

Glossary of

Terms associated with refractory materials —

Part 2: Applications in the coke, glass,
cement and other non-metallurgical
industries

Confirmed December 2011

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Refractory Products Standards Policy Committee (RPM/-) to Technical Committee RPM/7, upon which the following bodies were represented:

- British Cement Association
- British Ceramic Research Ltd.
- British Coal Corporation
- British Steel Industry
- Department of Trade and Industry (Minerals and Metals Division)
- Refractories Association of Great Britain
- Society of Glass Technology

This British Standard, having been prepared under the direction of the Refractory Products Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 30 November 1990

© BSI 12-1999

First published May 1962
Second edition in Parts November 1990

The following BSI references relate to the work on this standard:
Committee reference RPM/7
Draft for comment 86/44128 DC
87/35860 DC

ISBN 0 580 18413 7

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
Section 7. Coke and gas industry	1
71 000 Coke ovens	1
72 000 Gas retorts	4
73 000 Gas producers and gas	7
74 000 Boilers	8
Section 8. Other industrial applications	10
81 000 Glass industry	10
82 000 Cement industry applications	18
83 000 Lime kiln applications	28
84 000 Types and parts of kilns (ceramics industry)	29
85 000 Kiln furniture and its uses (ceramics industry)	33
86 000 Petrochemicals industry	34
87 000 Incineration	36
Index	40
Figure 1 — Coke oven	3
Figure 2 — Continuous vertical retort: number 1	5
Figure 3 — Continuous vertical retort: number 2	6
Figure 4 — Horizontal retort	6
Figure 5 — Industrial water tube boiler	9
Figure 6 — Pot furnace	14
Figure 7 — Tank furnace for sheet glass	15
Figure 8 — Glass tank furnace	16
Figure 9 — Forehearth (with a feeder)	17
Figure 10 — Tunnel kiln	32
Figure 11 — Section through typical continuous grate incinerator and cooling tower	39

Foreword

This Part of BS 3446 has been prepared under the direction of the Refractory Products Standards Policy Committee. Together with Parts 1 and 3 it forms a revision of BS 3446:1962, which is withdrawn. Much of the work in preparing BS 3446 was conducted under a joint BSI/DTI¹⁾ consultancy scheme.

BS 3446 is published in three Parts:

- *Part 1: General and manufacturing (sections 1 to 6);*
- *Part 2: Applications in the coke, glass, cement and other non-metallurgical industries (sections 7 and 8);*
- *Part 3: Applications in the metallurgical industries (section 9).*

Terms are listed alphabetically within each section. Each term has an individual number consisting of five digits in two parts, the first of two digits, the second of three. The first two digits represent the number of the section and subsection. The last three digits represent the place that the term occupies within the section or subsection.

Alternative terms are given below the preferred term. These terms are not individually numbered, but are included in the index with a reference to the preferred term. Terms of more than one word, e.g. “drawing chamber”, are written in a direct style, not as “chamber, drawing”.

Italicized words indicate terms that are defined elsewhere in this Part of BS 3446.

The definitions presented in this Part of BS 3446 give the general meaning of terms, and should not be interpreted as being legally binding.

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 43 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⁾ Department of Trade and Industry.

Section 7. Coke and gas industry

71 000 Coke ovens

(See Figure 1.)

No.	Term	Definition
71 001	air/gas duct	A vertical or inclined duct that conveys preheated air and/or combustion gas from the <i>regenerator</i> to the <i>heating flue</i> at its base, or in stages vertically via the <i>cross wall</i> bonder. (See <i>header</i> .)
71 002	air/gas inlet port	A brick, or assembly of bricks, forming a circular or rectangular port, sometimes calibrated, through which air and/or combustion gas is introduced to the bottom of a <i>heating flue</i> .
71 003	ascension pipe	A vertical pipe, located on the <i>battery top</i> , through which gases, evolved during the carbonization process, pass. NOTE The pipe may be lined with refractory concrete and/or special refractory shapes.
71 004	battery	A series of <i>ovens</i> built side by side in a continuous structure. (See <i>bench</i> .)
71 005	battery top	Brickwork situated above the <i>oven roofs</i> that supports the gas off-takes and machinery necessary for the operation of the <i>battery</i> .
71 006	battery top paving	Refractory brickwork, cast blockwork or cast refractory concrete that is laid or placed on the top of the <i>battery</i> .
71 007	bench paving	Brickwork that is sometimes placed on the top surface of the oven side benches to resist the heat and abrasion of coke spillage.
71 008	buttress wall pinion wall <i>non-preferred</i>	The structural support wall at the end of the <i>battery</i> , generally constructed of concrete and/or steelwork and bricks. NOTE The wall may contain cooling ducts.
71 009	by-pass plug hole	A temporary connection between the <i>oven chamber</i> and the <i>heating flue</i> provided to allow the passage of hot combustion gases during the heating up phase of coke oven commissioning. These holes are closed by refractory by-pass plugs when the <i>battery</i> becomes directly heated.
71 010	charge holes	Sealable vertical holes in the <i>oven roof</i> , through which coal is dropped into the <i>oven</i> .
71 011	charge pipe	A pipe projecting into the top of the <i>oven chamber</i> , either vertically through the <i>roof</i> or angularly through the <i>battery face</i> , through which coal is impelled into the <i>oven</i> .
71 012	coke oven door	The removable vertical refractory and/or metallic assembly at each end of the <i>oven chamber</i> to form the enclosed space for carbonization and which includes means of preventing the ingress of air and/or the leakage of gaseous or liquid products of carbonization.
71 013	coke oven door (clay-luted)	A <i>coke oven door</i> , so shaped round its periphery as to form a V-shaped recess between it and the <i>coke oven door frame</i> and into which a fireclay-based mortar is luted to form a seal.
71 014	coke oven door (self-sealing)	A <i>coke oven door</i> that has a rigid or sprung seal round its periphery, which incorporates a knife edge held mechanically against a plane face formed on the <i>coke oven door frame</i> .
71 015	coke oven door frame	The vertical assembly, sometimes independently renewable, usually iron or steel based, that surrounds the oven portal formed by the <i>jamb bricks</i> and into which the <i>coke oven door</i> fits. NOTE It may be constructed of horizontal segments which span between adjacent oven portals.

