Draft National Electricity Amendment (Technical Standards for Wind Generation and other Generator Connections) Rule 2006

under the National Electricity Law as applied by:

(a) the National Electricity (South Australia) Act 1996;

(b) the Electricity (National Scheme) Act 1997 of the Australian Capital Territory;

(c) the National Electricity (New South Wales) Act 1997 of New South Wales;

(d) the Electricity - National Scheme (Queensland) Act 1997 of Queensland;

(e) the Electricity - National Scheme (Tasmania) Act 1999 of Tasmania;

(f) the National Electricity (Victoria) Act 2005 of Victoria; and

(g) the Australian Energy Market Act 2004 of the Commonwealth.

The Australian Energy Market Commission makes the following Rule under the National Electricity Law.

John Tamblyn

Chairman
Australian Energy Market Commission

Draft National Electricity Amendment (Technical Standards for Wind Generation and other Generator Connections) Rule 2006

1. Title of Rule

This Rule is the *National Electricity Amendment (Technical Standards for Wind and other Generator Connections) Rule 2006.*

2. Commencement

This Rule commences operation on [INSERT DATE].

3. Amendment of the National Electricity Rules

The National Electricity Rules are amended as set out in Schedule 1.

4. Notes

Notes do not form part of this Rule

Schedule 1 Amendment of National Electricity Rules

(Clause 3)

[1] Clause 2.2.1 Registration as a Generator

Omit clause 2.2.1(e) and substitute:

(e) To be eligible for registration as a *Generator*, a person must:

(1) obtain the approval of *NEMMCO* to classify each of the *generating units* that form part of the *generating system* that the person owns, operates or controls, or from which it otherwise sources electricity, as either a *scheduled generating unit* or a *non-scheduled generating unit*;

(2) classify the *generating units* in accordance with *NEMMCO's approval* as referred to in subparagraph (1);

(3) satisfy *NEMMCO* that those *generating units* and the *connection points* for those *generating units* comply with the relevant technical requirements set out in Chapter 5; and

(4) satisfy *NEMMCO* that each *generating system* will be capable of meeting or exceeding its *performance standards.*

[2] Clause 2.9.2 Admission as a Registered Participant

Omit clause 2.9.2 and substitute:

2.9.2 Registration as a Registered Participant

(a) In this clause:

receiving date means the date on which *NEMMCO* receives:

(1) an application for registration referred to in clause 2.9.1;

(2) further information or clarification referred to in clause 2.9.1(b); or

(3) the information requested under clause S5.2.4(b),

whichever is the later.

(b) *NEMMCO* must within 15 *business days* of the receiving date, determine that an applicant is to be registered in the category of *Registered Participant* applied for if *NEMMCO* is reasonably satisfied that:

(1) an applicant meets the eligibility requirements specified for the category of *Registered Participant* to which the application relates;

(2) if the application relates to registration in one of the categories of *Market Participant*, the applicant is and will be able to fulfil the applicable financial obligations under Chapter 3 of the *Rules*; and

(3) an applicant has demonstrated a commitment to comply with the *Rules*.

(c) If *NEMMCO* determines that an applicant does not satisfy the requirements referred to in paragraph (b), *NEMMCO* must determine that the applicant is not qualified to be registered as a *Registered Participant* in the relevant category and provide reasons for that determination.

[3] Clause 3.13.3(k) Standing Data

Omit clause 3.13.3(k)–(q) and substitute:

(k) Subject to rule 5.3.8(a), a *Registered Participant* may request from *NEMMCO*:

(1) *registered bid and offer data*;

(2) information that is reasonably required by the *Registered Participant* to carry out *power system* studies (including, without limitation, *load* flow and dynamic simulations) for planning and operational purposes including:

(i) historical information relating to the operating conditions of the *power system*;

(ii) information and data provided to *NEMMCO* under paragraphs (f) and (g) and clause S5.2.4(g);

(iii) information and data described in the *Generating System Model Guidelines*, *Generating System Design Data Sheet*, and *Generating System Setting Data Sheet* in accordance with clause S5.2.4(g);

(iv) information and data described in schedules 5.5.3 and 5.5.4; and

(3) operation and maintenance procedures and practices for *transmission network* or *distribution network* operation, developed for the purposes of schedule 5.1 sufficient to enable the *Registered Participant* to carry out *power system* modelling under normal, *outage* and emergency conditions,

(l) Where *NEMMCO* holds information requested under paragraph (k), it must be provided to the *Registered Participant* as soon as practicable.

(m) *NEMMCO* may provide information of the type described in paragraph (k) to persons other than *Registered Participants* on

request, for the purpose of undertaking research or providing advice to *Registered Participants* or potential investors in the *power system*.

(n) Where special approvals or exemptions have been granted by *NEMMCO*, including approval to aggregate *generating units*, *market network services* or *loads* for *central dispatch*, or exemptions from *central dispatch*, details of such special arrangements must be *published* by *NEMMCO*.

(o) *NEMMCO* must determine and *publish intra-regional loss factors* in accordance with clause 3.6.2 by 1 April each year and whenever changes occur.

(p) *Network Service Providers* must advise *NEMMCO* of their *distribution loss factors*, duly authorised by the appropriate *Jurisdictional Regulator*, and *NEMMCO* must *publish* such *distribution loss factors* in accordance with clause 3.6.3(i).

(q) *NEMMCO* must *publish* on a quarterly basis details of:

(1) *interconnector* transfer capability; and

(2) the discrepancy between *interconnector* transfer capability and the capacity of the relevant *interconnector* in the absence of *outages* on the relevant *interconnector* only,

for each day of the preceding quarter for all *interconnectors*.

Statement of opportunities

(r) By 31 October in each year, *NEMMCO* must prepare and *publish* at a reasonable charge to cover the cost of production, a *statement of opportunities*, including at least the following information for the subsequent 10 year period:

(1) projections of aggregate MW demand and *energy* requirements for each *region*;

(2) generating capabilities of existing *generating units* and *generating units* for which formal commitments have been made for construction or installation;

(3) planned *plant* retirements;

(4) a summary of *network capabilities* and *constraints* based upon *Annual Planning Reports*; and

(5) operational and economic information about the *market* to assist planning by *Scheduled Generators* and *Market Participants* and potential *Scheduled Generators* and *Market Participants.*

(s) If after the publication of the most recent *statement of opportunities*, significant new information becomes available to *NEMMCO* relating to:

(1) the matters covered by paragraphs (r)(1),(2) and (3); or

(2) the matters covered by clause 5.6.5(c)(8) and (9);

NEMMCO must, as soon as practicable, publish that information in a descriptive form that is consistent with the *statement of opportunities*.

(t) In preparing a *statement of opportunities NEMMCO* may seek the assistance of the *Inter-regional Planning Committee*.

(u) As soon as practicable after a *Scheduled Generator, Market Participant* or *Network Service Provider* becomes aware of any information required for *publication* by *NEMMCO* under paragraph (r), that information must be provided to *NEMMCO* by that *Scheduled Generator, Market Participant* or *Network Service Provider*.

[4] Clause 4.9.2 Dispatch Instructions to Scheduled Generators

Omit clause 4.9.2 and substitute:

4.9.2 Dispatch Instructions to Scheduled Generators

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

(1) whether the facilities for *generation* remote control by *NEMMCO*, if available, are required to be in service; and

(2) the level or schedule of power to be supplied by the *generating unit* over the specified period.

(b) Subject to paragraph (c), *NEMMCO* may at any time give an instruction to a *Generator* 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 control system* set-point is to be set to give a nominated 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*.

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

(d) A *Scheduled Generator* must, with respect to *scheduled generating units* which 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 to the *Scheduled Generator* by *NEMMCO*.

[5] Clause 4.14 Acceptance of Performance Standards

In clause 4.14(n), omit "5.3.7(e)(1)" and substitute "5.3.7(g)(1)".

[6] Clause 4.15 Performance Standard Compliance

In clause 4.15(b), omit "5.3.4A(g)" and substitute "5.3.4A(i)".

[7] Clause 5.1.2 Purpose

Omit clause 5.1.2(a) and substitute:

(a) This Chapter*:*

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

(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* to establish or modify a *connection* to a *network* or to alter *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 of this Chapter to facilitate management of the *national grid*.

[8] Clause 5.1.3 Principles

Omit clause 5.1.3 and substitute:

5.1.3 Principles

This Chapter is based on the following principles relating to *connection* to the *national grid*:

(a) All *Registered Participants* 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*.

(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*.

(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) A *Registered Participant* or person intending to become a *Registered Participant* may request *connection* of a facility, modification of a *connection*, or alteration of *connected plant* at a standard below an *automatic access standard* if the *connection*, modification to the *connection*, or alteration of *connected plant* does not adversely affect:

(1) *power system security*;

(2) *reliability* of *supply* in relation to the *connection* of a *generating system*; or

(3) the quality of *supply* to other *Network Users*.

(e) In some jurisdictions separate agreements may be required for *connection services* and *use of system services*.

(f) The operation of the *Rules* should result in the achievement of:

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

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

[9] Clause 5.2.2 Connection Agreements

Omit clause 5.2.2(b) and substitute:

(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.

[10] Clause 5.2.5 Obligations of generators

Omit clauses 5.2.5 and substitute:

5.2.5 Obligations of generators

(a) A *Generator* 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* with a *Network Service Provider;* and

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

(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 5.4 and schedule 5.2;

(3) provide *generation* forecast information to the relevant *Network Service Provider* in accordance with rule 5.6;

(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.

[11] Clause 5.2.6

Omit clause 5.2.6.

[12] Clause 5.3.1 Process and procedures

Omit clause 5.3.1 and substitute:

5.3.1 Process and procedures

(a) For the purposes of this rule 5.3:

establish a *connection* includes modifying an existing *connection* or altering *plant* but does not include alterations to *generating plant* in the circumstances set out in clause 5.3.9.

(b) A *Registered Participant* or person intending to become a *Registered Participant* who wishes to establish a *connection* to a *network* must follow the procedures in this rule 5.3.

(c) Any person wishing to establish a *connection* to a *network* may elect to follow the procedures in this rule 5.3.

(d) A *Generator* wishing to alter *connected generating plant* must comply with clause 5.3.9.

[13] Clause 5.3.2 Connection Enquiry

Omit clause 5.3.2 and substitute:

5.3.2 Connection Enquiry

(a) A person referred to in clause 5.3.1(b) or (c) 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 *Local Network Service 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.

(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*.

(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 *Local Network Service Provider* must meet this request.

(e) Where the *Local Network Service Provider* considers that the *connection* enquiry should be jointly examined by more than one *Network Service Provider* then, 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 requirements of schedules 5.1, 5.2, 5.3 or 5.3a, as relevant.

[14] Clause 5.3.3(b) and (b1) Response to Connection Enquiry

Omit clause 5.3.3(b) and (b1) and substitute:

(b) The *Network Service Provider* must provide the following information in writing to the *Connection Applicant* within 10 *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 10 *business days* after receipt of that request:

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

(i) will need to be involved in planning to make the *connection* or must be involved under clause 5.3.5(e); and

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

(2) whether it will be necessary for any of the parties identified in subparagraph (1) to enter into an agreement with the *Connection Applicant* in respect of the provision of *connection* or other *transmission services* or *distribution services* to the *Connection Applicant* or both;

(3) whether any service the *Network Service Provider* proposes to provide is *contestable* in the relevant *participating jurisdiction*; and

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

(b1) The *Network Service Provider* must, within 20 *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, provide the *Connection Applicant* with written details, for each technical requirement set out in the schedules to this Chapter and which are relevant to the proposed *plant*, of:

(1) the *automatic access standards*;

(2) the *minimum access standards*;

(3) the applicable *plant standards*; and

(4) which of the requirements *NEMMCO* will be involved in the negotiation of for the purposes of clause 5.3.4A(c),

[15] Clause 5.3.3(c) Response to Connection Enquiry

In clause 5.3.3(c), omit "5.3.2(a1)" and "5.3.2(b)" and substitute "5.3.2(b)" and 5.3.2(d)", respectively.

