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Industrial furnaces and associated processing equipment — Method of measuring energy balance and calculating efficiency —

Part 2: Reheating furnace for steel

Fours industriels et équipements associés — Méthode de mesure du bilan énergétique et de calcul de l'efficacité —

Partie 2: Fours de réchauffage pour acier

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Contents

Page

Foreword	vi
Introduction.....	vii
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions	1
4 Basic principles.....	1
4.1 General	1
4.2 Sankey diagram	4
4.3 Process Heating Assessment Survey Tool (PHAST).....	4
5 Basic condition of measurement and calculation.....	5
5.1 State of furnace	5
5.2 Duration of measurement.....	5
5.3 Unit of energy	5
5.4 Reference condition	5
5.5 Unit of volume.....	5
5.6 Fuel	5
6 Type of energy used in this standard.....	5
6.1 General	5
6.2 Energy balance	5
6.2.1 Total energy input	5
6.2.2 Fuel equivalent energy.....	5
6.2.3 Other energy input	6
6.2.4 Total energy output	6
6.2.5 Thermal energy output.....	7
6.2.6 Energy consumed in electrical auxiliary equipment	8
6.2.7 Energy used for generation of utility.....	8
6.2.8 Electrical generation loss.....	8
6.3 Thermal energy balance	8
6.3.1 General	8
6.3.2 Thermal energy input from electrical energy	9
6.3.3 Circulating heat	9
6.4 Energy balance of electrical generation	9
6.4.1 General.....	9
6.4.2 Energy input.....	9
6.4.3 Energy output	9
6.5 Recycled energy	9
7 Measurement method	12
7.1 General	12
7.2 Fuel	12
7.2.1 Volume.....	12
7.2.2 Sampling, test, analysis and measurement of calorific value	12
7.2.3 Pressure and temperature	12
7.3 Atomization agent	12
7.3.1 Volume.....	12
7.3.2 Pressure and temperature	12
7.4 Combustion air and exhaust gas.....	12
7.4.1 Combustion air	12
7.4.2 Exhaust gas	12

7.4.3	Measurement method for burners with recuperative functions	13
7.5	Controlled atmosphere gas	13
7.5.1	Volume	13
7.5.2	Temperature	13
7.6	Products and jigs/fixtures for products handling	13
7.6.1	Mass	13
7.6.2	Temperature	13
7.6.3	Mass of weight loss	13
7.7	Temperature of furnace surface	13
7.7.1	Furnace wall	13
7.7.2	Section area of parts through furnace wall	14
7.8	Furnace inner wall temperature	14
7.9	Inner furnace pressure	14
7.10	Cooling water	14
7.10.1	Temperature	14
7.10.2	Volume	14
7.11	Electrical auxiliary equipment	14
7.11.1	Installed electrical auxiliary equipment	14
7.11.2	Energy for transferring fluid	14
7.12	Generation of utilities	14
7.13	Recycled energy	14
8	Calculation	14
8.1	General provisions	14
8.2	Total energy input	14
8.2.1	Calorific value of fuel	14
8.2.2	Calorific value of waste	15
8.2.3	Calorific value of source gas of atmosphere gas	15
8.2.4	Fuel equivalent energy of electricity	15
8.2.5	Sensible heat of combustion air	15
8.2.6	Sensible heat of atomization agent	15
8.2.7	Heat by formation of scale	15
8.2.8	Sensible heat of infiltration air	16
8.3	Total energy output	16
8.3.1	Thermal energy output	16
8.3.2	Energy consumed in electrical auxiliary equipment	18
8.3.3	Energy used for generation of utilities	18
8.3.4	Electrical generation loss	18
8.4	Total energy efficiency	18
8.4.1	General	18
8.4.2	Total energy efficiency limited to heating-up process	18
9	Report	19
Annex A (Normative)	Symbols and units	20
Annex B (Informative)	Reference data	23
Annex C (Informative)	Example report of energy balance and efficiency of a reheating furnace for steel	25
C.1	Equipment specification summary	25
C.2	Area of energy balance	26
C.3	Measurement data	27
C.4	Energy balance sheet	30
C.5	Energy efficiency	32
C.6	Energy flow diagram	32
Annex D (Informative)	Assessment of uncertainty of the total energy efficiency	34
D.1	Introduction	34
D.2	Assessment	34
D.2.1	Measurement condition	34
D.2.2	Calculation	35

