

**32 Glass; mineral and slag wool**

**32a Manufacture, moulding, reshaping, and final treatment of moulded glass, quartz glass and the like**

**32a (IPC: C03B) Manufacture, shaping, and supplementary processes**

**32b Chemical structure of glass: glass compositions, fluxes, colouring and decolourising; surface property modification: etching, sandblasting, glass painting, coating of glass with glass or metal, stained glass**

**32b (IPC: C03C) Chemical composition of glasses, glazes, or vitreous enamels; Surface treatment of glass; Joining glass to glass or other materials**

**32a Manufacture, moulding, reshaping, and final treatment of moulded glass, quartz glass and the like** (grinding, polishing 67; compound glass 39; cleaning of glass plates 32b)

**Melting of raw materials**

32a-1 Tank furnaces (heating 24), glass melting processes (32b-1)

32a-2/01 Pot furnaces

32a-2/02 Pots

32a-3 Combined tank and pot furnaces

32a-4 Other glass melting furnaces, especially shaft and electric furnaces (18a-1; 18a-4; 18a-18/02; 40a-7 – 40a-9; equipment for electric glass melting furnaces not peculiar to glass making 21h-14 – 21h-19)

**Purification and delivery of molten glass for moulding**

32a-5 Auxiliary devices in glass melting furnaces, e.g. glass tapping devices, purification and charging devices (discharge ends 32a-23)

32a-6 Gathering and measuring devices, tapping devices for molten glass, and devices for the transfer of glass, provided they do not form part of the melting furnace (mechanically driven gathering and casting devices 32a-21)

**First shaping of glass from the molten state**

32a-7 Mouth glass blowing in general (32a-8; 32a-10)

32a-8 Mouth glass blowing for the production of work of particular shape (32a-15; holding devices 32a-27)

32a-9 Compressed air glass blowing for the purposes of finishing a [bulb] parison formed on the blowpipe (32a-10)

32a-10 Swinging devices for sheet glass blowing, by mouth or compressed air

32a-11 Glass blowing processes, commencing from a glass layer, and their combination with other glass shaping processes in one operation

32a-12 Compressed air glass blowing in blowing machines with tilting system

32a-13 Compressed air glass blowing in blowing machines with non-tiltable moulds (32a-14)

32a-14 Compressed air glass blowing in pressure blowing machines

32a-15 Individual elements of compressed-air blowing apparatus, supply and discharge of blown air, mouthpieces, moulds, cooling, heating and heat insulating devices, fusion devices in direct connection with the moulding process, discharge and transfer devices (32a-34), drives, equipment for the production of specially shaped work, e.g. threaded necks, recessed bottoms (32a-8; 32a-32), double-walled containers (32a-8; 32a-27)

32a-16 Glass pressing in general (32a-17; pressing in general 58a, 58b)

- 32a-17 Glass pressing for the production of specially shaped work (casting of glass objects, 32a-24; pressing of wire-reinforced objects, 32a-22)
- 32a-18 Intermittent rolling of plain glass sheets (metal rolling mills 7a), rolling tables
- 32a-19 Continuous rolling of plain glass ribbons (32a-24)
- 32a-20 Rolling of patterned glass sheets, laminated glass, and objects other than of sheets from molten glass
- 32a-21 Auxiliary apparatus for glass rolling, e.g. plate supports, grippers (35b-6; 81e-1 – 81e-18; 67a), pot tongs and other devices for moving pots (35b-1), mechanically moved ladles (32a-6; 31c-27), devices for melting out and cleaning glass pots
- 32a-22 Rolling or other methods for the intermittent or continuous production of wire and asbestos glass, rolling of sheet glass with application and introduction of granular materials, also hollow wire-reinforced glass
- 32a-23/01 Intermittent and continuous lifting of glass ribbons from the molten mass, and lifting of laminated and flashed glass
- 32a-23/02 Intermittent or continuous lifting out of tubes, cylinders and bars from the molten mass
- 32a-23/03 Discharge ends, discharge vessels, gathering devices, turning devices
- 32a-24/01 First shaping of glass by methods other than those mentioned in 32a-7 – 32a-23 for the production of flat glass, e.g. by discharging, pressing into and drawing from, shaping slots, by edge overflowing, and production of flashed glass
- 32a-24/02 by pulling from stationary or rotary tools and shaping nozzles for the production of tubes or bars (working furnaces therefor 32a-1 – 32a-4, 32a-23)
- 32a-24/03 Equipment for cutting glass, sheets, ribbons, tubes, or bars, while yet in plastic state (32a-18; 32a-19; 32a-20; 32a-23)
- 32a-24/04 Shaping by centrifugal action, shaking, pouring of the molten mass, stamping out from glass layers while still in a plastic state
- 32a-25 Glass spinning by drawing out from the melt or from re-softened glass bodies or bars (furnaces therefor 32a-1 – 32a-4); processing of spun glass into insulating materials 80b-9)

