






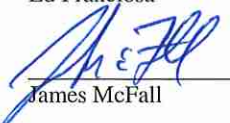
<p>ELECTRIC RESOURCES DIVISION TRANSMISSION & DISTRIBUTION DIVISION</p>	<p>SUBJECT Technical Facility Interconnection Requirements</p>
--	---

OPERATING BULLETIN NO. 56

**TECHNICAL FACILITY INTERCONNECTION
REQUIREMENTS**

REWRITE: December 1, 2018
REWRITE: June 17, 2009
Effective: April 14, 2008

APPROVED BY:


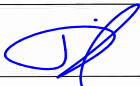


<u>Signature</u>	<u>Title</u>	<u>Date</u>
 _____ David Olivares	Electric Resources Engineer	<u>11/21/18</u>
 _____ Martin Caballero	Resource Planning & Development Manager	<u>11/21/18</u>
 _____ Manjit Sekhon	Electrical Engineering Manager	<u>11/27/18</u>
 _____ Esteban Martinez	Electrical Engineering Manager	<u>11/29/2018</u>
 _____ Ed Franciosa	AGM, Transmission & Distribution	<u>12-5-18</u>
 _____ James McFall	AGM, Electric Resources	<u>12-5-2018</u>

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

REVISION APPROVALS

Rev. No.	Approvals	Date
1	 MC MS PM EF JM	12/1/2019
2	 MC MS CE PM JM	11/20/2020
3	 MC MS PM EF JM	11/1/2021
4	 MC SP JR PM JM	11/1/2022
5		
6		
7		
8		
9		

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

REVISIONS

Rev. No.	Date	Section/Description
4	11/1/2022	Annual Review: Updated references to retired OBs and replaced with the relevant SOPs throughout, including in reference table in Section 7.1.
3	11/1/2021	Annual Review: Updated Table 7.2- FAC-001-3, R3.3 and R4.3 based on errata adopted in FERC Docket RD21-3-000 (Feb. 19, 2021). Also updated Section 3.2.1.1 and 7.1 to include OB 46 updated title.
2	11/20/2020	Annual Review. Updated Section 3.2.1.1 and 7.1 to include OB 48 updated title.
1	12/1/2019	Previously referenced OB 48; added it into Section 3.2.1.1. In addition, included a reference to OB 110, System Operating Limits for the Planning Horizon in Section 3.2.1.4.7 and in the reference table, as well as other minor editorial changes in Section 3.10.
Rewrite	12/1/2018	Modified to reflect the new FAC-001-3 requirements; modified the title and applicability section to clarify that the requirements will also be used as guidance for interconnection requests that are not part of the Bulk Electric System; added the definition of Sub-transmission System to facilitate making the document generally applicable to all interconnection requests below the Bulk Electric System level; clarified that Distribution System level interconnection request requirements are addressed in MID's Electric Service Rule No. 21.

TABLE OF CONTENTS

1 Applicability and Availability1

2 Definitions2

3 General Requirements for Interconnection Customer Generator Facility, Interconnection Customer Transmission Facilities, Interconnection Customer End-Use Facilities, and Interconnection Customer Interconnection Facilities7

 3.1 Application for Interconnection7

 3.2 Interconnection System Impact Study and Interconnection Facilities Study8

 3.3 Procedures for Notification of New or Materially Modified Facilities to Others (those responsible for the reliability of the interconnected transmission systems) as soon as feasible.....14

 3.4 Facilities Owned and/or Operated by MID.....14

 3.5 Grounding15

 3.6 Insulation and Insulation Coordination.....15

 3.7 Testing and Inspection15

 3.8 Metering17

 3.9 Communications17

 3.10 Operations18

4 System Protection and Other Control Requirements21

 4.1 System Protection Facilities.....21

 4.2 System Protection Testing21

 4.3 Requirements for Protection22

 4.4 Power Quality22

 4.5 Switching and Tagging Rules, and Applicable Operating Procedures23

 4.6 Disturbance Analysis Data Exchange.....23

 4.7 Maintenance23

 4.8 Coordination23

 4.9 Secondary Systems24

 4.10 Emergencies24

5 Requirements Specific to Interconnection Customer Generating Facility27

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

5.1 Power System Stabilizers.....27

5.2 WECC27

5.3 Pre-Commercial Generator Testing27

5.4 Post-Commercial Generator Testing.....28

5.5 Generator Operations28

5.6 Start-Up and Synchronization.....28

5.7 Reactive Power29

5.8 Governors and Regulators.....30

5.9 Under-Frequency and Over Frequency Conditions31

5.10 Requirements for Generator Protection32

6 Requirements Specific to Interconnection Customer End-Use Facilities.....32

7 References.....32

7.1 Referenced MID Documents32

7.2 NERC Reliability Standards34

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

1 Applicability and Availability

- 1.1 The Modesto Irrigation District (MID) Facility Connection Requirements have been developed and implemented to comply with the North American Electric Reliability Corporation (NERC) Standard FAC-001-3 – Facility Connection Requirements. These requirements are to ensure compliance with NERC Reliability Standards and applicable Western Electricity Coordinating Council (WECC), Subregional, Power Pool, and MID’s planning criteria and facility connection requirements. MID’s connection requirements address connection requirements for Generation facilities, Transmission facilities, and End-user facilities. For purposes of satisfying NERC standards, these requirements are considered to be the minimum requirements to be used as a guide in processing Bulk Electric System interconnection requests to MID. These requirements also provide guidance for processing interconnection requests to MID’s electric system at the Sub-transmission System level. There may be additional requirements depending on the location and characteristics of the proposed interconnection facility and those requirements will be addressed on a case by case basis. Interconnection request requirements on the MID Distribution System are addressed in MID Electric Service Rule No. 21. Upon review of the technical requirements of an interconnection request, MID will have the discretion to determine which study review process will be applicable. The implementation of requirements covered by this Operating Bulletin No. 56 shall be the responsibility of the Resource Planning and Development Manager, or his designee, within the Resource Planning and Development Department.
- 1.2 It is further understood that an Interconnection Customer shall not provide interconnection to any third party via the Interconnection Customer's facilities without studies undertaken, in accordance with requirements identified in this Operating Bulletin No. 56 and coordinated with MID. Existing Interconnection Customers shall be required to, within 45 days of having an executed agreement with MID, conduct a study and coordinate with its Transmission Planner and Planning Coordinator on the reliability impact of interconnecting a third party Facility to its existing Facility, document and publish Facility connection requirements to ensure compliance with NERC reliability standards and applicable regional entity, subregional and MID planning criteria and Facility connection requirements.
- 1.3 Evaluation of the impacts posed by any proposed interconnection of Generation, Transmission, and/or End-user facilities to the MID's Bulk Electric System shall be consistent with and incorporate transmission planning methodologies that MID uses in the preparation of its MID NERC/WECC Transmission Annual Assessment (Annual Assessment). The Annual Assessment contains a written summary of MID's plans to achieve the required system performance as described

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 1
---	-----------------------------	--	------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

above throughout the planning horizon in Section 1, "Summary of Results" of the Annual Assessment, the most recent of which shall be made available within five (5) business days upon request.

- 1.4 It is intended that this document shall supersede all previous versions and may change as needed in order to meet all the requirements for NERC Reliability Standards.
- 1.5 This document shall be made available upon request (within five business days) to the users and/or potential users of the MID Transmission System, WECC, and NERC. In addition, this document shall be published on the MID website.

2 Definitions

Adverse System Impact shall mean the negative effects due to technical or operational limits on conductors or equipment being exceeded that may compromise the safety and reliability of the electric system.

Affected System shall mean an electric system other than MID’s Transmission System that may be affected by the proposed interconnection.

Affected System Operator shall mean the entity that operates an Affected System.

Affected System Owner shall mean the entity that owns an Affected System.

Applicable Laws and Regulations shall mean all duly promulgated applicable federal, state and local laws, regulations, rules, ordinances, codes, decrees, judgments, directives, or judicial or administrative orders, permits and other duly authorized actions of any Governmental Authority.

Balancing Authority shall mean the responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a Balancing Authority Area, and supports interconnection frequency in real time.

Balancing Authority Area shall mean the collection of generation, transmission, and loads within the metered boundaries of the Balancing Authority. The Balancing Authority maintains load-resource balance within this area.

