Fault Ride Through Workshop
A Generators Perspective

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GB Grid Code FRT Requirements

Fault Durations of up to 140ms are specified in the BCA Appendix F,

Example :-

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

For longer fault durations the Grid Code includes a generic voltage-duration profile for which plant should remain transiently stable and remain connected to the System.

Grid Code Compliance Process

CP.6.3.1 Prior to the issue of an **Interim Operational Notification** the **Generator** or **DC Converter Station** owner must submit to **NGET** to **NGET's** satisfaction:

……

(d) simulation study provisions of Appendix CP.A.3 and the results demonstrating compliance with Grid Code requirements of:

……..

CC.6.3.15,

……

as applicable to the **Power Station**, **Generating Unit(s)**, **Power Park Module(s)** or **DC Converter(s)** unless agreed otherwise by **NGET**;

EDF ENERGY

Generator Unit Studies (1)

CP.A.3.5 Fault Ride Through

CP.A.3.5.1 The **Generator** or **DC Converter Station** owner shall supply time series simulation study results to demonstrate the capability of **Non-Synchronous Generating Units**, **DC Converters**, and **Power Park Modules** to meet CC.6.3.15 by submission of a report containing:

(i) a time series simulation study of a 140ms solid three phase short circuit fault applied on the nearest point of the **National Electricity Transmission System** operating at **Supergrid** voltage to the **Non-Synchronous Generating Unit**, **DC Converter**, or **Power Park Module**.

(ii) time series simulation study of 140ms unbalanced short circuit faults applied on the nearest point of the **National Electricity Transmission System** operating at **Supergrid** voltage to the **Non-Synchronous Generating Unit**, **DC Converter**, or **Power Park Module**. The unbalanced faults to be simulated are:

1. a phase to phase fault
2. a two phase to earth fault
3. a single phase to earth fault.

For a **Non-Synchronous Generating Unit**, **DC Converter** or **Power Park Module** the simulation study should be completed with the **Non-Synchronous Generating Unit**, **DC Converter** or **Power Park Module** operating at full **Active Power** and maximum leading **Reactive Power** import and the fault level at the **Supergrid HV** connection point at minimum or as otherwise agreed with **NGET**.

Generator Studies (2)

(iii) time series simulation studies of balanced **Supergrid** voltage dips applied on the nearest point of the **National Electricity Transmission System** operating at **Supergrid** voltage to the **Non-Synchronous Generating Unit**, **DC Converter** or **Power Park Module**. The simulation studies should include:

1. 30% retained voltage lasting 0.384 seconds
2. 50% retained voltage lasting 0.71 seconds
3. 80% retained voltage lasting 2.5 seconds
4. 85% retained voltage lasting 180 seconds.