[16] Clause 5.3.4 Application for connection

After 5.3.4(f), insert:

(g) For the purposes of clause 5.3.2(f), where the performance or operation of *plant* that is the subject of an *application to connect* could in the reasonable opinion of the *Network Service Provider*, be materially affected by another project, the *Network Service Provider* must provide to the *Connection Applicant* the following information about the other project sufficient to identify the extent of the impact:

(1) if an *application to connect* has been received in respect of the other project, information of the types specified in schedule 5.4 but not clauses S5.4(d) or S5.4(i), consistent with the *application to connect* of the other project; and

(2) if an *offer to connect* has been made in respect of the other project, information of the types specified in clauses S5.2.4(g), and S5.5, consistent with the *offer to connect* of the

other project.

[17] Clause 5.3.4A Negotiated access standards

Omit clause 5.3.4A and substitute:

5.3.4A Negotiated access standards

(a) For the purposes of this clause 5.3.4A:

***NEMMCO* advisory matter** means any matters that relates to *NEMMCO's* functions under the *National Electricity Law* and any matter identified as a matter on which *NEMMCO* is required to advise in schedules 5.1, 5.2, 5.3 and 5.3a.

(b) A *negotiated access standard* must:

(1) be no less onerous than the corresponding *minimum access standard* specified by the *Network Service Provider* under clause 5.3.3(b1)(2);

(2) be set at a level that will not adversely affect *power system security*;

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

(4) in respect of *generating plant*:

(i) be set at a level that will not adversely affect *reliability* of *supply* to the extent specified in schedule 5.2; and

(ii) in respect of *generating plant*, meet the requirements applicable to a *negotiated access standard* in clauses S5.2.5, S5.2.6, S5.2.7 and S5.2.8.

(c) A *Network Service Provider* must, following the receipt of a proposed *negotiated access standard* under clause 5.3.4(e) or paragraph (h) consult with *NEMMCO* in relation to *NEMMCO* advisory matters for that proposed standard.

(d) *NEMMCO* must, within 20 *business day*s following the submission of a proposed *negotiated access standard* under clause 5.3.4(e) or paragraph (h), respond to the *Network Service Provider* in writing in respect of any *NEMMCO* advisory matters.

(e) A *Network Service Provider* must, within 30 *business days* following the receipt of a proposed *negotiated access standard* in accordance with clause 5.3.4(e) or paragraph (h)(3), accept or reject a proposed *negotiated access standard*.

(f) The *Network Service Provider* must reject the proposed *negotiated access standard* if that *connection*, or alteration of the *generating plant* (as the case may be), at the *negotiated access standard* proposed by the *Connection Applicant* would:

(1) on *NEMMCO's* advice:

(i) adversely affect *power system security*; or

(ii) in respect of the *connection* of *generating plant*, adversely affect *reliability* of *supply* beyond the extent specified in schedule 5.2;

(2) in the *Network Service Provider's* opinion, adversely affect quality of *supply* for other *Network Users*;

(3) in the opinion of *NEMMCO* or the *Network Service Provider*, in respect of a *NEMMCO* advisory matter or a matter allocated to the *Network Service Provider*, respectively, be lower than the corresponding *minimum access standard*; or

(4) in respect of the *connection* of *generating plant*, in *NEMMCO*'s opinion, not satisfy subparagraph (a)(4)(ii).

(g) If a *Network Service Provider* rejects a proposed *negotiated access standard*, the *Network Service Provider* must, when rejecting the proposed *negotiated access standard*, advise the *Connection Applicant* of a *negotiated access standard* that the *Network Service Provider* will accept.

(h) The *Connection Applicant* may, in relation to a proposed *negotiated access standard* advised by a *Network Service Provide*r in accordance with paragraph (g):

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

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

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

[18] Clause 5.3.5 Preparation of offer to connect

Omit clause 5.3.5 and substitute:

5.3.5 Preparation of offer to connect

(a) The *Network Service Provider* to whom the *application* to connect is submitted:

(1) at the *automatic access standard* under clause 5.3.4; or

(2) at a *negotiated access standard* that has been accepted by the *Network Service Provider* under clause 5.3.4A(f);

must proceed to prepare an offer to *connect* in response.

(b) The *Network Service Provider* must use its reasonable endeavours to advise the *Connection Applicant* of all risks and obligations in respect of the proposed *connection* associated with planning and environmental laws not contained in the *Rules*.

(c) The *Connection Applicant* must provide such other additional information in relation to the *application to connect* as the *Network Service Provider* reasonably requires to assess the technical performance and costs of the required *connection* and to enable the *Network Service Provider* to prepare an offer to *connect*.

(d) So as to maintain levels of service and quality of *supply* to existing *Registered Participants* in accordance with the *Rules*, the *Network Service Provider* in preparing the offer to *connect* must consult with *NEMMCO* and other *Registered Participants* 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, in order to assess the *application to connect* and determine:

(1) the technical requirements for the equipment to be *connected*;

(2) the extent and cost of *augmentations* and changes to all affected *networks*;

(3) any consequent change in *network service* charges; and

(4) any possible material effect of this new *connection* on the *network power transfer capability* including that of other *networks*.

(e) If the *application to connect* involves the *connection* of *generating units* having a *nameplate rating* of 10 MW or greater to a *distribution network*, the *Distribution Network Service Provider* must consult the relevant *Transmission Network Service Provider* regarding the impact of the *connection* contemplated by the *application to connect* on fault levels, line reclosure protocols, and stability aspects.

(f) The *Transmission Network Service Provider* consulted under paragraph (e) must determine the reasonable costs of addressing these matters for inclusion by the *Network Service Provider* in the offer to *connect* and the *Distribution Network Service Provider* must make it a condition of the offer to *connect* that the *Connection Applicant* pay these costs.

(g) The *Network Service Provider* preparing the offer to *connect* must include provision for payment of the reasonable costs associated with *remote control equipment* and *remote monitoring equipment* as

required by *NEMMCO* and it may be a condition of the offer to *connect* that the *Connection Applicant* pay such costs.

[19] Clause 5.3.6 Offer to connect

Omit paragraph (e) and substitute:

[Deleted]

[20] Clauses 5.3.7 – 5.3.8

Omit clauses 5.3.7 and 5.3.8 and substitute:

5.3.7 Finalisation of connection agreements

(a) If a *Connection Applicant* wishes to accept an offer to *connect*, the *Connection Applicant* must negotiate a *connection agreement* with each relevant *Network Service Provider* identified in accordance with clause 5.3.3(b)(2) 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*.

(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*.

(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.

(g) The *Network Service Provider* responsible for the *connection point* and the *Registered Participant* must jointly advise *NEMMCO* that a *connection agreement* has been entered into between them and

forward to *NEMMCO* 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 a *Generator*, the arrangements for updating the information required in accordance with clause S5.2.4(b);

(3) the proposed *metering installation*;

(4) arrangements for the *Metering Provider* to obtain physical access to the *metering installation*; and

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

(h) *NEMMCO* must, within 20 *business days* of receipt of the notice under clause 5.3.7(g), advise the relevant *Network Service Provider* and the *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 7.2.

5.3.8 Provision and use of information

(a) The data and information to be provided under rule 5.3 must:

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

(2) be treated as *confidential information*; and

(3) not be disclosed or made available by the recipient to a third party except in the circumstances set out in clauses 5.3.2(c), and paragraphs (b),(c) and (d).

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

(1) assess the effect of the proposed *facility* or proposed alteration to *generating plant* (as the case may be) on the performance of the *power system* or another proposed *facility* or another proposed alteration*;*

(2) determine the extent of any required *augmentation* or *extension;* or

(3) advise *NEMMCO* of services described in clause 3.11.3(j).

(c) Where a technical requirement in clauses S5.2.5, S5.2.6, S5.2.7 or S5.2.8 requires a *Network Service Provider* or a *Generator* (who is the *Connection Applicant*) to take into account a *considered project* when negotiating a *negotiated access standard*, the data and information to be provided under this rule 5.3 on the *considered project* may be disclosed by the *Network Service Provider* in a non

confidential form to the *Connection Applicant* to the extent reasonably necessary for the *Connection Applicant* to determine a proposed *negotiated access standard* for that technical requirement.

(d) The data and information to be provided under rule 5.3 may only be disclosed by the recipient to a third party the disclosure is not to a *Transmission Network Service Provider,* only if it does not contain data and information from which the load characteristics described in clause S5.5.5 could be derived as an identifiable component.

(e) A person intending to disclose information under paragraph (b) must first advise the relevant *Connection Applicant* of the extent of the disclosure.

(f) 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* then it must promptly notify the other party in writing of that change.

(g) A *Registered Participant* must, within 5 *business days* of becoming aware that any information provided to *NEMMCO* in relation to a *performance standard* or other information of a kind required to be provided to *NEMMCO* under clauses 5.3.7(g)(1) or 5.3.7(g)(2) is incorrect, advise *NEMMCO* of the correct information.

5.3.9 Procedure to be followed by a Generator proposing to alter a Generating System

(a) This clause 5.3.9 applies where a *Generator* proposes to alter:

(1) a *connected generating system*; or

(2) a *generating system* for which *performance standards* have been previously accepted by *NEMMCO*,

in a manner that will affect the performance of the *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.

(b) A *Generator* must submit to the *Network Service Provider,* with a copy to *NEMMCO*:

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

(2) in respect of the *generating system* as altered:

(i) details of the *generating unit* design data and *generating unit* setting data in accordance with schedule S5.5 or the *Generating System Model Guidelines, Generating System Design Data Sheet,* or *Generating System Setting Data Sheet*; and

(ii) the information described in clause S5.2.4(g); and

(3) proposed amendments to the relevant *performance standard* being, for each relevant technical requirement for which the proposed alteration to the equipment will affect the performance of the *generating system*:

(i) the applicable *automatic access standard*; or

(ii) a proposed *negotiated access standard*.

(c) For the purposes of subparagraph(b)(3), clause 5.3.4A applies to a submission by a *Generator* under this clause 5.3.9.

(d) Without otherwise limiting subparagraph (b)(3), for the purposes of that clause, a proposed alteration to the equipment specified in column 1 of the table set out below is taken to affect the performance of the *generating system* relative to technical requirements specified in column 2, thereby necessitating a submission under subparagraph (b)(3):

Column 1 **(altered equipment)**	**Column 2** **(clause)**
machine windings	S5.2.5.1, S5.2.5.2, S5.2.9
power converter	S5.2.5.1, S5.2.5.2, S5.2.5.5, S5.2.5.12, S5.2.5.13, S5.2.9
reactive compensation plant	S5.2.5.1, S5.2.5.2, S5.2.5.5, S5.2.5.12, S5.2.5.13
excitation control system	S5.2.5.5, S5.2.5.12, S5.2.5.13
voltage control system	S5.2.5.5, S5.2.5.12, S5.2.5.13
governor control system	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, S5.2.5.8, S5.2.5.9
auxiliary supplies	S5.2.5.1, S5.2.5.2, S5.2.8
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 it and any other *Network Service Providers* and *NEMMCO* in the assessment of the submission.

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

(g) On payment of the required fee referred to 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 *NEMMCO* as appropriate.

(h) If the application of this clause 5.3.9 leads to a variation to an existing *connection agreement* the *Network Service Provider* and the *Generator* must immediately jointly advise *NEMMCO*.

5.3.10 Acceptance of Performance Standards for Generating Plant that is Altered

(a) A *Generator* must not commission altered *generating plant* until *Network Service Provider* has advised the *Generator* that *NEMMCO* is satisfied in relation to the matters set out in paragraph (b).

(b) *NEMMCO* must advise the Network Service Provider that is satisfied in relation to altered *generating plant* that:

(1) that the *Generator* has complied with clause 5.3.9; and

(2) that each amended *performance standard* submitted by the *Generator* either meets the *automatic access standard* applicable to the relevant technical requirement or, if the *performance standard* does not meet that standard, it would not be rejected if clauses 5.3.4A(b) and (f) were applied at the time the submission of *performance standards* is received by *NEMMCO*, and

the *Network Service Provider* must advise the *Generator* that NEMMCO is satisfied in accordance with this paragraph (b).

