ECC.6.3.15 FAULT RIDE THROUGH

ECC.6.3.15.1 General **Fault Ride Through** requirements, principles and concepts applicable to **Type B**, **Type C** and **Type** **D** **Power Generating Modules** and **OTSDUW Plant and Apparatus** subject to faults up to 140ms in duration

ECC.6.3.15.1.1 ECC.6.3.15.1 – ECC.6.3.15.8 section sets out the **Fault Ride Through** requirements on **Type B**, **Type C** and **Type D Power Generating Modules**, **OTSDUW Plant and Apparatus** and **HVDC Equipment** that shall apply in the event of a fault lasting up to 140ms in duration.

ECC.6.3.15.1.2 Each **Power Generating Module**, **Power Park Module**, **HVDC Equipment** and **OTSDUW Plant and Apparatus** is required to remain connected and stable for any balanced and unbalanced fault where the voltage at the **Grid Entry Point** or **User System Entry Point**  or (**HVDC Interface Point** in the case of **Remote End DC Converter Stations**  or **Interface Point** in the case of **OTSDUW Plant and Apparatus**) remains on or within the boundaries defined by the heavy black lines shown in the voltage against time curves in sections ECC.6.3.15.2 – ECC.6.3.15.7 (as applicable) below.

ECC.6.3.15.1.3 The applicable voltage against time curves defined in ECC.6.3.15.2– ECC.6.3.15.7 and ECC.6.3.15.1.4 respectively express the lower (low voltage ride through) and upper (high voltage ride through) limits (expressed as the ratio of its actual value and its reference 1pu) of the actual course of the phase to phase voltage (or phase to earth voltage in the case of asymmetrical/unbalanced faults) on the **System** voltage level at the **Grid Entry Point** or **User System Entry Point** (or **HVDC Interface Point** in the case of **Remote End HVDC Converter** **Stations** or **Interface Point** in the case of **OTSDUW Plant and Apparatus**) during a symmetrical or asymmetrical/unbalanced fault, as a function of time before, during and after the fault. The high voltage curve shown in ECC.6.3.15.1.4 shall be interpreted such that it starts from the time of inception of transient overvoltage (tov) and is applicable to all Type B, C and D synchronous generators and power park modules. The high voltage transient shall be interpreted as any voltage above the Uref corresponding to that in CC.6.1.4 and ECC.6.1.4.

ECC.6.3.15.1.4 Voltage against time curve and parameters applicable to Type B,C,D Synchronous Power Generating Modules and power park modules for high voltage ride through

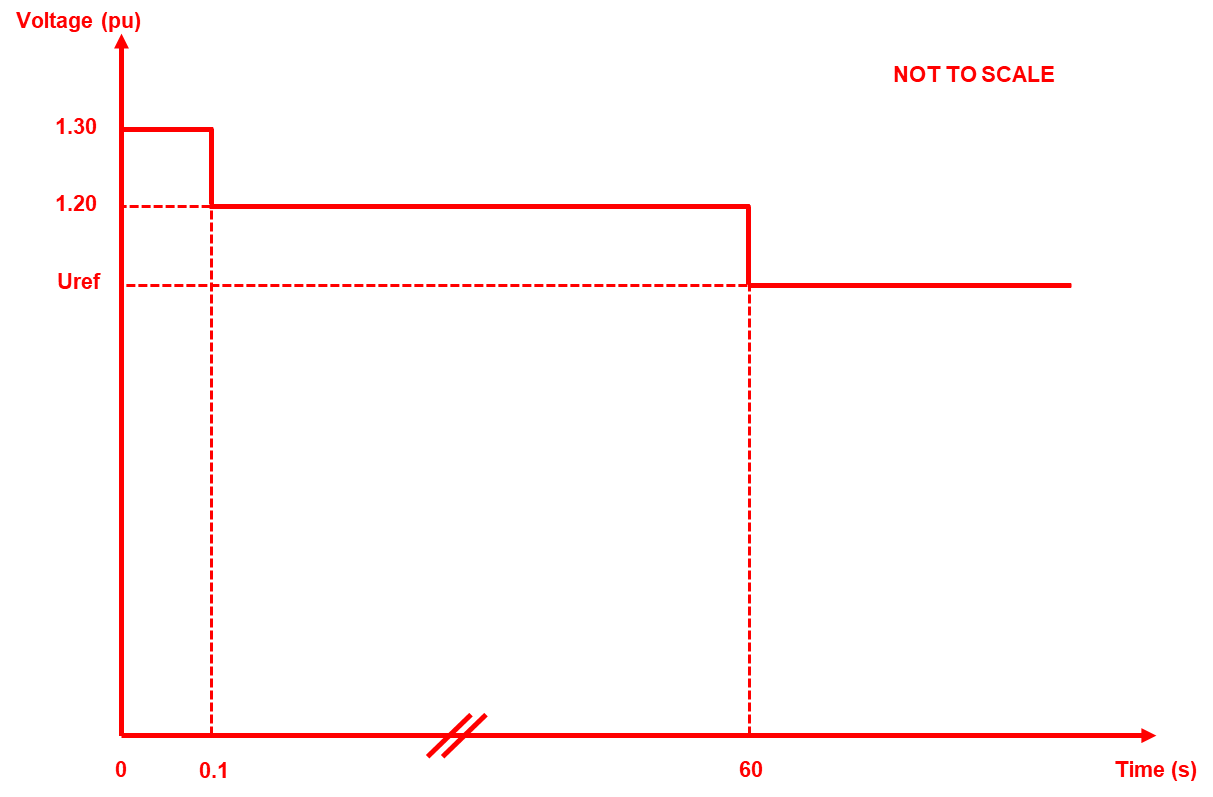


Figure ECC.6.3.15.1..4 Voltage against time curve applicable to **Type B,C,D Synchronous Power Generating Modules and power park modules for high voltage ride through**

