

Glossary of

Industrial furnace terms

Co-operating organizations

The Solid Fuel Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

Association of Consulting Engineers	Gas Council*
British Cast Iron Research Association	Heating and Ventilating Contractors Association
BCURA Industrial Laboratories	Imperial Chemical Industries Limited
British Coke Research Association	Institute of British Foundrymen*
British Electrical and Allied Manufacturers' Association	Institute of Fuel
British Ironfounders' Association*	Institution of Gas Engineers*
British Mechanical Engineering Confederation Ltd.	Institution of Heating and Ventilating Engineers*
British Steel Industry*	Institution of Mechanical Engineers*
Chamber of Coal Traders	Low Temperature Coal Distillers' Association of Great Britain Ltd.*
Chemical Industries Association	Ministry of Housing and Local Government
Coal Utilisation Council	Ministry of Public Building and Works
Coke Oven Managers' Association	Ministry of Technology
Council of Ironfoundry Associations	National Coal Board*
Domestic Solid Fuel Appliances Approval Council*	Society of British Gas Industries
Electricity Council, the Central Electricity Generating Board and Area Boards in England and Wales	Water-tube Boilermakers' Association*
	Women's Advisory Council on Solid Fuel

The scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Association of Boiler Setters, Chimney and Furnace Contractors	Combustion Engineering Association
Association of Shell Boilermakers	Society of Industrial Furnace Engineers
British Non-Ferrous Metals Research Association	

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Foreword

This standard makes reference to the following British Standards:

BS 499, *Welding terms and symbols*.

BS 499-1, *Welding, brazing and thermal cutting glossary*.

BS 2094, *Glossary of terms relating to iron and steel*.

BS 2094-1, *General metallurgical, heat treatment and testing terms*.

BS 3446, *Glossary of terms relating to the manufacture and use of refractory materials*.

BS 3447, *Glossary of terms used in the glass industry*.

Although this British Standard has been prepared under the authority of the Solid Fuel Industry Standards Committee and was envisaged as a further part of BS 1846¹⁾, the original draft was submitted by the Society of Furnace Builders (now the Society of Industrial Furnace Engineers) and, consequently, the terms and definitions are not limited to those relating only to solid fuel.

Section 1 of the glossary sets out to define “furnace” and includes a variety of similar or subordinate terms in common use. Arising from this introduction, it has been decided to exclude terms relating to food handling and to certain chemical or laboratory processes, mainly those characterized by the use of a comparatively low temperature.

Section 2 lists a number of processes which are carried out by means of a furnace or similar equipment and the remaining sections contain names and descriptions of furnaces used in particular industries, although not necessarily exclusively.

Where alternative terms are in use for the same item, any non-preferred term is given in small capital letters. Certain terms referring to equipment now falling into disuse are indicated in the same way. All the terms defined are listed alphabetically in the index and cross-indexed where appropriate.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ BS 1846, “Glossary of terms relating to solid fuel burning equipment”.

No.	Term	Definition
Section 1. General		
101	arch	A refractory structure in the form of an arch, generally for preheating refractory shapes used as replacements in glass furnaces; also employed to describe the roof or crown of many furnaces.
102	crucible POT	An externally fired container in which metal or other material is heated, generally to fusion. The contents may subsequently be baled or poured out, in the latter case possibly after removal from the heat source. The container may be circular, oval or rectangular in horizontal cross section.
103	furnace	A structure within which heat is generated to a controlled temperature by the combustion of fuel, or by the application of electrical or other energy, generally constructed or lined with refractory material and designed to suit the nature and dimensions of the material to be processed.
104	grate	A structure, generally in the form of bars, to support combustible material and to permit the incombustible residue (ash) to fall through the interstices.
105	hearth	Specifically, that part of the furnace on which fuel is supported during combustion, but extended to include any (horizontal) area where combustion processes or heat treatment are in progress.
106	heater STOVE	A structure or appliance acting as a source of heat.
107	incinerator	A refractory lined chamber and equipment connected to a chimney, designed to burn solid, liquid or gaseous wastes and to produce inoffensive gases and sterile residues containing little or no combustible material.
108	kiln ARCH	An alternative term for “furnace”, frequently employed in the ceramics, glass, refractories and other industries.
109	lehr	A tunnel shaped furnace through which glassware is passed continuously, for annealing, stress relieving or other manufacturing processes.
110	muffle INDIRECT HEATED OVEN	A furnace in which the working space and the charge therein are isolated from the heating medium and any combustion products.
111	oven	An alternative term for “furnace”, derived from the German; more properly, a heated chamber not normally used above about 500 °C.
112	retort	1. An externally heated refractory or metal distillation chamber. 2. A stationary or revolving chamber in which parts are heat treated in a prescribed atmosphere.