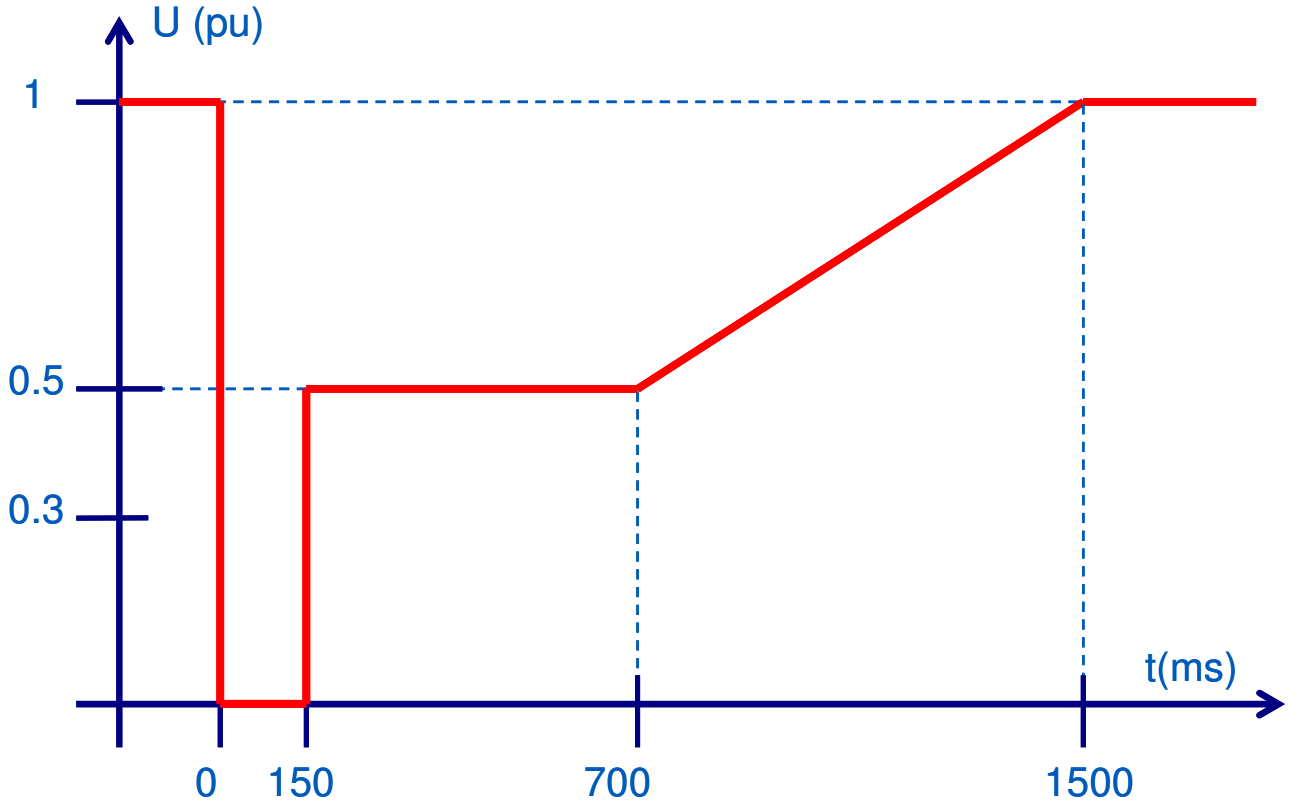
For a **Non-Synchronous Generating Unit**, **DC Converter** or **Power Park Module** the simulation study should be completed with the **Non-Synchronous Generating Unit**, **DC Converter** or **Power Park Module** operating at full **Active Power** and zero **Reactive Power** output and the fault level at the **Supergrid HV** connection point at minimum or as otherwise agreed with **NGET**. Where the **Non-Synchronous Generating Unit**, **DC Converter** or **Power Park Module** is **Embedded** the minimum **Network Operator's System** impedance to the **Supergrid HV** connection point shall be used which may be calculated from the maximum fault level at the **User System Entry Point**.

For **DC Converters** the simulations should include the duration of each voltage dip 1 to 4 above for which the **DC Converter** will remain connected.

Observations

- Studies appear to only apply to Non-Synchronous Generating Units, DC Converters and Power Park Modules
- The zero voltage duration is specified as 140ms and appears to be defaulting to this maximum in BCA's as well
- ENTSO-E RfG could change the zero voltage period to 150ms minimum