No.	Term	Definition
71 016	coke wharf bricks coke wharf refractory <i>non-preferred</i>	Refractory materials, either in brick or cast-block form, that are placed on top of the coke wharf structure to resist the heat and abrasion of the coke placed on the wharf to cool after quenching, and which may still contain isolated pockets of unquenched coke.
71 017	division wall (1)	A structural support wall that is shared between the ends of two adjacent <i>batteries</i> .
71 018	division wall (2)	A structural support wall constructed to rebuild and separate a large <i>battery</i> into smaller units.
71 019	door frame seal	The seal between the <i>coke oven door frame</i> and the refractory brickwork portal, which prevents air ingress and/or leakage of gaseous or liquid products of carbonization and leakage between adjacent <i>oven chambers</i> . The seal also accommodates any irregularities between the refractory and adjoining metal surfaces. NOTE Usually the seal is a ceramic fibre material in rope or strip form and/or a combination of a ceramic fibre material with a heat-resistant metal, cemented by a refractory mortar. (See <i>oven chamber</i> .)
71 020	door lining	The lining protecting the <i>coke oven door</i> casting from the oven temperature. NOTE It can be of refractory brick, refractory concrete or a metallic shield. Additionally, it may contain gas passages.
71 021	gas gun	A horizontal or inclined duct, situated near to <i>oven sole</i> level, that distributes high calorific value combustion gas to each heating flue. (See <i>heating flue</i> .)
71 022	gas nozzle	A calibrated hole contained in a small brick or in a small unit of metal or other suitable material, through which fuel gas passes. NOTE Generally this nozzle is located at or near the base of a <i>flue</i> .
71 023	gas riser under jet <i>non-preferred</i>	A vertical duct that passes high calorific value combustion gas to each heating flue from a distribution system contained within the basement or cellar underneath a <i>battery</i> .
71 024	header cross wall bonder <i>non-preferred</i>	One of a series of bricks set perpendicular to the walls of an <i>oven</i> and separating two <i>heating flues</i> .
71 025	heating flue	A vertical duct that is in a wall and in which heating gas is burned and through which hot products of combustion pass.
71 026	heating flue wall	A brickwork wall in which the <i>heating flues</i> are contained.
71 027	horizontal flue	A horizontal duct that is in a <i>heating flue wall</i> and that collects up-going combustion gases from <i>heating flues</i> and distributes them to down-going <i>heating flues</i> .
71 028	jamb brick coin brick, quoin brick, oven jamb brick, <i>all non-preferred</i>	One of a series of specially shaped bricks that form the oven portal in which the external door frame is located.
71 029	nozzle seating block	A <i>block</i> with a perforation in which the <i>nozzle</i> is seated.
71 030	oven oven chamber <i>non-preferred</i>	A closed space into which a quantity of coal can be charged for carbonizing.
71 031	oven roof	The horizontal brickwork forming the top of an <i>oven</i> .
71 032	oven sole	The brickwork forming the base of an <i>oven</i> .