Base Case shall mean the mathematical model of the electrical system that represents a snap-shot in time of system conditions within the WECC interconnection. Information obtained from the Base Case includes power flow, short circuit, and stability data bases used for the Interconnection Studies by MID.

Bulk Electric System shall have the same meaning as defined by NERC.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 2
---	-----------------------------	--	------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

Commercial Operation Date of a unit shall mean the date on which Interconnection Customer commences commercial operation of the unit at the Interconnection Customer Generating Facility after Trial Operation of such unit has been completed as confirmed in writing.

Distribution System shall mean all MID-owned facilities that are operated below the Sub-transmission System voltage level.

Emergency Condition shall mean a condition or situation: (1) that in the judgment of the Party making the claim is imminently likely to endanger life or property; or (2) that, in the case of MID, is imminently likely to cause a material adverse effect on the security of, or exceed the normal rating of an element in MID’s Transmission System, MID’s Interconnection Facilities or the electric systems of others to which MID’s Transmission System is directly connected; or (3) that, in the case of Interconnection Customer, is imminently likely to cause a material adverse effect on the security of, or damage to, the Interconnection Customer Generating Facility or Interconnection Customer’s Interconnection Facilities.

FERC shall mean the Federal Energy Regulatory Commission of the United States.

Good Utility Practice shall mean any of the practices, methods and acts engaged in or approved by a significant portion of the electric industry during the relevant time period, or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in the region, and in accordance with WECC and NERC.

Governmental Authority shall mean any federal, state, local or other governmental regulatory or administrative agency, court, commission, department, board, or other governmental subdivision, legislature, rulemaking board, tribunal, or other governmental authority having jurisdiction over the Parties, their respective facilities, or the respective services they provide, and exercising or entitled to exercise any administrative, executive, police, or taxing authority or power; provided, however, that such term does not include Interconnection Customer, MID, or any Affiliate thereof.

Initial Synchronization Date shall mean the date upon which the Generating Facility is initially synchronized and upon which Trial Operation begins.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 3
---	-----------------------------	--	------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

In-Service Date shall mean the date upon which the Interconnection Customer reasonably expects it will be ready to begin use of MID’s Interconnection Facilities to obtain back-feed/station service power from MID.

Interconnection Customer (IC) shall mean any entity that proposes to interconnect its Generating, Transmission, or End-User Facility with MID’s Transmission System.

Interconnection Customer End-Use Facilities shall mean all customer facilities located beyond the Interconnection Customer Interconnection Facilities that are not defined as either a Generating Facility or Interconnection Transmission Facility. Such facilities include, but are not limited to, those used for delivery of electrical energy to serve Interconnection Customer load.

Interconnection Customer Generating Facility shall mean Interconnection Customer’s device for the production of electricity identified in the Interconnection Request.

Interconnection Customer Generating Facility Capacity shall mean the net capacity of the Generating Facility and the aggregate net capacity of the Generating Facility where it includes multiple energy production devices.

Interconnection Customer Interconnection Facilities shall mean all facilities and equipment of the Interconnection Customer that are located between the Interconnection Customer End-Use or Generating Facility and the Point of Change of Ownership, including any modification, addition, or upgrades to such facilities and equipment necessary to physically and electrically interconnect the Interconnection Customer End-Use or Generating Facility to MID’s Transmission System. Interconnection Customer’s Interconnection Facilities are sole use facilities.

Interconnection Customer Transmission Facilities shall mean all Customer-owned facilities that are located beyond the Interconnection Customer’s Interconnection Facilities, and meet any of the following criteria: (1) The facilities are determined to be part of the Bulk Electric System, (2) MID determines that the facilities could potentially impact the Bulk Electric System, or (3) The facilities are directly connected to MID’s Sub-transmission System.

Interconnection Facilities shall mean MID’s Interconnection Facilities and the Interconnection Customer’s Interconnection Facilities. Collectively, Interconnection Facilities include all facilities and equipment between the Interconnection Customer End-Use or Generating Facility and the Point of Interconnection, including any modification, additions or upgrades that are necessary to physically and electrically interconnect the Interconnection Customer End-Use or Generating Facility to MID’s Transmission System.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 4
---	-----------------------------	--	------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

Interconnection Facilities Study shall mean an engineering study that gives a description and non-binding, good faith estimated cost of facilities required to interconnect the Interconnection Customer End-Use or Generating Facility to MID’s Transmission System and to address the identified short circuit, instability, and power flow issues identified in the System Impact Study.

Interconnection System Impact Study shall mean an engineering study that evaluates the impact of the proposed interconnection on the safety and reliability of MID’s Transmission System and, if applicable, an Affected System. The study shall identify and detail the system impacts that would result if the Interconnection Customer Generating Facility were interconnected without project modifications or system modifications.

Metering Equipment shall mean all metering equipment installed or to be installed at the Interconnection Customer Generating Facility at the metering points, including but not limited to instrument transformers, MWh meters, MVh meters, data acquisition equipment, transducers, remote terminal unit, telecommunications equipment, phone lines, and fiber optics.

MID Interconnection Facilities shall mean all facilities and equipment owned, controlled, or operated by MID from the Point of Change of Ownership to the Point of Interconnection including any modifications, additions or upgrades to such facilities and equipment.

NERC shall mean the North American Electric Reliability Corporation or its successor organization. NERC is the Electric Reliability Organization for the United States as defined in Section 215 of the Federal Power Act, certified by the FERC.

Network Upgrades shall mean the additions, modifications, and upgrades to MID’s facilities that are integrated and support MID’s overall Transmission System or Distribution System for the general benefit of all users of those systems.

Party or Parties shall mean MID, Interconnection Customer or any combination of the above.

Planning Coordinator shall mean the responsible entity that coordinates and integrates transmission facility and service plans, resource plans, and protection systems.

Point of Change of Ownership shall mean the point where the Interconnection Customer’s Interconnection Facilities connect to MID’s Interconnection Facilities.

Point of Interconnection shall mean the point where the Interconnection Facilities connect to MID’s Transmission System.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 5
---	-----------------------------	--	------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

Regional Reliability Organization shall mean the entity defined under Section 215 of the Federal Power Act with rights and obligations as set out in an agreement with NERC. The WECC is currently the Regional Reliability Organization.

Reliability Standards shall mean the requirements, recommendations, and guidelines of NERC, WECC, and the Balancing Authority Area of the Transmission System to which the Interconnection Customer Generating Facility is directly interconnected.

Sub-transmission System shall mean all MID-owned facilities that are operated at voltages below 100 kV, but at or above 69 kV.

System Operating Limit Methodology means the transmission planning and evaluation of MID’s System Operating Limit as defined by NERC using NERC/WECC transmission planning and operations standards criteria.

System Protection Facilities shall mean the equipment, including necessary protection signal telecommunications equipment, required to protect (1) MID’s facilities from faults or other electrical disturbances occurring at the Interconnection Customer Generating Facility and (2) the Interconnection Customer Generating Facility from faults or other electrical system disturbances occurring on MID’s Transmission System or on other delivery systems or other generating systems to which MID’s Transmission System is directly connected.

Transmission System shall mean all MID-owned facilities that are determined to be part of the Bulk Electric System or that MID determines could potentially impact the Bulk Electric System. These facilities shall also include those facilities that are part of MID’s Sub-transmission System.

Trial Operation shall mean the period during which Interconnection Customer is engaged in on-site test operations and commissioning of the Interconnection Customer Generating Facility prior to commercial operation.

Variable Renewable Generation (VRG) shall mean a generation facility using variable, renewable energy as input energy to the electrical generation process, and where the electrical output can vary due to the variation in renewable input energy.

WECC shall mean Western Electricity Coordinating Council or its successor.

