

Approved Modifications to the Transmission Code

<u>Modification Ref. No.</u>	<u>Section¹</u>	<u>Original Text</u>	<u>Modification²</u>	<u>Reasons</u>
TC/2006/1	1.3.1	“Certificate of Compliance” means a document issued by an <i>authorised person</i> as required under Section 5(2) of the Electricity (Electrical Workers And Installation) Regulations 2002;	“Certificate of Compliance” means a document issued by an <i>authorised person</i> as required under Section 5(2) of the Electricity (Electrical Workers And Installations) Regulations 2002;	To correct typo error.
		New	“Interruptible Load Provider” means a market participant who provides reserve from a load facility;	To add new definition.
		New	“Owners Engineer” means the <i>generation facility</i> in-house professional engineer;	To add new definition.
		“Statement of Turn-On” means a document issued by an <i>authorised person</i> as required under Section 5(3) of the Electricity (Electrical Workers And Installation) Regulations 2002;	“Statement of Turn-On” means a document issued by an <i>authorised person</i> as required under Section 5(3 4) of the Electricity (Electrical Workers And Installations) Regulations 2002;	To correct typo error.
		New	“Under Frequency Relay” (UFR) means a continuously monitoring relay that will operate, giving an alarm or initiation signal upon measured frequency moves outside set point limit.	To add new definition.

¹ Reference to the section of the code where change is to be made in the version dated on August 2002 as published on the web.

² The code modifications will take effect from 10/10/2007.

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TC/2006/2	6.2	Standards	Standards <u>and Standing Operating Procedures</u>	To amend the heading to include Standing Operating Procedures.
TC/2006/3	6.2.2	None as this is an inserted section.	<u>The <i>Power System Operator</i> shall develop a system level Standing Operating Procedure (SOP) for ensuring the secure operation of the power system in the event of natural gas supply disruption and revise the SOP from time to time, if necessary. The SOP shall be developed and revised by the <i>Power System Operator</i> in consultation with the generation licensees, gas transporter and any other relevant parties. Generation Licensees with <i>generation facility</i> that uses natural gas as the primary fuel and any other parties identified in the SOP shall comply with this SOP.</u>	The amendment is to require all Generation Licensees with <i>generation facility</i> that uses natural gas as the primary fuel to comply with a system level SOP to ensure the secure operation of the power system in the event of natural gas supply disruption. The system level SOP shall be developed by <i>Power System Operator</i> , in consultation with the relevant parties.

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TC/2006/4	6.11.2 (f)	None as this is an inserted section.	<p><u>Each generation facility that uses natural gas as the primary fuel shall be designed with the capability of initiating on-load changeover either automatically through gas pressure setting or manually to alternate fuel that is stockpiled on-site.</u></p> <p><u>The fuel changeover trigger setting shall have sufficient margin above that of the generation facility's low gas pressure trip setting to ensure that the generation facility remains connected to the power system and operates at or above its minimum stable loading level during the entire process of fuel changeover operation. The generation facility shall continue to supply electricity to the power system after completion of the fuel changeover process.</u></p>	The amendment is to include an additional requirement for a generation facility that operates on natural gas as its primary fuel. This requirement is necessary to ensure in the event of natural gas supply disruption, the generation facility is able to switch to alternate fuel that can be stockpiled on-site (usually diesel), while on-load, to ensure continuity of electricity supply to the grid.
TC/2006/5	6.12.3	The Transmission Licensee and Generation Licensee shall provide all the equipment at their site, including the communication equipment and the communication lines up to the surge arrestors located in the <i>Power System Operator's</i> Control Centres.	The Transmission Licensee and Generation Licensee shall provide all the equipment at their <u>respective site, including the communication equipment and the communication lines up to the surge arrestors located in the Power System Operator's Control Centres.</u> The Transmission Licensee shall provide data communication lines from the control centers of the <i>Power System Operator</i> to the transmission substation and power station switchhouses as specified by the <i>Power System Operator</i> for the purposes of real-time power system monitoring and control. All the equipment at the site shall be equipped with battery backup of at least 4-hour operation time. In addition, the AC power shall also be backed up by <u>the standby generator at the site, if the site is</u>	To add the requirement that the Transmission Licensee shall provide data communication lines, and for backup using battery backup and standby generator.