No.	Term	Definition
71 033	oven sole-brick	A brick or <i>block</i> forming part of an <i>oven sole</i> .
71 034	panel brick stretcher brick, liner brick, <i>both non-preferred</i>	A long rectangular tongue and grooved brick, forming part of the <i>flue wall</i> , laid parallel to the <i>oven chamber</i> length.
71 035	recirculation port	A sized port that is normally located at or near the base of a <i>flue</i> and that passes a proportion of hot combustion gases back into the initial combustion gas streams. NOTE An alternative location for it is at or near the <i>regenerator sole</i> .
71 036	regenerator division wall	A wall that is placed perpendicular to the regenerator length and that isolates a section of the <i>regenerator</i> into a compartment.
71 037	regenerator sole	Brickwork forming the base of the regenerators containing horizontal ducts that distribute air/low calorific value combustion gas to the <i>regenerators (regenerator sole flues)</i> . NOTE Waste gases are also collected before discharge into the <i>waste gas flue</i> .
71 038	rider bricks sole-flue port bricks, nostril blocks, <i>both non-preferred</i>	A group of perforated or spaced bricks on which the chequer bricks of the <i>regenerator</i> rest.
71 039	roof block	A long, deep brick used to span an <i>oven</i> and form the <i>roof</i> .
71 040	spreader block deflecting block <i>non-preferred</i>	A long brick with a triangular cross section placed across an <i>oven</i> and below the charging holes, with the apex directed upwards, so that the stream of coal entering the <i>oven</i> is divided and spread out.
71 041	substructure	The immediate base on which a <i>battery</i> is built, constructed of either concrete, brick or steel and often incorporating the waste gas flues or underjet basement (cellar). (See <i>gas riser</i> .)

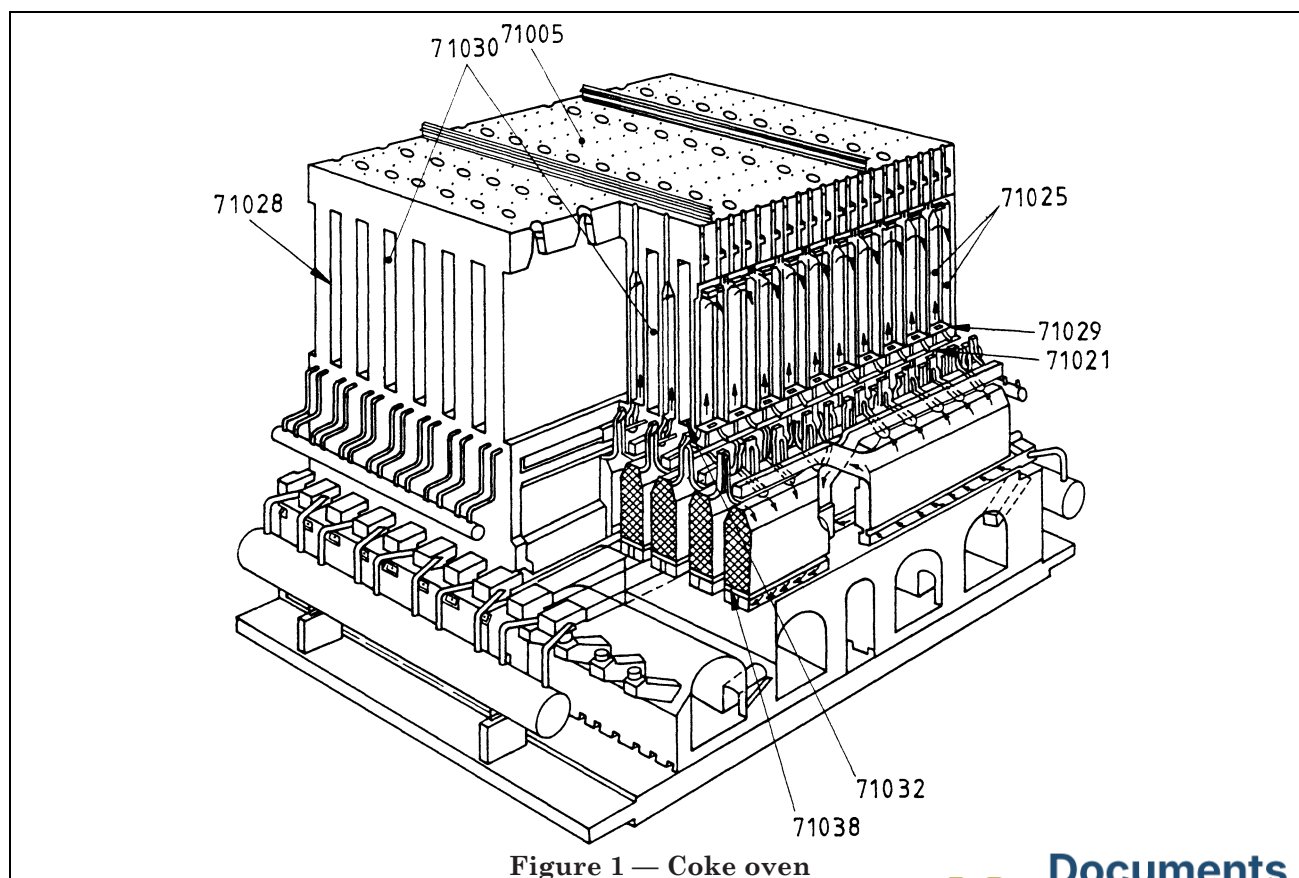


Figure 1 — Coke oven

72 000 Gas retorts

(See Figure 2 to Figure 4.)

