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SWITCHGEAR AND CONTROLGEAR FOR USE AT VOLTAGES UP TO 36 KV

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PURPOSE AND SCOPE

This functional specification stipulates the applicable domestic and international standards to which switchgear and controlgear supplied for use on, or directly connected to, the National Grid High-Voltage Electricity Transmission System must comply, at rated voltages from 1 to 36 kV (33 kV nominal). It also identifies, where choice exists, particular requirements when applying the appropriate standard(s) to National Grid applications. This specification does not apply to equipment on the low voltage side of Static Var Compensator (SVC) bays or tertiary connected SVCs, which are covered under National Grid Technical Specifications 2.11 and 2.18 respectively. Equipment with a rated voltage below 1 kV is covered by National Grid Technical Specification 3.12.3. Cable and Accessories for 11 kV and 33 kV application is covered by National Grid technical specification 3.5.14.

PART 1 – PROCEDURAL

1 GENERAL REQUIREMENTS

Switchgear and Controlgear for use on the National Grid High-Voltage Electricity Transmission System (the System), at voltages from 1 to 36 kV (33 kV nominal) shall conform to Energy Networks Association Technical Specification (ENATS) 41-36 – Distribution Switchgear for Service up to 36 kV (Cable and Overhead Conductor Connected) - and all standards referenced therein.

Switchgear and Controlgear offered for use on the National Grid System must be Type Registered in line with the guidance provided in National Grid Technical Guidance Note (TGN(E)) 185. Type Registration is a documented risk management process that National Grid utilises to give it confidence that the equipment it procures for use on or directly connected to the System is of adequate strength and capability to safely perform its design function.

For the purpose of type registration in respect of this specification suppliers will be required to provide documentary evidence of:

- a) Notice of Conformity Certificate (NOCC) for ENATS 41-36 along with copies of test reports and other documentation supporting the NOCC

- b) Supporting evidence to confirm that the requirements of this specification additional to that of ENATS 41-36 have been met
- c) Supporting evidence to confirm that the specific requirements of those National Grid specifications detailed herein have been met

Additionally, the general requirements of National Grid detailed in this document and the technical specifications and policy statements detailed in part 3 of this document shall be met, as appropriate to the connection voltage.

2 SERVICE CONDITIONS

2.1 Switchgear and Controlgear

- 2.1.1 In general equipment shall meet the requirements of National Grid TS 1 table 1 and section 2.3 – Special Service Conditions.
- 2.1.2 The layout of air insulated switchgear equipment shall, for conditions appropriate to the installation voltage, ensure the integrity of the air space between live parts and other conductors (where earthed or at different potential) is maintained.
- 2.1.3 In general air insulated installations shall, as a minimum, provide the operational and safety clearances detailed in Table 1 and Table 2 below.

Nominal System Voltage	BIL	Phase-to-Earth Clearance	Phase-to-Phase Clearance
kV (RMS)	kV (p)	m	m
6.6	75	0.5	0.25
11	95	0.5	0.25
33	170	0.5	0.43

Table 1 Substation Electrical Clearances

Nominal System Voltage	Safety Distance (National Grid safety rules)	Design Clearance for Safety (vertical) D_s	Design Clearance for Safety (horizontal) D_{SH}	Insulation Height (pedestrian access)
kV	m^1	m^2	m^3	m^4
All Voltages	0.8	3.2	2.3	2.4

Table 2 Substation Safety Clearances/Distances

- ¹ Persons should not allow any part of their body or any object under their control to infringe this safety distance.
- ² The minimum clearance from a live conductor to a point to which pedestrian access is permitted i.e. column 5 plus column 2.
- ³ It is considered good practice, where reasonably practicable, to apply the vertical design clearance in all directions.
- ⁴ The minimum clearance from the lowest insulation part of a support insulator to a point to which pedestrian access is permitted. In order to be consistent across sites with multiple voltages this height is that required for the highest voltage, i.e. 400 kV.

- 2.1.4 The design of the equipment shall allow, where applicable, the outage constraint requirements of National Grid technical specification 2.1, Substations to be met. For the avoidance of doubt this includes the replacement of any enclosure and associated dismantling of equipment. On Gas Insulated Installations it shall also be possible to perform such activities without the need to work adjacent to a gas partition that remains pressurised on one side. The supplier shall demonstrate how compliance with the outage constraint requirements of TS 2.1 can be achieved.
- 2.1.5 The use of Sulphur Hexafluoride gas installations shall be in accordance with National Grid Policy Statement PS(T) 005.
- 2.1.6 Guidance for the jointing of current carrying conductors is presented in National Grid Technical Guidance Note, TGN(E) 187.
- 2.1.7 GIS installations comprising two or more circuit breakers shall be housed in a building. Fixed lifting equipment shall be provided in such cases, unless the supplier can demonstrate they are not required for dismantling or removing any part of the substation for maintenance or repair purposes.

3 RATING AND PERFORMANCE REQUIREMENTS

3.1 Ratings

- 3.1.1 Switchgear supplied for use on the System must be able to perform its design function(s), for all reasonably foreseeable system conditions, without exceeding its proven strength and capability.
- 3.1.2 Switchgear and controlgear shall have an anticipated overall life of at least 40 years. Any component/module not expected to achieve this life expectancy shall be identified in the tender documentation together with recommendations of how to ensure the overall equipment life expectancy of 40 year is not compromised. For the avoidance of doubt this requirement includes buildings in which the switchgear is housed.
- 3.1.3 Normal rated insulation levels shall be in accordance with ENA TS 41-36 table 1a (IEC 60694 table 1a, repeated below as Table 3).

Rated Voltage U_r kV (RMS)	Rated Short-Duration (60 s) Power Frequency Withstand Voltage U_d kV (RMS)		Rated Lightning Impulse Withstand Voltage U_p kV (peak)	
	Common Value ¹	Across the Isolating Distance ¹	Common Value	Across the Isolating Distance
3.6	10	12	40	46
7.2	20	23	60	70
12	28	32	75	85
17.5	38	45	95	110
24	50	60	125	145
36	70	80	170	195

¹ Both wet and dry test conditions.

Table 3 Nominal Rated Insulation Levels