equivalent to a damping coefficient – 0.14 nepers per second or less); and</u></p> <p>(c) <u>0.6 Hz or more has a damping ratio of at least 0.05 in relation to a <i>minimum access standard</i> and a damping ratio of at least 0.1 otherwise.</u></p> <p><b><u>considered project</u></b></p> <p>In respect of a <i>generating system</i>, a project that meets both of the following criteria:</p> <p>(a) <u>A <i>connection agreement</i> has been entered into.</u></p> <p>(b) <u>An <i>offer to connect</i> has been made and the <i>Network Service Provider</i> considers that if the <i>offer to connect</i> were accepted that project might adversely affect the <i>Connection Applicant's</i> proposed <i>generating system</i>.</u></p> <p>In respect of a <i>transmission network</i> augmentation, a project that meets all of the following criteria:</p> <p>(a) <u>The <i>Network Service Provider</i> has acquired the necessary land and easements.</u></p> <p>(b) <u>The <i>Network Service Provider</i> has obtained all necessary planning and development approvals.</u></p> <p>(c) <u>As applicable:</u></p> <p>(i) <u>the augmentation project has passed the <i>regulatory test</i>; or</u></p> <p>(ii) <u>in respect of a <i>new small transmission network asset</i>, an intention to proceed with the project has been published in the <i>Network Service Provider's Annual Planning Report</i>, or</u></p>	<p>This definition is needed to describe what facilities need to be considered when assessing a proposed generating system connection.</p> <p>It is also needed to describe the stage at which a project's technical details (such as control system models and generator details) should reasonably be made available to other persons applying to connect.</p>	<p>Agree</p> <p>It should be noted that there is increasing difficulties with achieving development approval for both generation project and transmission projects. The final achievement of development approval can be subject to significant delays at the discretion of the relevant planning department. As such project should be considered if they have an offer to connect and the planning approval.</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p>(iii) in respect of a <i>funded augmentation</i> the arrangements have been made for its funding.</p> <p>(d) Construction has either commenced or the <i>Network Service Provider</i> has set a firm date for it to commence.</p> <p>In respect of a <i>distribution network</i> augmentation, a project that meets all of the following criteria:</p> <p>(a) The <i>Network Service Provider</i> has acquired the necessary land and easements;</p> <p>(b) The <i>Network Service Provider</i> has obtained all necessary planning and development approvals;</p> <p>(c) Construction has either commenced or the <i>Network Service Provider</i> has set a firm date for it to commence.</p> <p><b>continuous uninterrupted operation</b></p> <p>In respect of a <i>generating unit</i> operating during a <i>power system</i> disturbance, not disconnecting from the <i>power system</i> and, after clearance of any associated electrical fault, delivering <i>active power</i> and <i>reactive power</i> in accordance with its <i>performance standards</i>, with all essential auxiliary and reactive <i>plant</i> remaining in service, so as to not exacerbate or prolong the disturbance for other <i>connected plant</i>.</p> <p><b>generating system</b></p> <p>A system comprising one or more <i>generating units</i> and includes auxiliary or reactive <i>plant</i> that is located on the <i>Generator's</i> side of the <i>connection point</i> and is necessary for the <i>generating system</i> to meet its <i>performance standards</i>.</p> <p><b>Generating System Design Data Sheet</b></p> <p>The data sheet published by <i>NEMMCO</i> under clause S5.5.7(a)(1).</p>	<p>This new definition is required to clarify that behaviour that exacerbates or prolongs the disturbance is not acceptable.</p> <p>This definition is modified to clarify that a generating system includes other equipment that is provided by the Generator in order to meet its performance standards.</p>	<p>Inconsistent with NET proclamation. Leaves uncertainty for compliance. (eg. no reference to post disturbance loading levels)</p> <p>Agree</p> <p>Agree</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<u><b>Generating System Model Guidelines</b></u> The guidelines published by <i>NEMMCO</i> under clause S5.5.7(a)(3).		Agree
	<u><b>Generating System Setting Data Sheet</b></u> The data sheet published by <i>NEMMCO</i> under clause S5.5.7(a)(2).		Agree
	<u><b>Generator</b></u> A person who engages in the activity of owning, controlling or operating a <i>generating system</i> that is <i>connected</i> to, or who otherwise <i>supplies</i> electricity to, a <i>transmission</i> or <i>distribution system</i> and who is registered by <i>NEMMCO</i> as a <i>Generator</i> under Chapter 2 and, for the purposes of Chapter 5 (other than clause 5.10), the term includes a person who is required to, or intends to register in that capacity.	The term Generator has been extended to cover its use in Schedule 5.2 where it refers to persons who are connection applicants in respect of generating plant as "Generators".	Agree