WECC Three-Phase Rating Process shall mean the path rating process outlined in the most recent “Project Coordination and Path Rating Process” document published by WECC.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 6
---	-----------------------------	--	------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

3 General Requirements for Interconnection Customer Generator Facility, Interconnection Customer Transmission Facilities, Interconnection Customer End-Use Facilities, and Interconnection Customer Interconnection Facilities

3.1 Application for Interconnection

- 3.1.1 The Interconnection Customer shall make request for interconnection in accordance with FERC Large Generator Interconnection Procedure (LGIP), the FERC Small Generator Interconnection Procedure (SGIP), and MID procedures, as applicable. These procedures define the necessary documents and fees required during the interconnection request process, and time lines for accomplishment of the procedures outlined herein.
- 3.1.2 In accordance with the interconnection application process identified in this Section 3.1, information provided by Interconnection Customer shall provide all technical details of proposed facilities at the point of interconnection including but not limited to location, type of facilities (e.g. generator, load) MW and MVAR maximum demand or generation, voltage level, protective relays, breaker sizes and interrupting duties, generator data (e.g. transient/sub transient reactance and General Electric Power System Load Flow (GE PSLF) modeling data for prime mover, governor, exciter/voltage regulator, generator, and power system stabilizer), transformer data (impedance), switch/breaker locations and sizes, one-line electrical diagram, relay protection/control diagram, physical layout drawing. All drawings are to be stamped by a Registered Professional Engineer licensed in the State of California appropriate for the engineering activity described by the drawing.
- 3.1.3 It is the responsibility of the Interconnection Customer to make appropriate arrangements with a Balancing Authority to ensure that its proposed facilities are located within the boundaries of a Balancing Authority. During the Interconnection Facilities Study process MID shall seek to confirm that provisions with a Balancing Authority have been made to operate within its metered boundary.
- 3.1.4 MID shall review customer-provided information and request additional information from customer if applicable.
- 3.1.5 Throughout the Interconnection Study processes, the Customer shall provide additional information as requested by MID.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 7
---	-----------------------------	--	------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

3.2 Interconnection System Impact Study and Interconnection Facilities Study

3.2.1 Interconnection System Impact Study and resulting written summary report

3.2.1.1 General: An Interconnection System Impact Study and resulting summary report for proposed, new or modified interconnections shall be conducted that consists of short circuit/fault duty, steady state (thermal and voltage), stability analyses, protection studies, and studies to gauge the potential impacts to MID system operations, power quality impacts, and control. The short circuit/fault duty analysis shall identify direct Interconnection Facilities required and the Network Upgrades necessary to address short circuit issues associated with the Interconnection Facilities. The stability and steady state studies shall identify necessary upgrades to allow planned operating limits of customer facilities without exceeding any MID facility ratings or system operating voltage criteria. The following Operating Bulletins (OBs) and Standard Operating Procedures (SOPs) describe key criteria to be used in the study: OB 47, Electrical System Transmission Planning Policies and Procedures; OB 48, Bulk Electric System Transmission Facility Ratings; OB 51, Facilities Rating Methodology; and OB 54, Protection of the Bulk Electric System. The Interconnection System Impact Study shall also identify operating limits of customer facilities when no Network Upgrades are added and MID facility ratings are not exceeded. Additionally, the operational impacts of Interconnection Customer’s proposed interconnection shall also be studied in accordance with the following MID Operating Bulletins to determine if any additional operational procedures are required: SOP ER-OPS-PS-102, Operating Procedures for Outage Coordination; OB 49, Transmission Protection System Maintenance Program.

3.2.1.2 The customer's proposed interconnection shall be studied with MID's Transmission System at peak and minimum load for both current year and future years within a ten-year planning horizon, under a variety of seasons and severely stressed conditions anticipated by MID to be critical, to determine whether the customer's proposed facilities are

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

consistent with MID's reliability criteria and procedures. The proposed interconnection with proposed Network Upgrades must also be consistent with WECC and NERC reliability criteria for all years studied within the operating and planning horizons.

- 3.2.1.3 MID shall coordinate the conduct of the studies required to also determine the impact of the interconnection request on Affected Systems with Affected System Owners and Operators. Affected System Owners and Operators shall be notified and invited to participate with respect to the System Impact Study within fourteen (14) days of MID's determination of a potential impact to an Affected System. This notification shall include the location, voltage level, MW, and MVAR capacity or demand of the proposed Interconnection Facilities. Affected System Owners and Operators shall also be invited to notify their respective Planning Coordinator of a potential system impact. The Interconnection Customer shall cooperate with MID in all matters related to the conduct of studies and the determination of modifications to Affected Systems.
- 3.2.1.4 The Interconnection System Impact Study report shall provide the following information:
 - 3.2.1.4.1 Identification of any circuit breaker short circuit capability or surge protection limits exceeded as a result of the interconnection;
 - 3.2.1.4.2 Identification of any changes required to maintain proper system protection and coordination of protection relays and devices;
 - 3.2.1.4.3 Identification of any special metering, data network or telecommunications required as the result of the interconnection;
 - 3.2.1.4.4 Identification of any special grounding or safety issues that require resolution as the result of the interconnection;

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

- 3.2.1.4.5 Identification of any physical location, electrical conductor separation, insulation or insulation coordination issues requiring resolution as the result of the interconnection;
- 3.2.1.4.6 Identification of any thermal overload, voltage limit, reactive power or power factor control violations resulting from the interconnection;
- 3.2.1.4.7 Identification of impacts to MID’s import limit (SOP ER-OPS-112, Transmission Operating Plan, and OB 110, System Operating Limits for the Planning Horizon);
- 3.2.1.4.8 Identification of any power quality impacts, instability or inadequately damped response to system disturbances resulting from the interconnection;
- 3.2.1.4.9 Identification of any equipment ratings anticipated to be exceeded as the result of the interconnection;
- 3.2.1.4.10 Identification of any special requirements or equipment to ensure safe synchronizing of interconnection and interconnection customer's facilities with the MID Transmission System;
- 3.2.1.4.11 Identification of particular operational issues (to preclude or arrest abnormal frequency or voltage), maintenance, and inspection coordination requirements as the result of the interconnection;
- 3.2.1.4.12 Identification of communications and procedures required during normal and emergency operating conditions resulting from interconnection.

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

- 3.2.2 Procedures for Conducting Coordinated Joint Interconnection System Impact Studies of New Facilities and Their Impacts on the Interconnected Transmission Systems.
 - 3.2.2.1 Step 1: MID shall review Interconnection Customer-provided information and request additional information from customer if applicable.
 - 3.2.2.2 Step 2: The Interconnection Customer shall provide additional information requested by MID.
 - 3.2.2.3 Step 3: MID shall conduct a preliminary system impact study using NERC/WECC transmission planning standards and the System Operating Limit (SOL) methodology for MID's Transmission System, and will determine if any of the following conditions occur on potentially Affected Systems interconnected to MID's Transmission System within MID's transmission planning horizon:
 - 3.2.2.3.1 The customer facility causes a NERC/WECC violation that didn't previously exist.
 - 3.2.2.3.2 A NERC voltage violation at a bus directly results from the addition of the proposed customer facility, or if a voltage violation is projected to exist at a bus within MID's 10-year transmission planning horizon and the addition of the customer facility accelerates the presence of the projected voltage violation requiring sooner and/or greater levels of mitigation by MID.
 - 3.2.2.3.3 The customer facility causes the fault duty rating on any transmission circuit breaker to exceed 100% of that transmission breaker's interrupting capability rating or to exceed 100% of the momentary Ampacity rating of any transmission disconnect switch or connection component.
 - 3.2.2.3.4 Customer facility surge protection matches MID's system at point of interconnection.

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

- 3.2.2.3.5 Interconnection of customer facility will require detailed review of both customer and/or MID system protection related devices and settings in order to maintain coordinated protection operation.
- 3.2.2.3.6 Customer facility will require review of proposed facilities in light of existing MID metering, data network and/or telecommunications facilities.
- 3.2.2.3.7 Customer facility does not conform to MID grounding or safety requirements, or not in conformance with applicable IEEE-80 or any superseding industry standard specifications, or requires additional study to ensure a safe installation.
- 3.2.2.3.8 Customer facility physical location, electrical conductor separation, or equipment insulation level rating does not conform with that of MID system at point of interconnection.
- 3.2.2.3.9 Customer facility equipment rating does not provide adequate voltage, reactive or power factor control for MID's electric system, or introduces a special operating consideration that must be studied further.
- 3.2.2.3.10 Customer facility introduces power quality impacts (voltage flicker, undesired frequencies) concerns that could possibly adversely impact other MID customers and other Affected Systems.
- 3.2.2.3.11 Customer facility, when interconnected, has equipment ratings exceeded within facility or causes ratings of MID equipment or facilities to be exceeded.
- 3.2.2.3.12 Customer facility requires considerations for synchronizing with MID facilities.