[21] Clause 5.4.1 Applicability

Omit clause 5.4.1 and substitute:

5.4.1 Application

Rule 5.4 applies only to new installations and modifications to existing installations (including, without limitation, alterations to existing *generating plant*) after 13 December 1998 (in the case of installations located in *participating jurisdictions* other than Tasmania) and after 29 May 2005 (in the case of installations located in Tasmania).

[22] Clause 5.4.2 Advice of inconsistencies

Omit clause 5.4.2 and substitute

5.4.2 Advice of inconsistencies

(a) At any stage prior to commissioning the *facility* in respect of a *connection*, the *Registered Participant* or the person intending to be

registered as a *Generator* must advise the relevant *Network Service Provider* and *NEMMCO* in writing of any inconsistency between the proposed equipment and the *connection agreement* including the *performance standards* and, if necessary, the *Network Service Provider* and the *Registered Participant* or the person intending to be registered as a *Generator* must negotiate in good faith any necessary changes to the *connection agreement*.

(b) If there is an inconsistency in a *connection agreement* including a *performance standard* identified in paragraph (a), the *Registered Participant* or the person intending to be registered as a *Generator* and the *Network Service Provider* must not commission the *facility* in respect of a *connection* unless the *facility* or the *connection agreement* or *performance standard* has been varied to remove the inconsistency.

(c) Nothing in this clause 5.4.2 affects the operation of clause 5.3.6(c1).

[23] Clause 5.7.3 Tests to demonstrate compliance with connection requirements for generators

Omit clause 5.7.3 and substitute:

5.7.3 Tests to demonstrate compliance with connection requirements for generators

(a) Each *Generator* must, prior to the *Generator* implementing a compliance program in accordance with clause 4.15(b), provide evidence to any relevant *Network Service Provider* with which that *Generator* has a *connection agreement* and *NEMMCO* that its *generating system* complies with the applicable technical requirements of clause S5.2.5 of schedule 5.2 and the relevant *connection agreement* and the *performance standards* for that *generating system.*

(b) Each *Generator* must negotiate in good faith with the relevant *Network Service Provider* and *NEMMCO* to agree on a compliance monitoring program, including an agreed method, for its *generating system* to confirm ongoing compliance with the applicable technical requirements of clause S5.2.5 of schedule 5.2 and the relevant *connection agreement* and the *performance standards* for that *generating system.*.

(c) If, prior to the *Generator* implementing a compliance program in accordance with the requirements of clause 4.15(b), a performance test or monitoring of in-service performance demonstrates that a *generating system* is not complying with one or more technical requirements of clause S5.2.5 of schedule 5.2 and the relevant *connection agreement* or one or more of the *performance standards* for that *generating system* then the *Generator* must:

(1) promptly notify the relevant *Network Service Provider* and *NEMMCO* of that fact;

(2) promptly advise the *Network Service Provider* and *NEMMCO* 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 relevant technical requirements or *performance standards* (as the case may be).

(d) If *NEMMCO* reasonably believes that a *generating system* is not complying with one or more applicable *performance standards* or one or more applicable technical requirements of clause S5.2.5 of schedule 5.2 and the relevant *connection agreement, NEMMCO* may instruct the *Generator* to conduct tests within 25 *business days* to demonstrate that the relevant *generating system* complies with those *performance standards* or technical requirements and if the tests provide evidence that the *generating system* continues to comply with those requirement(s) *NEMMCO* must reimburse the *Generator* for the reasonable expenses incurred as a direct result of conducting the tests.

(e) If *NEMMCO*:

(1) is satisfied that:

(i) a *generating system* does not comply 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* 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 there is, or could be, a threat to *power system security* because of the performance of the *generating system*, or because the inadequacy of the applicable analytical model is adversely affecting *NEMMCO's* ability to assess *power system security*, including *power transfer capabilities*,

NEMMCO may direct the relevant *Generator* to operate the *generating system* at a particular *generated* output or in a particular mode until the relevant *Generator* submits evidence reasonably satisfactory to *NEMMCO* that the *generating system* is complying with the relevant *performance standard* and performing substantially in accordance with the applicable analytical model.

(f) Each *Generator* must maintain records for 7 years for each of its *generating 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 *NEMMCO* on request.

[24] Clause 5.7.6 Tests of generating units requiring changes to normal operation

Omit clause 5.7.6 and substitute:

5.7.6 Tests of generating units requiring changes to normal operation

(a) A *Network Service Provider* may, at intervals of not less than 12 months per *generating unit*, require the testing by a *Generator* of any *generating unit connected* to the *network* of that *Network Service Provider* in order to determine analytic parameters for modelling purposes or to assess the performance of the relevant *generating unit* for the purposes of a *connection agreement*, and the *Network Service Provider* is entitled to witness such tests.

(b) If *NEMMCO* reasonably considers that:

(1) the analytic parameters for modelling of a *generating unit* or *generating system* are inadequate; or

(2) available information, including results from a previous test of a *generating unit* or *generating system* are inadequate to determine parameters for an applicable model developed in accordance with the *Generating System Model Guidelines*, or otherwise agreed with *NEMMCO* under clause S5.2.4(b1)(2),

NEMMCO may direct a *Network Service Provider* to require a *Generator* to conduct a test under paragraph (a), and *NEMMCO* may witness such tests.

(c) Adequate notice of not less than 15 *business days* must be given by the *Network Service Provider* to the *Generator* before the proposed date of a test under clause 5.7.6(a).

(d) The *Network Service Provider* must use its best endeavours to ensure that tests permitted under this clause 5.7.6 are conducted at a time which will minimise the departure from the *commitment* and *dispatch* that are due to take place at that time.

(e) If not possible beforehand, a *Generator* must conduct a test under clause 5.7.6 at the next scheduled *outage* of the relevant *generating unit* and in any event within 9 months of the request.

(f) A *Generator* must provide any reasonable assistance requested by the *Network Service Provider* in relation to the conduct of tests.

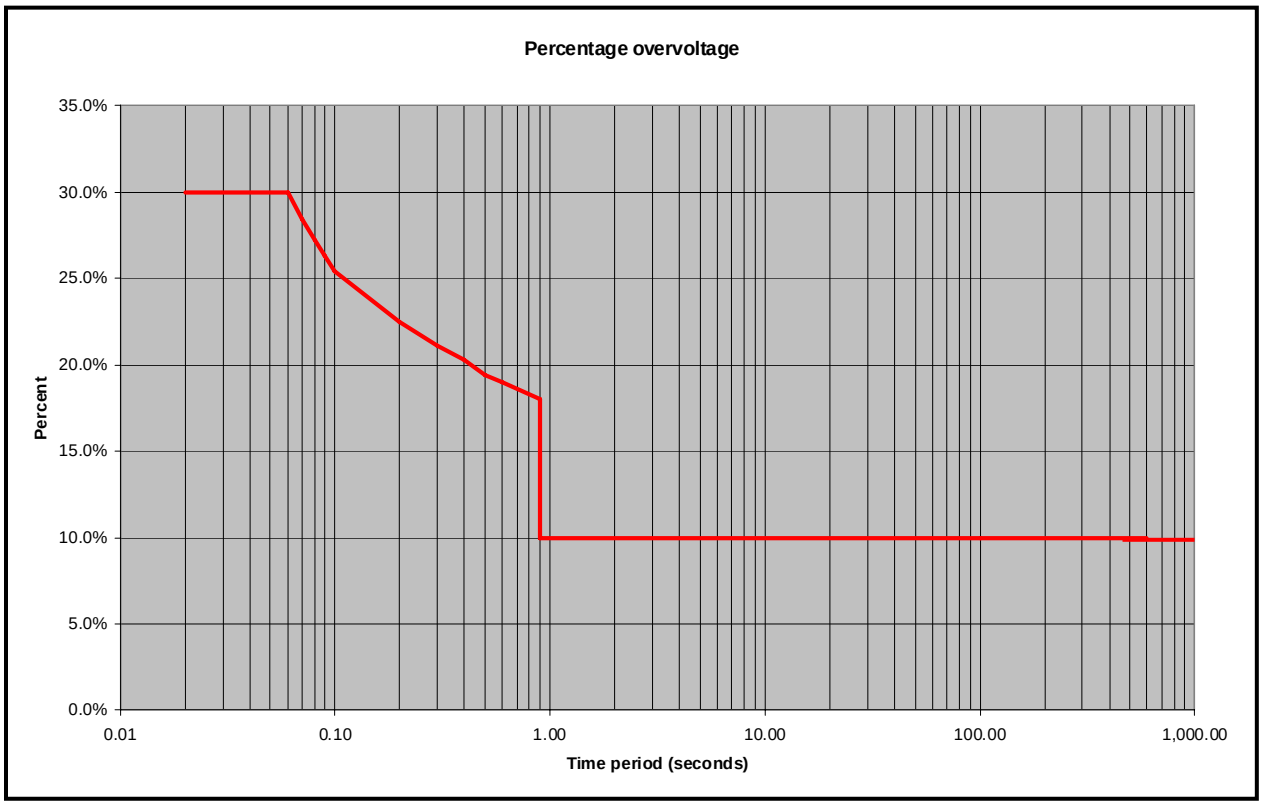
(g) Tests conducted under clause 5.7.6 must be conducted in accordance with test procedures agreed between the *Network Service Provider* and the relevant *Generator* and a *Generator* must not unreasonably withhold its agreement to test procedures proposed for this purpose by the *Network Service Provider*.

(h) A *Generator* must provide the test records obtained from a test under paragraph (a) to the *Network Service Provider*, who must derive the analytical parameters for the applicable model developed in accordance with the *Generating System Model Guidelines*, or otherwise agreed with *NEMMCO* under clause S5.2.4(b1)(2) and provide them to *NEMMCO* and the relevant *Generator*.

(i) Each of the *Generator*, the *Network Service Provider* and *NEMMCO* must bear its own costs associated with tests conducted under this clause 5.7.6 and no compensation is to be payable for financial losses incurred as a result of these tests or associated activities.

[25] Diagram in clause S5.1a.4

Omit the diagram in clause S5.1a.4 and substitute:



[26] Clause S5.1.7 Voltage unbalance

After clause S5.1.7(b) insert:

(c) A *Network Service Provider* must include conditions in *connection agreements* to ensure that each *Generator* will balance:

(1) the voltage generated in each phase of its *generating system* and,

(2) when not generating, the current drawn in each phase,

so as to achieve average levels of negative sequence voltage at each of the *generating system connection points* due to phase imbalances within the *generating plant* not more than the values determined by the *Network Service Provider* to achieve average levels of negative sequence voltage at the *connection points* of other *Network Users* of not more than the values set out in Table S5.1a.1 and clause S5.1a.7.

(d) The *Network Service Provider* and *Generator* may include in the *connection agreement* a requirement to upgrade performance to an agreed level not higher than the levels agreed under paragraph (c) if at any time in the future, another *Network User* is adversely affected by negative sequence voltage or current imbalance because of this *generating plant*.

[27] S5.1.9 Protection systems and fault clearance times

In clause S5.1.9(b), omit "5.3.4A(b)" and substitute "5.3.4A(c)".

[28] Clause S5.2.1 Outline of requirements

Omit clause S5.2.1 and substitute:

S5.2.1 Outline of requirements

(a) This schedule sets out details of additional requirements and conditions that *Generators* must satisfy as a condition of *connection* of a *generating system* to the *power system.* It does not apply to any *generating system* that is:

(1) subject to an exemption from registration under clause 2.2.1(c); or

(2) eligible for exemption under any guidelines issued under clause 2.2.1(c),

and which is *connected* or 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.*

(b) This schedule also sets out the requirements and conditions, which (subject to clause 5.2.5 of the *Rules*) are obligations of *Generators*:

(1) to co-operate with the relevant *Network Service Provider* on technical matters when making a new *connection*; and

(2) to provide information to the *Network Service Provider* or *NEMMCO*.

(c) The equipment associated with each *generating system* must be designed to withstand without damage the range of operating conditions which may arise consistent with the *system standards*.

(d) *Generators* must comply with the *performance standards* and any attached terms or conditions of agreement agreed with the *Network Service Provider* or *NEMMCO* in accordance with a relevant provision of schedules 5.1 or 5.1a.