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage parameters (pu)** | | **Time parameters (seconds)** | |
| Uov1 | 1.3 | tov1 | tov + 0.1 |
| Uov2 | 1.2 | tov2 | tov + 60 |
| Uov3 | Vref | tov3 | tov + inf |

Table ECC.6.3.15.1..4 Voltage against time curve applicable to Type B,C,D Synchronous Power Generating Modules and power park modules for high voltage ride through

ECC.6.3.15.2(a) Voltage against time curve and parameters applicable to **Type B Synchronous Power Generating Modules** for low voltage ride through

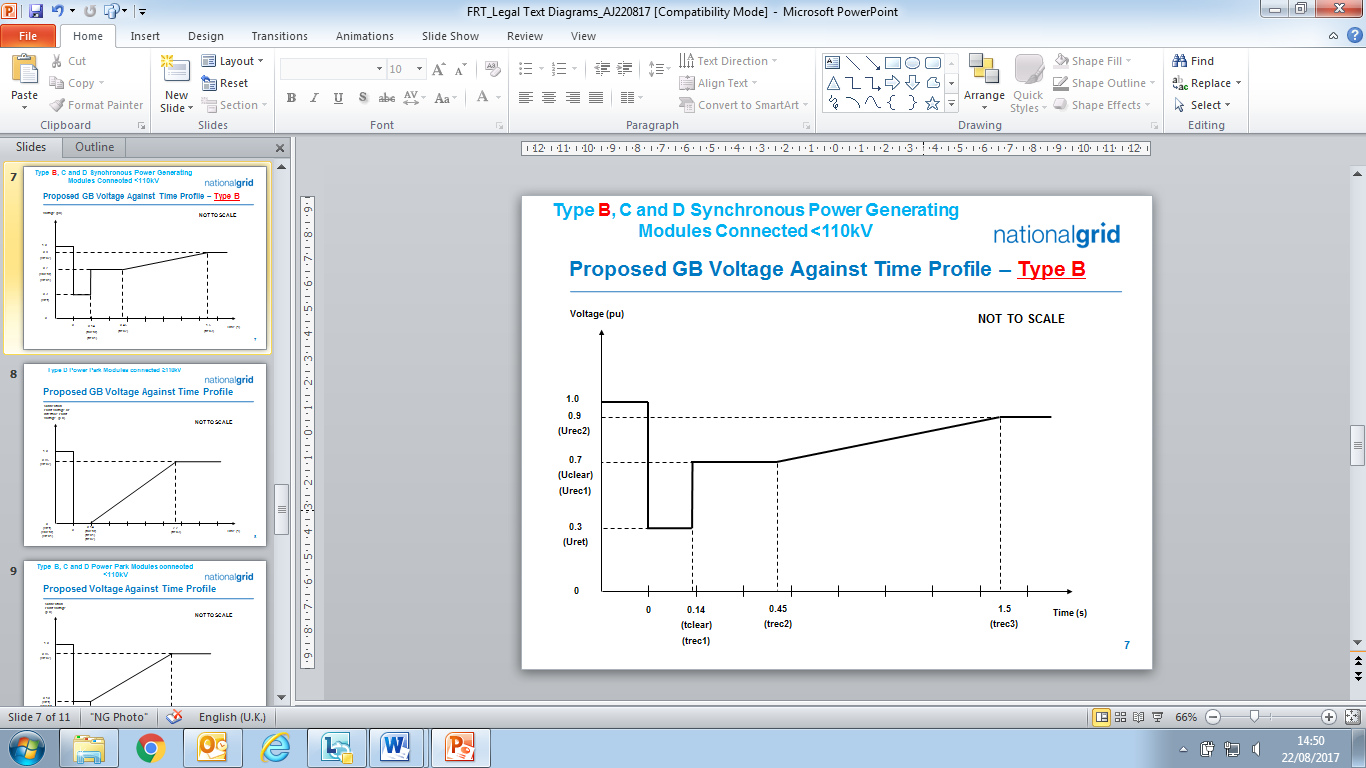


Figure ECC.6.3.15.2 (a)- Voltage against time curve applicable to **Type B Synchronous Power Generating Modules for low voltage ride through**

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage parameters (pu)** | | **Time parameters (seconds)** | |
| Uret | 0.3 | tclear | 0.14 |
| Uclear | 0.7 | trec1 | 0.14 |
| Urec1 | 0.7 | trec2 | 0.45 |
| Urec2 | 0.9 | trec3 | 1.5 |

Table ECC.6.3.15.2 (b) Voltage against time parameters applicable to **Type B**

**Synchronous Power Generating Modules for low voltage ride through**

ECC.6.3.15.3 Voltage against time curve and parameters applicable to **Type C** and **D Synchronous Power Generating Modules** connected below 110kV for low voltage ride through

