



Market Rule Amendment Proposal

PART 1 – MARKET RULE INFORMATION

Identification No.:	MR-00293-R00		
Subject:	Transmitter Technical Requirements		
Title:	Transmission Equipment Thermal Ratings – Equipment Thermal Ratings		
Nature of Proposal:	<input checked="" type="checkbox"/> Alteration	<input type="checkbox"/> Deletion	<input type="checkbox"/> Addition
Chapter:	4	Appendix:	4.4
Sections:			
Sub-sections proposed for amending:	Reference 5		

PART 2 – PROPOSAL HISTORY

Version	Reason for Issuing	Version Date
1.0	Draft Submitted for Technical Panel Review	6 Apr 05
2.0	Technical Panel Comments Incorporated; Published for Stakeholder Review and Comments	14 Feb 06
Approved Amendment Publication Date:		
Approved Amendment Effective Date:		

PART 3 – EXPLANATION FOR PROPOSED AMENDMENT

Provide a brief description of the following:

- The reason for the proposed amendment and the impact on the *IESO-administered markets* if the amendment is not made.
- Alternative solutions considered.
- The proposed amendment, how the amendment addresses the above reason and impact of the proposed amendment on the *IESO-administered markets*.

Summary

This amendment proposes to:

1. Align the market rules with the current practice in regards to market participants providing transmission equipment thermal ratings to the IESO;
2. Specify thermal rating information requirements that match the real-time, pre-dispatch and longer-term assessment needs of the IESO; and
3. Clarify that the provision of transmission equipment thermal rating information applies to all market participants that own or operate transmission equipment, not just those participants which are licenced by the OEB as transmitters.

These amendments are required to provide greater transparency and certainty as to the market participant obligations and to specify market participant obligations that are commensurate with the needs of the IESO to maintain reliable operation of the IESO-controlled grid.

Background

The existing market rules require market participants to provide the IESO with detailed transmission element information e.g. physical characteristics and specifications of transmission circuits and transformers (Appendices 4.4, 4.5A, 4.9 of Chapter 4; section 5.2.5 of Chapter 5). This information was required so that the IESO could calculate thermal ratings for the transmission elements. Respecting these ratings is necessary to prevent damage the market participants' equipment and to maintain the reliable operation of the IESO-controlled grid.

The IESO energy management system in place at market commencement drove the existing requirement. In 2003, the IESO replaced its energy management system. The current system does not calculate transmission equipment thermal ratings but rather requires transmission equipment thermal ratings as an input. At the time of the system replacement, the IESO and market participants instituted the practice whereby the participant provided the thermal ratings for its transmission equipment to the IESO. The IESO then uses these ratings in its management of the reliable operation of the IESO-controlled grid. This practice has worked well since it was instituted. The market rules need to be amended to reflect the current practice.

Discussion

Reference 5 of Appendix 4.4 of the market rules currently require transmitters to provide the IESO with "Physical characteristics of conductors, transformers, breakers, disconnects, wavetraps and the like shall be provided so all ratings can be calculated under prevailing conditions." As noted above, the IESO would use this information to determine the thermal ratings of the transmission equipment. This requirement should be changed to reflect the current practice where market participants provide the

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thermal ratings to the IESO.

The proposed requirement, which is consistent with current actual practice, would be that market participants that own or operate transmission equipment would provide:

- The IESO with the continuous and limited time thermal ratings for their transmission circuits and transformers.
- This information to the IESO via a data link with a minimum update rate of 5 minutes or as agreed to by the IESO. For backup and pre-dispatch purposes, market participants shall provide a thermal rating table in a suitable format to facilitate IESO applications to perform thermal rating interpolation.
- where other equipment (e.g. wavetraps) is more limiting, market participants shall provide the IESO with the thermal rating of the most restrictive element.

Thermal ratings for both real-time and pre-dispatch purposes are required so that real-time and pre-dispatch schedules are developed respecting the applicable limits. Thermal ratings of the most restrictive element are required to ensure that the appropriate limit is used for the circuit or transformer in series with that restrictive element.