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

- 3.2.2.3.13 Customer facility will require operational, maintenance or inspection coordination in order to avoid any adverse or abnormal operating conditions on MID's Transmission System.
- 3.2.2.3.14 Customer facility will require specific communications and/or procedures coordinated with MID during normal and/or emergency operating conditions.
- 3.2.2.4 Step 4: If the above conditions don't occur go to Step 6.

If any of the above conditions exists, MID shall inform the customer of this condition. In addition, the Transmission Owner and Transmission Operator whose facility experienced this condition shall be invited to become a participant in the Interconnection System Impact Study within 14 days of determination of a condition noted above and shall be invited to notify their respective Planning Coordinator. The customer information obtained and reviewed in Step 1 and Step 2 shall be provided to all study participants.
- 3.2.2.5 Step 5: Alternatives for eliminating the above conditions shall be developed jointly with the owner of the proposed customer facilities, MID, and the impacted adjacent Transmission Operator and Transmission Owner. If necessary, MID, the customer, and all interested Transmission Owners and Transmission Operators shall comply with the WECC Three-Phase Rating Process, as applicable.
- 3.2.2.6 Step 6: A written draft study report summarizing the pre-project and post-project system conditions, as well as alternatives to achieve the desired system performance and eliminating the adverse conditions identified in Step 4 above shall be drafted by MID and routed to study participants for comment.
- 3.2.2.7 Step 7: Final study report shall be issued to all study participants after considering comments from study participants. The final study report shall be retained for no

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

less than three (3) years from its date of publication, and also be made available within 30 calendar days to NERC or WECC if so requested.

3.2.3 Interconnection Facilities Study

If the Interconnection Customer wishes to continue past the System Impact Study, an Interconnection Facilities Study shall be conducted. This study shall give a description and non-binding, good faith estimated cost of facilities with the associated equipment ratings required to interconnect the customer facilities to the Transmission System and to address the identified short circuit, protection, instability, and steady state power flow issues identified in the System Impact Study, and the voltage level, MW and MVAR capacity or demand required at the Point of Interconnection.

3.3 Procedures for Notification of New or Materially Modified Facilities to Others (those responsible for the reliability of the interconnected transmission systems) as soon as feasible

If it has been determined through joint studies with neighboring Transmission Owners and Operators that the Interconnection Facilities shall have an impact on neighboring transmission owners and operators, then MID shall notify neighboring Transmission Owners and Operators of the schedule for installing the required upgrades and Interconnection Facilities. While neighboring Transmission Owners and Operators will have been included in communications during the Interconnection System Impact Study process, additional notification shall take place within two weeks after the Interconnection Customer signs all required agreements with MID and pays all required fees and charges as determined by MID. These Transmission Owners and Operators shall be given annual updates and shall be notified again sixty days prior to and immediately following energization of the Interconnection Facilities. MID shall also follow the progress reporting policies and procedures required by the WECC, as applicable, for notification of new or modified Bulk Electric System facilities.

3.4 Facilities Owned and/or Operated by MID

Facilities that are constructed by other entities but owned and/or operated by MID must meet the same design specifications, ratings, and safety requirements that would be used in newly MID-constructed facilities, including but not limited to, grounding of equipment and associated grounding grid design, considerations for physical and electrical clearances; facility ingress/egress; substation communications and protection wiring/control/battery; support structure and

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 14
---	-----------------------------	--	-------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

equipment type, location, numbering and operating locations; and protective relay/telecommunications facility design. Applicable standards used in such designs would include those described by the National Electrical Safety Code, California General Orders 95 and 128. It is MID’s responsibility to confirm that provisions have been made with a Balancing Authority to operate the facilities owned and/or operated by MID within the Balancing Authority’s metered boundary.

3.5 Grounding

All facilities shall be designed to conform to IEEE-80 specifications, as applicable. Transformers connected to MID’s Transmission System must have a grounded-wye connection on the side connected to MID’s Transmission System unless otherwise specified by MID. A ground current sensing scheme must be used to detect ground faults on MID’s Transmission System.

Substations that are constructed by other entities but owned and/or operated by MID must meet the same grounding and safety requirements used in MID’s substations. In addition, when customer facilities need to be connected to a MID ground or when system protection requires a solid ground, the ground grid must also meet the grounding requirements used for MID’s substations.

3.6 Insulation and Insulation Coordination

The Interconnection Customer’s physical location, electrical conductor separation and ratings of high voltage transmission and/or substation insulators must coordinate with MID’s requirements for transmission and substation insulators at the point of interconnection. Surge arrestors of the appropriate rating shall be used where appropriate to prevent damaging voltage surges on MID’s Transmission System.

3.7 Testing and Inspection

3.7.1 Pre-Energization Inspection, Testing and Modifications

Prior to energizing new facilities, MID personnel shall conduct an inspection of all new Interconnection Facilities. The inspection requirements will be consistent with the inspection requirements of other facilities of similar type that exist on the MID electric system and Good Utility Practice. Only after a satisfactory inspection is completed will the new Interconnection Facilities be authorized for energization and synchronization.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 15
---	-----------------------------	--	-------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

MID shall test MID’s Interconnection Facilities and Network Upgrades and Interconnection Customer shall test the Interconnection Customer Interconnection Facilities to ensure their safe and reliable operation. In accordance with Section 4.2, protective relays and control systems must be inspected and tested by functional trip test prior to placing any new interconnection facility in service.

Each Party shall make any modifications to its facilities that are found to be necessary as a result of such inspection and/or testing. Detailed reports shall be prepared in conjunction with these tests and copies of these reports shall be made available within 5 days of the request of one Party to the other. All modifications and subsequent inspection and/or testing shall be properly coordinated between the Parties.

3.7.2 Post-Energization Inspection, Testing and Modifications

Each Party shall at its own expense perform routine inspection and testing of its facilities and equipment in accordance with Section 4 and Good Utility Practice as may be necessary to ensure the continued interconnection of the Interconnection Customer Interconnection Facilities with the Transmission System in a safe and reliable manner. Each Party shall have the right, upon advance written notice, to require reasonable additional testing of the other Party’s facilities, at the requesting Party’s expense, as may be in accordance with Good Utility Practice. Detailed reports in conjunction with all inspections and testing of facilities and equipment under this section shall be prepared in conjunction with these inspections and tests and copies of these reports shall be made available within 5 days of the request of one Party to the other.

3.7.3 Right to Observe Testing

Each Party shall notify the other Party at least 96 hours in advance of its performance of tests of its Interconnection Facilities. The other Party has the right, at its own expense, to observe such testing.

3.7.4 Right to Inspect

Each Party shall have the right, for new or existing facilities, but shall have no obligation to: (i) observe the other Party’s tests and/or inspection of any of its System Protection Facilities and other protective equipment, including power system stabilizers; (ii) review the settings of the other Party’s System Protection Facilities,

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

synchronizing relays and other protective equipment; and (iii) review the other Party’s test reports and maintenance records relative to the Interconnection Facilities, the System Protection Facilities and other protective equipment. A Party may exercise these rights from time to time as it deems necessary upon reasonable notice to the other Party. The exercise or non-exercise by a Party of any such rights shall not be construed as an endorsement or confirmation of any element or condition of the Interconnection Facilities or the System Protection Facilities or other protective equipment or the operation thereof, or as a warranty as to the fitness, safety, desirability, or reliability of same.

3.8 Metering

3.8.1 General

MID shall install Metering Equipment at the Point of Interconnection prior to any operation of the Customer Interconnection Facilities and shall own, operate, test and maintain such Metering Equipment. Real and reactive power flows to and from any Interconnection Customer Generating, Transmission, or End-Use Facility shall be measured at or, at MID’s option, compensated to the Point of Interconnection.

3.8.2 Testing of Metering Equipment

MID shall inspect and test all MID-owned Metering Equipment upon installation and at least once every two (2) years thereafter.

3.8.3 Metering Data

At Interconnection Customer’s expense, the metered data shall be telemetered to one or more locations designated by MID. Such telemetered data shall be used, under normal operating conditions, as the official measurement of the amount of energy delivered to or from the Point of Interconnection.

