

DISTRIBUTION CODE MODIFICATION PROPOSAL FORM

Modification Proposal submitted By: ESB Networks	DATE OF SUBMISSION OF PROPOSAL: 24-7-18	Modification Proposal Number: <i>(to be assigned by Review Panel Secretary)</i> #44
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CONTACT DETAILS FOR MODIFICATION PROPOSAL ORIGINATOR: (IF NOT DISTRIBUTION CODE REVIEW PANEL

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MODIFICATION PROPOSAL TITLE:	Declared Supply Voltage parameter, compliance with RfG 1.1 pu requirements, compliance with EN50160 and re-alignment of voltages.
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DISTRIBUTION CODE SECTION(S) AFFECTED BY PROPOSAL

- **DPC 4.2.1**
- **TABLE 1**

MODIFICATION PROPOSAL DESCRIPTION *(Clearly state the desired amendment and all text changes. Attach further information if necessary)*

- Augmentation of DPC4.2.1 to include Declared Supply Voltages
- Augmentation of TABLE 1 to include Declared Supply Voltages as shown below.
- Change of DPC4.2.2 of text to reference to Declared Supply Voltages
- New clause DPC4.2.4, which states unambiguously that per unit voltages in the RfG Network Code, refers to the stated Declared Supply voltages.

DPC4.2.1 The **Distribution System** includes networks operating at the following nominal **and Declared Supply** voltages:

TABLE 1 – DISTRIBUTION NOMINAL VOLTAGES

	<u>Nominal Voltages</u>	<u>Declared Supply Voltages</u>
Low Voltage (LV)	230 volts – phase to neutral 400 volts – phase to phase	<u>230 volts – phase to neutral</u> <u>400 volts – phase to phase</u>
Medium Voltage (MV)	10,000 volts (10kV) 20,000 volts (20kV)	<u>11,000 Volts (11kV)</u> <u>21,000 Volts (21kV)</u>
High Voltage (HV)	38,000 volts (38kV) 110,000 volts (110kV)	<u>40,000 Volts (40kV)</u> <u>110,000 volts (110kV)</u>

Deletion of the text below from clause DPC4.2.2.

DPC4.2.2 ~~The **DSO** shall operate the **Distribution System** so as ensure that the voltage at the supply terminals, as defined in EN 50160, complies with that standard. The **Low Voltage** range tolerance shall be 230V +/- 10%. The resulting voltage at different points on the system depends on several factors, but at the **Connection Point** with **Customers** can be expected to be in accordance with Table 2 under steady state and normal operating conditions.~~

and replacement with:

Table 2 below gives the voltage ranges under steady state and normal operating conditions.

DPC4.2.4 For the avoidance of doubt, any per unit voltage values stated in any Connection Network Code, shall be deemed to refer to Declared Supply voltage given in TABLE 1 above. Operational voltages shall be kept within the limits given in Tables 2, Table 5 and Table 6a respectively.

MODIFICATION PROPOSAL JUSTIFICATION *(Clearly state the reason for the modification. Attach further information if necessary)*

1. The most recent version of EN 50160, introduced the new parameter of “Declared Supply Voltage”. The voltage at the Connection Point shall be kept within +/- 10% of these values. Up to now, these parameters had not been defined.
2. The Requirements for Generators [RfG] European Network Code mandates the Relevant System Operator to specify reactive power requirements in terms of voltage but only up to 1.1 pu voltage. The distribution voltages in operation and referred to in Planning standards, have crept up over the decades, to a point now where in terms of the nominal values, 1.1 pu is often exceeded. The ability of ESNB to mandate the appropriate U-Q behaviour is vital to the safe operation of the system and to the integrity of Connection Offers made to customers.
3. The values of Declared Supply Voltages have been chosen such that the highest and lowest voltages specified in the Distribution Code are within +/- 10% or between 0.9 – 1.1 pu of them. See Table A below.
4. Adoption of these values and a clarification to the effect that for use within the Republic of Ireland, all voltage per unit values referred to in RfG are deemed to be in terms of Declared Supply Voltage, will achieve two vital objectives going forward;
 - a. ESNB will comply fully with EN 50160 in terms of Connection Point voltages
 - b. The ability of ESNB to mandate required voltage against reactive power behaviour, as stipulated by RfG, will be maintained within the bounds of 1.1 pu.

IMPLICATIONS OF NOT IMPLEMENTING THIS MODIFICATION

- The voltages at which the distribution system is planned and operated, will remain out of alignment with the historical nominal values.
- In order to comply with the reactive power requirements stipulated in RfG, ESBN will have to alter its planning standards for new generator connections such that Connection Point voltages do not exceed 1.1 pu of the original historical nominals. This will have potentially serious consequences for the quantum of generation that can be connected and the cost of such connections.
- ESBN will not be in compliance with the EN 50160 standard.

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Table A: Relationship between voltages

Existing Nominal	Max	Min	Declared Supply Voltage	% at Max	% at Min
38kV	43.8	36.5	40	1.095	0.913
20kV	22.5	19	21	1.071	0.905
10kV	11.3	10.1	11	1.027	0.918