



Worldwide Market Surveillance Testing Avenues for Power Transformer Energy Performance

This paper reports the results of the research carried out by Power transformer Task 2.1 “Worldwide and EU Technical standard and legislative framework into the WP2 - Landscape of testing avenues” of the INTAS project.

Introduction

The energy performance of power transformers is currently being improved around the globe¹. There is a need to strengthen the capacity of Market Surveillance Authorities (MSAs) to conduct Ecodesign related market surveillance activities with respect to new and pending industrial and tertiary sector products. Especially in the case of customised products which are unsuitable for testing in laboratories. The focus of the research is to support Market Surveillance Authorities (MSAs) in monitoring, verification, and enforcement in order to ensure compliance for very large industrial products, specifically transformers and industrial fans, with the requirements of the Eco-design Directive. This paper discusses critically the technical boundaries, the existing energy performance metrics, the standardized measurement methods and provides a comparison highlighting issues and criticalities. The paper considers three-phase and single-phase power transformers (including auto-transformers) with a minimum power

1 In the EU alone, total losses from inefficiencies in 2008 amounted to 93.4 TWh per year, equivalent to almost 12% of the continent’s residential electricity consumption. A regulation covering this group was adopted in May 2014 and is now under revision process. The cost-effective improvement potential through more efficient design has been estimated in about 16.2 TWh per year in 2025, which corresponds to 3.7 Mt of CO2 emissions, with a projected loss of (aggregate of the 10-20% expected loss through non-compliance) of 1.6-3.2 TWh.

rating of 1 kVA used electricity transmission and distribution networks or for industrial applications with the exception of small and special transformers.

Legislative documents and programs

There are a certain number of legislative documents dealing with energy performance and testing energy performance of power transformers at European Union level, USA level and other country level. Regulations usually referred to MEPS - Minimum Energy Performance Standards - for transformers have evolved in many countries during last decade. Such regulations cover distribution transformers only, both liquid immersed and dry type transformers except for Europe and China.

Table I. Comparison Among Legislative Documents (MAY 2016).

Country Standard / Regulation	Transformers	Indicative Requirements
Australia / New Zealand AS2374.1.2-2003	1 phase: 10-50 kVA 3 phase: 25-2500 kVA Voltage: 11 and 22 kV	Min Efficiency at 50% load
Brazil ABNT NBR 5356	1 phase: 5 to 100 kVA 3 phase: 15 to 300 kVA Voltage: 15, 24.2 & 36.2kV	Max L and NL losses at 100% load