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See the BSI Catalogue for details.
August 1997

BRITISH STANDARD 3447 : 1962

CONFIRMED AUGUST 1985

Glossary of Terms used in the Glass Industry

Confirmed
November 2011

GLOSSARY OF TERMS USED IN THE GLASS INDUSTRY

B.S. 3447 : 1962

**Incorporating amendments issued March 1963 (PD 4864)
and July 1985 (AMD 4854)**

CONFIRMED AUGUST 1985

BRITISH STANDARDS INSTITUTION

Incorporated by Royal Charter

British Standards House, 2 Park St., London, W1Y 4AA

Telegrams: Standards London W1

Telephone: 01-629 9000

UDC 001.4 : 666.1

THIS BRITISH STANDARD, having been approved by the Glass Industry Standards Committee and endorsed by the Chairman of the Chemical Divisional Council, was published under the authority of the general Council on 18th January, 1962.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 5000, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following B.S.I. references relate to the work on this standard:
Committee reference GLC/-/1 Draft for comment CZ(GLC) 1015

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BRITISH STANDARD

GLOSSARY OF TERMS USED IN

THE GLASS INDUSTRY

FOREWORD

This glossary has been compiled with expert assistance from the various sections of the glass industry in the United Kingdom and takes into account the terms and definitions adopted by organizations elsewhere, such as the American Ceramic Society.

The intention of the committee responsible for the preparation of the glossary has been to include as many as possible of the terms which are widely used in and of special interest to the glass industry and to omit terms which are principally used in other industries. Terms which are purely local in usage have also been omitted, as well as general technical terms employed in the glass industry with their ordinary meaning, and also trade names. Terms relating to work on glass are included, but reference to B.S. 952, 'Glass for glazing: classification and terminology (including thicknesses and tolerances)', is advisable for more comprehensive explanations of the relevant terminology.

In the glass industry, as in other industries, the names applied to certain machines and to the operators of such machines are often the same. In these cases, the general practice adopted in the glossary has been to give a definition for one or the other, but not both terms. In addition, it has been considered that in a number of cases it was unnecessary to define both the name of a process and the operator or machine associated with it. In all such cases, definitions of all or both the relevant terms have been given only where some distinction in meaning exists.

Where more than one definition has been given in any section for a term, the most commonly used meaning has been placed first. Similarly, where alternative terms with the same meaning have been included, the term most widely used or least open to misinterpretation has been placed first.

A comprehensive index is included for convenience of reference.

This British Standard was reviewed in 1984 and it was recognized that, in the period since 1962, when the current edition was published, due to technological progress (e.g. in fibre optics, television glasses and manufacturing processes), many new terms have come into use. It was recognized that a number of glossaries, vocabularies and dictionaries have been published which list these new terms. Therefore, instead of revising and expanding this British Standard at this time, and in order to avoid unnecessary duplication, attention is drawn to the following publications.

British Standards Institution

- BS 1133 Packaging code
Section 18 Glass containers and closures
- BS 3130 Glossary of packaging terms
Part 3 Glass containers and closures
- BS 3446 Glossary of terms relating to the manufacture and use of refractory materials
(Related to ISO/R 836 (see blow).)

International Standards Organisation

- ISO/R 836-1968 Vocabulary for the refractories industry, Section V (4), Glass industry
- ISO/DIS 4791.2 Laboratory apparatus, Vocabulary relating to apparatus made essentially from glass, porcelain or vitreous silica. Technical terms and definitions
- ISO/DIS 7348 Vocabulary of glass container manufacture

International Commission on Glass

- Dictionary of Glass Making, 1983
- Terminology of Defects in Glass, 1969.

