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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 40816.4-2025

**Industrial furnaces and associated processing equipment -
Method of measuring energy balance and calculating efficiency
- Part 4: Furnaces with protective or reactive atmosphere**

工业炉及相关工艺设备 能量平衡测试及能效计算方法 第4部分：保护性或反应性
气氛炉

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 4 of GB/T 40816 "Energy Balance Test and Energy Efficiency Calculation Method for Industrial Furnaces and Related Process Equipment".

GB/T 40816 has published the following parts.

- Part 1: General Methods;
- Part 2: Steel Heating Furnace;
- Part 3: Intermittent Aluminum Melting Furnaces;

---Part 4: Protective or Reactive Atmosphere Furnaces;

---Part 11: Various Efficiency Assessments this document adopts ISO 13579-4:2013 "Energy balance test and energy efficiency calculation method for industrial furnaces and related process equipment" (Category 1).

4-part. Protective or reactive atmosphere furnace.

The following minimal editorial changes have been made to this document.

---Removed 9.3.1.1.3 from ISO 13579-4:2013 (because the referenced ISO 13579-1:2013 does not have 9.3.1.1.3).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Electrical Equipment Industry Association.

This document is under the jurisdiction of the National Technical Committee on Standardization of Industrial Electric Heating Equipment (SAC/TC121).

Introduction

Industrial furnaces and related process equipment are thermal devices that utilize the heat from fuel combustion or electrical energy conversion to heat materials or workpieces. In order to...

To assess the energy efficiency of industrial furnaces and related process equipment, GB/T 40816 "Energy Balance Test and Energy Efficiency Test of Industrial Furnaces and Related Process Equipment" was formulated.

The "Calculation Methods" series of standards. GB/T 40816 aims to specify the methods for energy balance testing and energy efficiency calculation of industrial furnaces and related process equipment.

The law is proposed to consist of 5 parts.

---Part 1: General Methods. The purpose is to describe general methods for energy balance testing and energy efficiency calculation of industrial furnaces and related process equipment.

method.

---Part 2: Steel Heating Furnaces. The purpose is to describe specific methods for energy balance testing and energy efficiency calculation of steel heating furnaces.

---Part 3: Intermittent Aluminum Melting Furnaces. The purpose is to describe specific methods for energy balance testing and energy efficiency calculation of intermittent aluminum melting furnaces.

---Part 4: Protective or Reactive Atmosphere Furnaces. The purpose is to describe the energy balance testing and energy efficiency of protective or reactive atmosphere furnaces.

A special method for effective calculation.

---Part 11: Various Efficiency Assessments. The purpose is to describe various efficiency assessment methods for industrial furnaces and related process equipment.

All other parts are formulated in accordance with GB/T 40816.1 and shall be used in conjunction with GB/T 40816.1.

Industrial furnaces and related process equipment Energy balance testing and energy efficiency calculation methods Part 4: Protective or Reactive Atmosphere Furnaces

1 Scope

This document specifies a general method for energy balance and energy efficiency calculation of protective or reactive atmosphere furnace process equipment. The general method includes.

---Measurement method;

---Calculation (General Calculation);

---Evaluation Report.

This document does not apply to efficiencies directly related to the process other than those in protective or reactive atmosphere furnaces.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 40816.1-2024 Energy Balance Test and Energy Efficiency Calculation Methods for Industrial Furnaces and Related Process Equipment Part 1: General Method (ISO 13579-1:2013, IDT) ment-Vocabulary)

3 Terms and Definitions

The terms and definitions defined in ISO 13574 and the following terms and definitions apply to this document.

3.1.1 Total Energy Input

3.1.1.1

Total energy input

The measured energy input is the sum of the energy inputs brought into the energy balance region, which consists of fuel equivalent energy and other energy inputs.

3.1.2 Fuel Equivalent Energy

3.1.2.1

fuel equivalent energy the sum of input energy, consisting of the calorific value of fuel, the calorific value of waste, the calorific value of atmospheric gas source gas, and the equivalent electrical energy of fuel.