



Document Reference: XDS-GFS-08-001-R3

Functional Specification

Station Auxiliary Power Supplies

Revision History					
Rev	Date	Description	Originator	Checker	Approver
R0	31/08/2011	First Issue – This document supersedes XDS-WTS-08-001-R0 and XDS-ETS-08-001-R0. Document reference number changed.	Paul Moran	-	Christy Kelleher
R1	29/05/2014	Text added to section 2 - A backup supply shall be required and shall be fed from a dedicated MV transformer connected to MV rural network. Where this is not practical then a diesel generator (a permanent fixture installed in the Customer compound) may be considered in the event of loss of the main supply	Sandra Howard	-	Paul Moran
R2	18/04/2017	Updated in line with due diligence tracker. LV Supply requirements amended.	Kieran French / Conor Farrell	-	Paul Moran
R3	05/02/2021	Updated to capture the requirement for two standalone feeds into each transmission station, independent of customer supplies. This is to ensure a robust LV supply to transmission stations over the lifetime of the asset as the customer supply may be decommissioned over the lifetime of a transmission station. Distinction between essential and non-essential loads removed as majority of station loads were classified as essential so removed the need for the distinction. Diesel generator section added to provide guidance on the spec of the diesel gens in Transmission Compounds.	Aidan Byrne	Aidan Geoghegan and TAO Due Diligence	Aidan Corcoran

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1 SCOPE

This specification covers the requirements for auxiliary power supplies in 110 kV, 220 kV and 400 kV substations. The specification covers AC supply, DC supply, backup power provision and the monitoring of each.

The following auxiliary power supplies shall be provided;

1. 400 V / 230 V AC supply
2. 220 V & 24 V DC supply for 110kV substations – 24 V DC is not applicable for SCS stations
3. 220 V & 48 V DC supply for 220/400 kV substations – 48 V DC is not applicable for SCS stations

The supplies shall be sized taking into account station future requirements.

1.1 110 kV SUBSTATION POWER SUPPLIES

RTU Supply: Comms 48 V DC
Signals Supply: Station 24 V DC
Position Indication Supply: Station 24 V DC
Command Supply¹: 220 V DC
Miscellaneous Supply: Comms 24 V DC

1.2 220 kV SUBSTATION POWER SUPPLIES

RTU Supply: Comms 48 V DC
Signals Supply: Station 48 V DC
Position Indication Supply: Station 48 V DC
Command Supply¹: 220 V DC
Miscellaneous Supply: Comms 48 V DC

1.3 110 kV SCS WITH IPP CONNECTION AND TSO RTU POWER SUPPLIES

RTU Supply: Comms 48 V DC
Signals Supply: Comms 220 V DC
Position Indication Supply: Comms 220 V DC
Command Supply¹: 220 V DC
Miscellaneous Supply: Comms 220 V DC

¹ 220 V DC power supply equipment shall be provided for the operation of protection and control equipment including plant operation such as circuit breaker tripping.

2 STATION LV SUPPLIES

The Solution Provider shall provide auxiliary power supplies for the substation as per the requirements set out below. The requirements for these supplies are dependent on the type of substation being developed. The three types of substations are as per the following designations:

1. Transmission Stations with a transmission customer connection
2. Transmission stations with a DSO busbar (38kV, 20kV or 10kV)
3. Transmission stations without a DSO or Customer connection

Note: EirGrid retains the right to designate, as it sees fit, any station for the purposes of defining the LV supply requirements. This will be outlined within project specific documentation.

Under normal circumstances the LV mains supply shall feed all of the substation auxiliary loads. These include but are not limited to the following;

- Battery chargers (including diesel generator battery charger)
- Transformer fans and OLTC control
- AC supply for charging CB operation springs
- Heating in all outdoor switchgear mech. boxes including marshalling kiosks heaters
- Sump pumps
- Fire alarm
- Security alarm
- Lighting

In the event of the loss of the LV mains supply a standby diesel generator shall be provided that will start up automatically and change over to feed the station auxiliary loads. The Solution Provider shall ensure that on change over, at no time shall the two supplies be connected in parallel. On restoration of mains supply, the scheme shall automatically revert back to the normal feeding arrangement. Primary and backup supplies should be sized appropriately to match the anticipated station load.

2.1 TRANSMISSION STATIONS WITH TRANSMISSION CUSTOMER CONNECTIONS

The primary LV mains supply shall be via the Grid connected transformer and a MV/LV house transformer, see Figure 1.

Note: Prior to commissioning of the Grid connected transformer(s), supply to the station can be via a temporary MV rural/urban network supply.

Backup LV AC supplies shall be provided by:

- A standby diesel generator with automatic changeover switch located in the TAO compound.
- A secondary LV mains supply via a MV/LV transformer connected to the local district MV network with manual change switch to allow switching between the primary and secondary LV mains supply. This local district MV Network feed shall be routed directly into the TAO compound and not via the customer's compound.

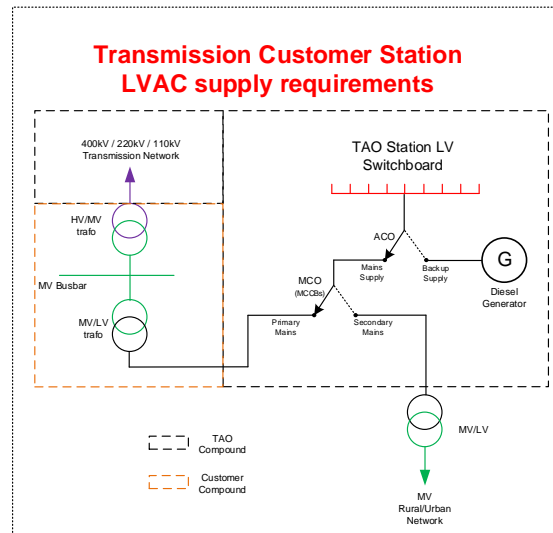


Figure 1: Transmission Customer Station LV AC Supply arrangement

2.2 TRANSMISSION STATIONS WITH A DSO BUSBAR (38kV, 20kV OR 10kV)

The primary LV mains supply shall be via the grid connected DSO transformer and a 38kV/LV or MV/LV House Transformer as the case may be.