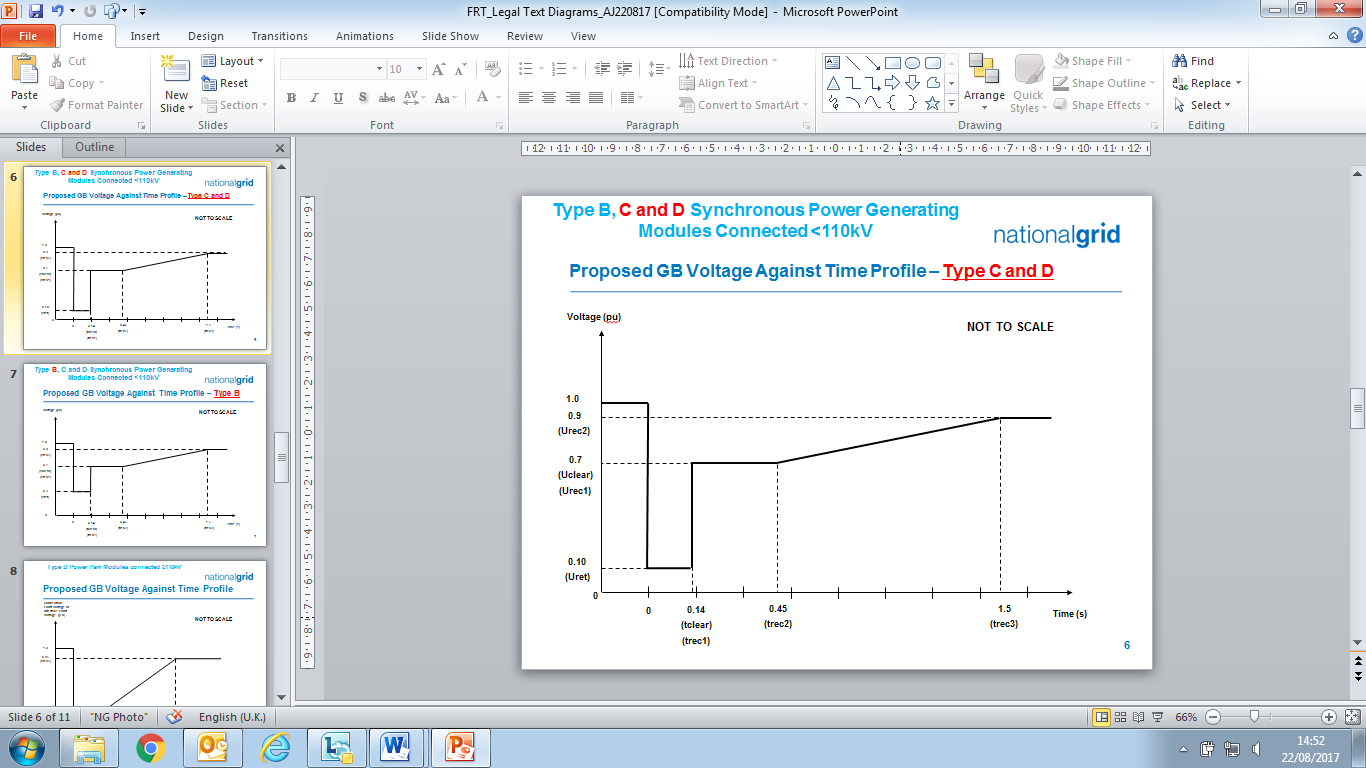


Figure ECC.6.3.15.3 - Voltage against time curve applicable to **Type C** and **D Synchronous Power Generating Modules** connected below 110kV for low voltage ride through

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage parameters (pu)** | | **Time parameters (seconds)** | |
| Uret | 0.1 | tclear | 0.14 |
| Uclear | 0.7 | trec1 | 0.14 |
| Urec1 | 0.7 | trec2 | 0.45 |
| Urec2 | 0.9 | trec3 | 1.5 |

Table ECC.6.3.15.3 Voltage against time parameters applicable to **Type C** and **D Synchronous Power Generating Modules** connected below 110kV for low voltage ride through

ECC.6.3.15.4 Voltage against time curve and parameters applicable to **Type D Synchronous Power Generating Modules** connected at or above 110kV for low voltage ride through

