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IEEE Standard Requirements for Arc Furnace Transformers

IEEE Power and Energy Society

Sponsored by the
Transformers Committee

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IEEE Standard Requirements for Arc Furnace Transformers

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of the
IEEE Power and Energy Society

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Abstract: The electrical characteristics and mechanical features of liquid-immersed transformers 69 kV or less (but not limited to 69 kV), used for supplying electric power to direct arc-melting furnaces are covered in this standard.

Keywords: capacitors, electric arc furnace transformer, IEEE C57.17, low voltage terminal construction, RC circuits, reignitions, restrikes, supplementary reactor (use of)

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Introduction

This introduction is not part of IEEE Std C57.17-2012, IEEE Standard Requirements for Arc Furnace Transformers.

In a paper entitled "Relation of Power Input and Controls to Efficiency and Quality of Steel Production," by Mr. Charles W. Vokac, presented on December 5, 1952, at the Electric Furnace Steel Conference in Pittsburgh, Pennsylvania (recorded in the Electric Furnace Steel Proceedings, American Institute of Mining and Metallurgical Engineers, 1952, pp 62–85) [B21], the following was stated:

> Standardization of transformer specifications is another way to increase the efficiency of steel production by reducing the initial cost of the transformer. Every builder and designer of transformers is ready to state how standardization will reduce costs and improve delivery. Their cooperation in this effort is assured. It will take also the cooperation of furnace builders and of the furnace users particularly, to realize this economy for their benefit. In an effort to get such a program started, the author offers some preliminary Standard Arc furnace Specifications for consideration by a representative committee selected by this or any other interested organization . . .

This paper became the basis for the original USA Standard. Originally, the task was undertaken by the Foundry Equipment Manufacturers Association (FEMA). Soon FEMA was joined by other standardization committees from AIEE (now IEEE) and the National Electrical Manufacturers Association (NEMA) to form the Joint Committee on Standards for Arc Furnace Transformers.

This joint committee developed the original standard for submittal to ASA Sectional Committee C57 for approval as an American Standard. In 1965, ANSI issued the C57.17 standard. The standard's last revision was in 1971 and last published on February 29, 1988.

In the fall of 2002, a task force was formed to determine if there was a need to revise this standard or if it was appropriate to reaffirm as written. The need to revise was apparent to update specific technologies, correct errors, and update the document format.

This standard is a voluntary consensus standard. Its use may become mandatory only when required by a duly constituted legal authority, or when specified in a contractual relationship. To meet specialized needs and to allow innovation, specific changes are permissible when mutually determined by the user and the producer, provided that such changes do not violate existing laws, and are considered technically adequate for the function intended.

It is of note that when measuring resistance for losses or temperature rise tests on low voltage, high-current windings having very low resistance are prone to relatively large measurement errors. Connection losses may also alter normal resistance and loss measurements.

This standard was processed and approved for submittal to IEEE by Accredited Standards Committee on Transformers, Regulators, and Reactors, C57. Committee approval of the standard does not necessarily imply that all committee members voted for its approval.

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IEEE Standard Requirements for Arc Furnace Transformers

1. Overview

1.1 Scope

This standard covers electrical characteristics and mechanical features of liquid-immersed transformers 69 kV or less (but not limited to 69 kV), used for supplying electric power to direct arc-melting furnaces.

All characteristics and definitions, except as specifically covered in this standard, shall be in accordance with the IEEE Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformer (C57.12 Series).

1.2 Purpose

The purpose is to provide an industry standard on the design and application of power and distribution transformers for the specific application of feeding arc furnaces and related foundry equipment.

1.3 Word usage

In this document, the word shall is used to indicate a mandatory requirement. The word should is used to indicate a recommendation. The word may is used to indicate a permissible action.