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RATINGS AND GENERAL REQUIREMENTS FOR PLANT, EQUIPMENT AND APPARATUS FOR THE NATIONAL GRID SYSTEM

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PURPOSE AND SCOPE

This document is the highest level specification in a three tier structure. Each successive level provides greater detail in a specific discipline and, collectively, these documents define National Grid's technical requirements for plant, equipment and apparatus for use on its electricity transmission system. These documents translate the actual operating characteristics of the National Grid electricity transmission system (National Grid System) into standardised values that assure safe & reliable operation. As far as possible, ratings and requirements are selected from values given in appropriate international standards. Deviations from these standards relate to particular requirements of National Grid network configurations or operational & safety procedures.

Greater detail regarding the actual operating characteristics of the National Grid System are detailed in CI 01 "Technical and Operational Characteristics of the National Grid Transmission System". Suppliers of plant, equipment and apparatus for use on the National Grid System should be familiar with CI 01.

The requirements of this document apply to all plant, equipment and apparatus which is part of the National Grid System. Requirements contained herein may be modified on a more specific basis by lower level specification however, unless such modifications are explicitly detailed, the requirements of this document apply.

Ratings are specified explicitly for plant with nominal voltages of 66kV and above and 13kV transformer tertiary connections. Rating for other nominal voltages are specified in TS 2.29.

Derogation from the requirements of the TS suite will normally be permitted only where it can be demonstrated that the proposed derogation is not detrimental to the safety, reliability and availability of the National Grid System.

PART 1 – TECHNICAL REQUIREMENTS

1 ENVIRONMENTAL SERVICE CONDITIONS

1.1 General

Plant, equipment and apparatus shall be suitable for operation under the normal service conditions defined in IEC 61936-1 with the following additions/modifications.

Equipment housed outdoors in association with high voltage plant shall have a degree of protection of at least IP54 as defined in BS EN 60529.

1.2 Normal Service Conditions

1.2.1 Indoor

The temperature class shall be “-5 indoor”.

1.2.2 Outdoor

The temperature class shall be “-25 outdoor”.

The ice coating classification shall be “class 10” (10mm).

The environmental pollution level shall be “Class III – Heavy” as defined in Table 1 of 60071-2.

1.3 Special service conditions

1.3.1 Indoor

Equipment intended to be sited within a closely controlled environment shall be suitable for operation in the temperature range +18⁰C to +27⁰C and within the relative humidity range 20% to 75% (Class A1 of BSEN 60654-1). Critical functionality shall be maintained in the event of failure of the environmental controls i.e. under the Normal Service Conditions defined above.

1.3.2 Outdoor

For particular locations, which may be subject to severe coastal/industrial pollution, the environmental pollution level shall be “Class IV – Very Heavy” as defined in Table 1 of 60071-2.

Informative: Further details regarding external insulation requirements for substations in polluted environments can be found in PS(T)023.

2 ELECTRICAL REQUIREMENTS

2.1 System Voltage

Plant and Equipment shall satisfy their specified functional and performance requirements over the appropriate range of primary voltages given in Table 1.

Plant and equipment for use on the 400kV system shall also operate safely and without any degradation in performance when operated in the range 420kV to 440kV for not longer than 15 minutes.

Plant and equipment shall satisfy their specified functional and performance requirements with phase voltage unbalance up to a maximum of 1%.

Informative: Phase voltage unbalance up to 2%, on an infrequent, short duration basis, may be specified at some sites.

Plant and equipment shall satisfy their specified functional and performance requirements when exposed to harmonic distortion levels in the voltage waveform up to the compatibility levels specified in Appendix A of ER G5/4.

Nominal System voltage	400 kV	275 kV	132 kV	66kV	13 kV tertiary
Rated voltage of plant	420 kV	300 kV	145 kV	72.5kV	17.5 kV
Maximum continuous System voltage	420 kV	303 kV	145 kV	70kV	16.9 kV
Minimum continuous System voltage	360 kV	247 kV	119 kV	62kV	10.4 kV

Table 1 - System Voltage

2.2 Rated Insulation Level and Protective Gap Settings

Plant shall meet the requirements of Table 3 with regard to its rated insulation level.

Table 4 details protective gap settings commonly used by National Grid which should be taken into account.

Informative: Current practice is to protect transformers and reactors with surge arresters as detailed in PS(T)021.

2.3 System Frequency

Plant and Equipment shall satisfy their specified functional and performance requirements over the range of frequencies given in Table 2.

Plant and equipment shall also operate safely and without any degradation in performance within the following frequency ranges:

- a) 47Hz to 47.5Hz for at least 20 seconds
- b) 50.5Hz to 52 Hz continuous

Rated frequency	50 Hz
Maximum continuous frequency	50.5 Hz
Minimum continuous frequency	47.5 Hz

Table 2 - System Frequency