### **Reshaping and remoulding of glass articles**

- 32a-26 Reshaping especially of mouthpieces, with manually and mechanically operated glass-shaping shears
- 32a-27 Reshaping of glass sheets, cylinders, tubes, bars and finished glass bodies, i.e. reshaping glass sheets into lenses, spreading cylinders into plates, manufacture of incandescent lamps and their parts from tubes and bars, manufacture of phials (phials as a medical implement 30k-4/02) transversely dividing tubes and bars into beads and rings, covering, perforating, punching, nipping, fusing tubular glass into vacuum bottles (32a-8; 32a-15), blown bubble melting, etc., holding devices (67a-32)

### **Treatment of glass articles subsequent to shaping processes**

- 32a-28 Cooling of glass objects in general, e.g. in separate independent chambers
- 32a-29 Continuous cooling of articles in conduits or in a series of successive chambers by moving the object to be cooled, also flattening ovens including a cooling conduit (32a-31; 32a-32; conveying belts, conveyor tracks 81e-1 – 81e-18; rolls, cylinders 7a-18 – 7a-27)
- 32a-30 Sudden cooling of glass articles for the purpose of hardening
- 32a-31 Reheating of glass objects to the softening or surface-melting point in general, fire polishing (other polishing methods 67a-31); swelling furnaces, drum furnaces, fusing apparatus, muffle furnaces (32a-32); ordinary flattening ovens (32a-29; 32a-32; 80c-4) flattening processes (32a-27); furnaces and burners for the fusing of cut and broken places
- 32a-32 Reheating of glass objects to the softening or surface-melting point, fire polishing, in continuous operation by moving the workpiece; fusing devices, also devices for manufacture of recessed bottoms; muffle furnaces and flattening ovens with mechanical conveyance of the workpiece (32a-29; 80c-5; 80c-6)
- 32a-33 Breaking off and cutting glass objects (dividing glass bars or glass tubes into beads or rings 32a-27; cutting of softened glass 32a-24; mounting of cutting diamonds 49l-6;

- drilling of glass 80c-9; sorting of glass objects by means of measuring and sorting machines 42b-26; phial openers as a medical implement 30k-4/03)
- 32a-34 Mechanical charging and arrangement of glass objects in annealing ovens, so-called "tending" (conveyor tracks, conveyor belts 81e; discharging devices connected to the machines 32a-15)
- 32a-35 Melting and shaping of quartz glass, quartz material, and similar difficult to melt vitrifiable substances (porous bodies obtained by sintering 80b-8)

## **32a Manufacture, shaping, and supplementary processes**

### **Melting the raw materials**

- 32a-1/00 Preparing the batches**
- 32a-3/00 Charging the melting furnaces**
- 32a-5/00 Melting in furnaces; Furnaces so far as specially adapted for glass manufacture**

#### **Note:**

**Group 32a-5/02 takes precedence over groups 32a-5/04 – 32a-5/14.**

- 32a-5/02 . in electric furnaces
- 32a-5/04 . in tank furnaces
- 32a-5/06 . in pot furnaces
- 32a-5/08 . . Glass-melting pots
- 32a-5/10 . in combined tank furnaces and pots
- 32a-5/12 . in shaft furnaces
- 32a-5/14 . in revolving cylindrical furnaces
- 32a-5/16 . Special features of the melting process; Auxiliary means specially adapted for glass-melting furnaces
- 32a-5/18 . . Stirring devices
- 32a-5/20 . . Bridges; Shoes or other devices for with-holding dirt or foam
- 32a-5/22 . . Cooling; Refining
- 32a-5/24 . . Automatically regulating the melting process
- 32a-5/26 . . Outlets; Overflows
- 32a-5/28 . . Siphons
- 32a-5/30 . . Means for taking-off charges of molten glass
- 32a-5/32 . . . Feeders
- 32a-5/34 . . . . Scoop feeders
- 32a-5/36 . . . Gathering devices in the form of rods or pipes
- 32a-5/38 . . . Cutting-off the glass flow with the aid of knives or scissors
- 32a-5/40 . . . by suction

