Facility Connection Requirements

Effective Date: October 1, 2019

Revision History

Date	Rev	Description	Author	Approved
Feb. 1, 2010	R0	Issued for review.	M. Sidiropoulos	P. Chernikhowsky
Mar. 1, 2010	R1	Issued for approval.	M. Sidiropoulos	P. Chernikhowsky
Sep. 21, 2011	R2	Editorial changes.	M. Sidiropoulos	P. Chernikhowsky
Dec. 2, 2011	R3	PCS edits.	M. Sidiropoulos	P. Chernikhowsky
Sep. 15, 2016	R4	Major review and update for new FAC-001-2 standard.	J. Leason	P. Chernikhowsky
Sep. 19, 2019	R5	Minor review and update for the new forms, process flowchart, and FAC-001-3 standard.	J. Leason	B. Matamoros

Table of Contents

1.0 General

This document has been prepared to identify the processes, procedures, and requirements for connecting new Facilities to the FortisBC System and is applicable to new connections or substantial modifications of generation Facilities, transmission Facilities, and end-user (load) Facilities. It is intended to provide documentation in compliance with specific BC Mandatory Reliability Standards.[1]

1.1 Scope

The requirements specified in this document apply to any of the following:

- All transmission Facilities interconnected with the FortisBC System with a nominal phase-to-phase voltage greater than 35,000V.[2]
- All load Facilities interconnected with the FortisBC System with a nominal phase-to-phase voltage greater than 35,000V.[3]
- All generation Facilities interconnected with the FortisBC System that are not included in the scope of the FortisBC Net Metering Program and where the generator is capable of operating in parallel with the FortisBC System.[4]

The requirements in this document do not apply to point-to-point transmission service (wheeling) or load interconnections with the FortisBC System with nominal phase-to-phase voltage of 35,000V or less.

- For point-to-point transmission service, refer to FortisBC Electric Tariff Supplement No. 7.
- For distribution service (35,000V or less), refer to the FortisBC Service and Metering Guide.

These requirements will apply on a go forward basis, effective on the date of approval of this document. FortisBC may, in its sole discretion, on a case-by-case basis, request modifications of existing non-compliant Facilities in order to make them compliant, for those Facilities that FortisBC deems are critical to system reliability.

1.2 Responsibility and Conflicts

The FortisBC Manager, Electric Network Assets or their designate is responsible for updating and maintaining this document. This document shall be reviewed and updated as required by FortisBC Mandatory Reliability and Network Assets staff.[5]

When a revision to this document is completed and approved, it shall be posted on the FortisBC website for public use.[6] This document must be used in conjunction with the FortisBC Electric Tariff. Where there is any conflict between this policy and the FortisBC Electric Tariff, the FortisBC Electric Tariff will be the governing document.

[1] (FAC-001-3)
[2] (FAC-001-3, R1.2)
[3] (FAC-001-3, R1.3)
[4] (FAC-001-3, R1.1)
[5] (FAC-001-3, R1)
[6] (FAC-001-3, R1 and R2)

2.0 Standard Facility Interconnection Procedures

The following Standard Facility Interconnection Procedures (SFIP) are applicable to processing an Interconnection Request (IR) for any Facility interconnecting to the FortisBC System that meets the criteria in Section 1.1 above. FortisBC shall receive, process, and analyze all IRs on a first come, first served basis as set forth in this SFIP. Nothing in this SFIP shall constitute a request for Service or confer upon an Interconnection Customer (IC) any right to receive Service. A separate request for Service must be submitted by the IC as set out in the FortisBC Electric Tariff. In most cases, the IC should submit IR and Service applications at the same time. A flowchart detailing the SFIP process is provided in Appendix 3.

2.1 Interconnection Request Process

The IC shall submit a separate IR for each site and may submit multiple IRs for a single site. An IR to evaluate one site at two different voltage levels shall be treated as two IRs.

2.1.1 Initiation

To initiate an IR, the IC must complete all of the following:

i. Initiate a request for electricity Service via FortisBC Electricity Customer Service (1-866-436-7847, electricity.customerservice@fortisbc.com, or online at www.fortisbc.com).
ii. Submit the completed IR forms as specified in Appendix 1.

The expected In-Service Date of the new Facility or increase in capacity of the existing Facility shall be no more than two years in the future.

2.1.2 Acknowledgement

FortisBC shall hold a meeting with the IC within thirty (30) days of receipt of the request to discuss the scope of the IR, acknowledge receipt of the IR, and identify if the IR is valid or deficient. An IR will not be considered a valid request until all of the required forms and data specified in Appendix 1 have been received by FortisBC. If the required forms and data specified in Appendix 1 are not completed, FortisBC shall notify the IC of the reasons for such failure and that the IR does not constitute a valid request. The IC shall provide FortisBC the additional requirements needed to constitute a valid request within thirty (30) days after receipt of such notice. If the additional requirements are not received by FortisBC within the required timeline, the IR will be deemed withdrawn.

2.1.3 Modifications

FortisBC may request additional technical information from the IC during the course of the required reviews or studies. In addition, the IC shall submit to FortisBC, in writing, modifications to any information provided in the IR. If the IC modifies its designated Point of Interconnection, IR, or the technical information provided therein is modified, FortisBC may extend the time to complete the required reviews or studies.

Notwithstanding the above, anytime during the course of the required reviews or studies, FortisBC may identify changes to the IR that may affect the costs, loading capabilities, or the ability to accommodate the IR. If the identified changes are acceptable to FortisBC and the IC, FortisBC shall modify the IR in accordance with such changes and proceed with any re-work necessary to do so.