SECTION 1: TYPES AND PROPERTIES OF GLASS

Sub-section 11. Types of glass

Sub-section 12. Properties of glass and physical testing

SUB-SECTION 11. TYPES OF GLASS

No.	Term	Definition
1101	Glass	An inorganic product of fusion which has cooled to a rigid condition without crystallizing.
1102	Soda-lime glass LIME-SODA GLASS	Glass in which the main constituents are silica, soda and lime.
1103	Borosilicate glass	Silicate glass containing boron as a characteristic constituent. Borosilicate glasses are generally heat-resisting.
1104	Borate glass	A glass in which boron partly or completely replaces silicon.
1105	Phosphate glass	A glass in which the essential glass-former is phosphorus pentoxide.
1106	Lead glass LEAD CRYSTAL	Glass containing a substantial proportion of lead.
1107	Crystal glass	A colourless, highly transparent glass of high refractive index, frequently used for tableware.
1108	Vitreous silica FUSED SILICA QUARTZ GLASS SILICA GLASS	A vitreous material consisting almost entirely of silica, made in translucent and transparent forms. The former has minute gas bubbles disseminated in it.
1109	Vitrite	Black glass made for use in the caps of electric lamps.
1110	Water glass	A water-soluble sodium silicate.
1111	Flint WHITE FLINT	In general, a colourless glass other than flat glass.
1112	Translucent glass	Glass which transmits light diffusely. Through-vision may vary from almost clear to almost obscured. Diffusiveness is produced by suitable treatment of the surface of clear glass, either by imprinting a pattern or texture, or by sandblasting, acid embossing or other means.
1113	Neutral tinted glass	A dark grey glass.
1114	Alabaster glass	Translucent glass resembling the mineral alabaster.
1115	Milk glass	Opaque white glass.
1116	Moonstone	Translucent glass resembling the mineral moonstone.
1117	Opal glass	Glass which is white or coloured and varies from translucent to completely opaque.

No.	Term	Definition
1118	Aventurine	Glass made so that it contains specks of bright reflecting metallic or other crystalline material.
1119	Ambetti AMBITTY	Glass made so that it contains minute opaque specks.
1120	Stained glass	1. Glass coloured by fusing pigments to the surface. 2. Windows made of pieces of stained glass (1) or of coloured translucent or clear sheet.
1121	Actinic green	Emerald green glass, normally used for poison bottles.
1122	Pale glass	Pale green glass.
1123	Amber glass	Glass varying in colour between light yellowish brown and deep reddish brown.
1124	Ruby glass	Glass coloured red by colloidal suspensions of elemental gold, copper or selenium.
1125	Optical glass	High quality glass of closely specified optical properties used in the manufacture of optical systems.
1126	Optical crown	Glass of low dispersion made for optical purposes. Particular optical crowns are prefixed by the following terms: fluor, borosilicate, soft, hard, light barium, zinc, medium barium, dense barium, special barium. The refractive index increases generally in the order given.
1127	Optical flint FLINT	Glass of high dispersion made for optical purposes. Particular optical flints are prefixed by the following terms: telescope, extra light, light, barium light, dense, borate, barium, extra dense, special barium, double extra dense. The refractive index increases generally in the order given.
1128	Light	Having a lower refractive index, as applied to optical glass.
1129	Dense	Having a higher refractive index, as applied to optical glass.
1130	Crookes glass	A range of spectacle glasses having low transmission for ultra-violet light, and containing cerium and other rare earths.
1131	Wood's glass	A glass with very low visible and high ultra-violet transmission.
1132	Welding glass	Coloured glass to protect a welder's eyes from glare and injurious radiation.
1133	X-ray protective glass X-RAY SHIELDING GLASS	Glass which contains a high percentage of lead and sometimes also barium and which has a high degree of opacity to X-rays. The opacity is usually expressed in terms of the thickness of metallic lead which would give equal absorption of X-rays of stated wavelength.

No.	Term	Definition
1134	Photosensitive glass	A glass made with constituents which cause it to change colour on exposure to light and, in some cases, subsequent heating.
1135	Stabilized glass	1. Glass heat-treated in such a way that it is in an equilibrium state corresponding to some particular temperature. 2. Glass articles (e.g. thermometers) heat-treated so that they suffer no permanent change of dimensions or properties over a particular range of temperature. 3. (Non-browning glass, radiation stabilized glass.) Glass resistant to darkening by high energy, short-wave radiation.
1136	Sealing glass	A glass designed to seal to a particular metal or alloy.
1137	Heat-absorbing glass	Glass which absorbs infra-red radiation to a marked extent.
1138	Heat-resisting glass	A glass able to withstand high thermal shock, generally because of a low coefficient of thermal expansion.
1139	Flameproof glass	Glass which does not crack easily when exposed to heat or flames.
1140	Neutral glass	A glass of high chemical durability.
1141	Short glass	A fast-setting glass.
1142	Long glass	A slow-setting glass.
1143	Soft glass	Glass with a relatively low softening point.
1144	Hard glass	A glass of relatively high softening point.
1145	Sweet glass	Easily workable glass.
1146	E. glass	A glass containing not more than 1 per cent of alkali (calculated as Na_2O) and used for the manufacture of glass fibres.
1147	A. glass	A glass containing between 10 and 15 per cent of alkali (calculated as Na_2O) and used for the manufacture of glass fibres.
1148	Spectacle crown	White crown glass of refractive index 1.523 used for ophthalmic purposes.
1149	Spectacle flint SPECTACLE FUSING FLINT	A glass of high refractive index which is fused to spectacle crown in the manufacture of bifocal spectacle lenses.