### **32a-7/00 Distributors for the molten glass**

### **Shaping of glass (manufacture of fibres 32a-37/00)**

#### **32a-9/00 Blowing glass**

- 32a-9/02 . with the mouth; Auxiliary means therefor
- 32a-9/04 . . Making hollow glass articles with feet or projections
- 32a-9/06 . . Making hollow glass articles with double walls, e.g. vacuum flasks
- 32a-9/08 . Finish-blowing with compressed air of blanks blown with the mouth
- 32a-9/10 . Blowing glass cylinders for sheet manufacture
- 32a-9/12 . starting from a ribbon of glass
- 32a-9/14 . in machines without turn-over moulds (press-blowing machines 32a-9/26)
- 32a-9/16 . in machines with turn-over moulds
- 32a-9/18 . . Rotary-table machines
- 32a-9/20 . in machines with suction moulds
- 32a-9/22 . . Rotary table machines
- 32a-9/24 . . Construction of the blank mould
- 32a-9/26 . in press-blowing machines
- 32a-9/28 . in machines of the endless-chain type
- 32a-9/30 . Details of blowing glass

32a-9/32	. . Giving special shapes to parts of hollow glass articles, e.g. forming screw threads or lips at the mouths of containers
32a-9/34	. . Glass-blowing moulds except those in the groups 32a-9/02 and 32a-9/24
32a-9/36	. . Blow heads; Supplying, ejecting, or controlling the air
32a-9/38	. . Means for cooling, heating, or insulating glass-blowing machines
32a-9/40	. . Gearing or controlling mechanisms specially adapted for glass-blowing machines
32a-9/42	. . Means for fusing immediately after the forming
32a-9/44	. . Means for discharging combined with glass-blowing machines
32a-9/46	. . Means for cutting the hot glass in glass-blowing machines
<b>32a-11/00</b>	<b>Pressing glass</b>
32a-11/02	. in machines with rotary tables
32a-11/04	. in machines with moulds fed by suction
32a-11/06	. Construction of the plunger
32a-11/08	. . for making solid articles, e.g. lenses
32a-11/10	. . for making hollow articles
32a-11/12	. Cooling or heating plunger
32a-11/14	. with metal inserts
32a-11/16	. Gearing or controlling mechanisms specially adapted for glass presses
<b>32a-13/00</b>	<b>Rolling glass</b>
32a-13/02	. Rolling non-patterned sheets discontinuously
32a-13/04	. Rolling non-patterned sheets continuously
32a-13/06	. Rolling corrugated sheets
32a-13/08	. Rolling patterned sheets
32a-13/10	. Rolling multi-layer sheets
32a-13/12	. Rolling glass with enclosures, e.g. wire or asbestos
32a-13/14	. Rolling other articles
32a-13/16	. Construction of the glass rollers
32a-13/18	. Auxiliary means for rolling glass, e.g. sheet supports, gripping devices, hand-ladles, means for moving glass pots
<b>32a-15/00</b>	<b>Drawing glass upwardly from the melt</b>
32a-15/02	. Drawing glass sheets
32a-15/04	. . from the free surface of the melt
32a-15/06	. . from a debiteuse
32a-15/08	. . by means of bars below the surface of the melt
32a-15/10	. . multi-layer glass sheets or glass sheets coated with coloured layers
32a-15/12	. . Construction of the annealing tower
32a-15/14	. Drawing tubes, cylinders, or rods from the melt
32a-15/16	. . Drawing tubes, cylinders, or rods, coated with coloured layers
32a-15/18	. Means for laying-down and conveying combined with the drawing of glass sheets, tubes, or rods
<b>32a-17/00</b>	<b>Forming glass by flowing out, pushing-out, or drawing downwardly or laterally from forming slits or by overflowing over lips</b>
32a-17/02	. Forming glass coated with coloured layers
32a-17/04	. Forming tubes or rods by drawing from stationary or rotating tools or from forming nozzles
<b>32a-18/00</b>	<b>Shaping glass in contact with the surface of a liquid</b>
32a-18/02	. Forming sheets
<b>32a-19/00</b>	<b>Other methods of shaping glass</b>
32a-19/02	. by casting
32a-19/04	. by centrifuging
32a-19/06	. by sintering
32a-19/08	. by foaming
32a-19/10	. Forming beads
<b>32a-21/00</b>	<b>Severing still-plastic glass sheets, tubes, or rods</b>
32a-21/02	. by cutting (32a-9/46 takes precedence)
32a-21/04	. by punching out

32a-21/06 . by flashing-off

### **32a-23/00 Re-forming shaped glass**

- 32a-23/02 . Re-forming glass sheets
- 32a-23/021 . . by letting them sink into a mould
- 32a-23/022 . . using male and female moulds
- 32a-23/04 . Re-forming tubes or rods
- 32a-23/06 . . by bending
- 32a-23/08 . . to exact dimensions
- 32a-23/10 . . to finished hollow-ware, e.g. test tubes
- 32a-23/12 . . . to ampoules
- 32a-23/14 . . to electric bulbs
- 32a-23/16 . . to vacuum bottles
- 32a-23/18 . Re-forming ampoules
- 32a-23/20 . Uniting glass pieces by fusing
- 32a-23/22 . . Uniting glass lenses, especially bifocal lenses (grinding, polishing 67a – 67c)
- 32a-23/24 . . Making hollow glass sheets or bricks
- 32a-23/26 . Punching reheated glass