2.1.4 Withdrawal

The IC may withdraw its IR at any time by written notice of such withdrawal to FortisBC. In addition, if the IC fails to adhere to all requirements of this SFIP, FortisBC shall deem the IR to be withdrawn and shall provide written notice to IC of the deemed withdrawal and an explanation of the reasons for such deemed withdrawal. Upon receipt of such written notice, the IC shall have thirty (30) days in which to respond with information or actions that corrects the deficiency. If an IR has been withdrawn, a new IR will then need to be submitted by the IC, as per the requirements of this SFIP.

2.2 Feasibility Review

Upon receipt of a complete IR and after the acknowledgement meeting described above, FortisBC will carry out a Feasibility Review. The Feasibility Review shall be based on the technical information provided by the IC in the IR, as may be modified as the result of the acknowledgement meeting, and will consist of a power flow analysis. The Feasibility Review will include analysis for estimated peak loading, select outage contingencies, and potential future Network Upgrades as determined by FortisBC. The Feasibility Review will state the assumptions upon which it is based, state the results of the analyses, and provide the requirements or potential impediments to providing the requested Service. The Feasibility Review will provide the potential available capacity and list the Facilities that may be required because of the IR with a high level, non-binding, good faith estimate of cost responsibility.

2.2.1 Procedures

FortisBC shall complete the Feasibility Review within the timeframes FortisBC reasonably requires for the study, taking into consideration the complexity and size of the IR and the number of other IRs being studied by FortisBC during the same period. However, FortisBC shall normally complete the Feasibility Review within sixty (60) days of the IR acknowledgement meeting.

2.2.2 Approval

The IC is required to provide formal notification to FortisBC that they wish to proceed with the IR within thirty (30) days after receipt of the Feasibility Review from FortisBC. If the formal notification to proceed is not received by FortisBC within the required timeline, the IR will be deemed withdrawn.

2.3 System Impact Study

Once the Feasibility Review has been completed and the IC elects to continue with the IR, FortisBC shall undertake a System Impact Study. The System Impact Study shall be based on the technical information provided by the IC in the IR, as may be modified as the result of the scoping meeting, and will consist of a power flow analysis, short circuit analysis, and a stability analysis (if applicable). The System Impact Study will include analysis during peak loading and off-peak loading for all credible outage contingencies and all planned future Network Upgrades. The System Impact Study will state the assumptions upon which it is based, state the results of the analyses, and provide the requirements or potential impediments to providing the requested Service. The System Impact Study will confirm the available capacity and confirm the point of interconnection.

2.3.1 Procedures

FortisBC shall complete the System Impact Study within the timeframes FortisBC reasonably requires for the study, taking into consideration the complexity and size of the IR and the number of other IRs being studied by FortisBC during the same period. However, FortisBC shall normally complete the System Impact within sixty (60) days of receipt of the notification from the IC to proceed with the IR after the Feasibility Review has been issued.

2.3.2 Scoping Meeting

FortisBC will have internal scoping meeting to review the IR and initiate the System Impact Study. The FortisBC personnel and departments that must be included in the meeting are:

- Transmission Planning
- Stations, Lines, and/or Distribution Engineering
- Protection Engineering
- System and Network Operations
- Resource Planning
- Mandatory Reliability

2.3.3 Coordination[7]

FortisBC will coordinate the completion of any System Impact Studies required to determine the impact of the IR on Affected Systems and include those results in its applicable System Impact Study within the period specified in this SFIP[8]. FortisBC will notify all Affected Systems of the timeline and potential impact of the IR[9]. The IC will cooperate with FortisBC in all matters related to the conduct of studies and the determination of modifications to Affected Systems.

FortisBC actively participates in WECC, BC Reliability Coordinator, and BC Hydro coordinated studies of new Facilities and their impacts on the interconnected system. FortisBC regularly submits the overall FortisBC System models and data to BC Hydro, BC Reliability Coordinator, and WECC. FortisBC will include any new Facilities in the overall FortisBC model and data submittals, so that these new Facilities would be included in the BC Hydro, BC Reliability Coordinator, and WECC models and systems.

The IC must provide confirmation and evidence to FortisBC that any new or materially modified Facilities specified within the IR are within a Balancing Authority Area's metered boundaries.[10]

2.3.4 Approval

The IC is required to provide formal notification to FortisBC that they wish to proceed with the IR within thirty (30) days after receipt of the System Impact Study from FortisBC. If the formal notification to proceed is not received by FortisBC within the required timeline, the IR will be deemed withdrawn.

[7] (FAC-001-3, R3 and R4)
[8] (FAC-001-3, R3.1 and R4.1)
[9] (FAC-001-3, R3.2 and R4.2)
[10] (FAC-001-3, R3.3 and R4.3)

2.4 Facilities Study

Once the System Impact Study has been completed and the IC elects to continue with the IR, FortisBC shall undertake a Facilities Study. The Facilities Study shall specify and estimate the cost of any FortisBC Interconnection Facilities and Network Upgrades necessary to accomplish the Interconnection and include an estimate of the time required to complete the construction and installation of such Facilities.

The IC will be required to pay for the cost of the FortisBC Interconnection Facilities and Network Upgrades as specified in the Facilities Study. The Facilities Study shall consider all equipment, engineering, procurement, and construction work needed to implement the conclusions from the System Impact Study required for physical and electrical connection of the IC Facility to the FortisBC System. The Facilities Study shall also identify the electrical switching configuration of the connection equipment, including, lines, transformers, switchgear, meters, protection, supervisory, communications, and other equipment necessary to accomplish the Interconnection.

2.4.2 Procedures

FortisBC shall complete the Facilities Study within the timeframes FortisBC reasonably requires for the study, taking into consideration the complexity and size of the IR and the number of other IRs being studied by FortisBC during the same period. However, FortisBC shall normally complete the Facilities Study within sixty (60) days of receipt of the notification from the IC to proceed with the IR after the System Impact Study has been issued.

2.4.3 Coordination

FortisBC will coordinate the completion of any Facility Studies required to determine the impact of the IR on Affected Systems and, if possible, include those results in its applicable Facilities Study within the period specified in this SFIP. The IC will cooperate with FortisBC in all matters related to the conduct of studies and the determination of modifications to Affected Systems.