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			equipped with such a facility.	
TC/2006/6	6.12.6	None as this is an inserted section.	<u>The Interruptible Load Provider shall provide the Power System Operator with real-time status and measurements at its interruptible load facility. The information shall include the status of circuit breakers and contactors, status of UFR ("armed" or "unarmed") and the status of any other devices as specified by the Power System Operator. Measurements of power and frequency for the incoming feeders from the grid and for the designated loads within the load facility, and measurements of any other quantities as specified by the Power System Operator shall also be provided.</u>	To add the requirement for interruptible loads facility for remote monitoring purposes.
TC/2006/7	6.13	Performance Monitoring Facilities for 230kV and 400kV Substations	Performance Monitoring Facilities for 230kV and 400kV Substations/ <u>Switchhouses</u>	To amend the heading to include the 230kV and 400kV Switchhouses
TC/2006/8	6.13.1	The Transmission Licensee shall provide, install and maintain at its own cost, the performance monitoring facilities/transient recorders at its 230kV and 400kV substations. The performance monitoring facilities shall be capable to monitor and record the dynamic performance of its equipment during system disturbances. The Transmission Licensee shall provide such information to <i>Power System Operator</i> upon request. The recorder shall be capable of capturing, but not limited to the following :- (a) substation busbar voltage, current and <i>frequency</i> ; and (b) <i>circuit breaker and protection devices status</i>	The Transmission Licensee and <u>Generation Licensee</u> shall provide, install and maintain at its their own cost, the performance monitoring facilities/transient recorders at its 230kV and 400kV substations/ <u>switchhouses</u> . The performance monitoring facilities shall be capable to monitor and record of monitoring and recording the dynamic performance of its equipment during system disturbances. The Transmission Licensee <u>and Generation Licensee</u> shall provide such information to <u>the Power System Operator</u> upon request. The recorder shall be capable of capturing, but not limited to the following :- (a) substation/ <u>switchhouse</u> busbar voltage, current and <i>frequency</i> ; and (b) <i>circuit breaker and protection devices status</i>	This amendment is to explicitly differentiate between switchhouse and substation owned by different Licensees.

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TC/2006/9	6.14	None as this is an inserted section.	<u>Performance Monitoring Facilities for Interruptible Load Facilities</u>	To add a new Section Heading for the requirement for interruptible loads.
TC/2006/10	6.14.1	None as this is an inserted section.	<u>The <i>Interruptible Load Provider</i> shall provide the <i>Power System Operator</i> with records of status and measurements before and after activation of its interruptible load facility. The records shall include the status of circuit breakers and contactors, status of <i>UFR</i> ("armed" or "unarmed") and the status of other devices as specified by the <i>Power System Operator</i>. Records of power and frequency for the incoming feeders from the grid and for the designated loads within the load facility, and measurements of any other quantities as specified by the <i>Power System Operator</i> shall also be provided.</u>	To add the requirement on performance monitoring for interruptible loads.
TC/2006/11	C6	None as this is an inserted section	<u>Additional Requirements for A Combined-Cycle Plant With Multi-shaft Configuration For Consideration As Multiple Independent <i>Generation Facilities</i></u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.
TC/2006/12	C6.1	None as this is an inserted section	<u>This Appendix states the additional requirements for a <i>Combined-Cycle Plant</i> with multi-shaft configuration seeking to register as multiple independent <i>generation facilities</i>. A <i>Combined-Cycle Plant</i> with multi-shaft (n+n+1) configuration comprises n gas turbines (GTs), n heat recovery steam generators (HRSGs) and one steam turbine (ST), may seek to register as multiple independent <i>generation facilities</i>, where each <i>Generation Facility</i> may comprise of either</u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.

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			i. <u>only one <i>Generating Unit</i>; or</u> ii. <u>more than one <i>Generating Unit</i>.</u>	
TC/2006/13	C6.2	None as this is an inserted section	<u>The Generation Licensee shall at its own cost, engage an independent specialist consultant other than its <i>Owners Engineers</i> and Engineering, Procurement & Construction (EPC) contractors, to conduct detail design review, witness site verification tests, and certify that the <i>Combined-Cycle Plant</i> is in compliance with Appendix C6.3.</u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.
TC/2006/14	C6.3	None as this is an inserted section	<u>The verification tests shall be conducted and meet the acceptance criteria stipulated in the System Operation Manual.</u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.
TC/2006/15	C6.4	None as this is an inserted section	<u>The independent specialist consultant shall ensure a detailed test plan is prepared based on its detailed knowledge of the <i>Combined-Cycle Plant</i> from the design review conducted. Where the Generation Licensee wishes to use a new technology or additional tests, it may request discussion with the <i>Power System Operator</i> in respect of revising the existing testing methods or procedures to demonstrate meeting the performance requirements stipulated in Appendix C 6.3.</u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.
TC/2006/16	C6.5	None as this is an inserted section	<u>The Generation Licensee is required to submit to the <i>Power System Operator</i> the design review report together with the proposed test plan at least six months before the site verification tests.</u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.
TC/2006/17	C6.6	None as this is an inserted section	<u>Generation Licensee is required to conduct</u>	To add requirements