(e) This schedule does not set out arrangements by which a *Generator* may enter into an agreement or contract with *NEMMCO* to:

(1) provide additional services that are necessary to maintain *power system security*; or

(2) provide additional services to facilitate management of the *market*.

(f) This schedule provides for *automatic access standards* and the determination of *negotiated access standard* derived from *minimum access standards* which, once determined, must be record together with the *automatic access standards* in a *connection agreement* and registered with *NEMMCO* as *performance standards*.

[29] S5.2.2 Application of Settings

In clause S5.2.2, omit "5.3.4A(b)" wherever occurring and substitute "5.3.4A(c)".

[30] S5.2.3 Technical matters to be coordinated

Omit clause S5.2.3 and substitute:

S5.2.3 Technical matters to be coordinated

(a) A *Generator* 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 *generating 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 *Generator* must ensure that in designing a *generating system's* electrical *plant* operating at the same *nominal voltage* as at the *connection point*, including any *substation* for the *connection* of the *generating system* to the *network*:

(1) the *plant* complies with the relevant *Australian Standards* unless a provision of these *Rules* allows or requires otherwise;

(2) the earthing of the *plant* complies with the Electricity Supply Association of Australia Safe Earthing Guide to reduce step and touch potentials to safe levels;

(3) the *plant* is capable of withstanding, without damage the 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 *generating system* is *connected* as specified in the *connection agreement*; and

(5) safety provisions in respect of the *plant* comply with requirements applicable to the *participating jurisdiction* in which the *generating system* is located, as notified by the *Network Service Provider*.

[31] S5.2.4 Provision of information

Omit clause S5.2.4 and substitute:

S5.2.4 Provision of information

(a) A *Generator* or person who is negotiating a *connection agreement* with a *Network Service Provider* must promptly on request by *NEMMCO* or the *Network Service Provider* provide all data in relation to that *generating system*, specified in:

(1) schedule 5.5;

(2) the *Generating System Model Guidelines;*

(3) the *Generating System Design Data Sheet*, or

(4) the *Generating System Setting Data Sheet*.

(b) A *Generator*, or person required under the *Rules* to register as the *Generator* in respect of a *generating system* comprised of *generating units* with a combined *nameplate rating* of 30 MW or more, by the earlier of:

(1) the date on which proposed *performance standards* or amendments to *performance standards* are submitted to *NEMMCO* under clause 5.3.9(b).

(2) three months before commissioning of a *generating system* or planned alteration to a *generating system;* or

(3) 5 *business days* before commissioning of an unplanned alteration to a *generating system,*

must provide:

(4) to *NEMMCO* and the relevant *Network Service Providers* (including the relevant *Transmission Network Service Provider* in respect of an *embedded generating unit*) with the following information about the *control systems* of the *generating system*:

(i) a set of functional block diagrams, including all functions between feedback signals and *generating system* output;

(ii) the parameters of each functional block, including all settings, gains, time constants, delays, deadbands and limits; and

(iii) the characteristics of non-linear elements; and

(5) to *NEMMCO* only, simulation source code in an unencrypted form suitable for at least one of the software simulation products nominated by *NEMMCO* and in a form that would allow conversion for use with other software simulation products by *NEMMCO*,

sufficient for *NEMMCO* and *Network Service Providers* to perform load flow and dynamic simulation studies.

(c) The information provided under paragraph (b) must:

(1) encompass all *control systems* that respond to voltage or frequency disturbances on the *power system*, and which are either integral to the *generating units* or otherwise part of the *generating system*, including, without limitation, those applying to *reactive power* equipment that forms part of the *generating system;*

(2) conform with the applicable models developed in accordance with the *Generating System Model Guidelines*, or an alternative model agreed with *NEMMCO* to be necessary to adequately represent the *generating plant* to carry out load flow and dynamic simulations.

(d) The *Generator* must update the information provided under paragraph (b) within 3 months after commissioning tests or other tests undertaken in accordance with clause 5.7.3 are completed.

(e) For the purposes of clause 5.3.4(g), the technical information that a *Network Service Provider* must, if requested, provide to a *Connection Applicant* in respect of a proposed *connection* for a *generating system* includes:

(1) the highest expected single phase and three phase fault levels at the *connection point* with the *generating system* not *connected*;

(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 *voltag*e fluctuation, harmonic *voltage* distortion and *voltage* unbalance at the *connection point* with the *generating system* not *connected*;

(4) technical information relevant to the *connection point* with the *generating system* not *synchronised* 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; and

(5) 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.

(f) All information provided under this clause S5.2.4 must be treated as *confidential information*.

(g) Any person required to provide information under paragraphs (a) and (b)(4) must also provide that information in a non confidential form for the purposes of clause 3.13.3(k) and 5.3.4(g)(2).

[32] S5.2.5 Technical requirements

Omit clause S5.2.5 and substitute:

S5.2.5.1 Reactive power capability

Automatic access standard

(a) The *automatic access standard* is each *generating system*, operating at:

(1) any level of *active power* output; 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 capable of 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 unit* or *generating system* and 0.395.

Minimum access standard

(b) The *minimum access standard* is no capability is required to supply or absorb *reactive power* at the *connection point*.

Negotiated access standard

(c) When negotiating a *negotiated access standard* the *Generator* and the *Network Service Provider*:

(1) must, subject to any agreement under paragraph (d)(4), ensure that the *reactive power capability* of the *generating system* is 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 at least existing and *considered projects*;

(2) may 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 negotiate a limit that describes how the *reactive power capability* varies as a function of *active power output* due to a design characteristic of the *plant*.

(d) If the *generating system* is not capable of the level of performance established under paragraph (c)(1) the *Generator*, depending on what is reasonable in the circumstances, must:

(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 *generating system's connection point* or another location, to provide the deficit of *reactive power* (*supply* and absorption), which equipment is deemed to be part of the *generating 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*, operational arrangements by which the *plant* can achieve an agreed level of performance for those operating conditions.

(e) The *Generator* may select more than one option referred to in paragraph (d).

General access standard

(f) An *access standard* must record, the agreed value for rated *active power* and where relevant the method of determining the value.

(g) The value for rated *active power* under paragraph (f) for a *generating system* must take into account the system's in-service *generating units* and additional *reactive power* equipment that is part of the *generating system*.

(h) An *access standard* for consumption of energy by a *generating system* when not supplying or absorbing *reactive power* under an *ancillary services agreement* are to be established under rule S5.3.5 as if the *Generator* were a *Market Customer*.

S5.2.5.2 Quality of electricity generated

(a) For the purpose of this clause S5.2.5.2 in respect of a *synchronous generating unit*, AS 1359.101 and IEC 60034-1 are *plant standards* for harmonic voltage distortion.

Automatic access standard

(b) The *automatic access standard* is each *generating system*, when generating and when not generating, must not produce at any of its *connection points* for *generation*:

(1) voltage fluctuation greater than the limits allocated by the *Network Service Provider* under clause S5.1.5(a);

(2) harmonic 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 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 each *generating system*, when generating and when not generating, must not produce at any of its *connection points* for *generation*:

(1) *voltage* fluctuations greater than limits determined under rule S5.1.5(b);

(2) harmonic *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 unbalance more than limits determined under clause S5.1.7(c).

Negotiated access standard

(d) Subject to clause S5.1.7(d), 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 Generating unit response to frequency disturbances

(a) For the purposes of this clause S5.2.5.3:

'**normal operating frequency band**'; '**operational frequency tolerance band**'; or '**extreme frequency excursion tolerance limits**' is a reference to the widest range specified for that term for any condition (including an "island" condition) in the *frequency operating standards* that apply to the *region* in which the *generating unit* is located.

'**stabilisation time**' and '**recovery time**' mean the longest times allowable for *system frequency* to remain outside the *operational frequency tolerance band* and the *normal operating frequency band*, respectively, for any condition (including and "island" condition) in the *frequency operating standards* that apply to the region in which the *generating unit* is located.

'**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 each *generating system* including all operating *generating units* 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 the recovery time including any time spent in the range under subparagraph (1);

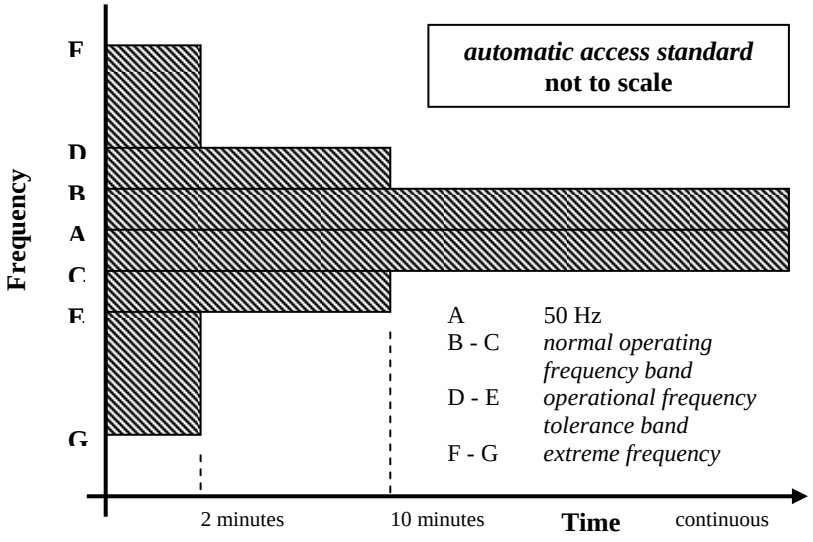
(3) the *normal operating frequency band* for an indefinite period;

(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,

provided that the rate of change of *frequency* is between –4 Hz and 4 Hz per second for more than 0.25 seconds.

[N**ote:** 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 each *generating system* including all operating *generating units* 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);

(4) *normal operating frequency band* for an indefinite period; and

(5) 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 paragraph (e),

provided the rate of change of *frequency* is between -1 Hz and 1 Hz per second for more than one second.

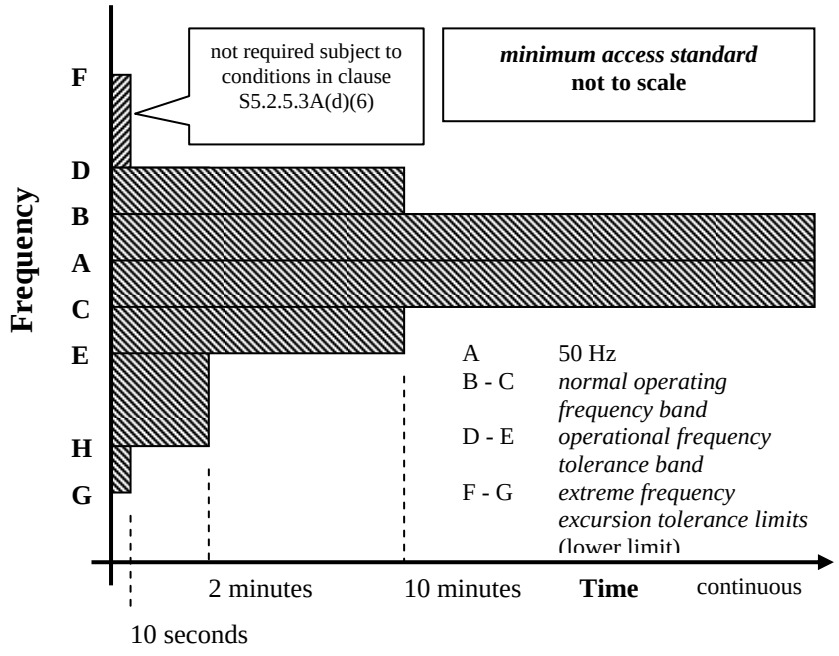
(d) The *minimum access standard* in respect of a *generating system* including all operating *generating units* that:

(1) is part of a *generating system* comprised of *generating units* with a combined *nameplate rating* of 30 MW or more; or

(2) does not have a *protection system* to trip the *generating unit* if the *frequency* exceeds a level agreed with *NEMMCO*,

is the *generating unit* must be capable of *continuous uninterrupted operation* for frequencies in the range of the upper bound of the *operational frequency tolerance band* to the upper bound of the *extreme frequency excursion tolerance limits* (including islanded conditions) for at the transient frequency time, provided the rate of change of *frequency* is between -1 Hz and 1 Hz per second for more than one second.