2.5 Facility Interconnection Agreement

The IC is required to provide formal notification to FortisBC that they wish to proceed with the IR within thirty (30) days after receipt of the Facilities Study from FortisBC. If the formal notification to proceed is not received by FortisBC within the required timeline, the IR will be deemed withdrawn.

FortisBC shall not connect the IC to the FortisBC System unless the IC enters into a Facility Interconnection Agreement. The Facility Interconnection Agreement (FIA) is the legal document applicable to an IR pertaining to a Facility and sets out the contractual obligations of the IC and FortisBC in relation to the IR. The FIA shall include provisions setting out the IC's responsibility to reimburse FortisBC for the costs of constructing Interconnection Facilities, the amount and form of security that FortisBC may require the IC to provide for such construction costs, provisions setting out the ownership and operation of Interconnection Facilities, and FortisBC's technical requirements for interconnection and the establishment of operating orders, as well as default and dispute mechanisms.

3.0 Common Technical Requirements

This section addresses the technical requirements that are common to the connection of generation, transmission, and load Facilities to the FortisBC System. Subsequent sections describe connection requirements that apply exclusively to each of the three types of Facilities. This document is not intended to be a comprehensive design specification. Specific design and construction of the electrical Facilities shall comply with all applicable federal, provincial, and local laws, regulations, design, and construction standards including all applicable BC MRS standards. Final design of Facility connections to the FortisBC System will be subject to FortisBC review and approval on a case-by-case basis. FortisBC reserves the right to waive or modify the technical requirements below based on the specifics of each project.

3.1 Responsibilities

The IC is responsible for providing all devices necessary to protect its own equipment from damage by abnormal conditions and operations that might occur on the interconnected electrical system. The IC shall protect its Facilities from over voltage, under voltage, overload, short circuits (including ground fault conditions), open circuits, phase unbalance, phase reversal, surges from switching and lightning, over and under frequency conditions, and other injurious electrical conditions that may arise on the interconnected system. The IC is responsible for providing for the orderly re-energization and synchronizing of their equipment to other parts of the electric system. The IC shall have appropriate operating procedures and equipment designs to guard against out-of-synch closure or uncontrolled energization. Each Party is responsible to know and follow all applicable regulations, industry guidelines, safety requirements, and accepted practice for the design, operation and maintenance of the Facility.

3.2 Site Access

There are situations where equipment owned by FortisBC is located within the Customer's Facility. This is often required for data acquisition or metering. The Customer must provide site access to FortisBC employees where FortisBC equipment is located within the Customer's Facility.

3.3 Safety

FortisBC is strongly committed to safety of its employees and the public. Strict adherence to established switching, tagging, grounding, safety procedures by FortisBC and the IC is required at all times. Any work carried out within a Facility shall be performed in accordance with all applicable laws, rules, and regulations and in compliance with Workers Compensation Board (WCB) of British Columbia. Automatic and manual disconnect devices are to be provided by both Parties as a means of removing all sources of current and voltage to any particular element of the power system. Only trained operators are to perform switching functions within a Facility under the direction of the responsible operator or designated person.

3.4 Operational Procedures

FortisBC and the IC shall establish operational procedures in accordance with all applicable BC MRS requirements as specified in a joint operating order. The joint operating order shall address the following:

i. 24 hour contacts for normal and emergency conditions.
ii. Operating representatives.
iii. Communication methods.
iv. Maintenance coordination procedures.

v. Actions to be taken to energize or de-energization any interconnected Facilities.
vi. Any other required operating policies.

All Parties are to be provided with current station operating diagrams. Common, agreed upon nomenclature is to be used for naming stations, lines, and switches. Updated diagrams are to be provided when changes occur to interconnected Facilities.

The IC shall make similar joint operating arrangements, if required, with the Balancing Authority.

3.5 Operating Issues

The operator of Facilities interconnecting to the FortisBC System will not perform any switching that energizes or de-energizes portions of the FortisBC System or that may adversely affect the FortisBC System without prior notice to FortisBC or its designated operating representative. Operators of Facilities interconnecting to the FortisBC System shall notify FortisBC or its designated operating representative before performing any switching that would significantly affect voltages, power flows or reliability in the interconnected transmission system. The operator shall not disconnect a Facility without prior approval accept when necessary to prevent injury to personnel or damage to equipment. If any operating condition or circumstance creates an undue burden on the FortisBC System, FortisBC shall have the right to open the interconnection(s) to relieve the FortisBC System of the burden imposed upon it. Prior notice will be given to the extent practical. Each party shall maintain its system and Facilities to avoid or minimize the likelihood of disturbances that might impair or interrupt service to the customers of the other party.

3.6 Maintenance of Facilities

The maintenance of Facilities is the responsibility of the owner of those Facilities. FortisBC has the right to review maintenance reports and testing records of Facilities that are interconnected to the FortisBC System and could affect the FortisBC System. The IC shall notify FortisBC as soon as practicable of any out of service equipment that might affect the protection, monitoring, or operation of interconnected Facilities. The IC shall maintain Facilities interconnected to the FortisBC System in a manner that does not place the reliability and capability of the FortisBC System or other portions of the interconnected system at risk.

3.7 Point of Interconnection

The Point of Interconnection defines the location where facility ownership changes from FortisBC to the IC. The voltage level, MW and MVAR capacity or demand at Point of Interconnection shall be compatible to, and coordinated with FortisBC. The interconnecting facility must be connected to the FortisBC System through a primary fault-interrupting device. Facilities interconnecting to the FortisBC System must have an isolating device installed at the Point of Interconnection. This isolating device, typically a disconnect switch, must be capable of physically and visibly isolating the Facilities from the FortisBC System. This isolating device must be lockable in the open position by FortisBC.