3.9 Communications

3.9.1 Interconnection Customer Obligations

Interconnection Customer shall maintain satisfactory operating communications with MID’s system dispatcher or representative designated by MID. Unless agreed otherwise, Interconnection Customer, as a minimum, shall provide standard voice line, dedicated voice line and facsimile communications at its Interconnection

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

Customer’s control room or central dispatch facility through use of either the public telephone system, or a voice communications system that does not rely on the public telephone system. Interconnection Customer shall also provide dedicated relay protection and/or data circuit(s) as MID determines necessary to provide Interconnection Customer facility protective relay communications, equipment operational status, instantaneous and accumulated data to MID. The data circuit(s) shall extend from the Customer Interconnection Facilities to the location(s) specified by MID. Operational communications shall be activated and maintained prior to, and under, but not be limited to, the following events: system paralleling or separation, scheduled and unscheduled shutdowns, equipment clearances, and hourly and daily load data.

3.9.2 Remote Terminal Unit

Prior to the Initial Synchronization Date of the Customer Interconnection Facilities, one or more remote terminal units, or equivalent data collection and transfer equipment acceptable to MID, shall be installed by MID at Interconnection Customer’s expense, to gather equipment operational status, and accumulated and instantaneous data to be telemetered to the location(s) designated by MID through use of a dedicated point-to-point data circuit(s). The communication protocol for the data circuit(s) shall be specified by MID. Instantaneous bi-directional analog real power and reactive power flow information must be telemetered directly to the location(s) specified by MID.

Each Party shall promptly advise the other Party if it detects or otherwise learns of any metering, telemetry or telecommunications equipment errors or malfunctions that require the attention and/or correction by the other Party. The Party owning such equipment shall correct such error or malfunction as soon as reasonably feasible.

3.10 Operations

3.10.1 General

Each Party shall comply with the applicable NERC and WECC requirements. Each Party shall provide to the other Party all information that may reasonably be required by the other Party to comply with Applicable Laws, Regulations, and Reliability Standards.

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

3.10.2 MID’s Obligations

MID shall cause the Transmission System and MID’s Interconnection Facilities to be operated, maintained and controlled in a safe and reliable manner. MID may provide written operating instructions to Interconnection Customer and provide operating protocols and procedures as they may change from time to time. MID will consider changes to its operating protocols and procedures proposed by Interconnection Customer.

3.10.3 Interconnection Customer Obligations

Interconnection Customer shall at its own expense operate, maintain and control the Interconnection Customer Interconnection Facilities in a safe, and reliable manner and in accordance with MID’s interconnection requirements and all applicable WECC criteria.

3.10.4 Operational Training and Coordination

Prior to the In-Service Date for the new Interconnection Facilities and continuously thereafter, the Interconnection Customer shall maintain trained staff for operation of its facilities. In addition to training required by WECC, training shall also include a meeting prior to the In-Service Date and annually thereafter, with MID’s Electric Operations staff to review and understand key operational terminology and policies, including those procedures outlined in Sections 3.10.5, 4.5, 4.8, and 4.10 utilized by the Parties for the continued safe and coordinated operation of the Interconnection Customer’s facilities and MID’s Transmission System.

3.10.5 Communications and Procedures During Normal and Emergency Operating Conditions

3.10.5.1 Communications between the customer and MID shall take place by wired line telephone with cell phone used as a backup. The customer shall provide MID with wire line and cell phone numbers that are monitored twenty-four hours per day, seven days a week including weekends and holidays. Contact names for all phone numbers shall also be provided. If the Customer needs to contact MID, the Customer shall contact MID’s Control Center at 209-526-7501. This number is monitored twenty-four

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

hours per day, seven days a week including weekends and holidays.

3.10.5.2 Each Party shall coordinate planning of and communicate with the other Party during the following operations/conditions that involve or potentially impact the Interconnection Facilities, MID’s Transmission System or the Interconnection Customer’s Transmission, Generating or End-Use Facilities:

3.10.5.2.1 All switching, paralleling, or synchronizing of facilities at or in the vicinity of the Interconnection Facility.

3.10.5.2.2 Any observed change in the operational status of equipment at or in the vicinity of the Interconnection Facility.

3.10.5.2.3 Any observance of abnormal operating conditions at or in the vicinity of the Interconnection Facility. These could include, but not limited to abnormal values of voltage, frequency, or real and reactive power flows.

3.10.5.2.4 Any planned maintenance or outages at or in the vicinity of the Interconnection Facility.

3.10.5.2.5 Any physical security-related conditions or incidents that could impact either Party's facilities.

3.10.6 Interruption of Service

If required by Good Utility Practice to do so, MID may require Interconnection Customer to interrupt or reduce deliveries of electricity in either direction if such delivery of electricity could adversely affect MID’s ability to perform such activities as are necessary to safely and reliably operate and maintain the Transmission System. The following provisions shall apply to any interruption or reduction:

3.10.6.1 The interruption or reduction shall continue only for so long as reasonably necessary under Good Utility Practice;

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

- 3.10.6.2 When the interruption or reduction must be made under circumstances which do not allow for advance notice, MID shall notify Interconnection Customer by telephone as soon as practicable of the reasons for the curtailment, interruption, or reduction, and, if known, its expected duration.
- 3.10.6.3 Except during the existence of an Emergency Condition, when the interruption or reduction can be scheduled without advance notice, MID shall notify Interconnection Customer in advance regarding the timing of such scheduling and further notify Interconnection Customer of the expected duration. MID shall coordinate with the Interconnection Customer using Good Utility Practice to schedule the interruption or reduction during periods of least impact to the Interconnection Customer and MID.

4 System Protection and Other Control Requirements

4.1 System Protection Facilities

Interconnection Customer shall, at its expense, install, operate and maintain utility grade System Protection Facilities as a part of the Interconnection Customer Generating, Transmission, End-Use, or Interconnection Facilities. MID shall install at Interconnection Customer’s expense any System Protection Facilities that may be required on MID’s Interconnection Facilities or the Transmission System as a result of the interconnection of the Interconnection Customer’s Interconnection, Generating, Transmission, or End-Use Facilities.

Each Party’s protection facilities shall be designed with ratings and equipment settings that provide coordinated operation with other systems in accordance with Good Utility Practice. MID shall review and approve the proposed System Protection Facilities design to ensure compliance with NERC/WECC Reliability Standards, coordinated operation, and Good Utility Practice. Each Party shall be responsible for protection of its facilities consistent with Good Utility Practice. Each Party shall test, operate and maintain System Protection Facilities in accordance with Good Utility Practice.

4.2 System Protection Testing

Prior to the In-Service Date, and again prior to the Commercial Operation Date, each Party or its agent shall perform a complete calibration test and functional trip test of the applicable System Protection Facilities. The future maintenance and

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

testing of all protective relaying devices and related support equipment shall be in accordance with MID’s protective relaying system and maintenance procedures, as specified by the following Operating Bulletins: OB 9, Preventative Maintenance and Testing of Substation Equipment; OB 32, Generation Protection System Maintenance and Testing Program; and OB 49, Transmission Protection System Maintenance Program. MID personnel will need to be involved with procedures prior to and during any future maintenance and testing of protective relaying devices. The requesting entity is responsible for the costs associated with the ongoing testing and maintenance of the protective relaying and control equipment. At intervals required by MID’s protective relaying system and maintenance procedures, applicable NERC and WECC Reliability Standards and following any apparent malfunction of the System Protection Facilities, each Party shall perform both calibration and functional trip tests of its System Protection Facilities in accordance with Good Utility Practice. These tests do not necessarily require the tripping of any in-service generation unit. These tests do, however, require that all protective relays and lockout contacts be activated. Detailed reports of these tests shall be prepared and maintained by the Party responsible for the test, and copies of the reports shall be made available within 5 days of a Party’s request to the other Party.

4.3 Requirements for Protection

In compliance with Good Utility Practice, Interconnection Customer shall provide, install, own, and maintain relays, circuit breakers that incorporate the required interrupting duty and surge protection, and all other devices necessary to remove any fault originating on any Interconnection Customer equipment. Removal of the fault shall be coordinated with the protective requirements of the Transmission System. Such protective equipment shall include, without limitation, a disconnecting device or switch with load-interrupting capability located between the Interconnection Customer equipment and the Transmission System at a site selected upon mutual agreement. Interconnection Customer shall be responsible for protection of the Interconnection Customer’s equipment from short-circuit faults and such conditions as negative sequence currents, over or under-frequency, sudden load rejection, and over or under-voltage. Interconnection Customer shall be solely responsible to preclude connection to, or to disconnect the Interconnection Customer equipment if conditions on the Transmission System could adversely affect the Interconnection Customer equipment.

