

Comparison of Texas PUC and Minnesota Utilities Technical Interconnection

Texas		
Texas Code Reference	Functional Description	MN Utilities Filing Reference ¹

25.212 (a)	Purpose	
25.212 (a) (1)	<p>Conditional Authority (to operate) May operate 60 Hertz (Hz), three-phase or single-phase generating equipment, ... in parallel with the utility system pursuant to an interconnection agreement, provided that the equipment meets or exceeds the requirements of this section.</p>	
25.212 (a) (2)	<p>Special Requirements Specific interconnection locations and conditions may require the installation and use of more sophisticated protective devices and operating schemes.</p>	
25.212 (a) (3)	<p>Utility Notification of Special Requirements The utility may require additional devices and operating schemes, and make those additional requirements known at the time the interconnection studies are completed.</p>	
25.212 (a) (4)	<p>Mutually Agreed Changes The customer and utility may agree to different requirements, or a party may petition the commission for a good cause exception, after making every reasonable effort to resolve all issues between the parties.</p>	
25.212 (b)	General Interconnection and Protection Requirements	
25.212 (b) (1)	<p>Code Compliance Required Generation and interconnection installation must meet all applicable national, state, and local construction and safety codes.</p>	D4.5.G&H
25.212 (b) (2)	<p>Generator Shall Not be Connected to a De-energized Circuit Shall be equipped with protective hardware and software to prevent the generator from being connected to a utility de-energized circuit.</p>	D4.4.D; D4.9.3.ii
25.212 (b) (3)	<p>Generator Shall Not be Connected to an Abnormally Operating Utility Circuit Generator shall be equipped with protective hardware and software to prevent connection or parallel operation with the utility system unless the utility system service voltage and frequency is of normal magnitude.</p>	D4.5.F
25.212 (b) (4)	<p>Pre-Certified Equipment May be installed with an approved interconnection control and protection scheme without further review of their design by the utility. When exporting using pre-certified equipment, the protective settings and operations shall be utility specified.</p>	D4.8.V.1

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25.212 (b) (5)	Customer is Responsible for Protecting its Generating Equipment Customer's protective equipment shall prevent unnecessary tripping of the utility system breakers.	D4.5.F
25.212 (b) (6)	Communications Channel Facilities greater than two megawatts (MW) may require a customer provided communication channel between the utility and the customer's facility.	D4.12.4.i.1
25.212 (b) (7)	Adequate Interrupting Capability Circuit breakers or other interrupting devices must be capable of interrupting maximum available fault current. Facilities larger than two MW and exporting shall have a redundant circuit breaker unless listed device suitable for the rated application is used.	
25.212 (b) (8)	Manual, Accessible, Lockable Disconnect Required Customer will furnish and install a manual disconnect device that has a visual break, is accessible to the utility personnel, and capable of being locked in the open position. Customer shall follow the utility's switching, clearance, tagging, and lockout procedures.	D4.8.2.v.2; D4.9.3.A.i
25.212 (c)	Prevention of Interference Customer's generator shall meet the following criteria:	
25.212 (c) (1)	Voltage The customer will operate its generating equipment in such a manner that the voltage levels on the utility system are in the same range as if the generating equipment were not connected to the utility's system. The customer shall provide an automatic method of disconnecting the generating equipment if: a voltage deviation in excess of +5.0 % or – 10% from nominal voltage persists for more than 30 seconds, deviation in excess of +10% or –30% from nominal voltage persists for more than ten cycles. Customer may reconnect when utility system voltage and frequency return to normal range and the system is stabilized.	D4.10.3.B.ii.a
25.212 (c) (2)	Flicker Customer's equipment shall not cause excessive voltage flicker of 3.0% or greater.	D4.11.3.B.ii.d
25.212 (c) (3)	Frequency Customer's generating equipment shall not deviate more than +0.5 Hertz (Hz) or –0.7 Hz from a 60 Hz base. Customer shall automatically disconnect within 15 cycles if this frequency tolerance cannot be maintained. Customer may reconnect when voltage and frequency return to normal range and the system is stabilized.	D4.10.3.B.ii.b

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25.212 (c) (4)	<p>Harmonics</p> <p>Total harmonic distortion (THD) voltage shall not exceed 5.0% of the fundamental 60 Hz frequency nor 3.0% of the fundamental frequency for any individual harmonic.</p>	D4.10.3.B.ii.c
25.212 (c) (5)	<p>Fault and Line Clearing</p> <p>Customer shall automatically disconnect within ten cycles if the voltage on one or more phases falls below - 30% of nominal voltage. This disconnect timing also ensures that the generator is disconnected prior to automatic re-close of utility breakers. Customer may reconnect when voltage and frequency return to normal range and the system is stabilized. With the utility's approval, may employ a relay scheme with delayed tripping or blocking between customer and company.</p>	D4.11.3.B.ii.e; D4.11.3.B.iii
25.212 (d)	<p>Control, Protection and Safety Equipment Requirements Specific to Single Phase Generators of 50 kilowatts (kW) or Less Connected to the Utility's System</p> <p>Exporting may require additional operational or protection devices, will require coordination of operations with the host utility. Necessary equipment include an interconnect disconnect device, a generator disconnect device, an over-voltage trip, an under-voltage trip, an over/under frequency trip, and a synchronizing check.</p>	D4.14.5 all
25.212 (e)	<p>Control, protection and safety equipment requirements specific to three-phase synchronous generators, induction generators, and inverter systems.</p> <p>Exporting may require additional operational or protection devices and will require coordination of operations with the utility.</p>	D4.14.5 all
25.212 (e) (1)	<p>Three Phase Synchronous Generators</p> <p>Generator circuit breakers and three-phase devices with electronic or electromechanical control. Customer is solely responsible for properly synchronizing its generator with the utility. Excitation system response ratio shall not be less than 0.5. Generator's excitation system(s) shall conform, as near as reasonably achievable, to the field voltage versus time criteria specified in American National Standards Institute Standard C50.13-1989 in order to permit adequate field forcing during transient conditions. For generating systems greater than two MW the customer shall maintain the automatic voltage regulator (AVR) of each generating unit in service and operable at all times. If the AVR is removed from service for maintenance or repair, the utility's dispatching office shall be notified.</p>	