3.8 Grounding

Each Party's interconnection substation must have a ground grid that solidly grounds all metallic structures and other non-energized metallic equipment. If the interconnection substation is close to another substation, the two grids may be isolated or connected. If the ground grids are to be isolated, there shall be no metallic ground connections between the two substation ground grids. There must also be sufficient physical separation to limit soil conduction. If the ground grids are to be interconnected, the interconnecting cables must have sufficient capacity to handle the fault currents, duration, and duty. FortisBC must approve any connection to a FortisBC substation

ground grid. Each Party's overhead line structures must be adequately bonded and grounded to control step and touch potential and to provide adequate lightning performance. Any exceptions to a continuous ground wire shall be supported by a system study. All ground wires and bond wires must be adequately sized to handle anticipated maximum fault currents and duty without damage. Interconnections may substantially increase fault current levels at nearby substations and transmission lines. Modifications to the ground grids of existing substations and overhead ground wires of existing lines may be necessary. The Interconnection Studies will determine if modifications are required and the scope and cost of the modifications.

3.9 Insulation Coordination

New IC Facilities connected to the FortisBC System shall not degrade existing operating performance and capabilities and must have insulation levels and overvoltage protection that is comparable to the existing FortisBC System. Basic Impulse Levels (BILs), surge arresters, conductor spacing and gap application, substation and line insulation strength, protection and shielding shall be documented and submitted for evaluation to FortisBC as part of the interconnection plan.

3.10 Equipment Ratings

All current-carrying IC Facilities shall be designed to carry the maximum loads that are predicted and used in load flow analysis under normal and applicable contingency conditions. In addition, all equipment shall be rated to carry and interrupt the fault levels that are or will be available at the Interconnection Facilities, including the ultimate fault currents specified by FortisBC. If the equipment supplied is not designed for the ultimate fault duty, the IC assumes the responsibility for upgrading when necessary to accommodate changes to the system and the IC is responsible for contacting FortisBC to ensure their equipment is suitably rated. FortisBC assumes no responsibility should fault currents exceed or be expected to exceed those originally specified.

3.11 System Stability and Reliability

The FortisBC System is planned, designed, and operated in accordance with all applicable BC MRS standards. The type of connection, size of the source or load, breaker configurations, source or load characteristics, and the ability to set protective relays will affect where and how the connection is made. The IC shall participate, if required by FortisBC and at FortisBC's sole discretion, in Special Protection Systems (SPS) or Remedial Action Schemes (RAS) as specified by FortisBC including automatic generation shedding, load shedding, transfer tripping of circuits, and reactive compensation switching.

3.12 Protective Relaying

Protective relaying systems and associated communications systems for all Interconnection Facilities shall be planned, designed, constructed, coordinated, and maintained in accordance with applicable BC MRS standards. Utility grade protective relays and fault clearing systems shall be provided on the interconnected power system. Adjoining power systems may share a common zone of protection between two Parties. Compatible relaying equipment as specified by FortisBC, must be used on each side of the point of ownership within a given zone of protection. The design must provide coordination for speed and sensitivity in order to maintain power system security and reliability. Interconnections must be protected with primary and secondary relay systems that provide no intentional time delay when clearing faults for 100% of the protected system. A power source for tripping and control must be provided at substations by a DC storage battery. The battery is to be sized with sufficient capacity to operate all tripping devices after eight hours without a charger. Communication assisted protections and transfer trips are required for many installations. Fiber optics is the preferred means of communication. Power line carrier or wireless communication may also be used if approved by FortisBC.

3.13 Synchronizing Requirements

Synchronizing Facilities consisting of potential transformers and associated protective relaying/controls are required at the point where energy can be sourced on both sides of an interconnection circuit breaker. These Facilities verify that the voltages on both sides of a circuit breaker fall within certain tolerances of both magnitude and phase angle as established by system conditions, supervise the closing and automatic reclosing of the circuit breaker, and prevent the closing of the circuit breaker when the two systems are out of synchronism. Voltage magnitudes, phase angles, and frequency constraints shall be determined on a case-by-case basis depending on system characteristics, conditions, and interconnection location.

3.14 Power Quality

The IC's contribution at the Point of Interconnection shall not cause voltage unbalances greater than 1% of the normal interconnecting voltage, phase current unbalances greater than 5% of the normal rated interconnecting current, and harmonic currents greater than 5% of the normal rated interconnecting current.

3.15 Circuit Breakers

All circuit breakers installed at the IC's site, the interconnecting substation, the Point of Interconnection, or any other location on the interconnected system shall meet the following requirements:

i. All circuit breakers shall have an interrupting rating higher than the fault level at the specific location as determined by FortisBC.
ii. All circuit breakers shall have a stated interrupting capability that does not rely on fault reduction schemes such as intentional time delays in clearing.
iii. All circuit breakers shall be rated to perform all required switching duties, including but not limited to capacitive current switching (line/cable dropping in particular), load current switching, and out-of-phase opening.
iv. All circuit breakers shall perform all required duties without creating transient over-voltages that could damage equipment of FortisBC or other third-parties.
v. All Circuit breakers shall have a 3 cycle maximum interrupting time excluding communication and protection time.

The IC shall upgrade its circuit breakers to ratings determined by FortisBC in order to accommodate higher fault duties due to changes in the system.

3.16 Metering Equipment

Unless agreed otherwise, FortisBC will own, operate, and maintain the metering equipment, including the instrument transformers, secondary conductors, cables, meters and transducers. The IC shall bear all reasonable documented costs associated with the purchase, installation, operation, testing, and maintenance of the metering equipment. Meters shall be Revenue Canada Sealed and Approved installed as close to the Point of Interconnection as practicable. The metering and communication of such metered quantities shall be in accordance with FortisBC requirements. Power for the metering and communication equipment, if needed, is to be provided by the station battery. A check meter for the Point of Interconnection will be installed at FortisBC's discretion. Metering shall be designed and installed in accordance with all applicable standards.