SUB-SECTION 12. PROPERTIES OF GLASS AND PHYSICAL TESTING

No.	Term	Definition
1201	Chemical durability	The resistance of glass to chemical attack.
1202	Solarization	Changes of the light transmission properties of glass as a result of exposure to sunlight or other radiation in or near the visible spectrum.
1203	Liquidus temperature	The maximum temperature at which equilibrium exists between the molten glass and its primary crystalline phase.
1204	Working range	The range of temperature in which glass is formed into ware in a specific process. At the upper end of the working range the glass is ready for working (generally at a viscosity of 10^3 to 10^4 poises) and at the lower end, it is sufficiently viscous to hold its formed shape (generally at a viscosity greater than 10^6 poises). For comparative purposes, but not necessarily in relation to any specific process, the working range of glass is assumed to correspond to a viscosity range from 10^4 to $10^{7.6}$ poises.
1205	Setting rate	A comparative term referring to the time required for the glass surface to cool through the working range. A short time implies a fast setting rate and a long time implies a slow setting rate. See <i>short glass</i> , <i>long glass</i> .
1206	Transformation points	In the measurement of the thermal expansion coefficient of a glass there may be two temperatures, the Mg point and the Tg point , at which the slope of the graph of expansion against temperature changes fairly sharply.
1207	Softening point	The temperature above which a glass is soft enough to be worked. Since any glass softens over a range of temperature, the term lacks precision and is unsatisfactory. A more exact term is the 7.6 temperature , at which the viscosity of a glass is $10^{7.6}$ poises.
1208	Annealing range	The range of temperature within which glass may be annealed. At the upper temperatures internal stresses disappear rapidly without deformation of the glass. At the lower temperatures internal stresses are released slowly. Below the annealing range, rapid temperature changes do not introduce permanent stresses in the glass. The temperature at which a glass has a viscosity of 10^{13} poises (the 13.0 temperature) is sometimes referred to as the annealing temperature or the upper annealing temperature .
1209	Stress	Any condition of tension or compression existing within glass, particularly due to incomplete annealing, temperature gradient, or inhomogeneity.
1210	Strain	Elastic deformation due to stress.
1211	Strain disc	A glass disc of calibrated birefringence used as a comparative measure of the degree of annealing of glass.

No.	Term	Definition
1212	Temper ANNEALING STRESS	The amount of residual stress in annealed ware measured by comparison with strain discs.
1213	Ring section	Transverse section cut from a glass container for optical examination.
1214	Bulk test	A test in which the capacity of glass containers is determined not with reference to a single container but on the average of a representative sample batch.
1215	Bursting pressure	The internal pressure at which a glass container breaks.
1216	Substance	The thickness of flat glass; in the case of sheet glass, usually expressed in oz/ft ² .
1217	Rib marks HACKLE MARKS	Arc-shaped ridges on a fractured glass surface, perpendicular to the direction of fracture travel.
1218	Particle count	The number of glass particles or dice in a specified area of fractured toughened glass.

SECTION 2: RAW MATERIALS AND RELATED TERMS

No.	Term	Definition
2001	Batch CHARGE	A mixture of materials, prepared for delivery to the furnace.
2002	Charge	1. See <i>batch</i> . 2. The quantity of batch required to fill a pot.
2003	Fill FILLING	A charge of batch to a pot or furnace.
2004	Mix	Mixed batch, specifically one mixer load.
2005	Batch charger BATCH FEEDER	A mechanical device for introducing batch into the furnace.
2006	Blanket feed	A method of feeding a wide, relatively shallow layer of batch into a glass tank furnace.
2007	Batch mixer BLENDER	The machine in which batch is mixed.
2008	Batch house MIXING ROOM	The place where materials are weighed and mixed.
2009	Cullet	Broken glass which may be added to the batch for remelting. Factory cullet is obtained from within the works, Foreign cullet from an outside source.
2010	Quenched cullet DRAGADED CULLET DRAGLADLED CULLET	Cullet made by running molten glass into water.
2011	Cullet washer	A machine for washing cullet.
2012	Flux	A batch constituent used to promote fusion.
2013	Frit	Calcined or partly fused materials from which glass is made.
2014	Oxidizing agent	A mineral or chemical compound which raises the state of oxidation of other glass components during melting, thus helping in refining or controlling the colour of the glass.
2015	Decolorizer	A substance or mixture of substances added to the batch which counteracts the colouring effect of impurities. Its action is either physical (by imparting the colour complementary to that of the impurity) or chemical (e.g. by oxidation).
2016	Colouring agent	Batch constituent used to give colour to the glass produced.
2017	Opacifier	A mineral or chemical compound used in the batch to produce opal glass.
2018	Cobalt	An industrial term for cobalt oxide.
2019	Antimony	An industrial term for antimony trioxide.