No.	Term	Definition
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Section 2. Furnace processes

(See also BS 499-1, and BS 2094-1^a)

NOTE Definitions of terms for various types of electrical heating are under consideration internationally and will be incorporated in a British Standard glossary of electrical terms at a later date.

201	annealing	1. <i>Metal</i> . A heating and cooling process designed primarily to soften the material. 2. <i>Glass</i> . A heating and cooling process designed primarily to relieve stresses in the material.
202	brazing	The process of joining metal surfaces by flowing between them a metal of lower melting point but generally above 500 °C.
203	bright annealing BLACK BOX ANNEALING	Annealing a metal under atmospheric or other conditions in such a way that the original bright surface is retained.
204	calcining	A heating process designed to remove moisture and combustibles and to promote reactions in the solid state until only oxides remain.
205	carburizing	Increasing the carbon content of the surface of a metal by heating it in a carbon rich environment.
206	close annealing POT ANNEALING	Annealing a metal in a closed container so that surface oxidation is restricted.
207	dielectric heating	A method of heating by the losses occurring in an electrically insulating material in an alternating field.
208	enamelling COATING (metal) DECORATING; PAINTING (glass and ceramics)	The process of coating a material with a vitreous glaze.
209	homogenizing	A process of treatment at elevated temperature to reduce segregation.
210	induction heating	A method of heating by currents induced in an electrically conducting material by an alternating field.
211	infra-red heating	A method of heating by radiation from a low energy source.
212	malleablizing	The softening of white cast iron by annealing so as to produce a degree of ductility.
213	normalizing HOMOGENIZING	A heating and cooling process designed to achieve improved mechanical properties.
214	patenting	A heating and cooling process designed to facilitate subsequent working; associated with rod and wire production.
215	power frequency heating MAINS FREQUENCY HEATING LINE FREQUENCY HEATING	A method of heating using the mains supply of electricity.
216	preheating	A heating process designed to prepare material for subsequent treatment, generally at higher temperature.

^a BS 499, "Welding terms and symbols", Part 1, "Welding, brazing and thermal cutting glossary", and BS 2094, "Glossary of terms relating to iron and steel", Part 1, "General metallurgical, heat treatment and testing terms".

No.	Term	Definition
217	resistance heating ELECTRODE HEATING	A method of heating by the losses occurring when a current is passed through a material of low electrical conductivity.
218	sintering	A heating process designed to promote surface reaction and agglomeration of particles without actual fusion.
219	stress relieving	A heating and cooling process designed to relieve internal stresses.

