Grid Code Modification Proposal Form Email to gridcode@eirgrid.com	

Title of Modification Proposal: Update to Interconnector Requirements

MPID (EirGrid Use Only): MPID 337

Date:	11/06/2025
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Grid Code Version:	Grid Code Version 14.3
Grid Code Section(s) Impacted by Modification Proposal:	○ CC.7.5.4 – both HVDC Units and Non-HVDC Units ○ CC.7.5.12.6 – HVDC Units only ○ OC.4.3.4.2.2 – HVDC Units only ○ Definition of Interconnector Registered Capacity – both HVDC and Non-HVDC Units ○ CC.7.5.10 (d) – HVDC Units only ○ Definition of Interconnector Converter Station – definition applies to both HVDC and Non-HVDC Units, but additional proposed text applies to HVDC Units only, specifically DC-connected Controllable PPMs ○ CC.7.5.1.1 (t) and (w) – HVDC Units only, specifically DC-connected Controllable PPMs

Modification Proposal Justification:

Several updates are required to Grid Code interconnector requirements, described below:

- **CC.7.5.4:** Removal of demarcation and boxing around CC.7.5.4 (a) – (e) as requirements concerning oscillations are applicable to both HVDC Units and Non-HVDC Units.
- **CC.7.5.12.6:** EirGrid consulted on HVDC Unit post fault active power recovery parameters in November 2018, where the recommended magnitude and accuracy for active power recovery was 90%. This 10% tolerance for short duration faults was mistakenly omitted when CC.7.5.12.6 was incorporated into the Grid Code. This requirement should be split up into two separate requirements – one for HVDC Units, which allows 10% tolerance for short and longer duration faults, and one for non-HVDC units, which would remain the same as the current Grid Code requirement.
- **OC.4.3.4.2.2:** As per the EU HVDC CNC, HVDC Units should have the capability to adjust their active power frequency response, during both import and export, at a Transmission System Frequency threshold between and including 50.2 Hz and 50.5 Hz for Limited Frequency Sensitive Mode Over-frequency (LFSM-O), and between and including 49.9 Hz and 49.5 Hz for Limited Frequency Sensitive Mode Under-frequency (LFSM-U). This clause should be updated to reflect these EU requirements.

- **Definition of Interconnector Registered Capacity, and CC.7.5.10 (d):** Proposed update to this definition to clarify that the Interconnector Registered Capacity is the greater of the Interconnector Registered Export Capacity and the Interconnector Import Capacity as defined in the Grid Code. Proposed additional text in CC.7.5.10 (d) to clarify that the reactive power capability of an interconnector is based on its Interconnector Registered Capacity, which is the greater of the Interconnector Registered Export Capacity and the Interconnector Import Capacity as defined in the Grid Code.
- **Definition of Interconnector Converter Station, and CC.7.5.1.1 (t) and (w):** Proposed text to clarify that remote end interconnector converter station requirements in the Grid Code are currently only applicable to DC-connected Controllable PPMs.

A Table Outlining the Proposed Changes:

Clause	Red Line Version Text *Deleted text in ~~strike through red font~~ and new text highlighted in blue font*	Green Line Version Text
CC.7.5.4	++ CC.7.5.4 Each **Interconnector**: (a) Must ensure that they do not cause any sub synchronous resonance, undamped oscillations or harmful shaft torsional oscillations to **Users** on the **Transmission System**. This shall be demonstrated by simulation prior to connection by the **Interconnector** using best industry practice as agreed by the **TSO**. (b) Where it is determined by the **TSO** that the **Interconnector** does cause such harmful oscillations or resonances the operation of the **Interconnector** shall cease until a solution is agreed with the **TSO**; (c) Where further studies are required to examine an oscillation or resonance issue there shall be an exchange of the necessary data between the **Interconnector Operator** and the **TSO**, such exchange of data shall not be unreasonably withheld. The **Interconnector Operator** shall provide a report to show the contribution that the **Interconnector** control system design will have on the torsional mode frequencies.	CC.7.5.4 Each **Interconnector**: (a) Must ensure that they do not cause any sub synchronous resonance, undamped oscillations or harmful shaft torsional oscillations to **Users** on the **Transmission System**. This shall be demonstrated by simulation prior to connection by the **Interconnector** using best industry practice as agreed by the **TSO**. (b) Where it is determined by the **TSO** that the **Interconnector** does cause such harmful oscillations or resonances the operation of the **Interconnector** shall cease until a solution is agreed with the **TSO**; (c) Where further studies are required to examine an oscillation or resonance issue there shall be an exchange of the necessary data between the **Interconnector Operator** and the **TSO**, such exchange of data shall not be unreasonably withheld. The **Interconnector Operator** shall provide a report to show the contribution that the **Interconnector** control system design will have on the torsional mode frequencies. (d) Input provisions for addition of a future sub synchronous damping controller shall be made by the **Interconnector Operator**; (e) When several **Interconnector Convertor Stations** or other plant and equipment are in close electrical proximity, the **TSO** may specify control interaction studies on site specific basis with defined scope and extent