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13579-2 was prepared by Technical Committee ISO/TC 244, *Industrial furnaces and associated thermal processing equipment*.

ISO 13579 consists of the following parts, under the general title *Industrial furnaces and associated processing equipment — Method of measuring energy balance and calculating energy efficiency*:

- Part 1: *General methodology*
- Part 2: *Reheating furnaces for steel*
- Part 3: *Batch type aluminium melting furnaces*
- Part 4: *Furnaces with protective or reactive atmosphere*

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Introduction

All calculations within this standard are based on the location of equipment at the reference conditions.

NOTE For equipment intended to be installed other than the sea level the impact of the elevation should be calculated for that location.

Symbols used in this part 2 of this standard and all the annexes attached to this part, together with their meaning and units, are given in Annex A.

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Industrial furnaces and associated processing equipment — Method of measuring energy balance and calculating efficiency —

Part 2: Reheating furnace for steel

1 Scope

This Part 2 of ISO 13579 specifies general methodology of measuring energy balance and calculating efficiency of the process involving reheating furnaces for steel as designed by the furnace manufacturers. This general methodology includes:

Measurement methods,

Calculations (general calculation) and

Evaluation report.

This standard is excluding any efficiencies related to the process itself outside of the reheating furnaces for steel. (e.g. in a rolling mill process, the reheating furnace shall be the only part covered by this standard.)

2 Normative references

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

ISO 13574, Industrial furnaces and associated thermal processing equipment — Vocabulary

ISO 13579-1, Industrial furnaces and associated thermal processing equipment — Method of measuring energy balance and calculating efficiency — Part 1: General methodology

3 Terms and definitions

The terms and definitions used in this part of Standard is defined in ISO 13574, Industrial furnaces and associated thermal processing equipment — Vocabulary.

4 Basic principles

4.1 General

Area of energy balance measurement shall be determined.

In principle, exclude table rollers from the area of energy balance.

NOTE Examples of determination of the area of energy balance measurement for reheating furnace for steel are shown in Figure 1 and 2.

The following aspects shall be included in the energy balance measurement:

- a) Energy input;
 - "Fuel equivalent energy" as specified in 4.2.2;
 - "Other energy input" as specified in 4.2.3;
- b) Energy output;
 - "Thermal energy output" as specified in 6.2.5;
 - "Energy used in electrical auxiliary equipment" as specified in 6.2.6;
 - "Energy for generation of utilities" as specified in 6.2.7;
 - "Electrical generation loss" as specified in 6.2.8.

Determine energy input and energy output which goes into and comes out of the area of energy balance based on the measurement data.

The total energy input into the area shall balance the total energy output from the area.

Result of energy balance measurement is required to be summarized into energy input and energy output in an energy balance sheet with necessary information such as equipment summary, measurement condition and measurement data.

Thermal energy balance and electrical generation may be created as subcategories. See 6.3 and 6.4.