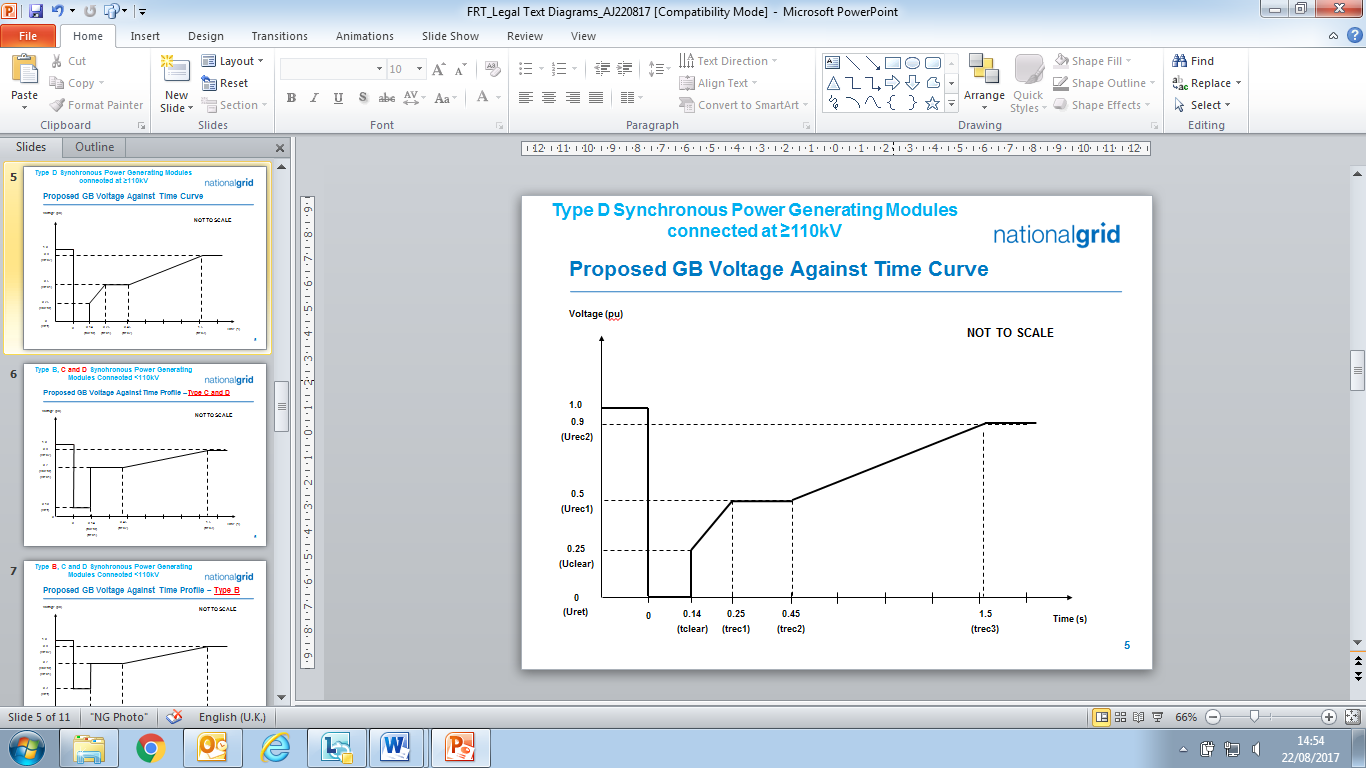


Figure ECC.6.3.15.4 - Voltage against time curve applicable to **Type D Synchronous Power Generating Modules** connected at or above 110kV for low voltage ride through

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage parameters (pu)** | | **Time parameters (seconds)** | |
| Uret | 0 | tclear | 0.14 |
| Uclear | 0.25 | trec1 | 0.25 |
| Urec1 | 0.5 | trec2 | 0.45 |
| Urec2 | 0.9 | trec3 | 1.5 |

Table ECC.6.3.15.4 Voltage against time parameters applicable to **Type D Synchronous Power Generating Modules** connected at or above 110kV for low voltage ride through

ECC.6.3.15.5 Voltage against time curve and parameters applicable to **Type B**, **C** and **D Power Park Modules** connected below 110kV for low voltage ride through