The obligation is proposed to apply to all market participants that own or operate transmission equipment not just those participants licenced as transmitters. The current market rules could be interpreted to imply that only licenced transmitters were to provide thermal rating information. This change is necessary as in Ontario there are generators and connected wholesale customers that are not licenced transmitters but which own or operate transmission equipment. The IESO may need to know the thermal ratings of such transmission equipment in order to maintain reliable operation of the IESO-controlled grid.

However it is recognized that the transmission equipment owned and operated by a market participant that is not a licenced transmitter is typically used solely by the market participant e.g. radial transmission circuit. In such cases, the IESO may not require the thermal ratings of this equipment to maintain the reliable operation of the IESO-controlled grid. To address this situation, the market rules propose to only require a generator or connected wholesale customer to provide the IESO with thermal rating information if the IESO requires it to maintain reliable operation of the grid. This condition is expected to result in a very limited number of generator or connected wholesale customers being obligated to provide the IESO with equipment thermal rating information.

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Appendix 4.4 – Transmitter Requirements

Ref	Item	Requirement
1	Abrupt Voltage Changes	Voltage changes shall not normally exceed 4% of steady state rms for capacitor switching operations. Voltage changes shall not normally exceed 10% of steady state rms for line switching operations
2	Frequency Variations	All equipment shall be capable of continuous operation within the range of 59.5 to 60.5 Hz and have the capability to operate for 10 minutes in the range 58 to 61.5 Hz.
3	Load Shedding Facilities	Each <i>transmitter</i> shall comply with IMO-IESO requirements for automatic under-frequency load shedding in accordance with its <i>operating agreement</i> . Each <i>transmitter</i> shall be able to manually drop up to 50% of its load within 10 minutes.
4	Automatic Reclosure	Transmission circuits shall be equipped with timed, single-shot automatic re-closing facilities. Reclosure shall only be initiated by protections that operate when it is highly likely that the fault is not permanent. Reclosure within 5 seconds of fault detection is allowed only in exceptional circumstances. Angle supervision shall be provided on all breakers rated at 230 kV and above. Automatic reclosure shall remain enabled only for a limited period of time, usually about 40 seconds, following initiation.
5	Thermal Characteristics/Ratings	<ul style="list-style-type: none"> • Market participants that own and operate transmission equipment shall provide the IESO with the continuous and limited time thermal ratings for their transmission circuits and transformers. • Market participants shall provide this information to the IESO via a data link with a minimum update rate of 5 minutes or as agreed to by the IESO. For backup and pre-dispatch purposes, market participants shall provide a thermal rating table in a suitable format to facilitate IESO applications to perform thermal rating interpolation. • Where other equipment (e.g. wavetraps) is more limiting, market participants shall provide the IESO with the thermal rating of the most restrictive element. • Generators and connected wholesale customers that own and operate transmission equipment that is part of the IESO-controlled grid shall provide the IESO with the continuous and limited time thermal ratings for their transmission circuits and transformers only if required by the IESO to maintain reliable operation of the IESO-controlled grid. Physical characteristics of conductors, transformers, breakers, disconnects, wavetraps and the like shall be provided so all ratings can be calculated under prevailing conditions.
6	Protective System Requirements	Protection systems shall be constructed and maintained in accordance with all applicable <i>reliability standards</i> .
7	IMO-IESO Information Requirements	The <i>transmitter</i> shall provide any information that the <i>IMO</i> deems necessary to direct the operation of the <i>IMO-controlled grid</i> . This Information, including, but not limited to, voltages, flows, and equipment status shall be telemetered continually to the IMO/IESO .
8	Voltage Reduction	<i>Transmitters</i> with the ability to regulate <i>distribution</i> voltages under load shall install and maintain facilities and equipment to provide <i>voltage reduction capability</i> .
9	Telecommunications	Communication channels shall have a level of reliability that is consistent with the required performance of the associated protection system. Telecommunications shall be designed to assure adequate signal transmission during transmission disturbances and may be provided with means to verify proper signal performance. Equipment may be monitored to assess its readiness and be powered by batteries or other sources independent of the IMO/IESO .
10	Testing and Compliance Monitoring	<i>Transmitters</i> shall test and maintain their equipment in accordance with all applicable <i>reliability standards</i> .
11	Metering	<i>Transmitters</i> shall comply with the metering codes and standards set by the IMO/IESO .