[**Note:** The minimum access standard is illustrated in the following diagram. To the extent of any inconsistency between the diagram and paragraph (d), paragraph (d) prevails.]



Negotiated access standard

(e) A *negotiated access standard* can be accepted by the *Network Service Provider* provided that *NEMMCO* and the *Network Service Provider* agree that:

(1) the *negotiated access standard* is as close as practicable to the *automatic access standard* while respecting the need to protect the *plant* from damage;

(2) the *frequency* would be unlikely to fall below the lower bound of the *operational frequency tolerance band* as a result of over-frequency tripping of *generating units*; and

(3) there would be no material adverse impact on quality of *supply* to other *Network Users* or on *inter-regional* or *intra-regional power transfer capability*.

(f) In the event of any inconsistency between paragraph (e)(2) and the *minimum access standard* referred to in paragraphs (c) or (d), the *minimum access standard* prevails.

(g) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.3.

S5.2.5.4 Generating system response to voltage disturbances

Automatic access standard

(a) The *automatic access standard* is each *generating system* including all operating *generating units* must be capable of *continuous uninterrupted operation* during the occurrence voltage at the *connection point* in the range of:

(1) over-voltages for the durations permitted under clause S5.1a.4;

(2) 90% to 110% of *normal voltage* continuously;

(3) 80% to 90% of *normal voltage* for a period of at least 10 seconds; and

(4) 70% to 80% of *normal voltage* for a period of at least 2 seconds.

Minimum access standard

(b) The *minimum access standard* is each *generating system* including all operating *generating units* must be capable of *continuous uninterrupted operation* for voltages at the *connection point* in the range of 90% to 110% of *normal voltage*, provided that the ratio of voltage to *frequency* (as measured at the *connection point* and expressed as percentage of *normal voltage* and a percentage of 50 Hz) does not exceed:

(1) 115% for more than two minutes; or

(2) 110% for more than 10 minutes.

Negotiated access standard

(c) In negotiating a *negotiated access standard*, each *generating system* including all operating *generating units* must be capable of *continuous uninterrupted operation* for the range of voltages specified in the *automatic access standard* except where *NEMMCO* and the *Network Service Provider* agree that:

(1) the *negotiated access standard* is as close as practicable to the *automatic access standard* while respecting the need to protect the *plant* from damage;

(2) the *generating plant* that would be tripped, as a result of any voltage excursion within levels specified by the *automatic access standard* is not more than 100 MW or a greater limit based on what *NEMMCO* and the *Network Service Provider* both consider to be reasonable in the circumstances; and

(3) there would be no material adverse impact on the quality of *supply* to other *Network Users* or on *inter-regional* or *intra-regional power transfer capability*.

(d) In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.5.4, *NEMMCO* and the *Network Service Provider* must take into account, without limitation:

(1) the expected performance of existing *networks* and *network* developments that are *considered projects*;

(2) the expected performance of existing *generating plant* and *generation* projects that are *considered projects*, and

(3) any corresponding *performance standard* (or where no *performance standard* has been registered, the *access standard*) that allows *generating plant* to trip for voltage excursions in ranges specified under the *automatic access standards*.

(e) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.4.

General access standard

(f) The *access standard* must include any operational arrangements necessary to ensure the *generating system* including all operating *generating units* will meet its agreed performance levels under abnormal network or *generating system* conditions.

S5.2.5.5 Generating system response to disturbances following contingency events

(a) In this clause S5.2.5.5:

(1) a fault includes without limitation:

(i) a *short circuit fault* of the relevant type; and

(ii) a fault of the relevant type resulting from reclosure onto a fault by the operation of *automatic reclose equipment*; and

(2) '**fault type**' means one or more of the following:

(i) a three-phase fault;

(ii) a two phase to ground fault;

(iii) a phase to phase fault; and

(iv) a phase to ground fault.

Automatic access standard

(b) The *automatic access standard* is:

(1) each *generating system* including all operating *generating units* must remain in *continuous uninterrupted operation* for a disturbance caused by event that is:

(i) a credible contingency event;

(ii) a three phase fault in a *transmission system* cleared by all relevant primary *protection systems*;

(iii) a two phase to ground, phase to phase or phase to ground fault in a *transmission system* cleared in:

(A) the longest time expected to be taken for a relevant *breaker fail protection system* to clear the fault; or

(B) if a *protection system* referred to subparagraph (A) 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; and

(iv) a three phase, two phase to ground, phase to phase or phase to ground fault in a *distribution network* cleared in:

(A) the longest time expected to be taken for the *breaker fail protection system* to clear the fault; or

(B) if a *protection system* referred to in subparagraph (A) 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 *generating unit* from the *power system* by removing *network elements* from service; and

(2) subject to any changed *power system* conditions or *energy* source availability beyond the *Generator's* reasonable control, each *generating system* including all operating *generating units*, in respect of the fault types described in subparagraphs (1)(ii) to (iv), must deliver to the *network*:

(i) to assist the maintenance of *power system* voltages during the application of the fault, capacitive reactive current of at least the greater of its pre-disturbance reactive current and 4% of the maximum continuous current of the *generating system* including all operating *generating units* (in the absence of a disturbance) for each 1% reduction (from its pre-fault level) of *connection point* voltage during the fault; and

(ii) after *disconnection* of the faulted element, *reactive power* sufficient to ensure that the *connection point* voltage is within the range for *continuous uninterrupted operation* under clause S5.2.5.4

(iii) from 100 milliseconds after *disconnection* of the faulted element, *active power* of at least 95% of the level existing just prior to the fault.

Minimum access standard

(c) The *minimum access standard* is:

(1) each *generating system* including all operating *generating units* must remain in *continuous uninterrupted operation* for the disturbance caused by an event that is

(i) a credible contingency event;

(ii) a single phase to ground, phase to phase or two phase to ground fault in a *transmission system* cleared in the longest time expected to be taken for all relevant primary *protection systems* to clear the fault unless *NEMMCO* and the *Network Service Provider* agree that:

(A) the total reduction of *generation* in the *power system* due to that fault would not exceed 100 MW;

(B) there is unlikely to be an adverse impact on quality of supply to other *Network Users*; and

(C) there is unlikely to be a material adverse impact on *inter-regional* or *intra-regional power transfer capability*,

(iii) a single phase to ground, phase to phase or two phase to ground fault in a *distribution network*, cleared in the longest time expected to be taken for all relevant primary *protection systems* to clear the fault, unless *NEMMCO* and the *Network Service Provid*er agree that:

(A) the total reduction of *generation* in the *power system* due to that fault would not exceed 100 MW;

(B) there is unlikely to be an adverse impact on quality of *supply* to other *Network Users*; and

(C) there is unlikely to be a material adverse impact on *inter-regional* or *intra-regional power transfer capability*,

provided that the event is not one that would disconnect the *generating unit* from the *power system* by removing *network elements* from service; and

(2) subject to any changed *power system* conditions or *energy* source availability beyond the *Generator's* reasonable control after *disconnection* of the faulted *element*, each *generating system* must, in respect of the fault types described in subparagraphs (1)(ii) and (iii), deliver to the *network*, *active power* and *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.

Negotiated access standard

(d) In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.5.5, the *Network Service Provider* and *NEMMCO* must take into account, without limitation:

(1) the expected performance of:

(i) existing *networks* and *network* developments that are *considered projects*;

(ii) existing *generating plant* and *generation* projects that are *considered 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.

(e) A proposed *negotiated access standard* may be accepted if the *connection* of the *plant* at the proposed access level would not cause other generating *plant* or loads to trip as a result of an event, when they would otherwise not have tripped for the same event.

(f) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.5.

General access standard

(g) The *access standard* must include any operational arrangements to ensure the *generating system* including all operating *generating units* will meet its agreed performance levels under abnormal *network* or *generating system* conditions.

S5.2.5.6 Quality of electricity generated and continuous uninterrupted operation

Each generating *plant* must be capable of *continuous uninterrupted operation* at distortion levels up to the maximum voltage fluctuation, harmonic voltage distortion and voltage unbalance conditions outlined in S5.1a5, S5.1a6 and S5.1a7 of the *system standards*.

S5.2.5.7 Partial load rejection

(a) For the purposes of this clause S5.2.5.7 '**minimum load**' means the *generating unit* output level measured in sent out megawatts (MW).

Automatic access standard

(b) The *automatic access standard* is each *generating unit* must be capable of *continuous uninterrupted operation* during and following a *loading level* reduction directly imposed from the *power system* in less than 10 seconds from a fully or partially loaded condition provided that the *loading level* reduction is less than 30 percent of the *generating unit's nameplate rating* and the *loading level* remains above *minimum load*.

Minimum access standard

(c) The *minimum access standard* is each *generating unit* must be capable of *continuous uninterrupted operation* during and following a *loading level* reduction directly imposed from the *power system* in less than 10 seconds from a fully or partially loaded condition provided that the *load* reduction is less than 5 percent of the *generating unit's nameplate rating* and the *loading level* remains above *minimum load.*

Negotiated access standard

(d) If, in accordance with clause 5.3.4A of the *Rules*, the *Generator* and the *Network Service Provider* determine a *negotiated access standard* is to apply, the *Network Service Provider* must consult *NEMMCO* to ensure that the *negotiated access standard* does not materially adversely affect *system security*.

General access standard

(e) The actual partial load rejection performance must be recorded in the *connection agreement.*

S5.2.5.8 Protection of generating units from power system disturbances

Minimum access standard

(a) The *minimum access standard* is:

(1) subject to subparagraphs (2) and (3), for each *generating system* that is required by a *Generator* 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* for:

(i) conditions for which it must remain in *continuous uninterrupted operation*; or

(ii) conditions it must withstand under the *Rules*; and

(2) each *generating system* with a *nameplate rating* of 30MW or more, or *generating system* comprised of *generating units* with combined *nameplate rating* of 30 MW or more, 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 *NEMMCO* (not less that the upper limit of the *operational frequency tolerance band*) and the duration above this *frequency* exceeds a value nominated by *NEMMCO* where the reduction may be achieved:

(A) by reducing the output of the *generating unit* within three 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 unit* from the *power system* within one second; or

(ii) in proportion to the difference between the *frequency* at the *connection point* and a level nominated by *NEMMCO* (not less than the upper limit of the *operational frequency tolerance band*), such that the *generation* is reduced by at least half, within three seconds of the *frequency* reaching the upper limit of the *extreme frequency excursion tolerance limits*.

Negotiated access standard

(b) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.8.

General access standard

(c) *NEMMCO* or the *Network Service Provider* may require that an *access standard* include a requirement for the *generating system* to automatically *disconnect* whenever the part of the *network* to which it is *connected* has been disconnected from the *national grid*, forming an island that *supplies* a *Customer*.

(d) The *access standard* must include specification of conditions for which the *generating unit* or *generating system* must trip and must not trip.

(e) Notwithstanding clauses S5.2.5.3, S5.2.5.4, S5.2.5.5 and S5.2.5.6, a *generating 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 *Generator* and *NEMMCO*;

(2) where a load that is not part of the *generating system* has the same *connection point* as the *generating system* and *NEMMCO* and the *Network Service Provider* agree that the disconnection would in effect be under-frequency load shedding;

(3) where the *generating system* is automatically disconnected under paragraph (b) or S5.2.5.9;

(4) where the *generating system* is automatically disconnected under clause S5.2.5.10 due to a failure of the *generating plant*; or

(5) in accordance with an agreement between the *Generator* 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 *NEMMCO* agrees is necessary to maintain or restore *power system* security in the event of a specified *contingency event.*

(f) The *Network Service Provider* is not liable for any loss or damage incurred by the *Generator* or any other person as a consequence of a fault on either the *power system*, or within the *Generator*'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 the *generating 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 *Generator* must provide redundancy in the primary *protection systems* under paragraph (a)(2) and provide *breaker fail protection systems* under paragraph (a)(3) if *NEMMCO* 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:

(1) consequential tripping of, or damage to, other *network* equipment or *facilities* of other *Network Users*, that would have a *power system security* impact; or

(2) 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 the *generating 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).