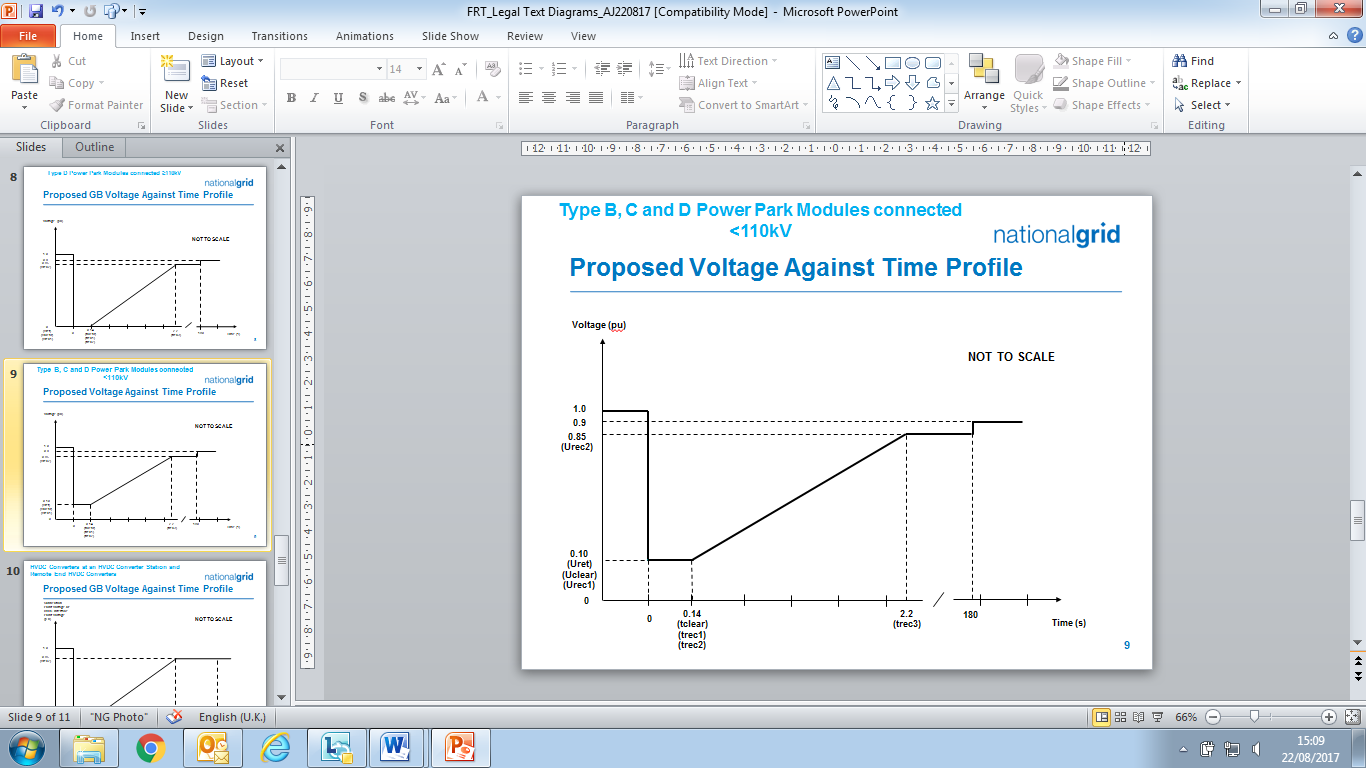


Figure ECC.6.3.15.5 - Voltage against time curve applicable to **Type B**, **C** and **D Power Park Modules** connected below 110kV for low voltage ride through

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage parameters (pu)** | | **Time parameters (seconds)** | |
| Uret | 0.10 | tclear | 0.14 |
| Uclear | 0.10 | trec1 | 0.14 |
| Urec1 | 0.10 | trec2 | 0.14 |
| Urec2 | 0.85 | trec3 | 2.2 |

Table ECC.6.3.15.5 Voltage against time parameters applicable to **Type B**, **C** and **D Power Park Modules** connected below 110kV for low voltage ride through

ECC.6.3.15.6 Voltage against time curve and parameters applicable to **Type D Power Park Modules** with a **Grid Entry Point** or **User System Entry Point** at or above 110kV, **DC Connected Power Park Modules** at the **HVDC Interface Point** or **OTSDUW Plant and Apparatus** at the **Interface Point for low voltage ride through**.



Figure ECC.6.3.15.6 - Voltage against time curve applicable to **Type D Power Park Modules** with a **Grid Entry Point** or **User System Entry** **Point** at or above 110kV, **DC Connected Power Park Modules** at the **HVDC Interface Point** or **OTSDUW Plant and Apparatus** at the **Interface Point for low voltage ride through**.

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage parameters (pu)** | | **Time parameters (seconds)** | |
| Uret | 0 | tclear | 0.14 |
| Uclear | 0 | trec1 | 0.14 |
| Urec1 | 0 | trec2 | 0.14 |
| Urec2 | 0.85 | trec3 | 2.2 |

Table ECC.6.3.15.6 Voltage against time parameters applicable to a  **Type D Power Park Modules** with a **Grid Entry Point** or **User System Entry** **Point** at or above 110kV, **DC Connected Power Park Modules** at the **HVDC Interface Point** or **OTSDUW Plant and Apparatus** at the **Interface Point for low voltage ride through**.

ECC.6.3.15.7 Voltage against time curve and parameters applicable to **HVDC Systems** and **Remote End HVDC Converter Stations for low voltage ride through**



Figure ECC.6.3.15.7 - Voltage against time curve applicable to **HVDC Systems** and **Remote End HVDC Converter Stations for low voltage ride through**

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage parameters (pu)** | | **Time parameters (seconds)** | |
| Uret | 0 | tclear | 0.14 |
| Uclear | 0 | trec1 | 0.14 |
| Urec1 | 0 | trec2 | 0.14 |
| Urec2 | 0.85 | trec3 | 2.2 |

Table ECC.6.3.15.7 Voltage against time parameters applicable to **HVDC Systems** and **Remote End HVDC Converter Stations for low voltage ride through**

ECC.6.3.15.8 In addition to the requirements in ECC.6.3.15.1 – ECC.6.3.15.7:

1. Each **Type B**, **Type C** and **Type D** **Power Generating Module** at the **Grid Entry Point** or **User System Entry Point**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus** at the **Interface Point**) shall be capable of satisfying the above requirements when operating at **Rated MW** output and maximum leading **Power Factor**.
2. **The Company** will specify upon request by the **User** the pre-fault and post fault short circuit capacity (in MVA) at the **Grid Entry Point** or **User System Entry Point** (or **HVDC Interface Point** in the case of a remote end **HVDC Converter** **Stations** or **Interface Point** in the case of **OTSDUW Plant and Apparatus**).
3. The pre-fault voltage shall be taken to be 1.0pu and the post fault voltage shall not be less than 0.9pu**.**
4. To allow a **User** to model the **Fault Ride Through** performance of its **Type B**, **Type C** and/or **Type D** **Power Generating Modules** or **HVDC Equipment**, **The Company** will provide additional network data as may reasonably be required by the **EU Code** **User** to undertake such study work in accordance with PC.A.8. Alternatively, **The Company** may provide generic values derived from typical cases.

(v) **The Company** will publish fault level data under maximum and minimum demand conditions in the **Electricity Ten Year Statement**.