	|| (d) Input provisions for addition of a future sub synchronous damping controller shall be made by the **Interconnector Operator**; || (e) When several **Interconnector Convertor Stations** or other plant and equipment are in close electrical proximity, the **TSO** may specify control interaction studies on site specific basis with defined scope and extent in order to demonstrate no adverse interaction effect. The control interaction study shall ~~idently~~ identify possible mitig~~i~~ation actions to be implemented if adverse control interaction is identified.	in order to demonstrate no adverse interaction effect. The control interaction study shall identify possible mitigation actions to be implemented if adverse control interaction is identified. […]

Clause	Red Line Version Text *Deleted text in ~~strike through red font~~ and new text highlighted in blue font*	Green Line Version Text
CC.7.5.12.6	|| The **Interconnector** shall provide at least 90% of its **Active Power** set-point as quickly as the technology allows and in any event within 500 ms of the **Transmission System Voltage** recovering to 90% of nominal **Voltage**, for **Fault Disturbances** cleared within 500 ms. For longer duration **Fault Disturbances**, the **Interconnector** shall provide at least 90% of its **Active Power** set-point within 1 second of the **Transmission System Voltage** recovering to 90% of the nominal **Voltage.** ‡‡ The **Interconnector** shall reach its **Active Power** set-point as quickly as the technology allows and in any event within 500 ms of the **Transmission System Voltage** recovering to 90% of nominal **Voltage**, for **Fault Disturbances** cleared within 500 ms. For longer duration **Fault Disturbances**, the **Interconnector** shall provide at least 90% of its **Active Power** set-point within 1 second of the **Transmission System Voltage** recovering to 90% of the nominal **Voltage.**	|| The **Interconnector** shall provide at least 90% of its **Active Power** set-point as quickly as the technology allows and in any event within 500 ms of the **Transmission System Voltage** recovering to 90% of nominal **Voltage**, for **Fault Disturbances** cleared within 500 ms. For longer duration **Fault Disturbances**, the **Interconnector** shall provide at least 90% of its **Active Power** set-point within 1 second of the **Transmission System Voltage** recovering to 90% of the nominal **Voltage.** ‡‡ The **Interconnector** shall reach its **Active Power** set-point as quickly as the technology allows and in any event within 500 ms of the **Transmission System Voltage** recovering to 90% of nominal **Voltage**, for **Fault Disturbances** cleared within 500 ms. For longer duration **Fault Disturbances**, the **Interconnector** shall provide at least 90% of its **Active Power** set-point within 1 second of the **Transmission System Voltage** recovering to 90% of the nominal **Voltage.**

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OC.4.3.4.2.2	|| […] **Limited Frequency Sensitive Mode – Over-frequency** The following shall apply for **Interconnectors** operating in Limited **Frequency** Sensitive Mode – Over- **Frequency**: (a) **Interconnector** shall be capable of adjusting **Active Power Frequency** response, during both import and export, ~~when the~~ at a **Transmission System Frequency** ~~rises to or above 50.2 Hz.~~ threshold between and including 50.2 Hz and 50.5 Hz. […] **Limited Frequency Sensitive Mode – Under-frequency** The following shall apply for **Interconnectors** operating in Limited **Frequency** Sensitive Mode – Under- **Frequency**: (a) **Interconnector** shall be capable of adjusting **Active Power Frequency** response, during both import and export, ~~when the~~ at a **Transmission System Frequency** ~~falls to or below 49.5 Hz.~~ threshold between and including 49.8 Hz and 49.5 Hz. […]	|| […] **Limited Frequency Sensitive Mode – Over-frequency** The following shall apply for **Interconnectors** operating in Limited **Frequency** Sensitive Mode – Over- **Frequency**: (a) **Interconnector** shall be capable of adjusting **Active Power Frequency** response, during both import and export, at a **Transmission System Frequency** threshold between and including 50.2 Hz and 50.5 Hz. […] **Limited Frequency Sensitive Mode – Under-frequency** The following shall apply for **Interconnectors** operating in Limited **Frequency** Sensitive Mode – Under- **Frequency**: (b) **Interconnector** shall be capable of adjusting **Active Power Frequency** response, during both import and export, at a **Transmission System Frequency** threshold between and including 49.8 Hz and 49.5 Hz. […]

