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ENERGY EFFICIENCY IN ELECTROHEATING INSTALLATIONS

FOREWORD

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62796, which is a technical specification, has been prepared by IEC technical committee 27: Industrial electroheating and electromagnetic processing.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
27/882/DTS	27/903/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This Technical Specification (TS) was prepared by a working group of IEC TC 27, whose overall intent was to develop guidelines for the classification of industrial electroheating systems, which allow for the determination of the performance/efficiency of a given system and a comparison with other systems of that class.

The initial technical considerations suggested that TC 27 should at first limit its focus on determination of energy consumption for a defined output of processed workload. The next step should then be consideration of performance characteristics influencing the energy efficiency, such as metallurgical or thermal processing particulars. However, during the course of the work, it turned out that comparisons of performance can best be made by specifying different workloads for different kinds of comparisons.

Measurements of efficiencies are split into two main categories: electrical-only and of the electroheating in normal operation. The latter has a relationship to other performance aspects which are also dealt with.

Testing requires specification limits on workload and three kinds are defined:

– normal workloads – i.e. such within the specifications provided by the manufacturer;
– dummy workloads – artificial items specially designed to very efficiently absorb the available output power without being processed or modified as the normal workload, and by that promoting the accuracy of enthalpy increase measurements;
– performance test workloads – artificial or partially artificial workloads specially designed for discrimination of processing results.

The TS provides general methods for determination of the efficiency of electroheating systems and is intended to assist in creating a consistent terminology and structure in various TC 27 test standards dealing with specific equipment types. The TS material is to be covered by the future third edition of IEC 60398 [3][1].

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1 Numbers in square brackets refer to the Bibliography.

ENERGY EFFICIENCY IN ELECTROHEATING INSTALLATIONS

1 Scope and object

This Technical Specification is applicable to industrial electroheating installations using electric energy as input, alone or in combination with other kinds of energy. However, external combustible fuel energy input is not dealt with, and all considerations begin at the electric only mains frequency source to which the installation is connected. Any external voltage transformation from the supply network to the plant into a special voltage which is fed into the installation is not dealt with in this Technical Specification, since it is not considered a responsibility of the manufacturer of the installation.

The object of this Technical Specification is to provide methods for determination of the efficiency of a given system as well as enabling comparisons with other equipment using the same principle for processing of the workload.

For satisfactory comparisons to be possible, differences in end product quality and influences of environmental factors on heat recovery are included.

Heat recovery aspects are dealt with but limited to the temperature changes, the specific heat capacity characteristics, and the physical properties of the usually fluidic substance obtained from the installation and employed for energy recovery use. Conversion into mechanical energy is dealt with.

Adaptation to the needs of operation and performance management as might be necessary for the implementation or application of smart grid technologies, is addressed but no test methods are given.

A guideline is provided for the development of the detailed electroheating efficiency tests for the particular test method standards. The different principles of electroheating for processing a workload, and types of equipment, are given in Clause 1 of IEC 60519-1:2010.

If energy from combustible gases or liquids is used in addition to electric energy, the measurement and calculation of the energy efficiency contribution of combustion in the installation are made according to the relevant ISO standards. These may deal with the electric energy input in other ways than in this Technical Specification.

NOTE The relevant standards in the ISO 13579 series are listed in the Bibliography [4 – 7].

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60519-1:2010, *Safety in electroheating installations – Part 1: General requirements*