SECTION 3: TERMS RELATING TO MELTING

Sub-section 31. Types of melting and auxiliary furnaces

Sub-section 32. Parts of furnaces and tools used during melting

Sub-section 33. Terms relating to melting operations

SUB-SECTION 31. TYPES OF MELTING AND AUXILIARY FURNACES

No.	Term	Definition
3101	Tank furnace	A furnace in which the glass is melted in a bath constructed from refractory blocks.
3102	Continuous tank furnace	A glass furnace which is fed with batch at one end, whilst the molten glass is continuously withdrawn at the other. It usually consists of more than one compartment.
3103	Day tank	A periodic, usually one-chamber glass furnace, in which glass is melted and worked out by hand. In general the former is done at night and the latter during the day.
3104	Cross-fired furnace	A tank furnace with pairs of ports along its melting end, so that flames travel across the furnace at right angles to the direction of glass flow.
3105	End-fired furnace	A furnace with ports situated in the end wall of the melting end, in which the flames travel in the direction of glass flow.
3106	Cell furnace	A furnace consisting of a melting end and auxiliary chambers in which glass is heated electrically.
3107	Pot furnace	A furnace for melting glass in pots.
3108	Revolving pot	A rotating, shallow refractory pot from which glass is gathered by suction.
3109	Arch	An arched structure for heating refractories.
3110	Pot arch	A furnace for heating pots before they are placed in a pot furnace.
3111	Glory hole	A small gas or oil-fired furnace used to re-heat the ware in hand working.
3112	Soaking pit	A conditioning furnace used to bring glass in open pots to a uniform temperature for castings.
3113	Bushing	A small electric melting unit, usually made of platinum and with numerous holes in the base, used for the manufacture of glass fibres.

SUB-SECTION 32. PARTS OF FURNACES AND TOOLS USED DURING MELTING

No.	Term	Definition
3201	Melting end	The chamber of a tank furnace in which glass is melted and refined.
3202	Melting end area	The total area of the glass surface in the melting end of the furnace when the glass furnace is new, excluding the dog-house.
3203	Working end	The compartment of a tank furnace from which the glass is delivered or gathered for forming.
3204	Refining zone	The part of a tank furnace in which refining takes place.
3205	Soaking area FRITTING ZONE	The area between the gable wall and the first pair of ports in a cross-fired tank furnace.
3206	Conditioning zone	1. Part of the feeder, away from the furnace wall, where the glass is brought to a required working temperature. 2. Part of a flat glass furnace where the glass is brought to a required temperature before passing to the fore-hearth (1) or drawing chamber.
3207	Superstructure	All the parts of a tank furnace above the sideblocks.
3208	Crown MAIN ARCH	The part of a furnace forming the roof.
3209	Birdcage	In the flat glass industry, the domed end of a tank.
3210	Skewbacks SPRINGERS	Specially shaped blocks supporting a furnace crown or other arch.
3211	Breast wall CASING WALL CASEMENT WALL JAMB WALL	Section of sidewall between tuckstones or tank blocks and crown.
3212	Gable wall	A square wall above the tank blocks at the end of a tank furnace, usually at the charging end.
3213	Baffle wall	A wall of a kiln for deflecting the flames.
3214	Shadow wall CURTAIN WALL BAFFLE WALL	A wall, with or without openings through it, erected on the bridge cover to screen the working end from excessive heat radiation. It may also be a suspended wall above the bridge.
3215	Mantle block	1. Refractory block fitting in the gable wall, over the dog-house. 2. The upper course of blocks enclosing the Fourcault drawing pit.