If the Interconnection Facilities are owned by the end-user, and that party does not own the instrument transformers or meters, then a location for mounting metering transformers and

recording devices are to be provided by the Facility owner. End-user devices are not to be connected directly to a voltage or current transformer secondary used for revenue metering.

3.17 Control and Communications

All Facilities connected to the FortisBC System may be required to provide control and communications Facilities, including those for protective relaying and remedial action schemes. All such Facilities will require FortisBC approval to ensure that applicable standards and required functionality and reliability are met. In some cases, specific equipment may be required to ensure compatibility with existing equipment such as Supervisory Control and Data Acquisition (SCADA) and other data monitoring systems. FortisBC may modify its control and communications requirements when detailed equipment information becomes available or changes. All costs to install, maintain, and support communication access are the responsibility of the IC.

FortisBC will specify the type of equipment required, the interface points and other characteristics required at the Facilities Study stage. Facilities, which may be required initially or in the future at the IC Facility, communicating with the FortisBC Control Centre for real-time operation of the power system, include:

i. Digital and/or analog metering equipment.
ii. Remote control.
iii. Status and alarm reporting equipment.
iv. Equipment for RAS actions.
v. Voice communications for operating.
vi. Data communications for SCADA equipment.
vii. Suitable battery and charger systems for the above.

In order to ensure compatibility of design and operation, FortisBC will provide technical requirements to the IC for the communications equipment at the IC Facility needed to transmit data from the IC Facility to FortisBC.

3.18 Future Modifications

Any changes that affect an interconnection must be submitted to FortisBC for review in advance. These include modifications to the metering or protection scheme as well as associated settings after the interconnection project has been completed. Information about expected increased load flows or higher fault current levels due to system changes must be provided in a timely manner.

The connection of new Facilities to the FortisBC System or the substantial modification of existing Facilities shall require a written request to FortisBC and further actions in accordance with the procedures specified in this SFIP.

3.19 Commissioning Requirements

The Facility Owner has full responsibility for the inspection, testing, and commissioning of its equipment up to the Point of Interconnection. A Professional Engineer, licensed in the Province of British Columbia, must declare that the IC's facility has been designed, constructed and tested in accordance with the requirements stated in this document, project specific requirements as required by FortisBC, and any other applicable standards. FortisBC has the right to review the commissioning plan as well as copies of the commissioning test records or reports signed by the IC's Professional Engineer for the testing of new or materially modified existing interconnected Facilities.

4.0 Generating Facility Technical Requirements

This section addresses the technical requirements for connecting new generation Facilities to the FortisBC System or substantially modifying existing generating Facilities connected to the FortisBC System. General overviews of functional requirements are described in this section. Detailed, project specific requirements will be developed by FortisBC as part of the System Impact Study or the Facilities Study. FortisBC reserves the right to waive or modify the technical requirements below based on the specifics of each project.

4.1 Voltage, Reactive Power, and Power Factor Control

4.1.1 Automatic Voltage Regulation

All generator Facilities connected to the FortisBC System must be equipped with Automatic Voltage Regulators (AVR). Generator Facilities must operate in the AVR control mode at all times unless otherwise approved by FortisBC. The operator of the generator Facility must contact the FortisBC System Operator when it becomes necessary to operate with the AVR off for more than 30 minutes and state the reason for operating with the AVR off. Generating Facility owners shall maintain a log that records the date, time, duration and reason for not being in the AVR control mode when operating in parallel with the FortisBC System. Generating Facility owners shall make this log available to FortisBC on request.

4.1.2 Operating Range

All generator Facilities shall have the ability to operate continuously in a range from an over-excited power factor of 90% to an under-excited power factor of 95% over the generating unit's complete range of output power.

All generator Facilities shall have the ability to operate continuously at their maximum power output while at any voltage level within plus 5% and minus 5% of rated terminal voltage.

4.1.3 Voltage Schedule

All generator Facilities shall have the ability to follow a specified voltage or VAR schedule issued by FortisBC on an hourly, daily, or seasonal basis depending upon the location of the generator. FortisBC will specify the desired generator voltage setting or desired MVAR output level for each generator connected to the FortisBC System. The operator of the generator Facility must contact the FortisBC System Operator when the generator cannot maintain the voltage or VAR schedule as prescribed for more than 30 minutes. The operator of the generator Facility shall state the reason for deviating from the voltage schedule and provide the FortisBC System Operator with the generator limitations that exist at that time. Generating Facility owners shall maintain a log that records the date, time, duration, and reason for not maintaining the voltage or VAR schedule. Generating Facility owners shall make this log available to FortisBC on request. If the FortisBC System Operator does not have direct control over the generator Facilities voltage regulator via supervisory control, the generator Facilities operator shall be able to implement the new MVAR output or voltage reference set point within an agreed time.

4.1.4 Coordination

The generator step-up and auxiliary transformer tap settings shall be coordinated with FortisBC. Owners of generator Facilities shall provide FortisBC with the initial generator

step-up and auxiliary transformer data as specified by FortisBC. Updated information shall be provided by the generator Facility owner when transformer changes are made.

The AVR control and limiting functions must coordinate with the generator's short time capabilities and protective relay settings. The generating Facility owner shall provide FortisBC with the AVR's control and limiter settings as well as the protection settings that coordinate with AVR control and limiting functions.

4.1.5 Power System Stabilizer

All generator Facilities connected to the FortisBC System shall be equipped with a Power System Stabilizer (PSS). Technical evaluations of oscillatory stability shall be conducted by the generator Facility owner prior to the interconnection of new generating Facilities. The determination of the PSS control settings shall be coordinated with FortisBC. Typically, this coordination would be to provide FortisBC with preliminary PSS settings prior to the stabilizer's field commissioning tests with the final settings provided after the field commissioning tests. The generating Facility owner is responsible for maintaining the PSS equipment in good working order and promptly reporting to FortisBC any problems interfering with its proper operation.