Market Rule Amendment Proposal

PART 1 – MARKET RULE INFORMATION

Identification No.:	MR-00293-R01		
Subject:	Transmitter Technical Requirements		
Title:	Transmission Equipment Thermal Ratings –Generic Information		
Nature of Proposal:	<input checked="" type="checkbox"/> Alteration	<input type="checkbox"/> Deletion	<input type="checkbox"/> Addition
Chapter:	4	Appendix:	4.5A
Sections:			
Sub-sections proposed for amending:			

PART 2 – PROPOSAL HISTORY – PLEASE REFER TO MR-00293-R00

Version	Reason for Issuing	Version Date
Approved Amendment Publication Date:		
Approved Amendment Effective Date:		

PART 3 – EXPLANATION FOR PROPOSED AMENDMENT

Provide a brief description of the following:

- The reason for the proposed amendment and the impact on the *IESO-administered markets* if the amendment is not made.
- Alternative solutions considered.
- The proposed amendment, how the amendment addresses the above reason and impact of the proposed amendment on the *IESO-administered markets*.

Summary

Please refer to MR-00293-R00.

This amendment proposes to change the market participant requirement under Appendix 4.5A to provide the IESO with transmission equipment thermal rating information. These changes would align the requirement with:

- the change in the IESO energy management system requirements as discussed in MR-00293-R00; and
- the IESO requirement for a different level of detail of information required for the two situations under which Appendix 4.5A applies.

These changes would clarify the market participant requirements and also align the market rules with the current practice.

Background

Please refer to MR-00293-R00.

Market participants are currently required to provide the IESO with the information listed in Appendix 4.5A when the participant is either:

- submitting a connection application for establishing a new or modified connection to the IESO-controlled grid (refer to existing section 6.1.6 of Chapter 4); or
- intending to place a connected facility in-service (refer to existing section 7.1.3 of Chapter 4).

With respect to equipment thermal rating information, Appendix 4.5A currently requires market participants to provide “Equipment parameters to enable continuous and limited time ratings to be calculated under prevailing and predicted conditions.”

The IESO requires different level of detailed thermal rating information for the two situations list above. For connection assessment purposes (contemplated under existing section 6.1.6 of Chapter 4), the IESO requires seasonal thermal rating information for connection study purposes i.e. winter and summer continuous and limited time thermal ratings as currently specified in Appendix 4.9. For grid operation purposes (contemplated under section 7.1.3 of Chapter4), the IESO requires more detailed and real-time thermal rating information as specified in Appendix 4.4.

Discussion

It is proposed to amend the market participant requirement in Appendix 4.5A to supply transmission equipment thermal rating information to reflect both the change in the IESO energy management

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system requirements and to reflect the IESO requirement for a different level of detail of information required as noted above in the Background.

When making a connection application, it is proposed that Appendix 4.5A require participants to provide the IESO with only winter and summer continuous and limited time thermal ratings as specified in Appendix 4.9.

Prior to placing a new or modified connected facility in-service, it is proposed that Appendix 4.5A require participants provide the IESO with the thermal rating information as specified in Appendix 4.4.

These changes will clarify the market participant requirements under the two different circumstances.

This amendment also proposes to clarify that these obligations apply to all market participants that own or operate transmission equipment, not just those participants that are licenced as transmitters for the reasons discussed in MR-00293-R00.

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Appendix 4.5A – Generic Information

