

SUBSTATION INSTALLATIONS

GTC designs, constructs and maintains its electrical equipment in compliance with the requirements of the Electricity, Safety, Quality and Continuity Regulations 2002. In order to satisfy these requirements and other industry recommendations, GTC's equipment is procured and installed inline with British and European Standards, Electricity Supply Industry (ESI) guidance and technical specifications produced by the Energy Networks Association (ENA).

In urban locations where substations installations are proposed, existing background noise levels of 35 to 40dB(A) are fairly typical. Notwithstanding this, GTC endeavours not to add to typical noise levels through the installation of its plant and equipment.

Substation Plant

The primary piece of equipment within a substation that is responsible for the production of noise is the transformer.

ENA G81 Framework for design and planning, materials specification, installation and record for low voltage housing development installations and associated new HV/LV distribution substations Part 1 (Design and Planning) Amendment 1 and Part 2 (Materials Specification) Amendment 1, dictate's the selection criteria for substations and provides guidance on the appropriate standards to be applied to substation plant.

GTC has chosen Schneider Electric as its preferred supplier for substation plant.

Transformers

In selecting its transformer specifications, GTC looked at best industry practice and selected a challenging specification for its transformers. Currently GTC transformers in keeping with the established Distribution Network Operators (DNO's) uses ENATS 35-1 Issue 6, which states the sound power level requirements for distribution transformers up to ratings of 1000kVA, calculated in-line with the International standard Determination of Sound Levels document, IEC 60076-10.

- 315kVA ENATS 35-1 Issue 6 states sound power level at 0.3m = 54dB(A)
Schneider Electric Transformers supplied to GTC have sound power level at 0.3m = 47dB(A)
- 500kVA ENATS 35-1 Issue 6 states sound power level at 0.3m = 56dB(A)
Schneider Electric Transformers supplied to GTC have sound power level at 0.3m = 48dB(A)
- 800kVA ENATS 35-1 Issue 6 states sound power level at 0.3m = 58dB(A)
Schneider Electric Transformers supplied to GTC have sound power level at 0.3m = 49dB(A)
- 1000kVA ENATS 35-1 Issue 6 states sound power level at 0.3m = 59dB(A)
Schneider Electric Transformers supplied to GTC have sound power level at 0.3m = 50dB(A)

GTC transformer sound power levels are lower than the ENATS 35-1 Issue 6 requirements, due to the level of no load losses specified by GTC and therefore by default, are quieter.

Building Design

In order to further reduce the impact of noise, GTC prefers to install its substation plant into brick buildings which has the effect of reducing sound power levels by approximately 20dB(A).

GTC's current substation design incorporates cavity wall construction with GRP doors in low risk areas such as residential estates and steel doors in higher risk areas. These doors are ventilated to ensure the correct movement of air, and the building design also uses a ventilation panels at the rear of the building to assist with air movement. These arrangements preclude the need for forced ventilation such as fans and thereby further reduce the potential for additional noise.

The location of the substation is also a factor in reducing noise, so where possible they are situated away from residential properties. Where this is not possible, brick built substations will be sited a minimum of 3m from any residential property.

Other Substation Installations

Where and for whatever reason the preferred brick built substation is not constructed, GTC will contain its substation equipment in a purpose built GRP housing. In such instances and in line with industry best practice, this type of substation will be constructed using the following limiting distances from the nearest adjacent properties to the transformer tank.

It should be noted that these limiting distances allow for worst case scenario installations of freestanding substation equipment, with no GRP housing and achieve acceptable attenuation of noise at these distances. Therefore the addition of a GRP housing to contain the substation equipment will further reduce the noise levels.

TRANSFORMER RATING (KVA)	315	500	800	1000
LIMITING DISTANCE (M) Rural Locations	11	14	17	19
LIMITING DISTANCE (M) Urban Locations	7	9	10	12

NB – The transformer tank will be situated between 0.5m and 0.75m inside the GRP housing.