4.2 Speed/Load Governor

All generator Facilities connected to the FortisBC System shall be equipped with a speed/load governing control system with speed droop characteristics as specified by FortisBC. The operator of the generator Facility shall notify the FortisBC System Operator of changes in the status of the turbine speed/load governing controls and any nonfunctioning, partially functioning or blocked governor controls when these conditions are expected to persist for five days or more.

4.3 Generator Testing

Generating Facility owners shall test the gross and net reactive capability of their Facilities with an initial test result provided to FortisBC prior to Commercial Operation and every five years thereafter. The generating Facility owner shall provide FortisBC with the expected generator capabilities as listed below:

i. Summer continuous generator gross MW, lagging MVAR, and leading MVAR.
ii. Winter continuous generator gross MW, lagging MVAR, and leading MVAR.
iii. Summer total plant auxiliary power usage MW and MVAR.
iv. Winter total plant auxiliary power usage MW and MVAR.

Updated information shall be provided by the generating Facility owner to FortisBC any time there is a revision available.

Generating Facility owners shall test the AVR control and limit functions with an initial test result provided to FortisBC prior to Commercial Operation and every five years thereafter. The initial test results shall include documentation of the settings AVR control and limit functions. Documentation of the generator protection that coordinates with these limit functions shall also be provided.

4.4 System Grounding

Interconnected generator Facility owners shall provide for an effectively grounded or ungrounded system as specified by FortisBC.

5.0 Transmission Facility Technical Requirements

This section addresses the technical requirements for connecting new transmission Facilities to the FortisBC transmission system or substantially modifying existing transmission Facilities connected to the FortisBC transmission system. General overviews of functional requirements are described in this section. Detailed, project specific requirements will be developed as part of the System Impact Study or the Facilities Study. FortisBC reserves the right to waive or modify the technical requirements below based on the specifics of each project.

The IC may elect to connect to FortisBC through a radial or looped connection. A radial point of connection means there is a single Point of Interconnection between the FortisBC transmission system and the IC's Facilities to deliver or export power from the IC Facilities. A looped connection means there are multiple Points of Interconnection between two or more entities' respective transmission systems. Looped connections are normally operated in parallel with the transmission systems such that it is possible for power to flow in either direction.

5.1 Voltage, Reactive Power, and Power Factor

Transmission Facilities connected to the FortisBC System shall meet the voltage range and reactive power flow requirements set forth in FortisBC operational standards to ensure that transmission voltages and reactive power flows are within limits permitted.

Transmission Facilities connected to the FortisBC System shall maintain a Power Factor of not less than 90% lagging. If the Power Factor of the IC's load is less than the minimum required, FortisBC will require the IC, at its expense, to install Power Factor corrective equipment to maintain the minimum required Power Factor.

5.2 Reclosing

Automatic reclosing requirements on Interconnection Facilities will be specified by FortisBC.

5.3 System Grounding

Interconnected transmission Facility owners shall provide for an effectively grounded or ungrounded system as specified by FortisBC.

6.0 Load Facility Technical Requirements

This section addresses the technical requirements for connecting new load Facilities to the FortisBC System or substantially modifying existing load Facilities connected to the FortisBC System. General overviews of functional requirements are described in this section. Detailed, project specific requirements will be developed as part of the System Impact Study or the Facilities Study. FortisBC reserves the right to waive or modify the technical requirements below based on the specifics of each project.

End-user Facilities are connected to the FortisBC System through a “delivery point” connection. A “delivery point” is a radial point of connection between FortisBC’s system and another entity’s system or Facilities that ultimately delivers the power to individual customer loads.

6.1 Voltage, Reactive Power, and Power Factor

End-user Facilities connected to the FortisBC System shall meet the voltage range and reactive power flow requirements set forth in FortisBC operational standards to ensure that system voltages and reactive power flows are within limits permitted.

End-user Facilities connected to the FortisBC System shall maintain a Power Factor of not less than 90% lagging. If the Power Factor of the IC’s load is less than the minimum required, FortisBC will require the IC, at its expense, to install Power Factor corrective equipment to maintain the minimum required Power Factor.

6.2 Auto-Restoration

End-user Facilities are energized in the direction from FortisBC to the load. Owners of interconnected load Facilities must be familiar with FortisBC policies and procedures regarding re-energization following an interruption. End-user Facilities with sensitive control systems or large motors shall apply appropriate protection measures.

6.3 Load Shedding

End-user Facilities responsible for load serving delivery points shall implement and maintain under frequency load shedding protection, if required, as specified by FortisBC. FortisBC has the right to require End-user Facilities responsible for load serving delivery points to implement or participate in emergency load shedding programs to the extent that such a program is required to assure transmission integrity under adverse conditions. The amount of load to be interrupted by emergency load shedding programs will be distributed and administered by FortisBC on a non-discriminatory basis.

6.4 Parallel Operation

End-user Facilities behind the designated delivery point with the FortisBC System shall be operated as a radial system only. Operation in a configuration that would tie two or more delivery points together in a manner that would cause the system behind the delivery points to be operated as a parallel network to the FortisBC system is prohibited without the express written permission of FortisBC. The installation of additional protective equipment may be required by FortisBC to ensure that parallel operation is automatically interrupted within the period allowed by FortisBC.

Appendix 1 – Interconnection Request Forms

Interconnection request

Energy at work FORTIS BC

Please provide information in all fields in each section, if applicable. Do not leave any fields blank. If any particular field is not applicable to your project please write N/A (not applicable).