Section 3. Roasting, sintering and calcining

301	bogie kiln BOGIE FURNACE CAR BOTTOM KILN CAR TYPE KILN	A furnace with a mobile hearth (bogie) for the accommodation of the charge; can be used for continuous or intermittent processes.
302	box kiln	A furnace suitable for intermittent use, loaded from the top or one end.
303	cascade furnace EXFOLIATING FURNACE	A vertical furnace incorporating one or more deflectors, arranged for top charging.
304	continuous kiln	A kiln in which the full firing temperature is continuously maintained in one zone or another of the kiln.
305	fluidized bed	A bed of small particles through which a gaseous heating, cooling or reactant medium is passed in such a way that the bed behaves like a fluid and heat transfer or reaction is accelerated by the movement of the particles.
306	intermittent kiln BATCH KILN IN AND OUT KILN PERIODIC KILN (USA)	A furnace in which a complete batch of material is placed for treatment and removed before the next charge is inserted.
307	lift-off cover furnace BELL FURNACE HOOD FURNACE TOP HAT FURNACE	A base over which a cover is placed for heating the charge; separate bases are normally available so that the same cover can be used for several charges.
308	lift-up hearth furnace ELEVATOR HEARTH FURNACE	A furnace in which a mobile hearth can be inserted, lifted for heating the charge, brought down again and withdrawn for cooling.
309	lime kiln	A furnace specifically designed for the calcination of limestone to produce quicklime.
310	multiple hearth furnace	A furnace with several chambers which can be employed in series or in parallel.
311	rod resistor furnace GRAPHITE RESISTOR FURNACE	A furnace in which heat is conveyed to the charge by radiation from electrically heated resistances.
312	rolling cover furnace	A base over which a cover supported on wheels is rolled for heating the charge.
313	rotary hearth kiln	A furnace with a rotating hearth, sometimes tilted, for continuous operation.

No.	Term	Definition
314	rotary kiln CEMENT KILN	A refractory lined cylinder slightly inclined from the horizontal, continuously charged and rotated, heated from the lower (discharge) end.
315	semi-muffle furnace	A kiln or furnace where combustion takes place before the products of combustion enter the work chamber; designed to avoid flame impingement.
316	shuttle furnace	An intermittent bogie kiln, in which the movement is in and out.
317	sinter strand furnace	A continuous belt moving through or below a combustion chamber, on which pelletized or crushed material is baked or sintered.
318	vertical lime kiln	A continuously operating vertical shaft, charged with mixed limestone and solid fuel or separately fired by gaseous or liquid fuels.
319	vertical shaft furnace VERTICAL SLOT FURNACE SHAFT KILN HERRESHOF FURNACE	A refractory structure, usually of circular cross section, charged at the top and fired at the base.

Section 4. Melting and smelting of metals

(See also BS 2094-1^a)

401	air furnace	An early type of natural draught, coal fired melting furnace employed in iron foundries before the introduction of the cupola; now used in roll foundries with coal or other fuel. The term is also applied more generally at the present time to natural draught furnaces of any type.
402	arc furnace	A melting unit in which heat is produced by an electric arc between electrodes or between an electrode and the furnace charge itself.
403	arc furnace, consumable electrode	A melting unit in which a charge is melted under vacuum by an electric arc struck initially between the charge and the water cooled furnace body, the arc being subsequently maintained between the molten charge and a consumable electrode.
404	arc furnace, direct	An arc furnace in which the electric arc is produced between an electrode and the charge.
405	arc furnace, indirect	An arc furnace in which the electric arc is formed between two electrodes.
406	assay furnace	A furnace for the heating of precious metals in containers (boats) to convert impurities to oxides.
407	blast furnace	A vertical, refractory lined structure incorporating within its height a hearth, bosh and stack; used for the reduction of ores to metal.
408	cementation furnace	An early coal fired furnace incorporating pots charged with alternate layers of wrought iron and charcoal. When the pots were sealed and raised to red heat, the bars absorbed carbon in accordance with the time and temperature of treatment.
409	channel induction furnace CORELESS INDUCTION FURNACE INDUCTION MELTING FURNACE	A furnace, of either a horizontal drum or a vertical body type, wherein the charge is melted by heat generated in a loop of molten metal located beneath or on the side of the furnace by a concentric induction coil.

^a BS 2094, "Glossary of terms relating to iron and steel", Part 1, "General metallurgical, heat treatment and testing terms".