Submission Date		
Identification	Identifier	
	Facility identifier	
Service Dates	Initial in-service:	
	Permanent in-service:	
	Permanent out-of-service:	
Protection System Description (all transmitters to provide, also generators and connected wholesale customers upon request)	<p>A functional description of all protective schemes shall be provided to allow a detailed analysis of all credible contingencies. These descriptions shall include, but are not limited to, the following: Operating times for protection components (e.g. primary relaying, auxiliary relaying, communication), General models for normal and delayed (breaker failure) fault clearing, and Exceptions to the general model (e.g. LEO, HIROP). For all recognized contingencies, the functional description must enable fault clearing times at all terminals to be determined for both normal and delayed clearing.</p>	
Parameters and practices for thermal limit calculations Thermal Ratings	<ul style="list-style-type: none"> For the purposes of making a connection application under section 6.1.6 of Chapter 4, a <i>connection applicant</i> shall provide the IESO with the transmission equipment thermal ratings as specified in Appendix 4.9. Prior to placing any new or modified <i>connected facility</i> in-service, a <i>market participant</i>, including <i>transmitters</i>, <i>generators</i> and <i>connected wholesale customers</i>, that own and operate transmission equipment associated with that <i>connected facility</i> shall provide the IESO with the equipment thermal ratings as specified in Appendix 4.4. Equipment parameters to enable continuous and limited time ratings to be calculated under prevailing and predicted conditions. All practices that could have a bearing on equipment operation shall be reported. These include but are not limited to the following: <ul style="list-style-type: none"> ferrous or non-ferrous connectors bolted or not bolted connections indoor or outdoor locations 	
Relay Information	Settings and characteristics to enable relay margin analysis of credible contingencies	
Detailed Single-Line	A detailed single-line diagram showing equipment and protection and telemetry points	
Test Results	Copies of all commission tests to all power system components	

Market participants and connection applicants also must provide nameplate data for equipment directly connected to the ~~IMO~~ IESO-controlled grid upon request.

PART 5 – IESO BOARD COMMENTS

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Market Rule Amendment Proposal

PART 1 – MARKET RULE INFORMATION

Identification No.:	MR-00293-R02		
Subject:	Transmitter Technical Requirements		
Title:	Transmission Equipment Thermal Ratings – Transmission Equipment Information		
Nature of Proposal:	<input checked="" type="checkbox"/> Alteration	<input type="checkbox"/> Deletion	<input type="checkbox"/> Addition
Chapter:	4	Appendix:	4.9
Sections:			
Sub-sections proposed for amending:			

PART 2 – PROPOSAL HISTORY – PLEASE REFER TO MR-00293-R00

Version	Reason for Issuing	Version Date
Approved Amendment Publication Date:		
Approved Amendment Effective Date:		

PART 3 – EXPLANATION FOR PROPOSED AMENDMENT

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- Alternative solutions considered.
- The proposed amendment, how the amendment addresses the above reason and impact of the proposed amendment on the *IESO-administered markets*.

Summary

Please refer to MR-00293-R00.

This amendment proposes to remove from the market rules, the list of detailed equipment information provided by market participants to the IESO for the purposes of thermal rating calculation. As the market participants are now providing the IESO with the thermal ratings directly, there is no longer a need for the participants to provide this detailed equipment information.

Background

Please refer to MR-00293-R00.

Discussion

Appendix 4.9 lists detailed transmission equipment information that market participants are required to provide to the IESO. The IESO used some of this information for determining thermal ratings of the transmission equipment. This information is no longer required by the IESO as market participants are now providing the IESO with the equipment thermal ratings. The obligation to provide this detailed information should be removed from the market rules.

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Appendix 4.9 – Transmission Facilities