A backup supply shall be provided by a standby diesel generator with automatic changeover switch.

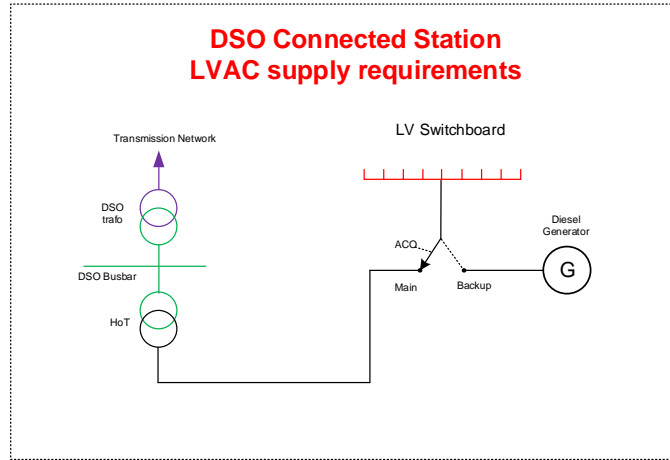


Figure 2: Transmission station with a DSO busbar

2.3 TRANSMISSION STATIONS WITHOUT A DSO OR CUSTOMER CONNECTION

The LV mains supply shall be via a MV/LV house transformer connected to the local district MV network.

A backup supply shall be provided by a standby diesel generator with automatic changeover switch.

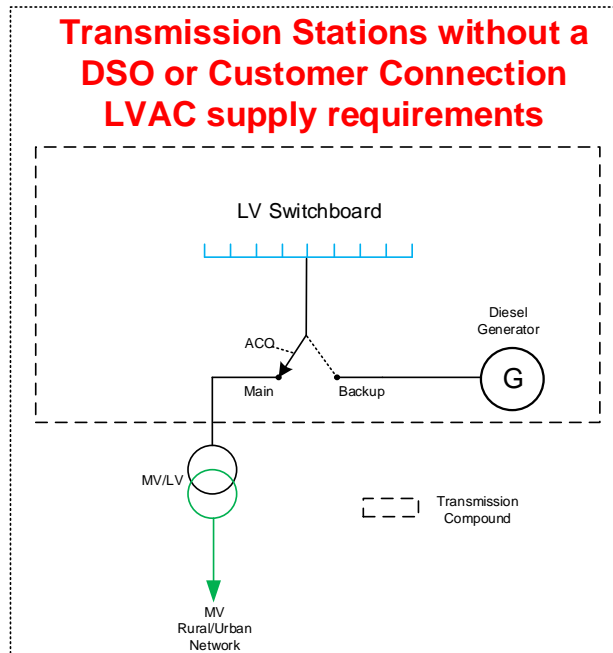


Figure 3: Transmission Station without a DSO or Customer Connection

2.4 GENERAL REQUIREMENTS

For new Customer connections into existing Transmission stations and for all other stations not covered by the above, EirGrid will advise of the LV supply requirements.

For Customer connections, the LV supplies shall not be routed via the interface kiosk. Please refer to the EirGrid functional specification XDS-GFS-07-001 "Station Control and Protection Cabinets and Marshalling Kiosks" for the full interface kiosk requirements.

On entering the station control room the LV supply cable shall be terminated at a suitably rated switched fuse device or MCCB. This shall then feed the LV distribution board.

The arrangement for the provision of the LV backup supply shall be agreed with EirGrid.

The LV supply requirements shall be designed and installed in accordance with the EirGrid functional specification XDS-GFS-10-001 "Station 220 V, 48 V and 24 V DC and 230/400 V AC Distribution Boards."

Status indication of which LV supply is in use shall be provided to the NCC and the local signal system.

A Completion Certificate shall be provided by a member of an approved body and is to be issued to EirGrid for the LV AC system.

2.5 STANDBY DIESEL GENERATOR REQUIREMENTS

The Solution provider shall provide a suitable standby diesel generator. The function of the diesel generator is to provide emergency standby/backup auxiliary power in the event of a failure or loss of the LV mains supply.

Low Voltage Standby Diesel Generator units shall be provided in either of the following configurations:

- Canopy Units
- Open Base Frame type

Each unit shall consist of a Diesel Engine, Alternator and integral Fuel Tank mounted on a fully-banded sub-base frame and delivered as a single assembly. It shall also include the circuit breaker through which the generator is electrically connected to the LV distribution board.

The generator unit internal DC Power system shall be designed and rated to supply the station loads as outlined in the preamble to Section 2 above.

The diesel fuel tank shall contain sufficient fuel to supply the generator running at full load for 24 hours.

The location and arrangement of the standby diesel generator shall be agreed with EirGrid. It shall be installed in a suitable building.

3 STATION DC SUPPLY

The DC supply shall be designed & installed in accordance with the latest revision of the EirGrid specification XDS-GFS-10-001 “Station 220 V, 48 V and 24 V DC and 230/400 V AC Distribution Boards”.

4 DISTRIBUTION BOARDS

The LV Distribution Board shall be designed & installed in accordance with the latest revision of the EirGrid specification XDS-GFS-10-001 “Station 220 V, 48 V and 24 V DC and 230/400 V AC Distribution Boards”.