



Governance the BCA Appendix F1 -5 SITE SPECIFIC TECHNICAL CONDITIONS

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Appendix F - SITE SPECIFIC TECHNICAL CONDITIONS

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- These appendices contain references to Scottish Electrical Standards for SHETL's Transmission System (SHETLS) or The Company Relevant Electrical Standards (RES) throughout. Copies of these standards are available from The Company's website at:
 - <http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/ges/ewelecstandards/>
 - The User shall ensure that all User equipment contained within Relevant Transmission Licensee's busbar protection zone at the User/ National Electricity Transmission Connection Point (see Grid Code CC 6.2.1.2) complies with the.
 - The SHETLS and RES are updated periodically. If the SHETLS or RES are updated in the period between issuing the Connection Offer and the User completing the connection to the National Electricity Transmission System, then The Company will seek agreement with the User to use the updated SHETLS or RES as the standard for plant and apparatus at the Connection Point.



APPENDIX F3

SITE SPECIFIC TECHNICAL CONDITIONS

SPECIAL AUTOMATIC FACILITIES

General

The User shall co-operate with The Company in installing/enhancing/amending intertripping facilities, should The Company require this at a later date, and will not unreasonably withhold its agreement to any such proposals.

For the avoidance of doubt, except where CUSC 4.2A.6 applies, any such changes of this Appendix F3 and/or to The Company's and/or the User's obligations in respect therefore shall be subject to the provisions of Paragraph 2.9.3 of the CUSC.

1. Transmission System to Generating Unit Intertripping Schemes

Not applicable

Other Facilities

8. Synchronising

The User will be required to interface with the National Electricity Transmission System substation synchronising system in accordance with the SHETLS.



Generating Unit and Power Station Protection Arrangements (CC 6.2.2.2)

The fault clearance time (from fault inception to circuit breaker arc extinction) for faults on all the User's equipment directly connected to the National Electricity Transmission System shall meet the following minimum requirement (s):

132kV and below within 120ms

The corresponding backup clearance time at 33kV shall be less than 300ms

General

The protection schemes shall be tested in accordance with the manufacturer's recommendations. Results arising from protections testing will be made available by The Company to the Relevant Transmission Licensee for verification of protection performance and coordination with the protection scheme (s) of the Relevant Transmission Licensee.

Testing of protective schemes shall comply with the requirements of the Grid Code and will include testing at service conditions and parameters.



APPENDIX F5

SITE SPECIFIC TECHNICAL CONDITIONS

OTHER TECHNICAL REQUIREMENTS

1. Protection of Interconnecting Connection (CC 6.2.2.3.1)

The term “Interconnecting Connections” is defined as the connections between the current transformers on the Generator circuit side of the circuit breaker to the Grid Entry Point at the busbar clamps on the busbar side of the busbar selector disconnectors.

The Relevant Transmission Licensee will design the protection scheme for the Interconnecting Connections at the new Connection Site once the Construction Programme has commenced.

In order to provide the required dependability and setting for the protection, the User will be required to install auxiliary components on its circuits, which are compatible with those used by the Relevant Transmission Licensee.

The User shall provide two Current Transformer Type ‘XB’ cores or otherwise agreed, in accordance with the SHETLS, in the current transformer accommodation referred to above, exclusively for use by the Relevant Transmission Licensee for the protection of the Interconnecting Connections.

2. Circuit Breaker Fail Protection (CC.6.2.2.3.2)

Not applicable



National Grid Technical Specification (NGTS) 2.6 (SM)

3. Pole Slipping Protection (CC.6.2.2.3.4)

Not applicable

4. Fault Disconnection Facilities

The User shall design and construct any Transmission Connection Assets and the User's Plant and Apparatus respectively to ensure that the connection points automatically de-energise incoming circuits in the event of a fault and in accordance with National Grid Technical Specification (NGTS) 2.6 (SM)

The User shall comply with Electrical Standards detailed in the GB Grid Code.

5. Plant Performance Requirements

5.1 Reactive Capability (CC.6.3.2)

The User is required to meet the requirements of CC.6.3.2 (c) of the Grid Code.

5.2 Black Start (CC.6.3.5)

There is no requirement for the Users plant to provide a Black Start facility.

5.3 Voltage Control Performance Requirements (CC.6.3.8)

The User is required to install a continuously acting automatic control system to provide control of the voltage at the Grid Entry Point as detailed in CC.6.3.8 of the Grid Code. The performance requirements of this control system are detailed in Appendix 7 of the Grid Code Connection Conditions.



Future inertial response control

5.4 Power Oscillation Damping

There is no requirement for the voltage control system to be fitted with a Power System Stabiliser. However if the User chooses to install a Power System Stabiliser within the Power Park Module voltage control system, its settings and performance shall be agreed with The Company and commissioned in accordance with BC.2.11.2 of the Grid Code.