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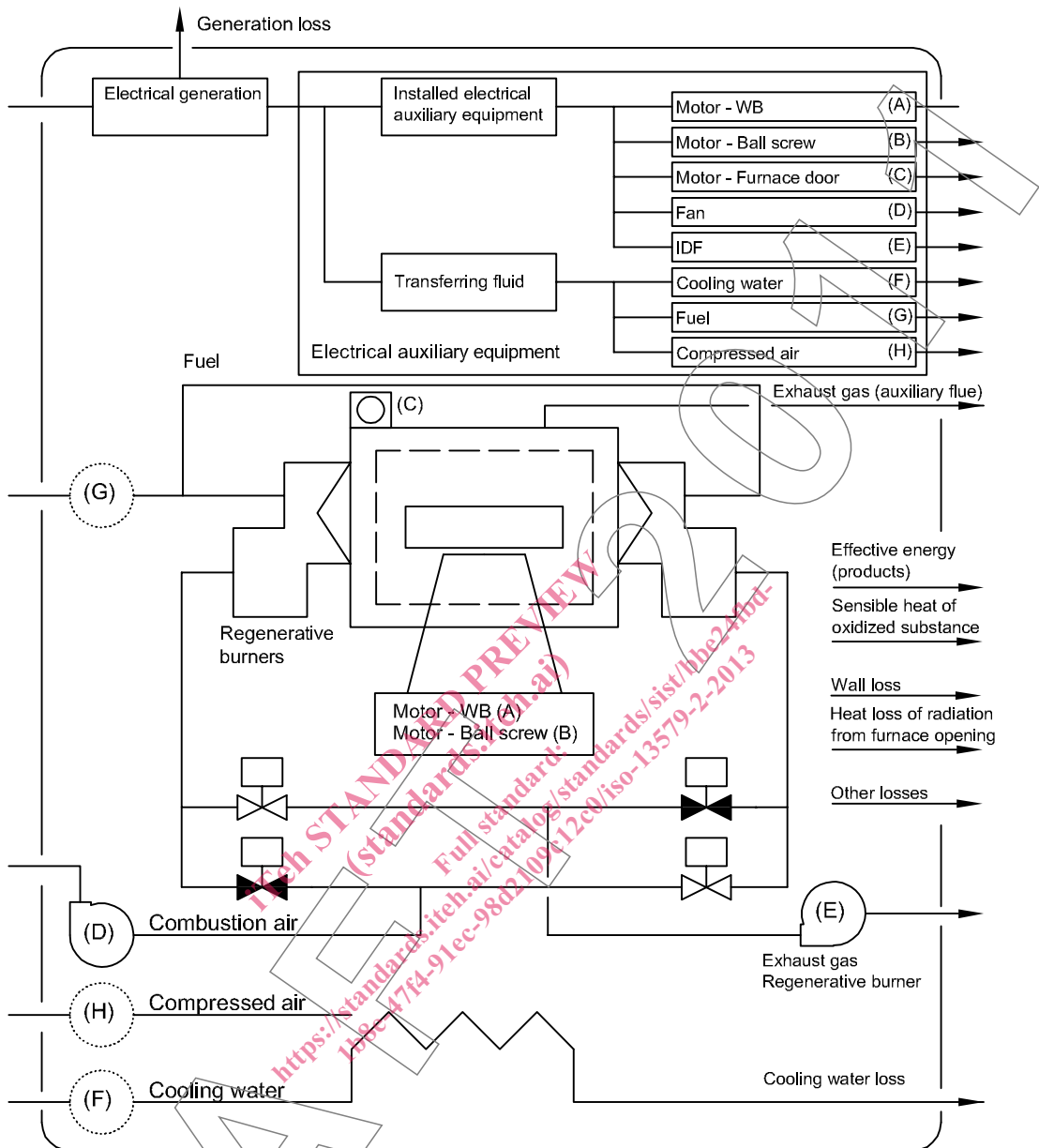


Figure 1 — Example of determination of the area of energy balance
 Continuous furnace for steel with regenerative burners