Negotiated access standard

(d) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.9.

General access standard

(e) The *Network Service Provider* and the *Generator* 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 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 paragraph (c) must:

(1) be coordinated with other *protection systems* already existing in the *power system* or to be provided as part of a *considered project;*

(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 unstable operation

Automatic access standard

(a) The *automatic access standard* is:

(1) each *synchronous generating unit* must have a *protection system* to *disconnect* it promptly when a condition that would lead to pole slipping is detected in order to prevent pole slipping or other conditions where the *generating unit* causes *active power*, *reactive power* or 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) each *generating unit* that is not a *synchronous generating unit* must have a *protection system* to *disconnect* it promptly for conditions where the *active power*, *reactive power* or voltage at the *connection point* become unstable as assessed in accordance with the *power system* stability guidelines established under clause 4.3.4(h).

Minimum access standard

(b) The *minimum access standard* is each *generating unit* 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.

Negotiated access standard

(c) If the *Network Service Provider* and the *Generator* agree, a *protection system* may also trip any other part of the *generating system* in order to cease the instability.

(d) Notwithstanding paragraph (c), a *protection system* must be provided in the *access standard* to trip the affected *generating unit* where:

(1) the *Network Service Provider* considers it necessary to prevent consequential tripping of, or damage to, other *generating units*, *network* equipment or other *Network Users' facilities*, or

(2) *NEMMCO* considers it necessary to prevent unstable operation having an adverse impact on *power system security*.

(e) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.10

S5.2.5.11 Frequency control

(a) For the purpose of this clause S5.2.5.11:

'**maximum operating level** means in relation to:

(1) a *non-scheduled generating unit*, the maximum *sent out generation* consistent with its *nameplate rating*;

(2) a *scheduled generating unit*, the maximum *sent out generation* (but not emergency *generation)* consistent with its registered bid and offer data;

(3) a *non-scheduled generating system*, the combined maximum *sent out generation* consistent with the *nameplate ratings* of its in-service *generating units*; and

(4) a *scheduled generating system*, the maximum combined *sent out generation* (but not emergency *generation*) of its in-service *generating units*, consistent with its *registered bid and offer 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*, its minimum *sent out generation* for continuous stable operation consistent with its *registered bid and offer data*;

(3) a *non-scheduled generating system*, the combined *minimum operating level* of its in-service *generating units*; and

(4) a *scheduled generating system*, the minimum combined *sent out generation* of its in-service *generating units*, consistent with its *registered bid and offer data*.

'**system frequency**' means the *frequency* of the *transmission system* or *distribution system* to which the *generating unit* or *generating system* is *connected*;

'**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.

Automatic access standard

(b) The *automatic access standard* is:

(1) each *generating system's active power* transfer to the *power system* must not:

(i) increase in response to a rise in *system frequency*; or

(ii) decrease in response to a fall in *system frequency*;

(2) each *generating system* must be capable of automatically reducing its *active power* transfer to the *power system*:

(i) whenever the *system frequency* exceeds the upper limit of the *normal operating frequency band*;

(ii) by an amount that equals or exceeds the least of:

(A) 20% of its maximum operating level times the *frequency* difference between *system frequency* and the upper limit of the *normal operating frequency* band;

(B) 10% of its maximum operating level; and

(C) subject to the *system frequency* recovering gradually, the difference between the *generating unit's* pre-disturbance level and minimum operating level, but zero if the difference is negative; and

(iii) sufficiently rapidly for the *Generato*r to be in a position to offer measurable amounts of lower services to the *spot market* for *market ancillary services*; and

(3) each *generating system* must be capable of automatically increasing its *active power* transfer to the *power system*:

(i) whenever the *system frequency* falls below the lower limit of the *normal operating frequency band*;

(ii) by the amount that is equal or exceeds the least of:

(A) 20% of its maximum operating level times the percentage *frequency* difference between the lower limit of the *normal operating frequency band* and *system frequency*;

(B) 5% of its maximum operating level; and

(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

(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*.

Minimum access standard

(c) The *minimum access standard* is for each *generating system*, *active power* transfer to the *power system* must not:

(1) increase in response to a rise in *system frequency*; and

(2) decrease more than 2% per Hz in response to a fall in *system frequency*.

Negotiated access standard

(d) A *Generator* proposing a *negotiated access standard* in respect of paragraph (c)(2) must demonstrate to *NEMMCO* that the proposed increase and decrease in *active power* transfer to the *power system* are as close as practicable to the *automatic access standard* for that *plant*.

(e) The *negotiated access standard* must record the agreed values for maximum operating level and minimum operating level, and where relevant the method of determining the values and the values for a *generating system* must take into account its in-service *generating units*.

(f) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.11.

General access standard 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.

S5.2.5.12 Impact on network capability

Automatic access standard

(a) The *automatic access standard* is each *generating system* must have plant capabilities and *control systems*, sufficient not to reduce any

inter-regional or *intra-regional power transfer capability* below the level that would apply if the *generating system* were disconnected.

Minimum access standard

(b) The *minimum access standard* is the *generating system* must have plant capabilities and *control systems* and operational arrangements sufficient to ensure there is no reduction in:

(1) the ability to *supply Customer* load as a result of a reduction in *power transfer capability*;

(2) *power transfer* capabilities into a *region* by more than the combined *sent out generation* of its *generating units* ; and

(3) *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*,

Negotiated access standard

(c) In carrying out assessments of proposed *negotiated access standards* under this clause S5.2.5.11, the *Network Service Provider* and *NEMMCO* must take into account, without limitation:

(1) the expected performance of:

(i) existing *networks* and *network* developments that are *considered projects*;

(ii) existing *generating plant* and *generation* projects that are *considered projects*;

(iii) *control systems* and *protection systems*, including *automatic reclose equipment*; and

(2) the expected range of *power system* operating conditions.

(d) The *negotiated access standard* must include operational arrangements, including curtailment of *generation* if necessary, to the satisfaction of *NEMMCO*, to ensure that the *generating plant* is operated in a way that meets at least the *minimum access standard* under abnormal *network* and *generating system* conditions, so that *power system security* can be maintained.

(e) A *negotiated access standard* under this clause S5.2.5.11 must detail the *plant* capabilities, *control systems* and operational arrangements that will be maintained by the *Generator*, notwithstanding that change to the *power system*, but not changes to the *generating system*, may reduce the efficacy of the *plant* capabilities, *control systems* and operational arrangements over time.

(f) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.11.

General access standard

(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 *generating system* (such as a power system stabiliser), the *Network Service Provider* and the *Generator* may negotiate for the provision of such additional *control system* facilities as a commercial arrangement.

S5.2.5.13 Control systems and stability

(a) For the purpose of this clause S5.2.5.12:

'**settling time**' means in relation to a step response test or simulation of 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:

(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

(2) otherwise, the sustained change induced in that output quantity.

'**rise time**' means in relation to a step response test or simulation of a *control system*, the time taken for an output quantity to rise from 10% to 90% of the maximum change induced in that quantity by a step change of an input quantity.

Automatic access standard

(b) The *automatic access standard* is:

(1) each *generating system* must have *plant* capabilities and *control systems* sufficient to ensure that:

(i) *power system* oscillations, for the frequencies of oscillation of the *generating unit* against any other *generating unit*, are *adequately damped*;

(ii) operation of the *generating system* does not degrade the damping of any critical mode of oscillation of the *power system*; and

(iii) operation of the *generating system* does not cause instability (including hunting of *tap-changing transformer control systems*) that would adversely impact other *Registered Participants*.

(2) each *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.

(3) each *synchronous generating system* must have an *excitation control system* that:

(i) regulates voltage at the *connection point* or another agreed location in the *power system* (including within the *generating system*) to within 0.5% of the setpoint;

(ii) is able to operate the stator continuously at 105% of *nominal voltage* with *rated active power* output;

(iii) 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;

(iv) 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*;

(v) has limiting devices to ensure that a voltage disturbance does not cause the *generating unit* to trip at the limits of its operating capability;

(vi) 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;

(vii) has *settling times* for a step change of voltage setpoint or voltage at the location agreed under subparagraph (i) of:

(A) generated voltage less than 2.5 seconds for a 5% voltage disturbance with the *generating 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 *generating 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) is able to increase field voltage from rated field voltage to the excitation ceiling voltage in less than 0.5 second;

(ix) has a *power system* stabiliser with sufficient flexibility to enable damping performance to be maximised, with characteristics as described in paragraph (c); and

(x) has reactive current compensation settable for boost or droop; and

(4) each *generating system*, other than one comprised of *synchronous generating units*, must have a voltage *control system* that:

(i) regulates voltage at the *connection point* or an agreed location in the *power system* (including within the *generating system*) to within 0.5% of its setpoint;

(ii) 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 clauses S5.1a.3 and S5.1a.4;

(iii) 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 agreed location in the *power system*, without reliance on a *tap changing transformer*;

(iv) has limiting devices to ensure that a voltage disturbance does not cause the *generating unit* to trip at the limits of its operating capability;

(v) with the *generating system* connected to the *power system*, has *settling times* for *active power*, *reactive power* and voltage due to a step change of voltage setpoint or voltage at the location agreed under clause subparagraph (i), of less than:

(A) 5.0 seconds for a 5% voltage disturbance with the *generating 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 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) has *reactive power* rise time, for a 5% step change in the voltage set point, of less than 2 seconds;

(vii) has a *power system* stabiliser with sufficient flexibility to enable damping performance to be maximised, with characteristics as described in paragraph (c); and

(viii) has reactive current compensation.

(c) A *power system* stabiliser provided under paragraph (b) must have:

(1) for a *synchronous generating unit*, measurements of rotor speed and *active power* output of the *generating unit* as inputs, and otherwise measurements of *power system frequency* and *active power* output of the *generating 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 generating unit* is continually adjustable over the range of –10% to +10% of stator 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.

Minimum access standard

(d) The *minimum access standard* is:

(1) each *generating system* must have *plant* capabilities and *control systems*, including if appropriate, a *power system* stabiliser, sufficient to ensure that:

(i) *power system* oscillations, for the frequencies of oscillation of the *generating unit* against any other *generating unit*, are *adequately damped*;

(ii) operation of the *generating 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 *generating unit* does not cause instability (including hunting of *tap-changing*

transformer control systems) that would adversely impact other *Registered Participants*;

(2) each *generating system* comprised of *generating units* with combined *nameplate rating* of 30 MW or more must have *facilities* for testing its *control systems* sufficient to establish their dynamic operational characteristics.

(3) each *generating unit* or *generating system* must have facilities:

(i) where the *connection point nominal voltage* is 100 kV or more, to regulate voltage in a manner that does not prevent the *Network Service Provider* from achieving the requirements of clauses S5.1a.3 and S5.1a.4;

(ii) where the *connection point nominal voltage* is less than 100 kV, to regulate voltage or *reactive power* or power factor in a manner that does not prevent the *Network Service Provider* from achieving the requirements of clauses S5.1a.3 and S5.1a.4,

and sufficient to achieve the performance agreed in respect of clauses S5.2.5.1, S5.2.5.2, S5.2.5.3, S5.2.5.4, S5.2.5.5, S5.2.5.6 and S5.2.5.12;

(4) each *synchronous generating unit*, that is part of a *generating system* comprised of *generating units* with a combined *nameplate rating* of 30 MW or more, must have an excitation control system that:

(i) regulates voltage at the *connection point* or an agreed location in the *power system* (including within the *generating system*), to within 0.5% of its setpoint or, where the *connection point nominal voltage* is less than 100 kV, regulates voltage, power factor or *reactive power* as agreed with the *Network Service Provider* and *NEMMCO*;

(ii) has excitation ceiling voltage of at least 1.5 times the excitation required to achieve *generation* at the *nameplate rating* for rated power factor, rated speed and *nominal voltage* ;

(iii) subject to coordination under paragraph (i), has a *settling time* of less than 5.0 seconds for a 5% voltage disturbance with the *generating unit* synchronised, from an operating point where such a voltage disturbance would not cause any limiting device to operate; and

(iv) has over and under excitation limiting devices sufficient to ensure that a voltage disturbance does not cause the *generating unit* to trip at the limits of its operating capability; and

(5) each *generating system* comprised of *generating units* with combined *nameplate rating* of 30 MW or more and which are not synchronous generating units, must have a *control system* that:

(i) regulates voltage at the *connection point* or an agreed location in the *power system* (including within the *generating system*) to within 0.5% of its setpoint or, where the *connection point nominal voltage* is less than 100 kV, regulates voltage, power factor or *reactive power* as agreed with the *Network Service Provider* and *NEMMCO*;

(ii) subject to coordination under subparagraph (i), has 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) has limiting devices to ensure that a voltage disturbance would not cause the *generating unit* to trip at the limits of its operating capability.