No.	Term	Definition
72 001	bench	A series of <i>settings of chambers</i> or retorts built side by side in a continuous structure. (See <i>battery</i> .)
72 002	chamber chamber-oven <i>non-preferred</i>	An intermittent carbonizing vessel generally having a capacity of between 1 t and 5 t of coal. (See <i>oven</i> and <i>retort</i> .)
72 003	collar	A short fireclay section (of a horizontal retort) which is placed between the main silica portion and the <i>mouthpiece</i> .
72 004	combustion chamber	A <i>heating flue</i> to which producer gas and air are admitted and in which the heat for carbonization is generated.
72 005	continuous vertical retort	A vertical retort from which gas is extracted and to which coal is fed continuously.
72 006	cross wall	One of the brick partitions built within a horizontal retort setting in order to support the retorts.
72 007	end block	A <i>block</i> used in the construction of the wall separating two adjacent vertical retorts.
72 008	flare bed	The duct that conveys producer gas to the nozzles of the <i>combustion chambers</i> in a <i>setting</i> of horizontal retorts.
72 009	floor tiles bonder bricks <i>non-preferred</i>	A group of bricks arranged horizontally, bracing the <i>chambers</i> or retorts of a vertical setting and limiting the combustion flues.
72 010	main arch	The part of a horizontal retort setting composed of the division walls and the <i>roof</i> within which the retorts and the recuperators are placed.
72 011	main flue	The flue into which the waste gases from a <i>bench</i> pass.
72 012	midfeather	A small wall separating two flues.
72 013	mouthpiece (1)	The metal part, attached to the end of a horizontal retort, to which the door is fixed.
72 014	mouthpiece (2)	The metal part at the top of a vertical retort through which coal is passed into the retort.
72 015	producer-gas flue CO flue	The flue that conveys producer-gas to the <i>combustion chambers</i> of a <i>setting</i> of retorts or <i>chambers</i> .
72 016	recuperator block recuperator tube <i>non-preferred</i>	A <i>block</i> used in the construction of the flue of a recuperator, having holes for the passage of the air or gas; it receives heat from waste gas passing through a similar adjacent flue by conduction through the material of the tubes or <i>blocks</i> .
72 017	setting bed <i>non-preferred</i>	A group of retorts or <i>chambers</i> that are within a <i>bench</i> and that may be heated independently of other similar groups in the same <i>bench</i> . NOTE The retorts may be continuous or intermittent and the retorts or chambers may be vertically inclined or horizontally inclined.
72 018	side wall	A vertical insulated wall across the outer ends of settings of <i>continuous vertical retorts</i> and through which access may be obtained to dampers within the <i>combustion chambers</i> .