Interconnection customer information

Project name	Company name	Contact name

Phone	Fax	Email

Address	Unit/suite	Town/city	Province/state	Country	Postal/zip code

Interconnection service information

The interconnection request is for (check one)

☐ A proposed new facility ☐ An increase in capacity of an existing facility ☐ A material modification to an existing facility

The interconnection request type is (check all that apply)

☐ Generation ☐ Transmission ☐ End user (load)

General facility information

Address or location or the proposed new facility site or, the name and specific location of the existing facility

Maximum rating of the proposed new facility or, amount of capacity increase of an existing facility in MVA

Winter (Oct. – April): Summer (July – Sept.): Spring (May – June):

General description of the equipment configuration for the facility

Proposed in-service date (yr/mth/day)

Approximate location of the proposed point of interconnection

Additional submission information

Check the boxes below to confirm each applicable document is being provided, along with this form:

☐ Generation ☐ Transmission ☐ End-user (load)

This interconnection request must be submitted via email, fax, or mail as follows:

Email: electricity.customerservice@fortisbc.com, **cc:** juan.rincon@fortisbc.com Fax **1-866-540-6732**	Mail: FortisBC - Electricity Suite 100, 1975 Springfield Road Kelowna, BC, V1Y 7V7	Attention: Key Account Manager – Shared Services, Energy Solutions

The undersigned Interconnection Customer submits this request to interconnect its facility with the FortisBC Electrical System pursuant to the FortisBC Electrical Tariff and FortisBC Facility Connection Requirements.

This interconnection request is submitted by:

Name (please print)	Signature	Date (yr/mth/day)

FortisBC USE ONLY

Received by	Date and time received	Signature

3431 19.03

Transmission facility technical data

Energy at work FORTIS BC

Please provide information in all blue shaded fields in each section, if applicable. Do not leave any fields blank. If any particular field is not applicable to your project please write N/A (not applicable). Use additional forms if additional facility information is required.

Overhead line or underground cable information

Nominal voltage (kV)	Length (km)	Conductor type	Conductor size
Conductor code name	Overhead ground wire type	Overhead ground wire size	Overhead ground wire code name
Pos-seq resistance R_1(Ohms/km)	Pos-seq reactance X_1(Ohms/km)	Zero-seq resistance R_0(Ohms/km)	Zero-seq reactance X_0(Ohms/km)
Summer continuous rating (MVA)	Summer emergency rating	Winter continuous rating (MVA)	Winter emergency rating (MVA)

Provide a description of the protection systems

Provide a description of the communications systems

Check the boxes below to confirm each mandatory document is being provided, along with this form:

☐ Route map ☐ Single line diagram including all electrical and all protection equipment

Reactive compensation device information (if applicable)

Connection location			Rated voltage (kV)
Type	Rating (MVAR)	Configuration	Switching device type

Provide a description of the protection systems

Provide a description of the criteria for automatic switching

Transformer information (if applicable)

Primary voltage rating (kV)	Secondary voltage rating (kV)	Tertiary voltage rating (kV)	Primary connection configuration
Secondary connection configuration	Tertiary connection configuration	Positive sequence impedance (%)	Zero sequence impedance (%)
Summer continuous rating (MVA)	Summer emergency rating	Winter continuous rating (MVA)	Winter emergency rating (MVA)
Tap changer location (HV or LV)	Tap changer type	Number of taps	Tap step voltage (%)

Provide a description of the protection systems

Additional information

Provide a description of any additional applicable information, if required

3431 19-03

1
2

1

Generation facility technical data

Energy at work FORTIS BC

Please provide information in all blue shaded fields in each section. Do not leave any fields blank. If any particular field is not applicable to your project please write N/A (not applicable). Use additional forms if additional facility information is required.

Generator information

Maximum generator rating (MVA)	Maximum turbine rating (MW)	Rated voltage (kV)	Rated power factor (PU)
Rated amperes (A)	Rated speed (RPM)	Rated frequency (Hz)	Number of phases
Short circuit ratio	Type of generation (synchronous, induction, etc.)	Amortisseur windings connected	Synchronous condenser ☐ Yes ☐ No
Connection (delta/wye)	Type of grounding	Grounding resistance	Turbine and generator inertia constant (H)
Turbine and generator moment of inertia (WR^2)		Energy source (water, steam, wind, etc.)	

Provide a description of the protection systems

Provide a description of the communications systems

Check the boxes below to confirm each mandatory document is being provided, along with this form:

- ☐ Site plan(s) showing the location of the customer's facility and the proposed point of interconnection.
- ☐ Single line diagram(s) which include all electrical and protection equipment.
- ☐ Governor and exciter (including power system stabilizer, if applicable) model block diagrams and data sheets provided in a WECC approved model and in PSSE format.

Impedance information (per-unit values on machine base kV and base MVA)

Base MVA		Base kV	
Unsaturated values		**Saturated values**	
D-Axis Synchronous Reactance (Xdi)	D-Axis Transient Reactance (X'di)	D-Axis Synchronous Reactance (Xdv)	D-Axis Transient Reactance (X'dv)
D-Axis Sub-Transient Reactance (X"di)	Q-Axis Synchronous Reactance (Xqi)	D-Axis Sub-Transient Reactance (X"dv)	Q-Axis Transient Reactance (X'qv)
Q-Axis Transient Reactance (X'qi)	Q-Axis Sub-Transient Reactance (X"qi)	Q-Axis Synchronous Reactance (Xqv)	Negative Sequence Resistance (R_2)
Negative Sequence Reactance (X_2)	Zero Sequence Reactance (X_0)	Q-Axis Sub-Transient Reactance (X"qv)	Zero Sequence Resistance (R_0)
Leakage Reactance (X_m)		Armature Resistance Per Phase (Ra)	Field Winding Resistance (Rf)

Time constant information (seconds)

D-axis values		**Q-axis values**	
Open Circuit Transient (T'do)	Open Circuit Sub-Transient (T"do)	Open Circuit Transient (T'qo)	Open Circuit Sub-Transient (T"qo)
Short Circuit Transient (T'd)	Short Circuit Sub-Transient (T"d)	Short Circuit Transient (T'q)	Short Circuit Sub-Transient (T"q)