Negotiated access standard

(e) If a *generating system* cannot meet the *automatic access standard*, the *Generator* must demonstrate why that standard could not be reasonably achieved and proposed a *negotiated access standard*.

(f) The *negotiated access standard* proposed by the *Generator* under paragraph (e) must be the highest level that the *generating system* can reasonably achieve, including by installation of additional dynamic *reactive power* equipment, and through optimising its *control systems*.

(g) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.13.

General access standard

(h) A limiting device provided under paragraphs (b) and (c) must:

(1) not detract from the performance of any *power system* stabiliser; and

(2) be coordinated with all *protection systems*.

(i) The *Network Service Provider* may require that the design and operation of the *control systems* of a *generating unit* or *generating system* be coordinated with the existing 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 *access standard*.

(k) The assessment of impact of the *generating units* on *power system* stability and damping of *power system* oscillations shall be in accordance with the *power system* stability guidelines established under clause 4.3.4(h).

S5.2.5.14 Active power control

(a) The *automatic access standard* is a *generating system* comprised of *generating units* with a combined *nameplate rating* of 30 MW or more, must have an *active power control system* capable of:

(1) for each *scheduled generating unit* or, if subject to aggregation approved by *NEMMCO* under rule 3.8.3, the *scheduled generating system*:

(i) maintaining and changing its *active power* output in accordance with its *dispatch instructions*; and

(ii) ramping its *active power* output linearly from one dispatch level to another, and

(2) subject to the *energy* source availability, for each *non-scheduled generating unit* or *non-scheduled generating system*:

(i) 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 *control centre*, subject to subparagraph(iii),

(ii) automatically limiting its *active power* output, to below the level specified in subparagraph (i); and

(iii) 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*.

Minimum access standard

(b) The *minimum access standard* is 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:

(1) for each *scheduled generating unit* or, if subject to aggregation approved by *NEMMCO* under clause 3.8.3, the *scheduled generating system*, maintaining and changing its *active power* output in accordance with its *dispatch instructions*;

(2) for each *non-scheduled generating system*:

(i) 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*;

(ii) limiting its *active power* output to or below the level specified in subparagraph (i);

(iii) subject to energy source availability, 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

(iv) being upgraded to receive electronic instructions from the *control centre* and respond within five minutes.

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, *NEMMCO* may require the *Generator* to upgrade its facilities to receive electronic instructions and act within five minutes of those instructions.

(d) The *negotiated 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*.

(e) *NEMMCO* must advise on matters relating to *negotiated access standards* under this clause S5.2.5.14.

General access standard requirements

(f) Each *control system* used to satisfy the requirements of paragraphs (a) and (b) must be *adequately damped*.

[33] S5.2.6 Monitoring and Control Requirements

Omit clause S5.2.6 and substitute:

S5.2.6.1 Remote Monitoring

Automatic access standard

(a) The *automatic access standard* is each:

(1) *scheduled generating unit;*

(2) *non-scheduled generating unit* with a *nameplate rating* of 30 MW or more; or

(3) *non-scheduled generating system* with a combined nameplate rating of 30 MW or more,

must have remote monitoring equipment to transmit to *NEMMCO's control centres* in real time in accordance with rule 4.11, the quantities that *NEMMCO* reasonably requires to discharge its market and *power system security* functions set out in Chapters 3 and 4.

(b) The quantities referred to under paragraph (a) that *NEMMCO* may request include:

(1) in respect of each *scheduled generating unit* or *non-scheduled generating unit* with a *nameplate rating* of 30 MW or more:

(i) current, *voltage*, *active power* and *reactive power* in respect of *generating unit* stators or power conversion systems (as applicable);

(ii) the status of all switching devices that carry the *generation*, tap-changing transformer tap position; and

(iii) aggregate *active power* if subject to aggregation approved by *NEMMCO* under rule 3.8.3;

(2) in respect of each *non-scheduled generating system* that includes a *generating unit* with a *nameplate rating* of less than 30 MW:

(i) its connected status, *tap-changing transformer* tap position and voltages;

(ii) *active power* and *reactive power* aggregated for groups of identical *generating units*; and

(iii) either the numbers of identical *generating units* operating or the operating status of each non-identical *generating unit*;

(3) in respect of each auxiliary supply system with capacity of 30 MW or more associated with a *generating unit* or *generating system*, *active powe*r and *reactive power*;

(4) in respect of *reactive power* equipment that is part of a *generating system* but not part of a particular *generating unit*, its *reactive power*,

(5) in respect of each wind farm:

(i) wind speed;

(ii) wind direction; and

(iii) ambient temperature; and

(6) any other quantity that *NEMMCO* reasonably requires to discharge its market and *power system security* functions as set out in Chapters 3 and 4.

Minimum access standard

(c) The *minimum access standard* is each:

(1) *scheduled generating unit* or,

(2) *scheduled generating system*, if subject to aggregation approved by *NEMMCO* under clause 3.8.3; or

(3) *non-scheduled generating system* with a combined *nameplate rating* of 30 MW or more,

must have remote monitoring equipment to transmit to *NEMMCO's control centres* in real time:

(1) the *active power* output of the *generating unit*, *scheduled generating system* or *non-scheduled generating system* (as applicable);

(2) if *connected* to a *transmission system*, the *reactive power* output of the *generating unit*, *scheduled generating system* or *non-scheduled generating system* (as applicable); and

(3) if a wind farm:

(i) number of units operating;

(ii) wind speed; and

(iii) wind direction,

in accordance with rule 4.11.

Negotiated access standard

(d) *NEMMCO* may advise on matters relating to *negotiated access standards* under this clause S5.2.6.1.

S5.2.6.2 Communications Equipment

Automatic access standard

(a) The *automatic access standard* is a *Generator* must:

(1) provide and maintain two separate telephone facilities using independent telecommunications service providers, for the purposes of operational communications between the *Generator's* responsible operator under clause 4.11.3(a) and *NEMMCO's control centre*; and

(2) provide electricity supplies for remote monitoring equipment and remote control equipment installed in relation to its *generating system* capable of keeping such equipment available for at least three hours following total loss of *supply* at the *connection point* for the relevant *generating unit*.

Minimum access standard

(b) The *minimum access standard* is a *Generator* must:

(1) provide and maintain a telephone facility for the purposes of operational communications between the *Generator's*

responsible operator under clause 4.11.3(a) and *NEMMCO's control centre*; and

(2) provide electricity supplies for remote monitoring equipment and remote control equipment installed in relation to its *generating system* capable of keeping such equipment available for at least one hour following total loss of supply at the *connection point* for the relevant *generating unit*.

Negotiated access standard

(c) A *negotiated access standard* must include, where the *Network Service Provider* or *NEMMCO* reasonably requires that a back-up telephone facility be independent of commercial telephone service providers, 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 *Generator* must provide communications paths (with appropriate redundancy) from the remote monitoring equipment or remote control equipment installed for each of its g*enerating systems* as appropriate, to a communications interface in a location reasonably acceptable to the *Network Service Provider* at the relevant *generation* facility.

(e) Communications systems between the communications interface under paragraph (d) and the *control centre* must be the responsibility of the *Network Service Provider* unless otherwise agreed by the *Generator* and the *Network Service Provider*.

(f) A *negotiated access standard* must include that the *Generator* provide accommodation and secure power supplies for communications facilities provided by the *Network Service Provider* under this clause S5.2.6.2.

(g) *NEMMCO* may advise on matters relating to *negotiated access standards* under this clause S5.2.6.2.

[34] S5.2.7 – S5.2.9

Omit clauses S5.2.7 - S5.2.9 and substitute:

S5.2.7 Power station auxiliary supplies

In cases where a *generating system* takes its auxiliary supplies via a *connection point* through which its *generation* is not transferred to the *network*, the *access standards* must be established under clause S5.3.5 as if the *Generator* were a *Market Customer*.

S5.2.8 Fault current

Automatic access standard

(a) The *automatic access standard* is:

(1) the contribution of the *generating system* to the fault current on the *connecting network* through its *connection point* must not exceed the lesser of:

(i) three times the combined maximum continuous current of the operating *generating units* of the *generating system*; and

(ii) the contributing 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 *generating 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(e)(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 *generating unit* or *generating 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 *generating unit* or *generating system*, as specified in the *connection agreement*.

Minimum access standard

(b) The *minimum access standard* is:

(1) the *generating system* does not need to limit fault current contribution;

(2) a *generating 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(e)(1);

(3) 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 reasonably be expected to flow through the circuit breaker for any fault in the *network* or in the *generating*

unit or *generating 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 *Generator*, impose the least obligation on the *Generator*.

(d) 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 *network* developments that are considered projects;

(2) the expected performance of existing *generating plant* and generation projects that are *considered projects*; and

(3) the expected range of *power system* operating conditions.

(e) The *Network Service Provider* is not liable for any loss or damage incurred by the *Generator* or any other person as a consequence of a fault on either the *power system*, or within the *Generator's* facility.

[35] S5.3.1 Information

In clause S5.3.1(b), omit "5.3.2(d)" and substitute "5.3.2(f)".

[36] S5.3.4 Settings of protection and control systems

In clause S5.3.4, omit "5.3.4A(b)" wherever occurring and substitute "5.3.4(c)".

[37] S5.3a.1 Provision of information

In clause S5.3a.1(b), omit "5.3.2(d)" and substitute "5.3.2(f)".

[38] S5.3a.2 Application of settings

In clause S5.3a.2, omit "5.3.4A(b)" wherever occurring and substitute "5.3.4(c)".

[39] S5.3a.4.1 Remote Monitoring

In clause 5.3a.4.1(c), omit "5.3.4(b)" and substitute "5.3.4(c)".

[40] S5.3a.14 Protection of market network services from power system disturbances

In clause S5.3a.14, omit "5.3.4(b)" and substitute "5.3.4(c)".

[41] S5.5.2 Technical Details to Support Application for Connection and Connection Agreement

In clause S5.5.2, omit the paragraph "Preliminary system planning data" and substitute:

> This data is required for submission with the *application to connect*, to allow the *Network Service Provider* to prepare an offer of terms 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 *Generating System Model Guidelines Generating System Design Data Sheet, Generating System Setting Data Sheet* and in schedules 5.5.3 to 5.5.5.

[42] S5.5.4 – S5.5.7 Technical Details to Support Application for Connection and Connection Agreement

Omit S5.5.4 – S5.5.6 and substitute:

S5.5.4 Schedules 5.5.3 to 5.5.5 cover the following data areas:

(a) schedule 5.5.3 - Network Plant Technical Data. This comprises fixed electrical parameters.

(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 *NEMMCO*.

(c) schedule 5.5.5 - Load Characteristics. This comprises the estimated design parameters of loads.

The documents and schedules applicable to each class of *Registered Participant* are as follows:

(a) *Generators*: the *Generating System Model Guidelines, Generating System Design Data Sheet* and *Generating System Setting Data Sheet*;

(b) *Customers* and *Network Service Providers*: schedules 5.5.3 and 5.5.4; and

(c) *Customers:* schedule 5.5.5.