RTE – Documentation Technique de Référence



Comparison with GB Grid Code

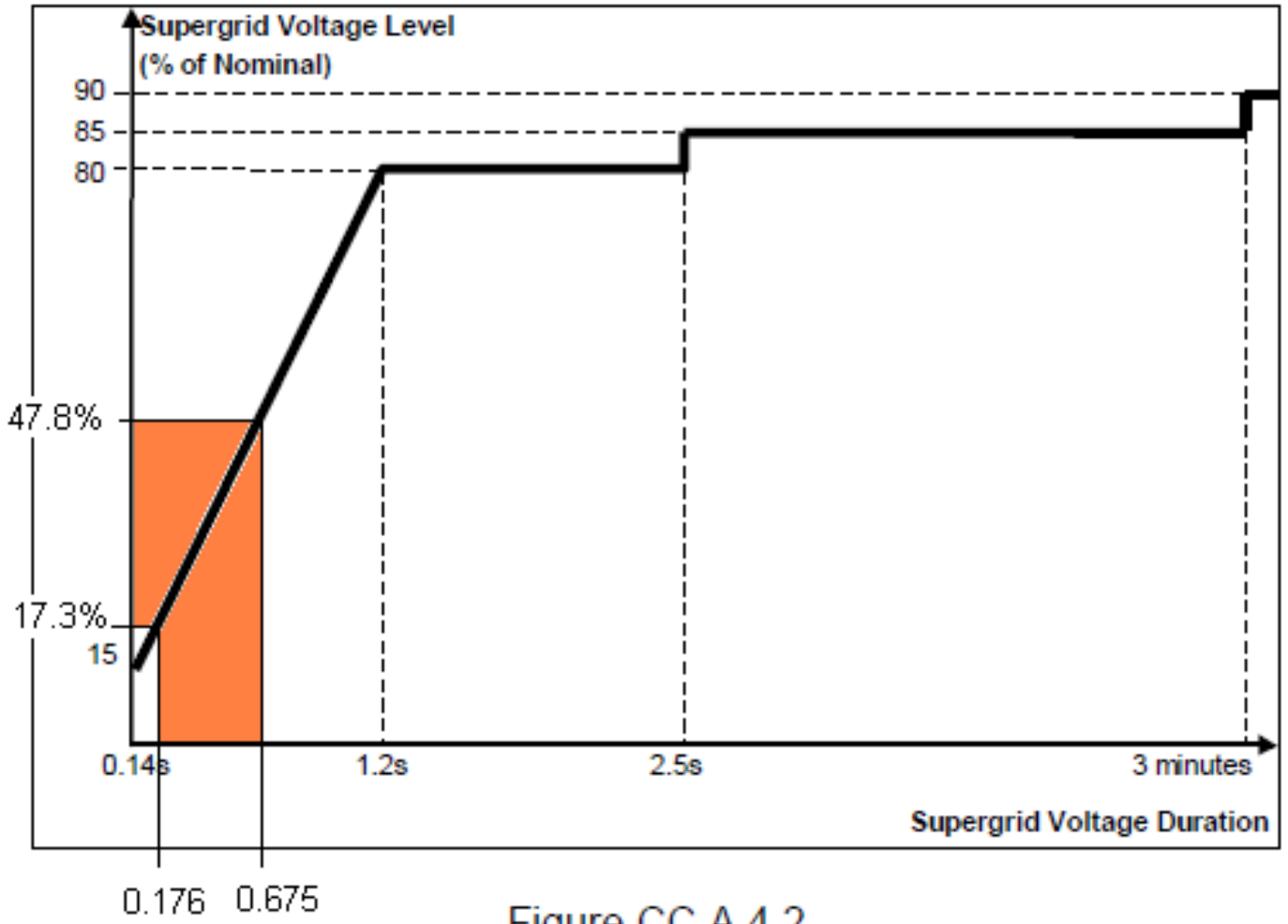


Figure CC.A.4.2

Possible Points of Discussion

- Even when compliance with the GB Grid Code is included in ITT's manufacturers tend to offer standard products designed to meet European or International Requirements
- Partial compliance with GB Grid Code leaves the developer with a risk to manage
- No understanding about the means by which NGET would enforce compliance and the consequences for the generator
- Concern that the Authority would not support lifetime derogations for new plant

Proposal in GCRP Paper 12/04

- To permit the developer to request a location specific FRT voltage duration curve where the generic profile cannot be met.
- Alternatively the developer could submit the FRT capability declared by manufacturer for NGET to assess taking account of the point of connection
- Facilitates the adoption of standard generator designs without impacting security supply
- Could remove uncertainty for the developer prior to awarding contracts