

FUNCTIONAL REQUIREMENTS FOR GIS LOCAL CONTROL AND PROTECTION

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PURPOSE AND SCOPE

This document identifies the functional requirements for Gas Insulated Switchgear (GIS) Local Control and Protection as an aid to identifying the optimum design and physical layout of the Local Control and Protection. The requirements have been identified using a combination of operational experience and Whole Life Value analysis so they can be applied to a GIS Solution. This document is to be utilised during GIS new build and Type Registration with the support of manufacturers to develop the optimum design and layout of the GIS, its control and protection equipment in relation to each other.

It is outside the scope of this document to identify the ideal arrangement for a given solution. A Whole Life Value assessment of potential arrangements for a GIS Solution can be performed to achieve this.

PART 1 –PROCEDURAL

1 PRINCIPLES OF REQUIREMENTS

The requirements stated in this document are based on a combination of operational experience and Whole Life Value. The purpose of these requirements is to aid in identifying the optimum solution in terms of layout and interfacing for GIS local control and protection by adhering to the following aspects;

- a) Safe to operate and install,
- b) Facilitates system access by reducing outage and installation time,
- c) Sustainable i.e. reduces the use of materials and resources or reduced environmental impact,
- d) Versatile i.e. can be adopted or changed easily,
- e) Do-able i.e. simple to construct, commission, etc,
- f) Reliable and performs to a high standard,
- g) Facilitates easy operation, maintenance, repair and replacement.

Informative: No one aspect should be considered above another with the possible exception of safety if the impact of a design has significant negative safety impacts in line with the National Grids core values.

2 FUNCTIONAL REQUIREMENTS

The functional requirements for local control and protection of GIS are stated below. For further information on how these have been derived and the implications of their application please refer to the Whole Life Value assessments listed in the References.

All wiring, connections, and cubicles shall meet the requirements of TS 2.19.

2.1 Maximising the Factory Works

As far as is reasonably possible equipment should be assembled and tested at the factory in order to reduce works on site. This may include assembly, wiring, testing, etc in an effort to minimise construction and commissioning works and results in improved system access by reducing outage time.

2.2 Ability to easily connect up Local Control Cabinet (LCC) and switchgear to facilitate speedy construction and allowing units to be swapped out easily and quickly.

Innovation which will allow equipment to be connected together or interchanged more easily is encouraged in order to minimise on site works and outage time. This can be achieved by considering the connection arrangements between different bits of equipment and devising techniques and interfaces which allow equipment to be exchanged and replaced quickly. Where possible consideration should be given to designing the interfaces to be “Hot Swappable” to reduce the outage time required to exchange equipment. This may be achieved by using pre wired plug and socket arrangements to connect equipment together which meet the requirements of TS 2.19. Where connections could be subject to adverse conditions, i.e. situated outdoors, suitable protection shall be provided to preserve them.

2.3 Working at ground level as much as possible

Where possible designs should encourage working at ground height to eliminate the risks associated with working at height. Where it is not feasible to work at ground level access using an appropriate platform or access device would be acceptable. Where regular access would be required for operational reasons, such as access to earthing devices and drives, a platform should be specified. Scaffolding and other portable access platforms, such as Mobile Elevated Work Platforms (MEWPs) should not be required for normal operation.

Ladders are not appropriate to work from and cannot be used as working platforms. Ladders are not an acceptable primary access solution unless they can be fixed in place to prevent movement. Fixed ladders can be used for access purposes with National Grid’s approval under certain circumstances, i.e. for secondary emergency egress.

2.4 Pre-wired assemblies (based on the transportable unit)

This furthers the idea of maximising factory works by building the equipment on a skid or transportable unit allowing it to be pre-wired, factory tested and shipped as a single unit. This could also facilitate transport arrangements by incorporating packing and packaging aspects into the design and layout.

2.5 LCC needs to be close enough to see and hear the switchgear

This is for operational and safety reasons to ensure the correct equipment has been identified and is being operated i.e. need to see/hear equipment operate when controlled from the LCC mimic/controller. Ideally the operator should be able to see both almost simultaneously. This may be achieved by positioning or orientating the local control cabinet in such a way as to be able to see both the LCC and the switchgear.

2.6 Require access to the breaker and mechanism

It is necessary to have access to the circuit breaker and its mechanism with sufficient space to be able to remove the breaker and mechanism quickly with as little dismantling or rebuilding of other infrastructure or equipment as possible. The LCC shall to be located so as not to impede access to work on the breaker and mechanism in any way. Where this is not feasible the process to easily extract the breaker and mechanism, carry out maintenance on them and repair or replace them must be demonstrated by the manufacturer to the satisfaction of the National Grid.