4.4 Power Quality

Neither Party’s facilities shall cause excessive voltage flicker nor introduce excessive distortion to the sinusoidal voltage or current waves as defined by ANSI

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 22
---	-----------------------------	--	-------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

Standard C84.1-1989, in accordance with IEEE Standard 519, or any applicable superseding electric industry standard. In the event of a conflict between ANSI Standard C84.1-1989, or any applicable superseding electric industry standard, MID shall determine whether ANSI Standard C84.1-1989, or the applicable superseding electric industry standard, is controlling.

4.5 Switching and Tagging Rules, and Applicable Operating Procedures

Each Party shall provide the other Party a copy of its switching and tagging rules and operating procedures that are applicable to the other Party's activities. The Parties shall comply with applicable switching and tagging rules and applicable operating procedures, as amended from time to time, in obtaining clearances for work or for performing switching operations on equipment.

4.6 Disturbance Analysis Data Exchange

The Parties shall cooperate with one another in the analysis of disturbances to either the Interconnection Customer's equipment or MID's Transmission System by gathering and providing access to any information relating to any disturbance, including information from oscillography, protective relay equipment targets, breaker operations and sequence of events records, and any other disturbance related information required by Good Utility Practice.

4.7 Maintenance

4.7.1 MID Obligations

MID shall maintain the Transmission System and MID's Interconnection Facilities in a safe and reliable manner.

4.7.2 Interconnection Customer Obligations

Interconnection Customer shall maintain the Interconnection Customer Generating, Transmission, End-Use, and Interconnection Facilities in a safe and reliable manner.

4.8 Coordination

The Parties shall confer regularly to coordinate the planning, scheduling and performance of preventive and corrective maintenance on Interconnection Customer Generating, Transmission, End-Use, and Interconnection Facilities. MID shall coordinate operations involving the Interconnection Customer facilities with the Balancing Authority and other Affected Transmission System Owners and Operators, as applicable.

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

4.9 Secondary Systems

Each Party shall cooperate and coordinate with the other in the inspection, maintenance, and testing of control or power circuits that operate below 600 volts, AC or DC, including, but not limited to, any hardware, control or protective devices, cables, conductors, electric raceways, secondary equipment panels, transducers, batteries, chargers, and voltage and current transformers that directly affect the operation of a Party’s facilities and equipment which may reasonably be expected to impact the other Party. Each Party shall provide advance notice to the other Party before undertaking any work on such circuits, especially on electrical circuits involving circuit breaker trip and close contacts, current transformers, or potential transformers.

4.10 Emergencies

This Section contains those obligations and actions required during an Emergency Condition as defined above in this Operating Bulletin No. 56.

4.10.1 Obligations

Each Party shall comply with the Emergency Condition procedures of the applicable ISO/RTO, NERC, WECC, Balancing Authority, Transmission Operator and Applicable Laws and Regulations.

4.10.2 Notification

MID shall notify Interconnection Customer promptly when it becomes aware of an Emergency Condition that affects MID’s Interconnection Facilities or the Transmission System that may reasonably be expected to affect Interconnection Customer’s operation of the Interconnection Customer Generating, Transmission, End-Use, or Interconnection Facilities. Interconnection Customer shall notify MID promptly when it becomes aware of an Emergency Condition that affects the Interconnection Customer Generating Facility, Interconnection Customer Transmission Facilities, Interconnection Customer End-Use Facilities, or the Interconnection Customer Interconnection Facilities that may reasonably be expected to affect the Transmission System or MID’s Interconnection Facilities. To the extent information is known, the notification shall describe the Emergency Condition, the extent of the damage or deficiency, the expected effect on the operation of Interconnection Customer’s or MID’s facilities and operations, its anticipated duration and the corrective action taken and/or to be taken

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

to resolve the Emergency Condition, abnormal frequency or voltage condition.

4.10.3 Immediate Action

Unless, in Interconnection Customer’s reasonable judgment, immediate action is required, Interconnection Customer shall obtain the consent of MID prior to performing any manual switching operations at the Interconnection Customer Generating, Transmission, End-Use, or Interconnection Facilities in response to an Emergency Condition either declared by MID or otherwise regarding the Transmission System.

4.10.4 MID Authority

4.10.4.1 General

MID may take whatever actions or inactions with regard to the Transmission System or MID’s Interconnection Facilities it deems necessary during an Emergency Condition in order to (i) preserve public health and safety, (ii) preserve the reliability of the Transmission System or MID’s Interconnection Facilities, (iii) limit or prevent damage, and (iv) expedite restoration of service.

MID may, on the basis of technical considerations, require the Interconnection Customer to mitigate an Emergency Condition by taking actions necessary and limited in scope to remedy the Emergency Condition, including, but not limited to, directing Interconnection Customer to shut-down, start-up, increase or decrease the real or reactive power deliveries to or from the Interconnection Customer Generating Facility, Transmission Facility or End-Use Facilities, as applicable; implementing a reduction or disconnection, directing the Interconnection Customer in the operation of reactive compensation devices, directing the Interconnection Customer to assist with black start (if available) or restoration efforts; or altering the outage schedules of the Interconnection Customer Generating, Transmission, End-Use, and Interconnection Facilities.

4.10.4.2 Reduction and Disconnection

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

MID may reduce interconnection service or disconnect the Interconnection Customer Generating, Transmission, End-Use, or Interconnection Facilities, when such reduction or disconnection is necessary under Good Utility Practice due to Emergency Conditions.

4.10.4.3 Interconnection Customer Authority

Consistent with Good Utility Practice and applicable NERC and WECC Reliability Standards, the Interconnection Customer may take whatever actions or inactions with regard to the Interconnection Customer Generating, Transmission, End-Use, or Interconnection Facilities during an Emergency Condition in order to (i) preserve public health and safety, (ii) preserve the reliability of the Interconnection Customer Generating, Transmission, End-Use, or Interconnection Facilities, (iii) limit or prevent damage, and (iv) expedite restoration of service. Interconnection Customer shall use reasonable efforts to minimize the effect of such actions or inactions on the Transmission System and MID’s Interconnection Facilities.

4.10.4.4 Transmission Service Interruption

MID reserves the right, consistent with Good Utility Practice to curtail, reduce or interrupt transmission service without liability on MID’s part for the purpose of making necessary adjustments to, changes in, or repairs on its lines, substations and facilities, and in cases where the continuance of transmission service would endanger persons or property. In the event of any adverse condition(s) or disturbance(s) on MID’s Transmission System or on any other system(s) directly or indirectly interconnected with MID’s Transmission System, MID, consistent with Good Utility Practice, also may curtail, reduce or interrupt transmission service in order to (i) limit the extent or damage of the adverse condition(s) or disturbance(s), (ii) prevent damage to generating or transmission facilities, or (iii) expedite restoration of service. MID shall give the Interconnection Customer as much advance notice as is practicable in the event of such curtailment, reduction or interruption.

5 Requirements Specific to Interconnection Customer Generating Facility

The following requirements are unique to the installation of generation facilities, including VRG facilities, as applicable. However, all requirements of the previous sections apply, unless otherwise noted herein. MID documents specific to generator operations that shall be used in the evaluation of impacts by proposed generator interconnections are SOP ER-OPS-04, Dispatching and Scheduling Procedure for Generation Operations, and SOP ER-OPS-312, Operating Procedure for Voltage and Reactive Power Control.

5.1 Power System Stabilizers

The Interconnection Customer shall procure, install, maintain and operate power system stabilizers in accordance with the guidelines and procedures established by WECC as implemented by MID. MID reserves the right to reasonably establish and require the periodic change of minimum acceptable settings for any installed power system stabilizers, subject to the design and operating limitations of the Interconnection Customer Generating Facility. If the Interconnection Customer Generating Facility’s power system stabilizers are removed from service or are not capable of automatic operation, the Interconnection Customer shall immediately notify MID, or its designated representative.

