

TYPE REGISTRATION OF POWER TRANSFORMERS

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PURPOSE AND SCOPE

The purpose of this guide is to set out the method by which the National Grid (NG) policy on type registration contained in PS(T) 003 should be applied in the case of a power transformer and its components. This document should be read in conjunction with TP 183 which sets out procedural requirements for the type registration process. This document applies to equipment purchased to NG TS 2.03, and covers power transformers, shunt reactors, series reactors, quadrature boosters and phase shifting transformers. For simplicity all these plant items are referred to as 'transformers' in this document. This document also refers to, and provides guidance on, some aspects of the type registration of the components supplied with the transformer particularly bushings, tap-changers and electronic winding temperature indicators.

PART 1 –PROCEDURAL

1 TYPE REGISTRATION OF TRANSFORMERS AND COMPONENTS

1.1 The Transformer as a 'Solution'

For type registration purposes, the transformer should be considered to be a solution on its own including major and minor components. Transformers are components of the system that can be moved from site to site. Transformers are always made to order in specialist factories on a separate contract or sub-contract from the rest of the substation supply. The complete transformer will form part of a 'transformer bay solution', but NG policy is that transformers should be interchangeable between bays so the type registration of the 'transformer bay solution' should not be specific to a particular design of transformer but rather to the transformer functional family (see PS(T)031). The major and minor components of the transformer are an integral part of the transformer ('transformer solution') and these components cannot generally be changed for one of a different design without invalidating the type registration of the transformer. One design of component may however be used on several transformer solutions and there are some component type tests that do not need to be repeated for each transformer solution. For convenience therefore particular transformer components namely tap-changers, bushings, electronic WTIs and current transformers which have specific type tests will be separately type registered. Other components will be considered with the transformer and will be covered by the transformer type registration process.

1.2 Type Registration of 'Transformer Solutions'

A transformer solution offered in a tender will be considered to be capable of type registration if it is of a standard type (according to PS(T) 031) and it is to be manufactured in a factory which has either a satisfactory history of producing transformers for NG or has been assessed for technical capability by Asset Policy. NG must have satisfactorily assessed the factory and the supplier for QA and other supplier capability issues before a contract is let. This will be generally performed according to the process set out in CIGRE Brochure 530 – Guide for Conducting Factory Capability Assessment for Power Transformers.

For non-standard transformers and quadrature boosters, Asset Policy must be involved with the production of the project specific specification and at the tender assessment stage to ensure that the unit will be capable of type registration.

Bushings over 11kV, tap-changers and electronic WTIs must either be already type registered at the tender stage or must be capable of type registration before the transformer reaches the factory acceptance test stage. In this case a self-certification statement (linked to TP 183) must be provided with the tender.

Other components such as gas and oil operated relays, pressure relief devices and mechanical WTIs must be suitable for the purpose and have a demonstrable track record of reliable performance in service. If a new design of component is proposed that does not fulfil this requirement, the use of this component must have been discussed and agreed with Asset Policy before a contract is awarded. Evidence will need to be supplied that current transformers have the secondary current and magnetic characteristics required to satisfy the specification and any site specific requirements,

The need for a design review, which is normally carried out between contract placement and the start of manufacturing, will be assessed by Asset Policy. Normally design review will not be required for existing tested designs of transformer, but will be required for new designs or if manufacture of a design is moved from one factory to another. The design review will cover aspects of the transformer design and manufacturing that cannot be tested but are nevertheless critical to safe or reliable operation in service. In particular short circuit performance, specification compliance, and maintenance safety issues will be covered. This will be generally performed according to the process set out in CIGRE Brochure 529 – Guidelines for Conducting Design Reviews for Power Transformers.

To become type registered, each individual transformer will need to satisfactorily pass an inspection by a qualified and knowledgeable (third party or NG) engineer at the pre-tank stage and pass all the works tests specified in NG TS 2.03. Type tests are required on the first unit of a new design or when the factory or manufacturing technique has changed. The high voltage tests and type tests will be witnessed by NG or a third party engineer, who will provide a report accepting that the tests have been carried out and passed. Any test anomaly shall be reported to Asset Policy to determine the appropriate action.

Once the tests have been completed to the satisfaction of the witnessing engineer and in the case of any anomaly NG, the transformer may be dispatched to site.

In exceptional circumstances when the tested parameters of the transformer are outside the tolerances specified, a derogation may be issued by the Asset Policy Manager to allow the transformer to be transported to site if the transformer is judged to be fit for service at that particular location. Otherwise the transformer will not leave the factory until it has satisfactorily passed all specified tests at the specified test levels following modification or repair if necessary.

The transformer will become type registered when it has been installed and site tested and a copy of the factory test certificate is received by Asset Policy. No type registration letter is required. The test certificate must detail the types, serial numbers and EGI codes of the components fitted to the transformer during test which must be the same as those fitted in service.

An EGI code will be issued for each design group of transformers following the successful completion of type tests on the first unit. The members of a design group will have all been built in the same factory to the same design, will have the same components and will all be covered by the same type test. It is possible however that more than one transformer in a design group will have been subjected to type tests. No individual transformer will be considered to be type registered until it has completed its own tests even though an EGI code has been issued for the type tested design.