5.6 Inertial Response

An Industry Working Group is currently in the process of reviewing the Grid Code requirements for the provision of frequency response. The outcome of this review may introduce a requirement for an inertial response control. Any requirement for such a facility will be specified in the Detailed Design Phase which shall be at least 6 months before the Completion Date.

5.7 Fault Ride Through (CC.6.3.15)

The User is required to meet the requirements of CC.6.3.15 of the Grid Code. The fault clearance time on the National Electricity Transmission System shall be taken as 140 ms.



5.8 Voltage Waveform Quality (CC.6.1.5, CC.6.1.6, CC.6.1.7)

The User shall provide The Company with Harmonic Assessment information (as specified in PC.4.4.1, PC.4.4.2, PC.4.5, PC.A.5.4.2 (h), PC.A.6.4, DRC.6.1.1 Schedule 1 and DRC.6.1.5 Schedule 5 of the Grid Code) so that assessments can be carried out in accordance with Grid Code Conditions CC.6.1.5(a) and CC.6.1.7 respectively.

Following the above assessments, The Company will specify to the User (by written notice), the harmonic voltage distortion or harmonic current emission limits (as appropriate) and will specify voltage fluctuation limits. The User shall comply with the above limits.

The specification of the above limits will normally be calculated using the data provided by the User. If the User subsequently notifies The Company of any changes to such data, The Company reserves the right to amend the limits and to issue revised limits to the User following any revised Voltage Waveform Quality Assessment.

5.9 Electro Magnetic Transients

The User shall take appropriate measures to minimise the probability and severity of electromagnetic voltage transients which may occur when the Power Park Module (or any material subsystem) is connected to or disconnected from the National Electricity Transmission System.

The User shall provide the Company with details of such measures and an assessment of the predicted probability and severity of such transients. In the event that transient overvoltage assessments need to be undertaken, The User will be required to provide the data required under PC.A.6.2.1.

6 Trading Point Electronic Data (CC.6.5.8)

The User shall provide electronic data communication facilities approved by The Company to permit the submission of data required by the Grid Code, from the User's Trading Point to The Company. The User will provide the necessary communication links and can elect to send data to two locations depending upon the level of diversity required by the User. The Company will provide the necessary connection equipment at both Wokingham and Warwick.

If the User intends to have a nominated Trading Point outside Great Britain, the responsibilities, functionality, dependability, security, procurement, configuration, delivery points, protocol and repair times of the communication links to The Company and the equipment installed as part of these facilities shall be agreed at least 6 months before the Completion Date.

7 Control Telephony (CC.6.5.2 to CC.6.5.5)

The User shall satisfy the Control Telephony requirements as specified in Schedule 1 (Communications Plant) of this Appendix. This encompasses additional communication requirements (CC.6.5.7, CC.6.5.8, CC.6.5.9 and BC.1.4.1). It must be possible to have immediate and direct contact with the Control Point 24 hours a day, 7 days a week with all communications being conducted in clear, plain English.

If the User intends to have a nominated Trading Point and / or Control Point outside Great Britain, the responsibilities, functionality, dependability, security, procurement, configuration, delivery points, protocol and repair times of the communication links to The Company and Relevant Transmission Licensee including the equipment installed as part of these facilities shall be agreed at least 6 months before the Completion Date.



9. Operational Metering (CC.6.5.6)

The Operational Metering requirements are contained in Schedule 2 of this Appendix.

The User is required to supply the signals defined in Schedule 2 to 132/33kV substation. The functionality, performance, availability, accuracy, dependability, security, protocol and repair times of the equipment generating and supplying the signals (i.e. the meters and communication links) shall be agreed with The Company and Relevant Transmission Licensee at least 6 months before the Completion Date. The User is required to supply the signals defined in Schedule 2 to 132/33kV substation. The functionality, performance, availability, accuracy, dependability, security, protocol and repair times of the equipment generating and supplying the signals (i.e. the meters and communication links) shall be agreed with The Company and Relevant Transmission Licensee at least 6 months before the Completion Date.

10 Dynamic System Monitoring (CC.6.6)

The User shall provide Dynamic System Monitoring facilities on the User's circuits to monitor system dynamic performance (CC.6.6) and provide communication facilities allowing remote access of data to The Company.

The Dynamic System Monitoring requirements are contained in Schedule 3 of this Appendix. The functionality, performance, availability, accuracy, dependability, security, configuration, delivery point, protocol and repair times of the equipment generating and supplying the signals (i.e. the monitors and communication links) shall be agreed with The Company and Relevant Transmission Licensee at least 6 months before the Completion Date. The User is required to supply the signals generated by the Dynamic System Monitors to the National Electricity Transmission System, Wide Area Network (WAN) or equivalent. These should be compatible with any Transmission equipment installed at the Connection Site.



13. Safety and Operational Interlocking

Electrical and mechanical interlocking to be provided by the User in accordance with the requirements of the SHETLS. This is separate from any interlocking requirements that may be required for Boundary Point Metering.