S5.5.5 A Generator that *connects* a *generating system*, that is not a synchronous generating unit, must be given exemption from complying with those parts of the *Generating System Model Guidelines Generating System Design Data Sheet* and *Generating System Setting Data Sheet* that are determined by the Network Service Provider to be not relevant to such generating systems, but must comply with those parts of schedules 5.5.3, 5.5.4, and 5.5.5 that are relevant to such generating systems, as determined by the Network Service Provider.

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 the *Generating System Model Guidelines Generating System Design Data Sheet* and *Generating System Setting Data Sheet*. 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*.

Codes:

S = Standard Planning Data

D = Detailed Planning Data

R = Registered Data (R1 pre-*connection*, R2 post-*connection*)

S5.5.7

(a) *NEMMCO* must, subject to clause S5.7.7(b), develop and *publish* in accordance with the *Rules consultation procedures:*

(1) a *Generating System Design Data Sheet* describing, for relevant technologies, the *generating system* design parameters of *generating unit*s and *generating systems* including, *plant* configurations, impedances, time constants, non-linearities, ratings and capabilities, to be provided under clauses S5.2.4 and S5.5,

(2) a *Generating System Setting Data Sheet* describing, for relevant *generation* and *control system* technologies, the *protection system* and *control system* settings of *generating unit*s and *generating systems* 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

(3) *Generating System Model Guidelines*, describing, for relevant *generation* and *control system* technologies, *NEMMCO's*

requirements when developing mathematical models for *generating units* and *generating systems*, including, without limitation, the impact of their *control systems* and *protection systems* on *power system* security.

(b) When developing and publishing the *Generating System Design Data Sheet*, *Generating System Setting Data Sheet* and *Generating System Model Guidelines* under paragraph (a), *NEMMCO* must have regard to the purpose of developing and publishing the sheets and guidelines which is to:

(1) allow *generating units* and *generating systems* to be mathematically modelled by *NEMMCO* and relevant *Registered Participants* in load flow and dynamic stability assessments 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) proposed *access standards* and *performance standards* of *generating units* and *generating systems* to be assessed; and

(iii) settings of *control systems* and *protection systems* of *generating units*, *generating systems* and *networks* to be assessed and quantified for maximum practical performance of the *power system;* and

(2) identify for each type of data its category in terms of clause S5.5.2.

(c) Any person may submit a request (with written reasons) to *NEMMCO* to amend the *Generating System Design Data Sheet*, *Generating System Setting Data Sheet* or the *Generating System Model Guidelines* developed and published by *NEMMCO* under paragraph (a) and *NEMMCO* must conduct the *Rules consultation procedures* in relation to the request.

(d) *NEMMCO* can make amendments requested under paragraph (c) or otherwise to the *Generating System Design Data Sheet*, *Generating System Setting Data Sheet* or the *Generating System Model Guidelines* without conducting the *Rules consultation procedures* if the amendment is minor or administrative in nature.

(e) *NEMMCO* may at the conclusion of the *Rules consultation procedures* under paragraph (c) or otherwise under paragraph (d), amend the relevant data sheet or guidelines (if necessary)

[43] Schedules 5.5.1 and 5.5.2

Omit schedules 5.5.1 and 5.5.2

[44] Schedule 5.5.3

In Schedule 5.5.3, omit the words "Technical Details of generating units as per schedules 5.5.1, 5.5.2".

[45] S5.6 Terms and Conditions of Connection agreements

Omit S5.6(c1) and substitute:

(c1) details of each *access standard* agreed between the *Network Service Provider* and the *Registered Participant* and all related conditions of agreement resulting from the application of any access provisions contained in schedule 5.1 for *Network Service Providers*, or schedule 5.2 for *Generators*, or schedule 5.3 for *Customers*, or schedule 5.3a for *Market Network Service Providers*;

[46] Clause 7.3.1 Metering Installation components

In clause 7.3.1(f), omit "5.3.7(e)" and substitute "5.3.7(g)".

[47] Clause 8.6.2 Exceptions

Omit clause 8.6.2(m) and substitute:

(m) **(modelling):** the disclosure, use or reproduction of data held by *NEMMCO* or a *Network Service Provider* for the purpose of modelling the operation of the *power system*, to the extent reasonably necessary to enable a *Connection Applicant* to develop an *application to connect* but does not include information provided in accordance with clauses S5.2.4(a), (b)(4) and (b)(5); or

(n) the disclosure of a *performance standard* to a *Network Service Provider* for the purpose of establishing a compliance monitoring program, or if *connection* at that *performance standard*, in *NEMMCO's* opinion, affects, or is likely to affect, the performance of that *Network Service Provider's network.*

[48] Clause 9.7.2(d) Application for Connection

In clause 9.7.2(d), omit "5.3.2(c)" and substitute "5.3.2(e)".

[49] Clause 9.7.2(e) Application for Connection

In clause 9.7.2(e), omit "5.3.7(a)(2)" and substitute "5.3.7(a)".

[50] Schedule 9A3 – Jurisdictional Derogations Granted to Generators References to schedule 5.5.1

In schedule 9A3, omit "schedule 5.5.1" and substitute "*Generating System Setting Data Sheet*".

[51] Clause 9.37.10 Reactive power capability (clause S5.2.5.1 of schedule 5.2)

In clause 9.37.10, omit "schedule 5.5.1" and substitute "*Generating System Setting Data Sheet*".

[52] Clause 9.37.20 Frequency control (clause S5.2.5.11 of schedule 5.2)

In clause 9.37.20, omit clause "S5.2.5.11(d)" and substituting "S5.2.5.11(b)(3)".

[53] Chapter 10 Glossary

In Chapter 10, insert in alphabetical order, the following definitions:

access standard

Either an *automatic access standard* or a *negotiated access standard* for a particular technical requirement as recorded in a *connection agreement*.

adequately damped

In relation to a *control system*, when tested with a step change of a feedback input or corresponding reference, or otherwise observed, any oscillatory response at a frequency of:

(a) 0.05 Hz or less has a damping ratio of at least 0.4;

(b) 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

(c) 0.6 Hz or more has a damping ratio of at least 0.05 in relation to a minimum access standard and a damping ratio of at least 0.1 otherwise.

considered project

(a) In respect of a *generating system*, a project that meets the following criteria:

(1) an *offer to connect* has been made and the *Network Service Provider* considers in its reasonable opinion that if the *offer to connect* were accepted that the project might materially affect the *Connection Applicant's* proposed *generating system*; or

(2) a *connection agreement* has been entered into.

(b) In respect of a *transmission network augmentation*, a project that meets the following criteria:

(1) the *Network Service Provider* has acquired the necessary land and easements;

(2) the *Network Service Provider* has obtained all necessary planning and development approvals;

(3) as applicable:

(i) the *augmentation* project has passed the *regulatory test;* or

(ii) in respect of a *new small transmission network asset*, an intention to proceed with the project has been published in the *Network Service Provider's Annual Planning Report*; or

(iii) in respect of a *funded augmentation* the arrangements have been made for its funding; and

(4) construction has either commenced or the *Network Service Provider* has set a firm date for it to commence.

(c) In respect of a *distribution network augmentation*, a project that meets the following criteria:

(1) the *Network Service Provider* has acquired the necessary land and easements;

(2) the *Network Service Provider* has obtained all necessary planning and development approvals; and

(3) construction has either commenced or the *Network Service Provider* has set a firm date for it to commence.

continuous uninterrupted operation

In respect of a *generating system* including all operating *generating units* operating during a *power system* disturbance, not disconnecting from the *power system* and, after clearance of any associated electrical fault, delivering *active power* and *reactive power* in accordance with its *performance standards*, with all essential auxiliary and reactive *plant*

remaining in service, so as to not exacerbate or prolong the disturbance for other *connected plant*.

Generating System Design Data Sheet

The data sheet published by *NEMMCO* under clause S5.5.7(a)(1).

Generating System Model Guidelines

The guidelines published by *NEMMCO* under clause S5.5.7(a)(3).

Generating System Setting Data Sheet

The data sheet published by *NEMMCO* under clause S5.5.7(a)(2).

nominal voltage

The design 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* and *normal voltage*

non-scheduled generating system

A *generating system* comprising *non-scheduled generating units.*

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 *NEMMCO*, for that *connection point* at the request of the *Network Service Provider* who provides *connection* to the *power system.*

rated active power

(a) 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*.

(b) 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.*

scheduled generating system

A *generating system* comprising *scheduled generating units.*

[54] Chapter 10 Glossary

In Chapter 10, omit the current corresponding definitions and substitute the following definitions:

generating system

A system comprising one or more *generating units* 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*.

Generator

A person who engages in the activity of owning, controlling or operating a *generating system* that is *connected* to, or who otherwise *supplies* electricity to, a *transmission* or *distribution system* and who is registered by *NEMMCO* as a *Generator* 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.

nameplate rating

The maximum continuous output or consumption in MW of an item of equipment as specified by the manufacturer, or as subsequently modified.

reliability

(a) In respect of equipment, the probability of its performing its function adequately for the period of time intended under the operating conditions encountered.

(b) 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.

In the definition of "performance standard", omit "5.3.4A(g)" and substitute "5.3.4A(i)".

[55] Chapter 11 Savings and Transitional Rules

After rule 11.4 insert:

11.5 Rules consequent on making the National Electricity Amendment (Technical Standards for Wind Generation and other Generator Connection) Rule 2006

11.5.1 Definitions

Subject to this rule 11.5, in this rule 11.5:

Amending Rule means the National Electricity Amendment (Technical Standards for Wind Generation and other Generator Connection) Rule 2006.

commencement date means the date on which the Amending Rule commences operation.

new Chapter 5 means Chapter 5 of the *Rules* immediately in force after the commencement date

old Chapter 5 means Chapter 5 of the *Rules* immediately in force prior to the commencement date.

11.5.2 Provision of information under S5.2.4 in registration in application

(a) The Amending Rule that requires a person who is applying to be a Registered Participant to submit information in relation to clause S5.2.4 for the purposes of clause 2.9.2 does not apply to any person who has, in accordance with clause 2.9.1:

(1) submitted an application to be registered as a *Registered Participant*;

(2) commenced a process for submitting further information in relation to the application referred to in subparagraph (1); or

(3) has submitted further information in relation to the application referred to subparagraph (1),

and, at the commencement date, has not been registered by *NEMMCO* in accordance with clause 2.9.2 as a *Registered Participant*.

(b) A person registered in accordance with this clause 11.5.2 is taken to be registered in accordance with the requirements of the Rules as amended by the Amending Rule.

11.5.3 Access standards made under the old Chapter 5

(a) Any *automatic access standard* or *negotiated access standard* that applied to a *generating unit or generating system* under the old Chapter 5 continues to apply to that system or unit as if the Amending Rule had not been made.

(b) Unless a Generator and a Network Service Provider otherwise agree, a *negotiated access standard* that is the subject of a

negotiating process as at the commencement date, is to be negotiated in accordance with the old Chapter 5, as if the Amending Rule had not been made.

11.5.4 Modifications to plant by generators

A Generator who at the commencement date has proposed to modify a plant and has commenced negotiations under the old Chapter 5 is to continue the negotiating process in accordance with the old Chapter 5 as if the Amending Rule had not been made.

11.5.5 Technical Details to Support Application for Connection and Connection Agreement

(a) Subject to paragraph (b), any action taken by *NEMMCO* for the purpose of developing and publishing an initial *Generating System Design Data Sheet*, an initial *Generating System Setting Data Sheet* and initial *Generating System Model Guidelines* prior to the commencement date is taken to satisfy the equivalent actions under clause S5.5.7.

(b) If *NEMMCO* develops and publishes the initial *Generating System Design Data Sheet* referred to in paragraph (a), after the commencement date, and the content of the data sheet is substantially the same as schedule 5.5.1 of the *Rules* as in force immediately before the commencement date, *NEMMCO* is taken to have satisfied the *Rules consultation procedures* for the purposes of S5.5.7

(c) If *NEMMCO* develops and publishes the initial *Generating System Setting Data Sheet* referred to in paragraph (a), after the commencement date, and the content of the data sheet is substantially the same as schedule 5.5.2 of the *Rules* as in force immediately before the commencement date, *NEMMCO* is taken to have satisfied the *Rules consultation procedures* for the purposes of S5.5.7.