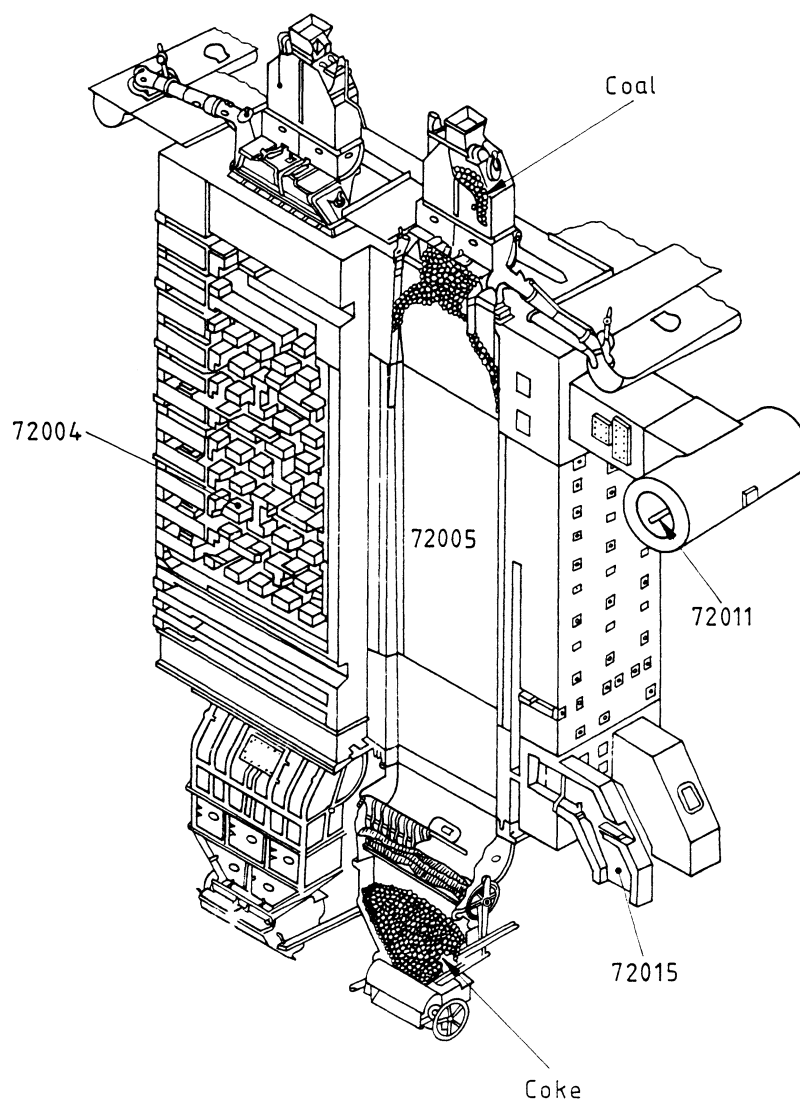


Figure 2 — Continuous vertical retort: number 1

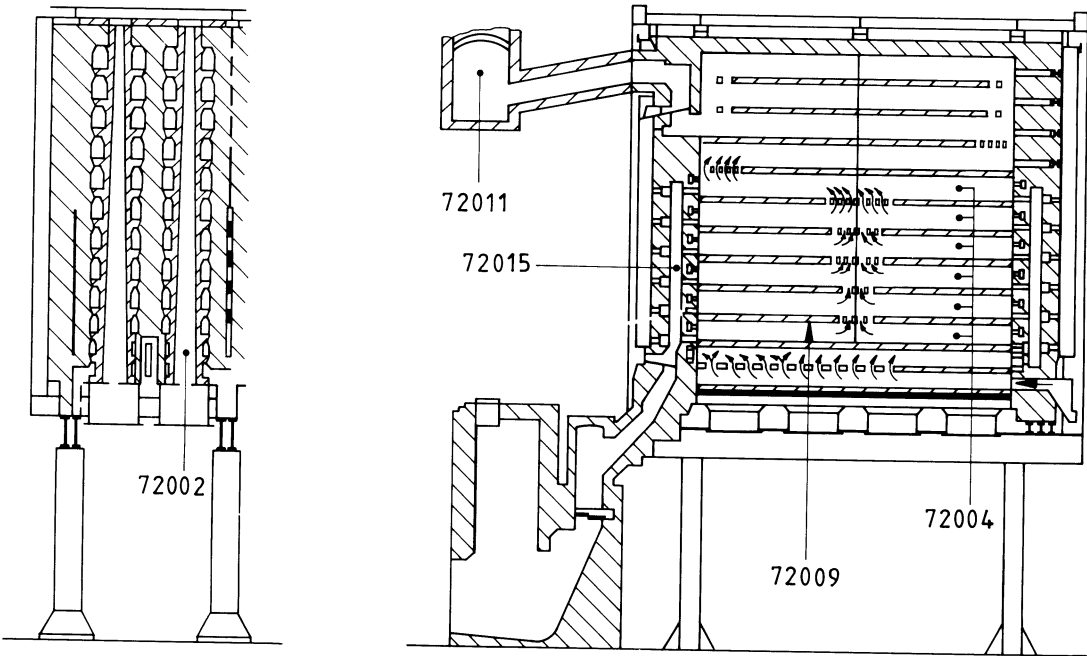


Figure 3 — Continuous vertical retort: number 2

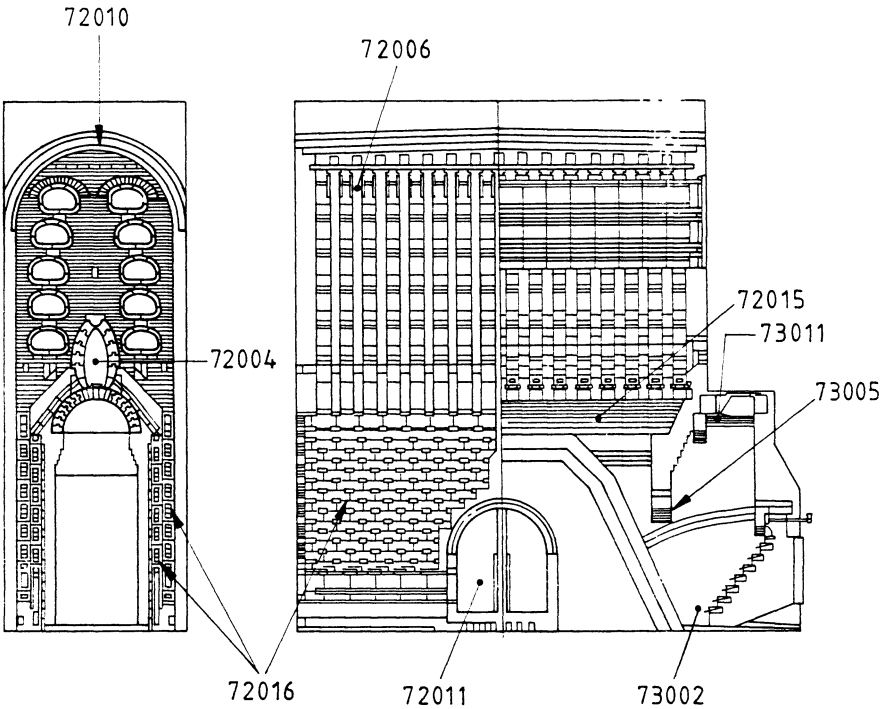


Figure 4 — Horizontal retort

73 000 Gas producers and gas

No.	Term	Definition
73 001	annular boiler cooler water jacket <i>non-preferred</i>	The part of a gas producer that encloses the most active portion of the firebed and in which low pressure steam is raised.
73 002	ash pan	The lower part of a gas producer where clinker and ash collect.
73 003	bus flue collecting flue <i>non-preferred</i>	A horizontal flue that is built within a <i>battery of step grate</i> gas producers and that collects the gas output from the whole group of producers.
73 004	carburettor	A refractory lined vessel in a gas producer plant containing cyclically pre-treated chequer bricks, on to which oil is sprayed to enrich the producer gas.
73 005	curtain arch	The refractory arch in a <i>step grate</i> producer, supporting the wall that separates the gas uptake from the firebed of the producer.
73 006	gasifier generator <i>non-preferred</i>	A vessel having refractory and <i>water jacket</i> lined sections, within which solid fuel (usually lignite or coal) is gasified by treatment with steam and air or oxygen.
73 007	mechanical producer	A gas producer in which ash and <i>clinker</i> are removed mechanically by means of a <i>revolving grate</i> and plough.
73 008	preheater	A vessel (sometimes refractory lined), usually filled with chequer bricks, within which one or more of the reactants in a gas-producing plant are preheated.
73 009	reactor	A refractory lined vessel containing a catalyst, which may be contained within metal tubes, or chequer bricks and within which steam and oil react to produce gas.
73 010	revolving grate	A slotted metal cone that is rotated mechanically at the base of a <i>gasifier</i> or <i>mechanical producer</i> . It supports the firebed and forces <i>clinker</i> and ash into the <i>ash pan</i> . Additionally, it distributes steam and air into the firebed.
73 011	roof	The top part of a gas producer.
73 012	step grate	A fixed assembly of horizontal metal plates that is supported by vertical metal frames and contains the firebed. Ash and <i>clinker</i> are removed using hand tools through hinged doors. NOTE See Figure 5.
73 013	superheater	A refractory-lined vessel in a gas producer plant filled with cyclically preheated chequer bricks, in which the decomposition of the oil vapours, begun in the <i>carburettor</i> , is completed.