(vi) Each **EU** **Generator** (in respect of **Type B**, **Type C**, **Type D Power Generating Modules** and **DC Connected Power Park Modules**) and **HVDC System Owners** (in respect of **HVDC Systems**) shall satisfy the requirements in ECC.6.3.15.8(i) – (vii) unless the protection schemes and settings for internal electrical faults trips the **Type B**, **Type C** and **Type D** **Power Generating Module**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus**) from the **System**. Specifically when subjected to a voltage dip shall satisfy the requirements in ECC.6.3.15.8(i) – (vii) except where:

1. the location of the fault means it cannot be fully cleared without tripping of **Type B**, **Type C** and **Type D** **Power Generating Module**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus**) shall trip as required.
2. clearance of the fault results in the **Type B**, **Type C** and **Type D** **Power Generating Module**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus**)becoming islanded and disconnected from the **Total System** and not supplying **Customers** (where ECC.6.3.5.5 and ECC.6.3.7.1.5 apply),then the **Type B**, **Type C** and **Type D** **Power Generating Module**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus**) shall be permitted to trip as required**.**
3. the **Type B**, **Type C** and **Type D** **Power Generating Module**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus**)is part of a combined protection scheme with the **Transmission Operator**,then the **Type B**, **Type C** and **Type D** **Power Generating Module**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus**)shall be permitted to trip as required**.**
4. the **Type B**, **Type C** and **Type D** **Power Generating Module**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus**)is part of an intertrip scheme which is switched into service and triggered, then the **Type B**, **Type C** and **Type D** **Power Generating Module**, **HVDC Equipment** (or **OTSDUW Plant and Apparatus**)shall be permitted to trip as required**.**

The protection schemes and settings should not jeopardise **Fault Ride Through** performance as specified in ECC.6.3.15.8(i) – (vii). The undervoltage protection at the **Grid Entry Point** or **User System Entry Point** (or **HVDC Interface Point** in the case of a **Remote End HVDC Converter** **Stations** or **Interface Point** in the case of **OTSDUW Plant and Apparatus**) shall be set by the **EU** **Generator** (or **HVDC System Owner** or **OTSDUA** in the case of **OTSDUW Plant and Apparatus**) according to the widest possible range unless **The Company** and the **EU Code User** have agreed to narrower settings. All protection settings associated with undervoltage protection shall be agreed between the **EU** **Generator** and/or **HVDC System Owner** with **The Company** and **Relevant Transmission Licensee’s** and relevant **Network Operator** (as applicable).

(vii) Each **Type B**, **Type C** and **Type D Power Generating Module**, **HVDC System** and **OTSDUW Plant and Apparatus** at the **Interface Point** shall be designed such that upon clearance of the fault on the **Onshore Transmission System** and within 0.5 seconds of restoration of the voltage at the **Grid Entry Point** or **User System Entry Point** or **HVDC Interface Point** in the case of a **Remote End HVDC Converter** **Stations** or **Interface Point** in the case of **OTSDUW Plant and Apparatus** to 90% of nominal voltage or greater, **Active Power** output (or **Active Power** transfer capability in the case of **OTSDW Plant and Apparatus** or **Remote End HVDC Converter Stations**) shall be restored to the level immediately before the fault within a tolerance of plus or minus 10% of the **Rated Capacity**. Once **Active Power** output (or **Active Power** transfer capability in the case of **OTSDUW Plant and Apparatus** or **Remote End HVDC Converter Stations**) has been restored to the required level, **Active Power** oscillations shall be acceptable provided that:

* The total **Active Energy** delivered during the period of the oscillations is at least that which would have been delivered if the **Active Power** was constant
* The oscillations are adequately damped.
* In the event of power oscillations, **Power Generating Modules** shall retain steady state stability when operating at any point on **the Power Generating Module Performance Chart**.

For AC Connected **Onshore** and **Offshore** **Power Park Modules** comprising switched reactive compensation equipment(such as mechanically switched capacitors and reactors), such switched reactivecompensation equipmentshall be controlled such that it is not switched in or out of serviceduring the fault but may act to assist in post fault voltage recovery.

ECC.6.3.15.9 General Fault Ride Through requirements for faults in excess of 140ms in duration.

ECC.6.3.15.9.1 General Fault Ride Through requirements applicable to HVDC Equipment and OTSDUW DC Converters subject to faults and voltage dips in excess of 140ms.

ECC.6.3.15.9.1.1 The requirements applicable to **HVDC Equipment** including **OTSDUW DC Converters** subject to faults and voltage disturbances at the **Grid Entry Point** or **User System Entry Point** or **Interface Point** or **HVDC Interface Point**, including **Active Power** transfer capability shall be specified in the **Bilateral Agreement**.

ECC.6.3.15.9.2 Fault Ride Through requirements for Type C and Type D Synchronous Power Generating Modules and Type C and Type D Power Park Modules and OTSDUW Plant and Apparatus subject to faults and voltage disturbances on the Onshore Transmission System in excess of 140ms

ECC.6.3.15.9.2.1 The **Fault Ride Through** requirements for **Type C** and **Type D Synchronous Power Generating Modules** subject to faults and voltage disturbances on the **Onshore Transmission System** in excess of 140ms are defined in ECC.6.3.15.9.2.1(a) and the **Fault Ride Through Requirements** for **Type C** and **Type D Power Park Modules** and **OTSDUW Plant and Apparatus** subject to faults and voltage disturbanceson the **Onshore Transmission System** greater than 140ms in duration are defined in ECC.6.3.15.9.2.1(b).