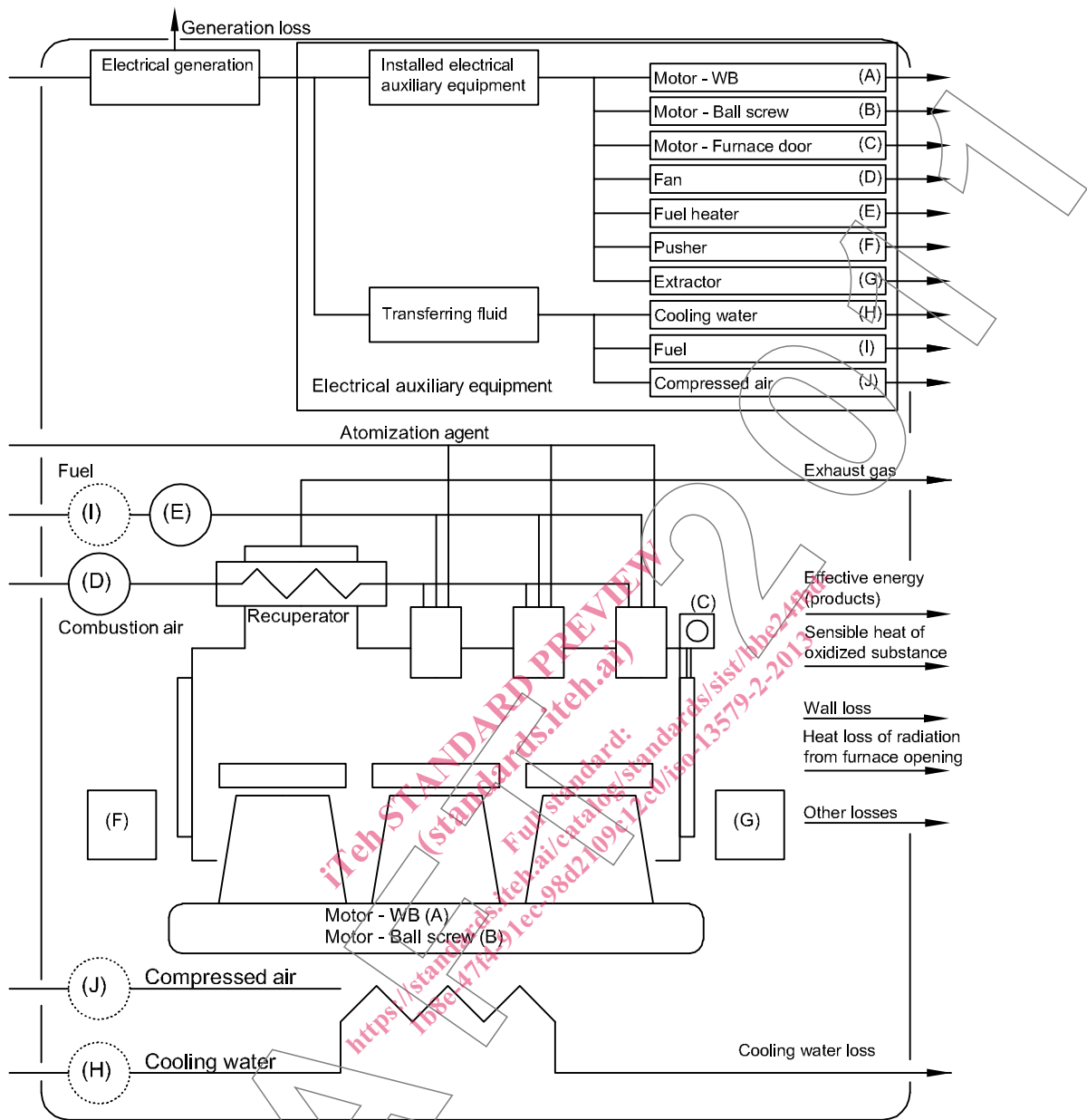


Figure 2 — Example of determination of the area of energy balance
Continuous furnace for steel with recuperator

4.2 Sankey diagram

As specified in ISO/CD 13579-1 4.2.

4.3 Process Heating Assessment Survey Tool (PHAST)

As specified in ISO/CD 13579-1 4.3.