73 014	wing wall	One of several narrow refractory walls, arranged radially from a central core, that divides a <i>gasifier</i> into a number of vertical <i>chambers</i> .

74 000 Boilers

(See Figure 5.)

No.	Term	Definition
74 001	ash hopper	A steel part of the furnace, sometimes refractory lined, into which the ash falls.
74 002	ash pit	A pit dug into the ground below the furnace, into which the ash may fall.
74 003	boiler furnace	The <i>combustion chamber</i> of a boiler.
74 004	chain grate stoker	A continuous mat of steel links on which a solid fuel is conveyed for combustion within the furnace.
74 005	economizer	Heating surface in the flue gas stream used to heat the <i>feed</i> water and cool the flue gases.
74 006	evaporator	A set of tubes in which saturated water is partially converted into steam because of applied heat from the furnace gases.
74 007	floor bottom	A refractory lining forming the base of a <i>combustion chamber</i> .
74 008	foundation	A refractory or non-refractory concrete and/or steel construction on which a boiler or part of a boiler rests.
74 009	front wall	The wall that faces the convection section and usually has firing equipment attached.
74 010	furnace arch	The refractory arch in a <i>combustion chamber</i> .
74 011	furnace roof	The roof of the <i>combustion chamber</i> of a water tube boiler.
74 012	heat baffle	Refractory heat protection for a metallic beam.
74 013	ignition arch	A refractory arch, designed to ensure good ignition, for the fuel on mechanical grates.
74 014	mud drum water drum <i>non-preferred</i>	The lower drum of an <i>evaporator</i> .
74 015	quarl block	A preshaped segment of refractory material, a number of which make up a complete quarl for the containment of the burner flame.
74 016	quarl throat	An opening in the wall of a <i>boiler furnace</i> into which a burner is set.
74 017	rear arch	The refractory wall towards the end of the furnace, designed to ensure completion of combustion or to limit the <i>combustion chamber</i> .
74 018	shell type boiler	A boiler in which the water is contained in a cylindrical shell, fuel being burned in one or more large tubular <i>chambers</i> located within the water space, and gases flowing through sets of tubes located inside the shell.
74 019	spreader stoker	Device on which fuel, not burned in suspension, falls to complete its combustion.
74 020	steam drum	Top drum of an <i>evaporator</i> .
74 021	support frame	A steel structure on which a boiler or part of a boiler is mounted or suspended.
74 022	water tube boiler	A boiler in which the water circulates inside banks of tubes that are heated by gases flowing across the outside.