	<u><b>nameplate rating</b></u> The maximum continuous output or consumption in MW of an item of equipment as specified by the manufacturer, or as subsequently modified.		Agree
	<u><b>nominal voltage</b></u> The design <i>voltage</i> level, nominated for a particular location on the <i>power system</i> , such that power lines and circuits that are electrically connected other than through transformers have the same nominal <i>voltage</i> regardless of operating <i>voltage</i> and <i>normal voltage</i> .	This term has been widely used in the Generator requirements as well as in the definition of normal voltage.	Agree
	<u><b>non-scheduled generating system</b></u> A <i>generating system</i> comprising <i>non-scheduled generating units</i> .		Agree



Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p><u>normal voltage</u></p> <p>In respect of a <i>connection point</i>, its <i>nominal voltage</i> or such other voltage up to 10% higher or lower than <i>nominal voltage</i>, as approved by NEMMCO, for that <i>connection point</i> at the request of the <i>Network Service Provider</i> who provides <i>connection</i> to the <i>power system</i>.</p> <p><b>performance standard</b></p> <p>A standard of performance established as a result of it being:</p> <p>(1) <del>accepted by NEMMCO in accordance with clause 4.14(d)(1);</del></p> <p>(2) <del>taken to be an applicable performance standard in accordance with clause 5.3.4A(e);</del></p> <p>(3) <del>deemed to apply in accordance with clause 4.14(h); or</del></p> <p>(4) <del>determined pursuant to clause 4.14(m).</del></p> <p><u>In relation to a technical requirement of access for a particular <i>plant</i>, a standard of performance recorded on the register by NEMMCO under clause 5.11.1.</u></p> <p><b>performance standards commencement date</b></p> <p>For:</p> <p>(a) <del>Generators, Customers and Network Service Providers who plan, own, operate or control a facility located in a participating jurisdiction (other than Tasmania); the performance standards commencement date is, in relation to that facility, 16 November 2003; and</del></p> <p>(b) <del>Generators, Customers and Network Service Providers who plan, own, operate or control a facility located in Tasmania; the performance standards commencement date is, in relation to that facility, the date that Tasmania becomes a participating jurisdiction.</del></p> <p><u>For Generators, Customers and Market Network Service</u></p>	<p>This definition currently in the system standards (S5.1a.4) is now used more widely, and therefore is to be moved into the glossary.</p> <p>Agree.</p> <p>This definition has been simplified. It identifies performance standards as those standards registered as such with NEMMCO under clause 5.12.</p> <p>In conjunction with 5.10.1(c), this change corrects an anomaly under the present wording where plant with connection agreements pre-dating 16 November 2003, but registered subsequent to that date, technically does not have performance standards.</p>	<p>Agree</p> <p>Agree</p>

Affected clause	Clause with proposed amendments	Reason	Auswind Comments
	<p><i>Providers who plan, own, operate or control a facility located in:</i></p> <p>(a) <i>a participating jurisdiction other than Tasmania, the performance standards commencement date is, in relation to that facility, 16 November 2003; and</i></p> <p>(b) <i>Tasmania, the performance standards commencement date is, in relation to that facility, 29 May 2005.</i></p> <p><b>rated active power</b></p> <p>(1) <i>in relation to a generating unit, the maximum amount of active power that the generating unit can continuously deliver at the connection point when operating at its nameplate rating; and</i></p> <p>(2) <i>in relation to a generating system, the combined maximum amount of active power that its in-service generating units can deliver at the connection point, when its in-service generating units are operating at their nameplate ratings.</i></p> <p><b>reliability</b></p> <p><del>The probability of a system, device, plant or equipment performing its function adequately for the period of time intended, under the operating conditions encountered.</del></p> <p><i>In respect of equipment, the probability of its performing its function adequately for the period of time intended under the operating conditions encountered.</i></p> <p><i>In respect of supply, the probability that it is sufficient to satisfy the demand for that supply, taking into account available generation, power transfer capability and other demand.</i></p> <p><b>scheduled generating system</b></p> <p><i>A generating system comprising scheduled generating units.</i></p>	<p>Now that Tasmania is also a participating jurisdiction, this definition needs to be corrected, and it can also be simplified.</p> <p>Amendment clarifies meaning and specifies date that Tasmania entered the NEM.</p> <p>This definition is extended to distinguish reliability of supply from reliability of equipment.</p>	<p>Agree</p> <p>Agree</p> <p>Agree</p>