(a) Requirements applicable to **Synchronous Power Generating Modules** subject to **Supergrid Voltage** dips on the **Onshore Transmission System** greater than 140ms in duration.

In addition to the requirements of ECC.6.3.15.1 – ECC.6.3.15.8 each **Synchronous** **Power** **Generating Module** shall:

(i) remain transiently stable and connected to the **System** without tripping of any **Synchronous** **Power** **Generating Module** forbalanced **Supergrid Voltage** dips and associated durations on the **Onshore Transmission System** (which could be at the **Interface Point**) anywhere on or within the boundaries defined by the heavy black lines shown in Figure ECC.6.3.15.9(a) and ECC.6.3.15.1.4. Appendix 4 and Figures EA.4.3.2(a), (b) and (c) provide an explanation and illustrations of Figure ECC.6.3.15.9(a); and,



Figure ECC.6.3.15.9(a)

(ii) provide **Active Power** output at the **Grid Entry Point**, during **Supergrid Voltage** dips on the **Onshore Transmission System** as described in Figure ECC.6.3.15.9(a), at least in proportion to the retained balanced voltage at the **Onshore Grid Entry Point** (for **Onshore Synchronous Power Generating Modules)** or **Interface Point** (for **Offshore Synchronous Power Generating Modules**)(or theretained balanced voltage at the **User System Entry Point** if **Embedded**) and shall correspondingly generate proportionate reactive current (where the voltage at the **Grid Entry Point** is outside the limits specified in ECC.6.1.4) without exceeding the transient rating limits of the **Synchronous** **Power** **Generating Module** and,

(iii) restore **Active Power** output following **Supergrid Voltage** dips on the **Onshore Transmission System** as described in Figure ECC.6.3.15.9(a), within 1 second of restoration ofthevoltage to 1.0pu of the nominal voltage at the:

**Onshore** **Grid Entry Point** for directly connected **Onshore** **Synchronous** **Power** **Generating** **Modules** or,

**Interface Point** for **Offshore Synchronous Power Generating Modules**

or,

**User** **System** **Entry Point** for **Embedded Onshore Synchronous Power Generating Modules**

or,

**User** **System** **Entry Point** for **Embedded Medium Power Stations** not subject to a **Bilateral Agreement** which comprise **Synchronous Generating Units** andwith an **Onshore User System Entry Point** (irrespective of whether they are located **Onshore** or **Offshore**)

to at least 90% of the level available immediately before the occurrence of the dip. Once the **Active Power** output has been restored to the required level, **Active Power** oscillations shall be acceptable provided that:

- the total **Active Energy** delivered during the period of the oscillations is at least that which would have been delivered if the **Active Power** was constant

- the oscillations are adequately damped.

For the avoidance of doubt a balanced **Onshore Transmission System Supergrid Voltage** meets the requirements of ECC.6.1.5 (b) and ECC.6.1.6.

(b) Requirements applicable to **Type C** and **Type** **D** **Power Park Modules** and **OTSDUW Plant and Apparatus** (excluding **OTSDUW DC Converters**) subject to **Supergrid Voltage** dips on the **Onshore Transmission System** greater than 140ms in duration.

In addition to the requirements of ECC.6.3.15.5, ECC.6.3.15.6 and ECC.6.3.15.8 (as applicable) each **OTSDUW Plant and Apparatus** or each **Power Park Module** and / or any constituent **Power Park Unit**, shall:

(i) remain transiently stable and connected to the **System** without tripping of any **OTSDUW Plant and Apparatus**, or **Power Park Module** and / or any constituent **Power Park Unit**, for balanced **Supergrid Voltage** dips and associated durations on the **Onshore Transmission System** (which could be at the **Interface Point**) anywhere on or within the boundaries defined by the heavy black lines shown in Figure ECC.6.3.15.9(b)and ECC.6.3.15.1.4. Appendix 4 and Figures EA.4.3.4 (a), (b) and (c) provide an explanation and illustrations of Figure ECC.6.3.15.9(b) ; and,



Figure ECC.6.3.15.9(b)

(ii) be required to satisfy the requirements of ECC.6.3.16. In the case of a **Non-Synchronous Generating Unit** or **OTSDUW Plant and Apparatus** or **Power Park Module** where there has been a reduction in the **Intermittent Power Source** or in the case of **OTSDUW Active Power** transfer capability in the time range in Figure ECC.6.3.15.9(b) an allowance shall be made for the fall in input power and the corresponding reduction of real and reactive current.

(iii) restore **Active Power** output (or, in the case of **OTSDUW**, **Active Power** transfer capability), following **Supergrid Voltage** dips on the **Onshore Transmission System** as described in Figure ECC.6.3.15.9(b), within 1 second of restoration ofthevoltage to 0.9 pu of the nominal voltage at the:

**Onshore** **Grid Entry Point** for directly connected **Onshore** **Power Park Modules** or,

**Interface Point** for **OTSDUW Plant and Apparatus** and **Offshore Power Park Modules** or,

**User** **System** **Entry Point** for **Embedded Onshore Power Park Modules** or,

**User** **System** **Entry Point** for **Embedded Medium Power Stations** which comprise **Power Park Modules** not subject to a **Bilateral Agreement** and with an **Onshore** **User** **System Entry Point** (irrespective of whether they are located **Onshore** or **Offshore**)

to at least 90% of the level available immediately before the occurrence of the dip except in the case of a **Non-Synchronous Generating Unit**, **OTSDUW Plant and Apparatus** or **Power Park Module** where there has been a reduction in the **Intermittent Power Source** in the time range in Figure ECC.6.3.15.9(b) that restricts the **Active Power** output or, in the case of **OTSDUW**, **Active Power** transfer capability below this level. Once the **Active Power** output or, in the case of **OTSDUW**, **Active Power** transfer capability has been restored to the required level, **Active Power** oscillations shall be acceptable provided that:

- the total **Active Energy** delivered during the period of the oscillations is at least that which would have been delivered if the **Active Power** was constant

- the oscillations are adequately damped.