Transformer information (if applicable)

Primary voltage rating (kV)	Secondary voltage rating (kV)	Tertiary voltage rating (kV)	Primary connection configuration
Secondary connection configuration	Tertiary connection configuration	Positive sequence impedance (%)	Zero sequence impedance (%)
Maximum continuous rating (MVA)	Maximum continuous rating (MVA)	Tap changer location (HV or LV)	Tap changer type
Number of taps	Tap step voltage	Current tap setting	

Additional information

Provide a description of any additional applicable information, if required

3431 19.03

2

1

End-user (load) facility technical data

(Transmission service: for load connection requirements greater than 63kV or distribution service: for loads >5 MVA to be connected at 25kV and under)

Energy at work FORTIS BC

Please provide information in all blue shaded fields in each section. Do not leave any fields blank. If any particular field is not applicable to your project please write N/A (not applicable). Use additional forms if additional facility information is required.

Interconnection voltage (kV)	Total connected load (kVA)	Proposed future connected load (kVA)	Existing peak demand (kW)
Additional expected peak demand (kW)	Load factor (%)	Expected power factor (%)	Electric heating load (kW)

Lighting load (kW)	Motor load (kW)	Other load (kW)	Hours of operation per day	Days of operation per week

Provide a description of the loads that are included in the 'Other load' total above

Provide a description of the type of business or operation

Check the boxes below to confirm each mandatory document is being provided, along with this form:

☐ Site plan(s) showing the location of the customer's facility and the proposed Point-of-Interconnection.

☐ Single line diagram(s) clearly showing the connection of all major electrical equipment.

Motor information (if applicable)

Provide the following information for all motors 50Hp and larger (attach a list if required).

Type (induction, synchronous)	**Nameplate size** (Hp)	**Nameplate voltage** (kV)	**Starting** (VFD, soft, direct)	**Running** (VFD, direct, etc.)	**Comments**

Generation information (if applicable)

The customer facility has onsite generation for the following purposes (check all that apply)	**Generator size (MW)**
☐ Emergency generation only, not to be paralleled with the FortisBC system	
☐ Onsite generation paralleled with the FortisBC system, with no intent to export.	
☐ Onsite generation paralleled with the FortisBC system, with intent to export.	

Reactive compensation device information (if applicable)

Connection location	Type	Configuration
Rated voltage (kV)	Rating (MVAR)	Switching device type

Provide a description of the protection systems

Provide a description of the criteria for automatic switching

Transformer information (if applicable)

Primary voltage rating (kV)	Secondary voltage rating (kV)	Tertiary voltage rating (kV)	Primary connection configuration
Secondary connection configuration	Tertiary connection configuration	Positive sequence impedance (%)	Zero sequence impedance (%)
Summer continuous rating (MVA)	Summer emergency rating	Winter continuous rating (MVA)	Winter emergency rating (MVA)
Tap changer location (HV or LV)	Tap changer type	Number of taps	Tap step voltage (%)

Provide a description of the protection systems

Additional information

Provide a description of any additional applicable information, if required

3431 19.03

2

Appendix 2 – Definitions

Affected System shall mean an electrical system or entity other than FortisBC that may be affected by the proposed interconnection. This can include any affected FortisBC customers, Transmission Operators, Balancing Authorities, and Reliability Coordinators.

Balancing Authority shall mean the responsible entity that integrates resource plans ahead of time, maintains Demand and resource 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.

BC Hydro shall mean British Columbia Hydro and Power Authority.

BC Reliability Coordinator (BCRC) shall mean the Reliability Coordinator for the Province of British Columbia or its successor organization.

British Columbia Mandatory Reliability Standards (BC MRS) are the NERC/WECC standards that have been approved for enforcement in British Columbia.

Commercial Operation shall mean the status of a Facility that has concluded commissioning and trials and commenced operation.

Commission means the British Columbia Utilities Commission (BCUC) or its successor.

Facility or Facilities shall mean a set of electrical devices that are connected to other electrical devices such as generators, transformers, circuit breakers, bus sections, overhead lines, and end-user electrical equipment.

FortisBC shall mean FortisBC Inc.

FortisBC System shall mean the electrical Facilities owned by FortisBC.

In-Service Date shall mean the date upon which the Interconnection Customer reasonably expects it will be ready to begin use of FortisBC's Interconnection Facilities.

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

Interconnection Facilities shall mean the FortisBC's Interconnection Facilities and the Interconnection Customer's Interconnection Facilities. Collectively, Interconnection Facilities include all Facilities and equipment between the Facility and the Point of Interconnection, including any modification, additions or upgrades that are necessary for physical and electrical connection of the Facility to the FortisBC System.

Interconnection Request (IR) shall mean an Interconnection Customer's request in the form of Appendix 1 to this SFIP.

NERC shall mean the North American Electric Reliability Corporation or its successor organization.

Network Upgrades shall mean the additions, modifications, and upgrades to the FortisBC System required at or beyond the point at which the Interconnection Facilities connect to the FortisBC System.

Party shall mean FortisBC or the Interconnection Customer and **Parties** shall mean both of them.

Point of Interconnection shall mean the point, as set forth in the Interconnection Request, where the Interconnection Facilities connect to the FortisBC System.

Reliability Coordinator (RC) shall mean the entity that is the highest level of authority who is responsible for the reliable operation of the Bulk Electric System, has the wide area view of the Bulk Electric System, and has the operating tools, processes and procedures, including the authority to prevent or mitigate emergency operating situations in both next-day analysis and real-time operations.

Service any electrical Service provided by FortisBC Inc. as specified in the FortisBC Electric Tariff.

WECC shall mean the Western Electricity Coordinating Council or its successor organization.

Appendix 3 – SFIP Flowchart