Overhead Circuits (For each section)	Identifier			
	Terminal station(s)			
	Voltage (kV)			
	Length (km)			
	Conductor sheltering			
	Identifier(s) and length of circuit(s) on common towers			
	Positive sequence impedance (R, X, B)			
	Zero sequence impedance (Ro, Xo, Bo)			
	Winter (10°C) continuous and 15-minute limited time* thermal ratings			
	Summer (30°C) continuous and 15-minute limited time* thermal ratings			
Overhead Circuits (For each segment)	Identifier			
	Length (km)			
	Distance from the “from” terminal (km)			
	Maximum operating temperature (°C)			
	Phase conductor size (kcmil)			
	Phase conductor type (ASC, ACSR)*			
	Phase conductor stranding (# of Al strands/ # of Steel strands)			
	Phase conductors per bundle and spacing (m)			
	Geometry of all phase and sky wires for each tower type			
	Ground resistivity (ohms)			
	Skywire size (kcmil)			
	Skywire type (Alumoweld, EHS, HS)*			
	Skywire stranding (# of Al strands/ # of Steel strands)			
	Skywire number if more than one			
	Identifier and length of circuits sharing the same right of way			
Mutual impedance to other circuits (Z_{zero})				
Underground Circuits	Identifier			
	Complete steady state and dynamic electrical and physical parameters of conductors, insulators and surrounding material			
Buses	Identifier			
	Station			
	Maximum operating temperature (°C) Continuous current rating (amps)			
	Conductor size (kcmil) Conductor type (ASC, ACSR, Al tube)*			
Surge Arresters	Identifier			
	Station			
	Manufacturer and serial number			
	Voltage rating (kV)			
	Type (e.g. ZnO, SiC)			
	Class (e.g. secondary, distribution, intermediate, station)			
Switches	Identifier			
	Station			
	Manufacturer and serial number			
	Voltage rating (kV)			
	Type (e.g. disconnect, interrupt)			
	Continuous current rating (amps)			
Wavetraps	Identifier			
	Station			
	Manufacturer and serial number			
	Continuous current rating (amps)			
Current Transformers	Identifier			
	Station			
	Manufacturer and serial number			
	Continuous current rating (amps)			
DC Lines	Identifier			
	Complete steady state (loadflow) parameters and dynamic parameters			
FACTS Devices	Identifier			
	Complete steady state (loadflow) parameters and dynamic parameters			

[*If the conductor type is new then additional information may be requested. Limited time thermal ratings shall be 15-minute ratings or longer as agreed with the IESO.](#)

PART 5 – IESO BOARD COMMENTS

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Market Rule Amendment Proposal

PART 1 – MARKET RULE INFORMATION

Identification No.:	MR-00293-R03		
Subject:	Transmitter Technical Requirements		
Title:	Transmission Equipment Thermal Ratings – Security Limits		
Nature of Proposal:	<input checked="" type="checkbox"/> Alteration	<input type="checkbox"/> Deletion	<input type="checkbox"/> Addition
Chapter:	5	Appendix:	
Sections:	5.2		
Sub-sections proposed for amending:	5.2.5		

PART 2 – PROPOSAL HISTORY – PLEASE REFER TO MR-00293-R00

Version	Reason for Issuing	Version Date
Approved Amendment Publication Date:		
Approved Amendment Effective Date:		

PART 3 – EXPLANATION FOR PROPOSED AMENDMENT

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Summary

Please refer to MR-00293-R00.

This amendment, which is consequential to MR-00293-R00, proposes to align the market rules regarding operating security limits with the current practice of market participants providing the IESO with transmission equipment thermal rating information.

This amendment also proposes to replace all “IMO” references in the chapter 5 with “IESO”, in keeping with the organizational name changed legislated under Bill 100.

Background

Please refer to MR-00293-R00.

Discussion

Section 5.2.5 of Chapter 5 currently requires market participants to provide the IESO with information for the IESO to use for dynamic calculation of thermal ratings. This section also obligates the IESO to not operate the IESO-controlled grid so as to exceed these ratings.

This amendment would align this requirement with the current practice where the market participant provides the IESO with the thermal ratings directly. The obligation on the IESO not to operate the IESO-controlled grid so as to exceed these ratings would remain.

This amendment also proposes to clarify that:

- Market participants would only be obligated to provide thermal rating information regarding transmission equipment that is part of the IESO-controlled grid; and
- All market participants have this obligation, not just those that have a transmitter’s licence.

PART 4 – PROPOSED AMENDMENT

5.2 Security Limits

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5.2.5 Each *market participant* shall:

- establish thermal ratings for ~~ensure that~~ the equipment ~~which that~~ it owns and that is part of the IESO-controlled grid, ~~has established ratings~~ and
- ~~shall~~ provide such ratings (including continuous and limited time ratings) to the ~~IESO~~ IMO in a form suitable for ~~the dynamic calculation of ratings~~ IESO monitoring ~~(including continuous and limited time ratings)~~.

~~The~~ IMO ~~IESO~~ shall not deliberately operate or plan to operate equipment comprising the ~~IMO~~ IESO-controlled grid in excess of the thermal rating for such equipment as communicated to the ~~IMO~~ IESO by the relevant ~~transmitters~~ market participants.

PART 5 – IESO BOARD COMMENTS

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