For the avoidance of doubt a balanced **Onshore Transmission System Supergrid Voltage** meets the requirements of ECC.6.1.5 (b) and ECC.6.1.6.

ECC.6.3.15.10 Other **Fault Ride Through** Requirements

(i) In the case of a **Power Park Module** (excluding **Non-Synchronous Electricity Storage Modules**), the requirements in ECC.6.3.15.9 do not apply when the **Power Park Module** (excluding **Non-Synchronous Electricity Storage Modules**) is operating at less than 5% of its **Rated MW** or during very high primary energy source conditions when more than 50% of the **Power Park Units** in a **Power Park Module** have been shut down or disconnected under an emergency shutdown sequence to protect **User’s Plant** and **Apparatus**.

(ii) In addition to meeting the conditions specified in ECC.6.1.5(b) and ECC.6.1.6, each **Non-Synchronous** **Generating Unit**, **OTSDUW Plant and Apparatus** or **Power Park Module** and any constituent **Power Park Unit** thereof will be required to withstand, without tripping, the negative phase sequence loading incurred by clearance of a close-up phase-to-phase fault, by **System** **Back-Up** **Protection** on the **Onshore Transmission System** operating at **Supergrid Voltage**.

1. **Generators** in respect of **Type B**, **Type C** and **Type D Power Park Modules** and **HVDC System Owners** are required to confirm to **The Company**, their repeated ability to operate through balanced and unbalanced faults and **System** disturbances each time the voltage at the **Grid Entry Point** or **User System Entry Point** falls outside the limits specified in ECC.6.1.4. Demonstration of this capability would be satisfied by **EU** **Generators** and **HVDC System Owners** supplying the protection settings of their plant, informing **The Company** of the maximum number of repeated operations that can be performed under such conditions and any limiting factors to repeated operation such as protection or thermal rating; and
2. Notwithstanding the requirements of ECC.6.3.15(v), **Power Generating Modules** shall be capable of remaining connected during single phase or three phase auto-reclosures to the **National Electricity Transmission System** and operating without power reduction as long as the voltage and frequency remain within the limits defined in ECC.6.1.4 and ECC.6.1.2; and
3. For the avoidance of doubt the requirements specified in ECC.6.3.15 do not apply to **Power Generating Modules** connected to either an unhealthy circuit and/or islanded from the **Transmission System** even for delayed auto reclosure times.
4. To avoid unwanted island operation, **Non-Synchronous Generating Units** inScotland (and those directly connected to a **Scottish Offshore Transmission System**), **Power Park Modules** in Scotland (and those directly connected to a **Scottish Offshore Transmission System**), or **OTSDUW Plant and Apparatus** with an **Interface Point** in Scotlandshall be tripped for the following conditions:

(1) **Frequency** above 52Hz for more than 2 seconds

(2) **Frequency** below 47Hz for more than 2 seconds

(3) Voltage as measured at the **Onshore** **Connection Point** or **Onshore** **User System Entry Point** or **Offshore Grid Entry Point** or **Interface Point** in the case of **OTSDUW Plant and Apparatus** is below 80% for more than 2.5 seconds

Voltage as measured at the **Onshore** **Connection Point** or **Onshore** **User System Entry Point** or **Offshore Grid Entry Point** or **Interface Point** in the case of **OTSDUW Plant and Apparatus** is above 120% (115% for 275kV) for more than 1 second. The times in sections (1) and (2) are maximum trip times. Shorter times may be used to protect the **Non-Synchronous Generating Units**,or **OTSDUW Plant and Apparatus**.

ECC.6.3.15.11 HVDC System Robustness

ECC.6.3.15.11.1 The **HVDC System** shall be capable of finding stable operation points with a minimum change in **Active Power** flow and voltage level, during and after any planned or unplanned change in the **HVDC System** or AC **System** to which it is connected. **The Company** shall specify the changes in the System conditions for which the **HVDC Systems** shall remain in stable operation.

ECC.6.3.15.11.2 The **HVDC System** owner shall ensure that the tripping or disconnection of an **HVDC Converter Station**, as part of any multi-terminal or embedded **HVDC System**, does not result in transients at the **Grid Entry Point** or **User System Entry Point** beyond the limit specified by **The Company** in co-ordination with the **Relevant Transmission Licensee**.

ECC.6.3.15.11.3 The **HVDC System** shall withstand transient faults on HVAC lines in the network adjacent or close to the **HVDC System**, and shall not cause any of the equipment in the **HVDC System** to disconnect from the network due to autoreclosure of lines in the **System**.

ECC.6.3.15.11.4 The **HVDC System Owner** shall provide information to **The Company** on the resilience of the **HVDC System** to AC **System** disturbances.