

# POWER TRANSFORMER STANDARDISATION MANUAL JANUARY 2014

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## Preface

Power Transformer is very vital equipment in our Transmission System, High Voltage AC and DC transmission to supply bulk power from generation source to load points is successful only through effectively and efficiently designed Power Transformers, Converter Transformer and Reactors.

It is heartening to note that India has put up enough manufacturing capacity to the order of 300000 MVA to meet market demand of power transformers. Indian companies are capable of designing and supplying transformers up to 1200 kV.

Transformer Industry has undergone many changes and transformations in terms of design philosophy, selection of materials and field applications.

While suppliers have focused on cost competitive product by optimizing designs, Utilities and customers choice and demand has been reliable and defect free product. The wide fluctuating raw material cost dominates the design process. However, IT has supplemented designers to implement their innovative design ideas. Customer feed back and field data on transformer performance played vital role in design improvement.

Concept of Asset Management has not picked up well among Utilities in India, but realization has come to assess the health of power transformer through condition monitoring.

There is always concern and keen interest from all stakeholders to have Power Transformers, which does not fail before its expected life. It is not simple to get answer to this wish, because many aspects from procurement to commissioning are required to be carefully and rightly addressed. Role of Utility / Customer is very important to address The need and actual application of power transformer with proper data. Many a times, a bulky document with multiple and superlative requirements is given. It ultimately leads to contractual dispute and delay in delivery. In many occasions, power transformers remain at site without erection & commissioning for long time. The storage and preservation are important. Erection and commissioning has to be done with utmost care duly following erection manual of suppliers.

There are several interface points with switchyard layout, which need to be accounted from day one.

In commercial front, Utilities assign importance to transformer losses and therefore loss capitalisation exercise is done at tender evaluation stage. Whereas designers are constrained to satisfy the loss figures once bid is awarded, Utility is equally compelled to accept unit with penalty. It is not a desirable practice.

Under the above background, Technical Committee of TRAFOTECH-2010 decided to review, discuss & finalize the standardisation process through committee. Accordingly, during closing meeting on 18th February, 2010, it was decided to commence the process of standardization as early as possible.

The task was assigned to Mr S.K. Negi, MD, GETCO, as Chairman of standardisation committee under the aegis of IEEMA. It was an open invitation to participate and contribute, however technical experts and designers from leading companies, Institutions and utilities would be permanent members.

It was decided in first meeting that emphasis will be to standardize design & engineering specification, drawings, quality plans, erection, testing and commissioning in the form of data and figures as far possible to understand quickly and facilitate the process of procurement and commissioning.

Further, Steering Committee on “Power Transformer Standardisation manual” was constituted as below:

Working Group	Title	Name	Organization
<b>Chairman: Mr. S. K. Negi, MD, Gujarat Energy Transmission Corporation Ltd.</b>			
1	Technical Specification & Parameters	Mr. P. Ramachandran Mr. M. L. Jain	ABB Ltd. EMCO Ltd.
2	Design and Engineering features Architectural features and General Arrangement Drawings On Load Tap Changer Bushings Fittings and accessories	Mr. M. Vijayakumaran Mr. M. L. Jain Mr. V. K. Lakhiani Mr. M. M. Goswami	ALSTOM Ltd. EMCO Ltd. T&R Ltd. POWERGRID
3	Contract drawings and documents	Mr. V. M. Varkey Mr. P. Ramachandran	SIEMENS Ltd. ABB Ltd.
4	Standard Manufacturing Quality Plan (MQP)	Mr. M. M. Goswami Mr. Y. V. Joshi	POWERGRID GETCO
5	Transportation, Erection, Testing and Commissioning	Mr. S. K. Negi Mr. Y. V. Joshi	GETCO GETCO
6	Transformer Oil	Mr. S. K. Negi	GETCO
7	Design Review	Mr. M. Vijayakumaran Mr. S. K. Negi	ALSTOM Ltd. GETCO
8	Frequently Asked Questions (FAQs)	Mr. P. Ramachandran Mr. V. K. Lakhiani	ABB Ltd. T&R Ltd.
<b>Convener : Mr. Anil Nagrani, IEEMA</b> <b>Nodal Officer : Mr. Y. V. Joshi, GETCO</b>			

The basic objectives of standardisation are:

- 1) To achieve countrywide standard design for each class wise rating wise transformers
- 2) To reduce lead time, human efforts & errors, materials inventories resulting in to conservation of essential materials
- 3) To define/enhance quality, productivity & overall efficiency. It improves process capability in many areas & to address for on-going defect
- 4) To eliminate waste & hence improving productivity
- 5) To promote better understanding & application of the principles and techniques
- 6) To achieve schedule of delivery.

The task was divided into various chapters and allocated to team of domain experts. The chapter was thoroughly debated to standardize design requirements in the simplest form of data which can be implemented universally according to rating and voltage class of power transformer and leave no scope of subjectivity between supplier and customer for commercial and technical parameters.

In the above standardization process, idea of adding chapters on Design Review and Frequently Asked Questions (FAQs) emerged for inclusion in the manual. It will greatly help practicing engineers to take key decisions and sharpen their skills in the entire value chain of transformer business.

Transmission system in India is becoming large and complex with a highest system voltage of 765 kV. We cannot afford break-downs and outages of any kind. It is essential that continuous customer feed back system is in place to gauge the design and manufacturing quality of each and every unit installed, in Utilities. This Standardisation Manual will definitely help Utilities in procurement to commissioning process of power transformer, for defect free service beyond its design life.

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