14. Earthing Facility

All earth mats on the User site(s) and Transmission site(s) where these are adjacent are to be bonded together. Two points will be provided within the Transmission substation to facilitate this bonding. User's transformers connected at the Grid Entry Point are to have Star connected HV windings with the star point solidly earthed.

The User shall carry out an earthing survey of their sites prior to construction. The earthing system is to be designed to withstand a short circuit current of 40 kA for 3 seconds at 33kV and the Rise Of Earth Potential (ROEP) shall be managed to minimise the exposure of third parties beyond the perimeter fence in accordance with the SHETLS.

15. Compliance Testing

15.1 A Working Group is currently in the process of introducing a compliance process into the Grid Code. Should this work result in the introduction of compliance provisions within the Grid Code (including Compliance Testing) section 15 of this Appendix F5 will be withdrawn.

15.2 As part of the compliance process, the User will be required to provide signals, in a type, format and protocol are specified in 15.3 to 15.6 below. Proposed variations shall be discussed and agreed with The Company in the commissioning phase.

15.3 The User shall provide signals with the following sample rates:

- (i) 1 Hz for reactive range tests
- (ii) 10 Hz for frequency control tests
- (iii) 100 Hz for voltage control tests



15.4 Unless otherwise agreed for on site witnessed tests The Company will connect monitoring equipment in addition to that of the User's. The User should generally provide all relevant signals for this purpose in the form of d.c. voltages within the range -10V to +10V. In exceptional circumstances some signals may be accepted as d.c. voltages within the range 60V to +60V with prior agreement between the User and The Company. All signals for each Power Park Module shall:

- (i) be suitably terminated in a single accessible location at the User's site.
- (ii) be transmitted without appreciable attenuation, delay or excessive filtering and be suitably terminated in a single robust location at or near the Grid Entry Point.
- (iii) be suitably scaled across the range. The following scaling would (unless The Company notify the User otherwise) be acceptable to The Company:
 - (a) 0MW to Registered Capacity 0-8Vdc
 - (b) Maximum leading Reactive Power to maximum lagging Reactive Power -8to8Vdc
 - (c) 48 – 52Hz as -8 to 8Vdc
 - (d) Nominal voltage -10% to +10% as -8 to 8Vdc

The User shall provide to The Company a 230V power supply adjacent to the signal terminal location.

15.5 During any tests, unless otherwise agreed, the following signals should be provided:

- (i) Total Power Park Module Active Power MW
- (ii) Total Power Park Module Reactive Power MVar
- (iii) Grid Entry Point line-line Voltage (kV)
- (iv) System frequency (Hz)
- (v) Injected frequency signal (Hz) and test logic signal (Boolean) when appropriate
- (vi) Injected voltage signal or test logic signal when appropriate
- (vii) Power Park Module site voltage (MV) (kV)
- (viii) Available power for Power Park Module (MW)
- (ix) Power source speed (e.g. wind speed) (m/s) (when appropriate)
- (x) Power source direction (degrees) (when appropriate)
- (xi) Any other signals as agreed between the User and The Company that may assist in demonstrating compliance.

The Company accept that signals 15.5(viii), (ix) and (x) may have lower effective sample rates than those required in 15.3 although any signals supplied for connection to The Company's recording equipment which do not meet at least the sample rates detailed in 15.3 should have the actual sample rates indicated to The Company before testing commences.



15.6 For all witnessed testing the User should either

(i) provide to The Company all signals outlined in 15.5 direct from the Power Park Module control system without any attenuation, delay or excessive filtering and with a signal update rate corresponding to 15.3;

appreciable

or

(ii) connected to current and voltage transformers for monitoring in real time on site, with all signals provided from the User as a download once the testing has been completed provided that:

control systems

- (a) the full test results can be provided within 2 working days to The Company;
- (b) all data can be provided with a sample rate in accordance with 15.2;
and
- (c) the solution does not unreasonably add a significant delay between tests or impede the volume of testing which can take place on the day.

Transducers connected to current and voltage transformers should meet the following specification

- (a) The transducer (s) should be permanently installed at the User's location to easily allow safe testing at any point in the future, and to avoid a requirement for recalibration of the Current Transformers and Voltage Transformers.
- (b) The transducer (s) should be directly connected to the metering Current Transformers and Voltage Transformers or similar.
- (c) The transducers should have a response time no greater than 50ms to reach 90% of output.

16. Voltage Fluctuations caused by Machine Starting

Any voltage fluctuation caused by transformer energisation or machine starting must be within the limits specified in Engineering Recommendation P28.

17. Local Switching

Not applicable

18. Plant Technical Requirements

The unique nature of the proposed connection arrangement requires the definition of specific connection conditions and performance requirements. The User shall be required to meet the connection conditions and performance/technical requirements as specified by the Relevant Transmission Licensee and The Company.