Clause	Red Line Version Text *Deleted text in ~~strike-through red font~~ and new text highlighted in blue font*	Green Line Version Text
Definition: Interconnector Registered Capacity	The maximum **Capacity**, in either flow direction, expressed in whole MW, that an **Interconnector** can deliver on a sustained basis, without accelerated loss of equipment life, at the **Connection Point**. This figure will be taken as the greater of the **Interconnector Registered Export Capacity** and the **Interconnector Registered Import Capacity** ~~This figure~~ and shall include transmission power losses for the **Interconnector**.	The maximum **Capacity**, in either flow direction, expressed in whole MW, that an **Interconnector** can deliver on a sustained basis, without accelerated loss of equipment life, at the **Connection Point**. This figure will be taken as the greater of the **Interconnector Registered Export Capacity** and the **Interconnector Registered Import Capacity** and shall include transmission power losses for the **Interconnector**.
CC.7.5.10 (d)	|| (d) An **Interconnector Converter Station** connecting to the **Transmission System** shall be capable of providing **Reactive Power** as per the following requirement at its maximum **Active Power** transmission capacity (at **Active Power** less than or equal to **Interconnector Registered Capacity** (Pmax)) at the **Connection Point**. The **Reactive Power** variation by the **Reactive Power** control mode of the **Interconnector Converter Station** shall not result in a **Voltage** step exceeding 0.03 pu at the connection point. […] An **Interconnector** shall be capable of moving to any operating point within their U-Q/P_{max} profile, without undue delay, and shall be capable of moving from its minimum **Reactive Power** capability Q_{min}/P_{max} (Import/Lead) to its maximum **Reactive Power** capability Q_{max}/P_{max} (Export/Lag) within 120 seconds, depending on the **Active Power** output. Here, P_{max} is the **Interconnector Registered Capacity** at the **Connection Point**, … the greater of the **Interconnector Export Capacity** and the **Interconnector Import Capacity**.	|| (d) An **Interconnector Converter Station** connecting to the **Transmission System** shall be capable of providing **Reactive Power** as per the following requirement at its maximum **Active Power** transmission capacity (at **Active Power** less than or equal to **Interconnector Registered Capacity** (Pmax)) at the **Connection Point**. The **Reactive Power** variation by the **Reactive Power** control mode of the **Interconnector Converter Station** shall not result in a **Voltage** step exceeding 0.03 pu at the connection point. […] An **Interconnector** shall be capable of moving to any operating point within their U-Q/P_{max} profile, without undue delay, and shall be capable of moving from its minimum **Reactive Power** capability Q_{min}/P_{max} (Import/Lead) to its maximum **Reactive Power** capability Q_{max}/P_{max} (Export/Lag) within 120 seconds, depending on the **Active Power** output. Here, P_{max} is the **Interconnector Registered Capacity** at the **Connection Point**, … the greater of the **Interconnector Export Capacity** and the **Interconnector Import Capacity**.

Clause	Red Line Version Text *Deleted text in ~~strike-through red font~~ and new text highlighted in blue font*	Green Line Version Text
Definition: Interconnector Converter Station	Part of an **Interconnector** with one or more HVDC converter units installed in a single location together with buildings, filters, **Reactive Power** devices, control, monitoring, protective, measuring and auxiliary equipment. Remote end **Interconnector Converter Stations** are **Interconnector Converter Stations** which are not synchronously connected to any synchronous area. Any reference to remote end **Interconnector Converter Station** requirements in this **Grid Code** are applicable to DC-connected **Controllable PPMs** only.	Part of an **Interconnector** with one or more HVDC converter units installed in a single location together with buildings, filters, **Reactive Power** devices, control, monitoring, protective, measuring and auxiliary equipment. Remote end **Interconnector Converter Stations** are **Interconnector Converter Stations** which are not synchronously connected to any synchronous area. Any reference to remote end **Interconnector Converter Station** requirements in this **Grid Code** are applicable to DC-connected **Controllable PPMs** only.
CC.7.5.1.1 (t)	|| […] For DC-connected **Controllable PPMs**, the remote end **Interconnector Converter Station**, ~~this is the end connecting to the **Transmission System**,~~ provisions of CC.7.5.1.1.(t), CC.7.5.1.3, CC.7.5.1.4 and CC.7.5.1.5 shall apply. […]	|| […] For DC-connected **Controllable PPMs**, the remote end **Interconnector Converter Station**, provisions of CC.7.5.1.1.(t), CC.7.5.1.3, CC.7.5.1.4 and CC.7.5.1.5 shall apply. […]
CC.7.5.1.1 (w)	|| […] For DC-connected **Controllable PPMs**, ~~A~~ the remote end **Interconnector Converter Station** shall remain connected to the remote end **Interconnector Converter Station** network and operate within the **Voltage** ranges and time periods specified below based on the reference 1 p.u. **Voltage**: […]	|| […] For DC-connected **Controllable PPMs**, the remote end **Interconnector Converter Station** shall remain connected to the remote end **Interconnector Converter Station** network and operate within the **Voltage** ranges and time periods specified below based on the reference 1 p.u. **Voltage**: […]