

SUBSTATION AUXILIARY SUPPLIES

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PURPOSE AND SCOPE

This document describes the technical requirements for User's equipment directly connected to the England and Wales Transmission system and located within NGET's busbar protection zone operating at nominal voltages of 400 kV, 275 kV, 132 kV and 66 kV unless otherwise agreed with the user as defined in the Bilateral agreement. The principles of this document applies to equipment connected at other voltages".

This document defines National Grid's technical requirements for the application of substation auxiliary equipment and describes the functional and performance requirements for both A.C. and D.C. auxiliary power supplies and equipment in the Transmission System in England and Wales.

PART 1 – PROCEDURAL

1 GENERAL REQUIREMENTS

Informative: The operational security of National Grid substations and the availability of the high voltage plant and secondary equipment within the substation is dependent upon reliable and secure auxiliary supplies.

1.1 Manufacture

1.1.1 Manufacturing facilities shall be certified by a recognised accreditation organisation to BS EN ISO 9001.

1.1.2 Manufacturers shall preferably have in place or be working towards installation of management systems compatible with the international environmental management system standard ISO 14001.

1.2 Equipment

1.2.1 All equipment shall meet statutory requirements for safety as specified in TS 1 (RES).

1.2.2 No-break supplies for protection, control, measurements, telecommunications and other electronic equipment shall be fed from a D.C. voltage supply defined by the user, the maximum voltage shall be 110V.

Informative: The preferred choice of supply for light current equipment is 110 V D.C.

1.2.3 A.C. supplies may be used where a short duration supply interruption is tolerable (typically 0-2 mins arising from the time taken for a supply to change over or for a diesel standby generator to run up to speed). Where a break is not acceptable and the equipment requires a no-break A.C. supply such as for a computer and monitor then it shall be fed from a D.C. supplied inverter or a stand-alone uninterruptible power supply (UPS).

Informative: The use of a UPS to power single items of equipment is not desirable and the preferred option is to provide PC's and monitors powered directly from a D.C. supply.

- 1.2.4 For safety reasons, the use of 230 V A.C. supplies for control systems should be avoided where reasonably practicable. If A.C. supplies must be used for general control purposes, a suitable transformer providing 110 V with centre tapped earth is recommended to derive an acceptable control voltage.

1.3 A.C. Supplies

- 1.3.1 The LVAC power supply shall be designed to provide a voltage maintained within the limits of 400/230 V + 10%, - 6% and 50 Hz \pm 1%.
- 1.3.2 All components of the LVAC supply should be capable of operating correctly at the levels of harmonics specified in BS EN 50160.

1.4 D.C. Supplies

- 1.4.1 Both the 48 V and 110 V D.C. supply systems at 400 kV and 275 kV substations shall be provided by two independent D.C supply systems.
- 1.4.2 Cross connections of D.C. supply systems between adjacent dispersed relay rooms, where the relay rooms belong to primary 400/275 kV circuits carried on the same route, shall be arranged to avoid common mode faults.
- 1.4.3 Each independent system shall be designated for a standby period as defined by the user with the maximum load of the associated distribution board, unless there is a need to comply with Engineering Recommendation G91 or Grid Code Black Start requirements in which case the requirements in these documents shall be complied with.,.

2 PERFORMANCE REQUIREMENTS

2.1 A.C. Supplies

- 2.1.1 All equipment supplied shall be provided with the following degrees of protection against ingress of objects and moisture, as specified in BS EN 60529.
- 2.1.2 Outdoor Equipment: The level of protection during normal operation shall be IP54. With access doors open, without the use of tools, the level of protection of live electrical conductors shall be IP20.
- 2.1.3 Indoor Equipment: The level of protection during normal operation shall be IP31. With access doors open, without the use of tools, for the level of protection of live electrical conductors shall be IP20.

2.2 D.C. Supplies

The requirements defined in section 2.2 do not apply unless the User's d.c. supplies are derived from NGET's d.c site supplies.

- 2.2.1 D.C. systems shall provide no-break supplies at all times up to the end of the specified standby period.
- 2.2.2 The power supply systems and cabling shall be sized to ensure that the battery is capable of supplying the load requirements at the end of the standby period.
- 2.2.3 Where the User does not need to comply with G91, the voltage measured at the distribution board at the end of the standby period at 5°C shall not be less than 46 V in the case of 48 V nominal systems and 102 V in the case of centralised 110 V systems and 93 V for dispersed 110 V systems.

2.2.4 The battery shall be capable of supplying the maximum tripping load at the end of the standby period. This is defined as the tripping of all the required plant associated with that battery for a primary busbar fault.

2.2.5 Where the User does not need to comply with G91, the battery/charger system shall maintain the voltage on the distribution boards at all times and at the extremes of the A.C. supply voltage to the charger within the following levels:

	Normal	Max.	Min. ¹	Min. ²
Voltage Envelope for 110 V nominal system ³	125	137.5	102	93
Voltage Envelope for 48 V nominal system	54	60	46	--

1 For centralised distribution boards

2 For distribution boards in dispersed relay rooms

3 For smaller capacity batteries where 6V or 12 V monoblocs are provided eg 100 Ah or less normal and nominal voltages are 122.6 V and 108 V respectively.

3 TEST REQUIREMENTS

N/A.

4 FORMS AND RECORDS

None.

PART 2 - DEFINITIONS AND DOCUMENT HISTORY

5 DEFINITIONS

The definitions used in TS 1 (RES) and TS 2.2 (RES) apply.

6 AMENDMENTS RECORD

Issue	Date	Summary of Changes / Reasons	Author(s)	Approved By (Inc. Job Title)
1	October 2014	New document		

6.1 Procedure Review Date

5 years from publication date.

PART 3 - GUIDANCE NOTES AND APPENDICES

7 REFERENCES

7.1 International, European and British National Documentation

This document makes reference to or should be read in conjunction with the documents listed below. Where a Standard has been harmonised into a Euronorm, only this latter reference is given. The issue and date of the documents detailed below shall be that applicable at the time of issue of this specification unless a specific issue date is given.

BS EN 50160 Voltage Characteristics of Electricity Supplied by Public Distribution Systems.

7.2 National Grid TS (RES) Documents

The following TS documentation is relevant to substation auxiliary supplies and should be read in conjunction with this document.

TS 1 (RES) Ratings and General Requirements for Plant, Equipment, Apparatus and Services for the National Grid System and Connection Points to it.

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