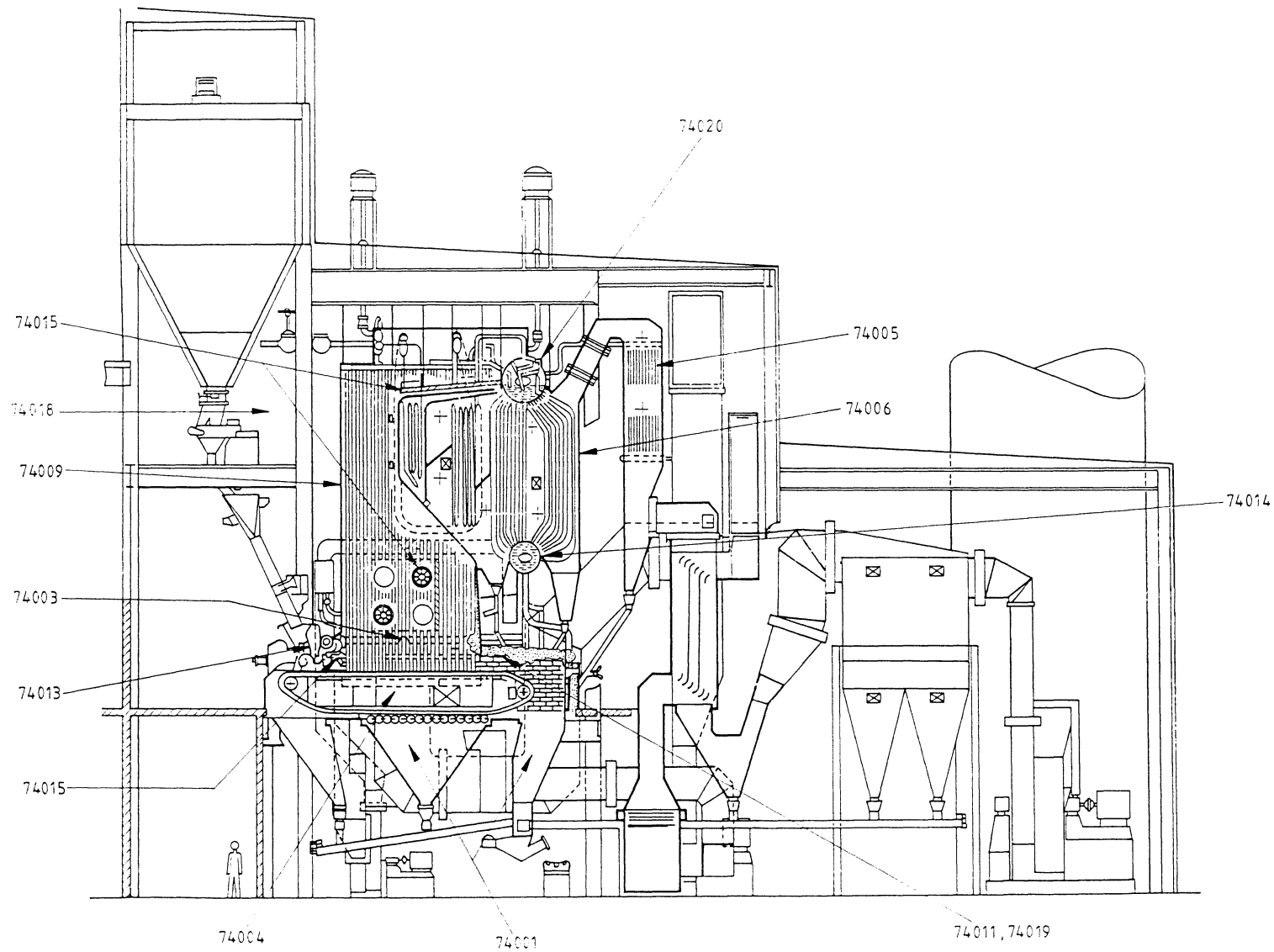


Figure 5 — Industrial water tube boiler

Section 8. Other industrial applications

81 000 Glass industry

(See Figure 6 to Figure 9.)