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			<u>additional tests identified by the Power System Operator, if any, to demonstrate compliance with the requirement stipulated in Appendix C6.3.</u>	for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.
TC/2006/18	C6.7	None as this is an inserted section	<u>The Generation Licensee is required to submit to the Power System Operator, a final report duly certified by its independent specialist consultant and the Generation Licensee. The report shall state all site test results recorded, and conclude whether the Combined-Cycle Plant is in compliance with the requirements stipulated in Appendix C6.3. In addition, the report shall also include details of any improvements recommended by the independent specialist consultant in the course of its review for the Combined-Cycle Plant to comply with the requirements.</u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.
TC/2006/19	C6.8	None as this is an inserted section	<u>Upon receipt of the report, the Power System Operator shall use its reasonable endeavors to complete the review of the final report submitted within 20 business days. Upon the Power System Operator's acceptance of the submitted report, the Generation Licensee shall submit standing capability data of the Combined-cycle Plant to the Power System Operator for approval to operate as multiple independent Generation Registered Facility.</u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.
TC/2006/20	C6.9	None as this is an inserted section	<u>However, during normal operation, if the outage of any single element/functional system of the Combined-Cycle Plant causes any of the following:</u> <u>(i) tripping of more than one generation facility; or</u> <u>(ii) loss in generation of more than the active output power of largest generation facility of the Combined-Cycle Plant;</u>	To add requirements for a combined-cycle plant with multi-shaft configuration for consideration as multiple independent generation facilities.

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			<u>The PSO may notify Energy Market Company of any change to the system risk attributable to one or more generation facilities of the Combined-Cycle Plant. On PSO's notification, Energy Market Company shall, in accordance with the Market Rules, determine risk and operating reserve requirement taking into account such change in system risk. The Generation Licensee shall identify the cause of tripping, take necessary remedial actions and re-test to verify its compliance to the requirements stipulated in Appendix C6.3. A detailed report shall be submitted to the PSO. Upon the PSO's acceptance of the submitted report, the PSO shall notify EMC of the revised system risk attributable to such generation facilities. Energy Market Company shall, in accordance with the Market Rules, determine risk and operating reserve requirements taking into account such change in system risk.</u>	
TC/2006/21	H2.2	None as this is an inserted section.	<u>Each dedicated RTU (new or replacement of existing RTU)³ shall be equipped with a Global Position Satellite (GPS) equipment for time synchronization and shall have a minimum resolution of 1 msec.</u> ³ <u>With effect from 10/10/2007.</u>	To add the requirement for clock synchronizing.
TC/2006/22	H4.2	<u>(d) Other quantities, as required</u>	<u>(d) Emergency Shutdown Valve (ESDV) and the status of all valves on the Onshore Receiving Facility (ORF) and natural gas transmission pipeline supplying natural gas to the generation facility.</u>	To add the requirement for monitoring of natural gas supply.
TC/2006/23	H4.2	None as this is an inserted section.	<u>(e) Pressure and gas flow at ORF and natural gas transmission pipeline supplying natural gas to the generation facility.</u>	To add the requirement for monitoring of natural

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TC/2006/24	H4.2	None as this is an inserted section.	<u>(f) Other quantities, as required</u>																	
TC/2006/25	H5.1	The status such as all <i>circuit breakers</i> , isolators, <i>earthing</i> switches and local/remote indications are 2-bit representations:	The status of all components such as all <i>circuit breakers</i> , isolators, <i>earthing switches</i> and local/remote indications which are 2-bit representations:	Earthing switches are 1-bit representations.																
TC/2006/26	H5.2	The statuses of all alarms are 1-bit representation:	The statuses of all <u><i>earthing switches</i> (for new or replacement of existing RTUs)⁴</u> and alarms are 1-bit representation: ⁴ <u>With effect from 10/10/2007.</u>	Earthing switches are 1-bit representations.																
TC/2006/27	H6 (f)	Transformer raise/lower uses <i>IEC</i> type 46.	Transformer raise/lower uses <i>IEC</i> type 46 47	To correct typo error.																
TC/2006/28	I1.4	Switchboard <table style="width: 100%; border: none;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">400kV</td> <td style="width: 25%; text-align: center;">230kV</td> <td style="width: 25%; text-align: center;">66kV</td> </tr> <tr> <td>1) Switchboard configuration</td> <td>One and half breakers for switchhouse and 400kV substation.</td> <td>One and half breakers for switchhouse and 230kV portion of 400/230kV substation. Conventional double busbar for all others.</td> <td>Conventional double busbar for all substations.</td> </tr> </table>		400kV	230kV	66kV	1) Switchboard configuration	One and half breakers for switchhouse and 400kV substation.	One and half breakers for switchhouse and 230kV portion of 400/230kV substation. Conventional double busbar for all others.	Conventional double busbar for all substations.	Switchboard <table style="width: 100%; border: none;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">400kV</td> <td style="width: 25%; text-align: center;">230kV</td> <td style="width: 25%; text-align: center;">66kV</td> </tr> <tr> <td>1) Switchboard configuration</td> <td>One and half breakers for switchhouse and 400kV substation.</td> <td>One and half breakers for switchhouse and 230kV portion of 400/230kV substation. Conventional double busbar for all others.</td> <td>Conventional double busbar for <u>all switchhouse and</u> substations.</td> </tr> </table>		400kV	230kV	66kV	1) Switchboard configuration	One and half breakers for switchhouse and 400kV substation.	One and half breakers for switchhouse and 230kV portion of 400/230kV substation. Conventional double busbar for all others.	Conventional double busbar for <u>all switchhouse and</u> substations.	This amendment is to state explicitly the requirement for 66kV switchhouse, the requirement will be same as 66kV substations.
	400kV	230kV	66kV																	
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