No.	Term	Definition
3216	Tuckstones	Blocks placed on top of the side blocks under the breast walls.
3217	Burner block QUARL BLOCK	Refractory block with one or more orifices through which oil or gas burners fire.
3218	Port BURNER	A structure leading to and forming an opening in a furnace wall for introducing fuel and combustion air or for combustion gases to leave the furnace.
3219	Sill PAVING	The floor of a port.
3220	Neck	The section of a port between the gas uptake and the furnace wall.
3221	Tongue MIDFEATHER	1. A dividing wall between the air and gas uptakes in tank furnace ports. 2. A dividing wall at the base of a chimney stack.
3222	Cheek JAMB	Blocks forming the sidewall of a port mouth.
3223	Drum	The mouth of a port.
3224	Block REFRACTORY BLOCK	Any large piece of refractory of regular shape.
3225	Tank block	A refractory block used in the construction of a tank furnace bath.
3226	Font	The casting cavity in fusion-cast (electro-cast) blocks.
3227	Siege blocks BOTTOM BLOCKS	Refractory blocks forming the bottom of a tank furnace.
3228	Side blocks	Refractory blocks forming the sides of a tank furnace, in contact with glass.
3229	Fluxline blocks	The top course of refractory blocks, forming the sidewall of a tank.
3230	Soldier blocks	Refractory blocks which extend more than the full depth of the glass in a furnace.
3231	Corner block	Specially shaped block used in the dog-house corners.
3232	Dog-house	A small extension of a glass furnace, into which the batch is fed.
3233	Throat DOG-HOLE	The submerged channel through which glass passes from the melting end to the working end of a tank furnace.
3234	Straight throat	A throat at the same level as the siege of the melting end.

No.	Term	Definition
3235	Dropped throat SUNKEN THROAT	A throat, the bottom of which is below the level of the melting end siege.
3236	Throat cheeks DICE BLOCKS	The side blocks of the throat passage.
3237	Throat cover	Blocks forming the top of the throat passage.
3238	Bridge	The structure formed by the endwalls of adjacent compartments of a tank furnace and the covers spanning the gap between the walls.
3239	Bridge cover	Refractory tiles spanning the space between the bridgewalls.
3240	Bridgewall	Furnace wall(s) separating the melting and working ends of a tank furnace.
3241	Siege	The floor of a tank furnace or pot furnace.
3242	Bench	The floor of a pot furnace.
3243	Checker bricks CHECKER TILES CHECKERS STUFFING REGENERATOR PACKING	Refractory pieces used for packing a regenerator.
3244	Arch	1. The crown of a pot furnace. 2. An opening through which a pot is placed into a furnace. 3. The roof of a port at its mouth.
3245	Bearer arch SADDLE ARCH RIDER ARCH	One of several arches supporting the checker packing in a regenerator.
3246	Flat arch	In general, a sprung arch with flat top and bottom.
3247	Flying arch	A double-walled bridge, entirely independent of the other tank structure, built across modern continuous tanks to separate the melting and refining end from the working end.
3248	Jack arch	An arch in a revolving pot housing at the exposed part of the pot.
3249	Canal	The part of a glass flat tank furnace leading from the refining zone to the forming machine.
3250	Alcove	A narrow, covered channel, forming an extension of the working end, to convey the glass to a forehearth or to a revolving pot.
3251	Forehearth	1. (Feeder channel.) A refractory channel forming an extension of the furnace working end from which glass is taken for forming. 2. An extension of the furnace working end from which glass is usually taken for forming.

No.	Term	Definition
3252	Syphon	A refractory block used in the construction of a tank furnace bath.
3253	Debiteuse	A refractory block with a slot, depressed below the surface of glass and used for the upward drawing of sheet glass in the Fourcault process.
3254	Floater	1. A floating refractory shape which holds back scum and impurities floating in the glass surface or controls their movement in a pot or tank furnace. 2. See <i>ring</i> .
3255	Ring POT RING FLOATER	A floating refractory ring which keeps away surface scum and impurities from the area in a pot furnace in which glass is gathered.
3256	Skimmer block	A refractory shape which holds back surface impurities.
3257	Pot	A round or oval refractory container in which glass is melted.
3258	Open pot	A pot open so that the glass is exposed to direct heating and chemical influences of the flame.
3259	Closed pot COVERED POT HOODED POT	A pot made with a roof to protect the contents from flames and combustion gases in the furnace and with a mouth for charging raw materials and gathering molten glass.
3260	Pot opening	The opening between the pillars of a pot furnace.
3261	Skittle pot CANNON POT	A pot for melting small quantities of glass in a furnace containing pots otherwise of normal size.
3262	Jockey pot	A small pot supported in the furnace by two ordinary pots.
3263	Glazed pot	A new pot, coated inside with a thin layer of glass to protect it from the raw batch.
3264	Seat	The position on a pot furnace siege where the pot stands.
3265	Eye	A circular opening in the melting chamber siege of a pot furnace through which the gas and air enter.
3266	Wicket wall	1. The wall built across the pillars of a pot furnace to enclose the pot and seal the pot opening. 2. In general, any wall closing an opening but not bonded with the sides of it.
3267	Pillar arches	The arches spanning the pillars of a pot furnace.
3268	Pillars	Columns supporting the crown of a pot furnace, between which the pots are set.
3269	Pillar blocks	The blocks forming the pillars of a pot furnace.