5.2 WECC

The Interconnection Customer shall comply with all requirements set forth by NERC and WECC as implemented by MID for required generator-associated equipment and settings, including, but not limited to, power system stabilizers, exciters, automatic voltage regulators and governors, and associated protective relay equipment.

5.2.1 Generator Certification and Testing Program

The Interconnection Customer shall ensure that 1) all generating units within the Interconnection Customer Generating Facility comply with the WECC generator certification criteria and 2) the Interconnection Customer and associated generating units within the Customer Generating Facility fully participate in the WECC generator testing program as implemented by MID on an ongoing basis, as applicable.

5.3 Pre-Commercial Generator Testing

Prior to the Commercial Operation Date, the Interconnection Customer shall inspect and test the Interconnection Customer Generating Facility to ensure

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

generator’s safe and reliable operation consistent with Applicable Reliability Standards as implemented by MID. Similar testing may be required after initial operation. The Interconnection Customer shall make any modifications to its generator that are found to be necessary as a result of such testing. Interconnection Customer shall generate test energy at the Interconnection Customer Generating Facility only if it has arranged for the delivery of such test energy.

5.4 Post-Commercial Generator Testing

Each Party shall at its own expense perform routine inspection and testing of its facilities and equipment in accordance with Good Utility Practice as may be necessary to ensure the continued interconnection of the Interconnection Customer Generating Facility with the Transmission System in a safe and reliable manner. Each Party shall have the right, upon advance written notice, to require reasonable additional testing of the other Party’s facilities, at the requesting Party’s expense, as may be in accordance with Good Utility Practice.

5.5 Generator Operations

Interconnection Customer shall at its own expense operate, maintain and control the Interconnection Customer Generating Facility in a safe and reliable manner and in accordance with MID’s interconnection requirements and all applicable WECC criteria. Interconnection Customer shall comply with all of MID’s operating instructions concerning Interconnection Customer Generating Facility real power and reactive power output within the manufacturer’s design limitations of the Interconnection Customer Generating Facility’s equipment that is in service and physically available for operation at the time, in compliance with Applicable Laws and Regulations. The Interconnection Customer shall create and keep maintenance records and operating logs for all Interconnection Customer Generation, Transmission, End-Use and Interconnection Facilities, as applicable. Copies of these records and logs shall be made available for review by MID within 5 (five) days of request.

5.6 Start-Up and Synchronization

The Interconnection Customer shall, at its expense, provide, install, own, operate and maintain utility grade relays and associated equipment to assure the safe and coordinated synchronization of Interconnection Customer’s facilities with those of MID. Consistent with the Parties’ mutually acceptable procedures, the Interconnection Customer is responsible for the proper synchronization of the Interconnection Customer Generating Facility to MID’s Transmission System.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 28
---	-----------------------------	--	-------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

5.7 **Reactive Power**

5.7.1 **Generation Power Factor and Voltage Regulation Design Criteria**

5.7.1.1 **MW and MVAR Capability:** Interconnection Customer shall design the Interconnection Customer Generating Facility, including VRG facilities when generating at an output level of twenty percent (20%) of the facility MW maximum or greater, to maintain a composite power delivery at continuous rated power output at the Point of Interconnection at a power factor within the range of 0.95 leading to 0.95 lagging measured at the Point of Interconnection with MID except during, or within the 10 minute period after a voltage or frequency disturbance on the system.

5.7.1.2 **Voltage Regulation Equipment Capability:** The Interconnection Customer Generating Facility, including VRG facilities, shall be designed to incorporate automatic voltage regulation mechanisms so that the generating facility can assist with regulation of MID’s system voltage at the Point of Interconnection under both steady state and system disturbance conditions, pursuant to requirements and specifications provided by MID in accordance with applicable requirements of NERC, WECC, MID’s Balancing Authority, and in accordance with Good Utility Practice. The Customer Generating Facility shall be able to operate in all of the following modes: 1) voltage control mode, including the capability for periodic manual and automatic adjustment, 2) VAR control, and 3) power factor control mode, as directed by MID.

5.7.2 **Generation Voltage Schedules and Ride Through**

5.7.2.1 **Voltage Schedules and Operation:** Once the Interconnection Customer has synchronized the Interconnection Customer Generating Facility with the Transmission System, MID shall require Interconnection Customer to have, within the Interconnection Customer Generating Facility’s capability, the ability to automatically adjust reactive output of the generator to voltage specifications or a voltage adjustment methodology as determined by MID’s operations staff in accordance with

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

the requirements of MID and WECC. The Interconnection Customer shall operate the Interconnection Customer Generating Facility in order to produce or absorb reactive power within the design limitations and equipment ratings of the Interconnection Customer Generating Facility so as to maintain the prescribed voltage schedule or voltage adjustment methodology. If Interconnection Customer is unable to maintain the specified voltage schedule, voltage adjustment methodology, or power factor, it shall promptly notify MID operations staff.

5.7.2.2 Voltage Ride-Through: All Interconnection Customer Generating Facilities, including VRGs, unless exempted by MID, shall incorporate design and equipment ratings such that, at a minimum, the facility shall provide voltage ride-through performance capability without tripping, in accordance with MID requirements reflecting Applicable Reliability Standards, and required of the Interconnection Customer facility on the effective date of the interconnection with MID’s Transmission System.

5.8 Governors and Regulators

Whenever the Interconnection Customer Generating Facility is operated in parallel with the Transmission System and the frequency/speed governors (if installed on the generating unit pursuant to provide droop response in accordance with applicable NERC/WECC requirements and Good Utility Practice) and voltage regulators are capable of operation, Interconnection Customer shall operate the Interconnection Customer Generating Facility with its speed governors and voltage regulators in automatic operation. If the Interconnection Customer Generating Facility’s speed governors and voltage regulators are not capable of such automatic operation, the Interconnection Customer shall immediately notify MID’s system operator, or its designated representative, and ensure that such Interconnection Customer Generating Facility’s reactive power production or absorption (measured in MVARs) are within the design capability of the Interconnection Customer Generating Facility’s generating unit(s) and steady state stability limits. Interconnection Customer shall not cause its Interconnection Customer Generating Facility to disconnect automatically or instantaneously from the Transmission System or trip any generating unit comprising the Interconnection Customer Generating Facility for an under or over frequency condition unless the abnormal frequency condition persists for a time period beyond the limits set forth by co-coordinated under/over frequency relay

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 30
---	-----------------------------	--	-------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

settings recommended by MID, in accordance with the Applicable Reliability Standards.

5.9 Under-Frequency and Over Frequency Conditions

The Transmission System is designed to automatically activate a load-shed program as required by WECC in the event of an under-frequency system disturbance. The Interconnection Customer shall design and enable these capabilities such that the Customer Generating Facility shall not disconnect automatically or instantaneously from MID’s electric system or equipment and any Affected Systems for a defined under-frequency or over-frequency condition, or an under-voltage or over-voltage condition. The defined conditions shall be in accordance with Good Utility Practice and consistent with any standards and guidelines that are applied to other generating facilities in the Balancing Authority Area on a comparable basis. Interconnection Customer Generating Facility response to frequency deviations of pre-determined magnitudes, both under-frequency and over-frequency deviations, shall be studied and coordinated with MID in accordance with the recommendations and standards of NERC, WECC, MID’s Balancing Authority and Good Utility Practice. The Customer Generating Facility’s protective equipment settings shall comply with MID’s automatic load-shed program. MID shall review the protective equipment settings to confirm compliance with the automatic load-shed program. The term “ride through” as used herein shall mean the ability of an Interconnection Customer’s Generating Facility to stay connected to and synchronized with MID’s electric system or equipment and any Affected Systems during system disturbances within a range of conditions, in accordance with Good Utility Practice and consistent with any standards and guidelines that are applied to other generating facilities in the Balancing Authority Area on a comparable basis. The term “frequency ride through” as used herein shall mean the ability of an Interconnection Customer’s Generating Facility to stay connected to and synchronized with MID’s electric system or equipment and any Affected Systems during system disturbances within a range of under-frequency and over-frequency conditions, in accordance with Good Utility Practice and consistent with any standards and guidelines that are applied to other generating facilities in the Balancing Authority Area on a comparable basis. The term “voltage ride through” as used herein shall mean the ability of an Interconnection Customer’s Generating Facility to stay connected to and synchronized with MID’s electric system or equipment and any Affected Systems during system disturbances within a range of under-voltage and over-voltage conditions, in accordance with Good Utility Practice and consistent with any standards and guidelines that are applied to other generating facilities in the Balancing Authority Area on a comparable basis.