No.	Term	Definition
81 001	back wall end wall, gable wall, <i>both non-preferred</i>	In container glass manufacture, the wall at the charging end of the <i>tank furnace</i> .
81 002	basket weave pigeon hole <i>non-preferred</i>	Specific types of <i>regenerator packing</i> arrangement.
81 003	bath (1)	Glass contact area of furnace.
81 004	bath (2)	In float glass manufacture, the tin-containing part in the float furnace.
81 005	binding steel scotching <i>non-preferred</i>	Support steel around refractory structure usually adjustable for expansion.
81 006	bonnet	Semicircular <i>crown</i> on <i>working end</i> of furnace.
81 007	bottom	The floor of a <i>tank furnace</i> , including the surface that comes into contact with the glass.
81 008	breast wall (1)	For a pot furnace, the brick wall between the furnace pillars and in front of, or surrounding, the front of a pot.
81 009	breast wall (2)	For a <i>tank furnace</i> , the superstructure side wall of the combustion space above the <i>tank blocks</i> .
81 010	bridge cover	A refractory shape spanning the space between the <i>bridge walls</i> .
81 011	bridge wall	An internal double wall separating the melting and working ends of a <i>tank furnace</i> , through which they are linked by means of the <i>throat</i> .
81 012	bubbler bubbler block <i>non-preferred</i>	Holes through furnace bottom to introduce low pressure gas, usually air, for mixing and other purposes.
81 013	bubbler strip	An adjoining series of <i>bubbler blocks</i> .
81 014	buffer course	Refractory installed to separate materials of two dissimilar chemical compositions which may inter-react.
81 015	canal	The part of a tank furnace that connects the <i>refining zone</i> to the <i>forehearth</i> or forming area. (See <i>feeder channel</i> .)
81 016	casting scar gate scar <i>non-preferred</i>	External surface evidence of the existence of a <i>void</i> or <i>font</i> in fusion-cast refractory <i>blocks</i> obtained in the production process.
81 017	centre	Wooden frame to support arches during construction.
81 018	charging arch	An arch at the charging end of the furnace under which raw material is introduced to the process.
81 019	conditioning zone	That part of a tank where the conditioning of the glass is completed before it passes to the <i>canal</i> and drawing area. (See <i>working end</i> and <i>filling packer</i> .)
81 020	cooling arch	A stationary furnace in which glass ware is annealed. (See <i>lehr</i> .)
81 021	cord	Glass defect in finished product generally of a stringy nature. (See <i>stone</i> and <i>seed</i> .)
81 022	cross-fired furnace	A <i>tank furnace</i> with several ports along its <i>melting end</i> and with flames travelling across the furnace at right angles to the direction of glass flow.
81 023	crown	The roof of a <i>tank furnace</i> or <i>regenerator</i> .

No.	Term	Definition
81 024	curtain wall	A suspended horizontal structure, fixed or movable, that separates the combustion space of a glass furnace into two zones.
81 025	day tank	A periodic one-chamber <i>tank furnace</i> in which the melting and working processes are carried out in specific time cycles, e.g. 24 h, 2 days, etc.
81 026	debiteuse	A refractory shape with a slot, depressed below the surface of the glass and used for the upward drawing of sheet glass in the Fourcault process.
81 027	doghouse filling packet <i>non-preferred</i>	A small extension of a tank furnace into which the batch is fed.
81 028	downward drilling	Wear on furnace bottoms caused by, among other things, tramp metal. (See <i>upward drilling</i> .)
81 029	drawbar	The submerged <i>block</i> used in the Pittsburgh process to define the position of sheet glass during drawing.
81 030	drawing chamber	The <i>chamber</i> of a <i>tank furnace</i> for sheet glass from which the sheet is drawn.
81 031	drip course	A protruding or recessed course built into the inside of the furnace crown, to prevent molten material running from the crown on to the <i>breast walls</i> and causing chemical erosion.
81 032	electrode block	A <i>block</i> through which electrodes for heating are introduced to the glass <i>bath</i> .
81 033	end-fired furnace	A <i>tank furnace</i> with ports situated in the <i>back wall</i> .
81 034	eye	An opening in the floor of a <i>pot furnace</i> through which the mixture of fuel and air enters.
81 035	feeder	The mechanical system that produces <i>gobs</i> of glass for the forming machines.
81 036	feeder channel	The part of the <i>forehearth</i> of a <i>tank furnace</i> for container-glass and pressed-ware that carries the glass from the working end to the <i>feeder</i> mechanism. (See <i>canal</i> .)
81 037	feeder sleeve feeder tube <i>non-preferred</i>	The cylindrical refractory tube surrounding the feeder <i>plunger</i> .
81 038	feeder spout feeder nose <i>non-preferred</i>	The part of the <i>forehearth</i> containing an opening in which <i>orifice rings</i> of various sizes can be fitted, and forming the end of the <i>forehearth</i> .
81 039	floater	A refractory unit that is placed across the width of a <i>tank furnace</i> and floats on the surface of the glass. NOTE The <i>floater</i> may be either a single refractory shape extending across the furnace, or two or more shapes so arranged as to be held together by the flow of glass.
81 040	flux line metal level <i>non-preferred</i>	The horizontal line around the inner surface of a <i>tank furnace</i> corresponding to the upper surface of the molten glass.
81 041	forehearth	A refractory channel in a steel casing forming an extension of a <i>tank furnace</i> from which glass is taken for forming.
81 042	front wall (glass) (1)	The wall at the working end of a <i>tank furnace</i> . (See <i>back wall</i> .)
81 043	front wall (glass) (2)	In flat glass manufacture, the filling end of a furnace. (See <i>back wall</i> .)