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25.212 (e) (2)	<p>Three-Phase Induction Generators and Inverter Systems Induction generation may be connected and brought up to synchronous speed (as an induction motor) if the initial voltage drop measured on the utility system is within the visible flicker standard. Otherwise, the customer may be required to install hardware or employ other techniques to bring voltage fluctuations to acceptable levels. Line-commutated inverters do not require synchronizing equipment. Self-commutated inverters shall be used in parallel with the utility system only with synchronizing equipment. Direct-current generation shall not be operated in parallel with the utility system.</p>	
25.212 (e) (3)	<p>Protective Function Requirements The protective function requirements for three phase facilities of different size and technology are:</p>	
25.212 (e) (3) (A)	<p>Ten kilowatts (kW) or less An interconnect disconnect device, a generator disconnect device, an over-voltage trip, an under-voltage trip, an over/under frequency trip, and a manual or automatic synchronizing check.</p>	D4.14.5 all
25.212 (e) (3) (B)	<p>Facilities of 10 kW but Not More Than 500 kW An interconnect disconnect device, generator disconnect device, overvoltage trip, under-voltage trip, over/under frequency trip, manual or automatic synchronizing check, either a ground over-voltage trip or a ground over-current trip, reverse power sensing if the facility is not exporting.</p>	D4.14.5 all
25.212 (e) (3) (C)	<p>Facilities More than 500 kW but Not More than 2,000 kW An interconnect disconnect device, a generator disconnect device, overvoltage trip, under-voltage trip, over/under frequency trip, either a ground over-voltage trip or a ground over-current trip, automatic synchronizing check, reverse power sensing if the facility is not exporting.</p>	D4.14.5 all
25.212 (e) (3) (D)	<p>Facilities More than 2,000 kW but Not More than 10,000 kW An interconnect disconnect device, a generator disconnect device, over-voltage trip, under-voltage trip, over/under frequency trip, either a ground over-voltage trip or a ground over-current trip, automatic synchronizing check and AVR stand alone capability, reverse power sensing if the facility is not exporting. A telemetry/transfer trip may also be required by the company.</p>	D4.14.5 all
25.212 (f)	<p>Facilities Not Identified For a specific unit or facility are not set out in this section, the company and customer may interconnect a facility using mutually agreed upon technical standards.</p>	

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25.212 (g)	<p>Requirements Specific to a Facility Paralleling for Sixty Cycles or Less (closed transition switching). An interconnect disconnect device, a generator disconnect device, an automatic synchronizing check for generators with stand alone capability, an over-voltage trip, an under-voltage trip, an over/under frequency trip, and either a ground over-voltage trip or a ground over-current trip.</p>	D4.14.5 all
25.212 (h)	<p>Inspection and Start-up Testing Customer shall provide notice at least two weeks before the initial energizing and start-up testing the utility may witness the testing customer shall revise and resubmit the application with information reflecting any proposed modification that may affect the safe and reliable operation of the utility system.</p>	D4.18.7.B
25.212 (i)	<p>Site Testing and Commissioning Testing protection systems shall include procedures to functionally test all protective elements of the system up to and including tripping of the generator and interconnection point. Testing will verify all protective set points and relay/breaker trip timing. The utility may witness the testing of installed switchgear, protection systems, and generator. The customer is responsible for routine maintenance of the generator and control and protective equipment. The customer will maintain records of such maintenance activities, which the utility may review. For generation systems greater than 500 kW, a log of generator operations shall be kept. The log shall include the date, generator time on, and generator time off, and megawatt and megavar output. The utility may review such logs at reasonable times.</p>	D4.18.7.B
25.212 (j)	<p>Metering The utility may supply, own, and maintain all necessary meters and associated equipment to record energy purchases and energy exports. Customer shall supply at no cost to the utility a suitable location on its premises for the utility's meters and other equipment. If metering at the generator is required in such applications, metering that is part of the generator control package will be considered sufficient if it meets all the measurements criteria that would be required by a separate stand alone meter.</p>	D4.12.4 all

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in Requirements
Comments

1) This language describes the purpose and application of the "Technical Requirements" and will undoubtedly be part of the final codified requirements in MN. The MN utilities are not proposing this at this time, although they are also not in disagreement with it.

See 1) above

See 1) above

See 1) above

in Requirements
Comments

The MN utilities do not have a similar provision other than the reference to meeting all applicable codes.

in Requirements
Comments

in Requirements
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all

There is no counterpart to this requirement in the MN rules.

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n Requirements
Comments

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