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 31
---	-----------------------------	--	-------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

5.10 Requirements for Generator Protection

In compliance with Good Utility Practice, Interconnection Customer shall provide, install, own, operate and maintain relays, circuit breakers and all other devices necessary with the appropriate equipment ratings to remove any fault contribution of the Interconnection Customer Generating Facility to any short circuit occurring on the Transmission System not otherwise isolated by MID’s equipment, such that the removal of the fault contribution shall be coordinated with the fault contributions and protective requirements of the Transmission System. Such protective equipment shall include, without limitation, a disconnecting device or switch with a rating for load-interrupting capability located between the Interconnection Customer Generating Facility and the Transmission System at a site selected upon mutual agreement. Interconnection Customer shall be responsible for protection of the Interconnection Customer Generating Facility from such conditions as negative sequence currents, over- or under-frequency, sudden load rejection, over- or under-voltage, out-of-step, and generator loss-of-field. Interconnection Customer shall be solely responsible to disconnect the Interconnection Customer Generating Facility if conditions on the Transmission System could adversely affect the Interconnection Customer Generating Facility.

6 Requirements Specific to Interconnection Customer End-Use Facilities

The Transmission System is designed to automatically activate a load-shed program as required by WECC in the event of an under-frequency system disturbance. Interconnection Customer shall provide, install, own, operate and maintain relays necessary to implement under-frequency relay set points for the Interconnection Customer End-Use Facilities (e.g. loads) as directed by MID to meet the WECC requirements.

7 References

7.1 Referenced MID Documents

- Operating Bulletin No. 9, Preventative Maintenance and Testing of Substation Equipment
- Operating Bulletin No. 32, Generation Protection System Maintenance and Testing Program
- Operating Bulletin No. 47, Electrical System Transmission Planning Policies and Procedures

EFFECTIVE DATE December 1, 2018	REVISION NUMBER 4	REVISION DATE November 1, 2022	PAGE 32
---	-----------------------------	--	-------------------

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

- Operating Bulletin No. 48, Bulk Electric System Transmission Facility Ratings
- Operating Bulletin No. 49, Transmission Protection System Maintenance Program
- Operating Bulletin No. 51, Facilities Rating Methodology
- Operating Bulletin No. 54, Protection of the Bulk Electric System
- Operating Bulletin No. 110, System Operating Limits for the Planning Horizon
- Standard Operating Procedure No. ER-OPS-04, Dispatching and Scheduling Procedure for Generation Operations
- Standard Operating Procedure No. ER-OPS-112, Transmission Operating Plan
- Standard Operating Procedure No. ER-OPS-312, Voltage and Reactive Power Control
- Standard Operating Procedure No. ER-OPS-PS-102, Outage Coordination
- MID NERC/WECC Transmission Annual Assessment

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

7.2 NERC Reliability Standards

Requirement	Description	Section, Page
FAC-001-3 R1	Each Transmission Owner shall document Facility interconnection requirements, update them as needed, and make them available upon request. Each Transmission Owner’s Facility interconnection requirements shall address interconnection requirements for:	§1, p.1
FAC-001-3 R1.1	Generation Facilities,	§1.1, p.1 §3, p.7 §5, p.27
FAC-001-3 R1.2	Transmission Facilities, and	§1.1, p.1 §3, p.7
FAC-001-3 R1.3	End-user Facilities	§1.1, p.1 §3, p.7 §6, p.32
FAC-001-3 R2	Interconnection of a third-party Facility to the MID Transmission System via an existing Interconnection Customer’s Facilities.	§1.2, p.1
FAC-001-3 R3	Each Transmission Owner shall address the following items in its Facility interconnection requirements:	§1, p.1
FAC-001-3 R3.1	Procedures for coordinated studies of new or materially modified existing interconnections and their impacts on affected system(s).	§3.2.1.1, p.8 §3.2.1.2, p.8 §3.2.1.3, p.9 §3.2.2, p.11 §3.2.3, p.14
FAC-001-3 R3.2	Procedures for notifying those responsible for the reliability of affected system(s) of new or materially modified existing interconnections.	§3.2.1.3, p.9 §3.3, p.14
FAC-001-3 R3.3	Procedures for confirming with those responsible for the reliability of affected systems of new or materially modified Facilities are within a Balancing Authority Area’s metered boundaries.	§3.1.3, p.7 §3.4, p.14
FAC-001-3 R4	Each applicable Generator Owner shall address the following items in its Facility interconnection requirements:	§1, p.1
FAC-001-3 R4.1	Procedures for coordinated studies of new interconnections and their impacts on affected system(s).	§3.2.1.1, p.8 §3.2.1.2, p.8 §3.2.1.3, p.9 §3.2.2, p.11 §3.2.3, p.14
FAC-001-3 R4.2	Procedures for notifying those responsible for the reliability of affected system(s) of new interconnections.	§3.2.1.3, p.9 §3.3, p.14
FAC-001-3 R4.3	Procedures for confirming with those responsible for the reliability of affected systems of new or materially modified Facilities are within a Balancing Authority Area’s metered boundaries.	§3.1.3, p.7 §3.4, p.14

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

Requirement	Description	Section, Page
FAC-002-2 R1	Each Transmission Planner and each Planning Coordinator shall study the reliability impact of: (i) interconnecting new generation, transmission, or electricity end-user Facilities and (ii) materially modifying existing interconnections of generation, transmission, or electricity end-user Facilities. The following shall be studied:	§3.2.1.1, p.8
FAC-002-2 R1.1	The reliability impact of the new interconnection, or materially modified existing interconnection, on affected system(s);	§3.2.1.1, p.8 §3.2.1.2, p.8 §3.2.1.3, p.9
FAC-002-2 R1.2	Adherence to applicable NERC Reliability Standards; regional and Transmission Owner planning criteria; and Facility interconnection requirements;	§1, p.1
FAC-002-2 R1.3	Steady-state, short-circuit, and dynamics studies, as necessary, to evaluate system performance under both normal and contingency conditions;	§3.2.1.1, p.8
FAC-002-2 R1.4	Study assumptions, system performance, alternatives considered, and coordinated recommendations. While these studies may be performed independently, the results shall be evaluated and coordinated by the entities involved.	§3.2.2, p.11
FAC-002-2 R2	Each Generator Owner seeking to interconnect new generation Facilities, or to materially modify existing interconnections of generation Facilities, shall coordinate and cooperate on studies with its Transmission Planner or Planning Coordinator, including but not limited to the provision of data as described in R1, Parts 1.1-1.4.	§3.2.1.1, p.8 §3.2.1.2, p.8 §3.2.1.3, p.9 §3.2.2, p.11
FAC-002-2 R3	Each Transmission Owner, each Distribution Provider, and each Load-Serving Entity seeking to interconnect new transmission Facilities or electricity end-user Facilities, or to materially modify existing interconnections of transmission Facilities or electricity end-user Facilities, shall coordinate and cooperate on studies with its Transmission Planner or Planning Coordinator, including but not limited to the provision of data as described in R1, Parts 1.1-1.4.	§3.2.1.1, p.8 §3.2.1.2, p.8 §3.2.1.3, p.9 §3.2.2, p. 11
FAC-002-2 R4	Each Transmission Owner shall coordinate and cooperate with its Transmission Planner or Planning Coordinator on studies regarding requested new or materially modified interconnections to its Facilities, including but not limited to the provision of data as described in R1, Parts 1.1-1.4.	§3.2.1.1, p.8 §3.2.1.2, p.8 §3.2.1.3, p.9 §3.2.2, p.11

**ELECTRIC RESOURCES DIVISION
TRANSMISSION &
DISTRIBUTION DIVISION**

SUBJECT

Technical Facility Interconnection Requirements

Requirement	Description	Section, Page
FAC-002-2 R5	Each applicable Generator Owner shall coordinate and cooperate with its Transmission Planner or Planning Coordinator on studies regarding requested interconnections to its Facilities, including but not limited to the provision of data as described in R1, Parts 1.1-1.4.	§3.2.1.1, p.8 §3.2.1.2, p.8 §3.2.1.3, p.9 §3.2.2, p.11