### **After-treatment of glass products (of fibres 32a-37/10)**

#### **32a-25/00 Annealing glass products**

- 32a-25/02 . in a discontinuous way
- 32a-25/04 . in a continuous way

#### **32a-27/00 Tempering glass products**

#### **32a-29/00 Reheating glass products for softening or fusing their surfaces; Fire-polishing; Fusing of margins**

- 32a-29/02 . in a discontinuous way
- 32a-29/04 . in a continuous way

#### **32a-31/00 Manufacture of rippled or crackled glass**

#### **32a-33/00 Severing cooled glass**

- 32a-33/02 . Cutting or splitting sheet glass; Apparatus or machines therefor (glass-cutting tools 32a-33/10)
- 32a-33/04 . . Cutting or splitting in curves, especially for making spectacle lenses
- 32a-33/06 . Cutting or splitting glass tubes, rods, or hollow articles
- 32a-33/08 . by fusing
- 32a-33/10 . Glass-cutting tools

#### **32a-35/00 Mechanical feeding of hot glass articles into annealing or heating kilns**

#### **32a-37/00 Manufacture or treatment of flakes, fibres, or filaments from softened glass, minerals, or slags**

- 32a-37/02 . by drawing or pressing
- 32a-37/04 . by centrifuging
- 32a-37/06 . by blowing in molten state
- 32a-37/08 . Nozzles
- 32a-37/10 . Non-chemical treatment (32b-25/00 takes precedence; non-woven fabrics 25; yarns or threads 76; woven fabrics 86)

#### **32a-39/00 The use of lubricants in shaping glass**

**32b Chemical structure of glass: glass compositions, fluxes, colouring and decolourising; surface property modification: stained glass, etching, sandblasting (sandblasting apparatus 67b), glass painting (especially pictures and designs 75d), coating of glass with glass or metal (electrolytic production of mirrors 48a-10; compound glass 39a-17/50), stained glass (surface ornamentation 75)**

**Chemical structure of glass**

- 32b-1 Structure of colourless glass, devitrified glass and foam glass
- 32b-2 Structure of glass uniformly colour, decolourised or clouded in the molten state, or of selectively absorbing glass (chemical structure of enamels 48c-2/01)
- 32b-3 Structure of glass irregularly coloured, decolourised or clouded in the molten state; glass marbled or veined in the mass, and ornamental articles made by melting or sintering glass powder
- 32b-4 Structure of heat-tinted and surface-coloured glass, e.g. golden ruby, lustre, glazes

**Glass surface-property modification**

- 32b-5 Production of special surface properties while the glass is in a plastic state, e.g. stained glass, crackled glass and glass with air inclusions (rolling of patterned glass sheets 32a-20)
- 32b-6 Etching of glass
- 32b-6/50 Other surface treatment of glass by chemical means or by coating, especially for the manufacture of variable-reflection layers (42h-1/01; application of light sensitive layers on glass plates 57b-6/01, 57c-5)
- 32b-7 Mechanical surface treatment, e.g. sandblasting treatment, damascening (grinding of glass 67a; sandblasting equipment 67b)

**Coating of glass with vitreous materials or with metal and the manufacture of decorated tiles**

- 32b-8 Coating of glass with enamels, e.g. glass painting with enamels
- 32b-9 Coating or covering of glass with softened glass, e.g. flashing, covering, making of mosaic pieces and of modified decorated tiles according to 32b-5 – 32b-10 other than by shaping in a plastic state (mechanical production by rolling 32a-20; by lifting, discharging, drawing 32a-23/01, 32a-23/02, 32a-24/01)
- 32b-10 Coating of glass with metal, e.g. mirror making, and of vacuum bottles (making glass conductive 48a-2; electrolytic production of mirrors 48a-10; metal coating by metal vaporisation or by spraying, also 48b-11/01 – 48b-11/04); fusing metal on or in glass (fusing-in of current conducting wires for electric incandescent lamps 21f-39; fusing-in of large-surface current conductors 21g-13/01, 21g-14/01, 21g-17/01; rolling-in of metal 32a-22); lining of metal bodies, e.g. metal tubes with glass (insulated containers for liquid gases 17g-4)
- 32b-11 Decoration of glass by fusing together glass pieces or by combining into lattice windows, stained glass windows, including those in which the frame is produced by casting metal in the joints between adjacent pieces of glass (imitation of stained glass 75d-2)
- 32b-12 Cleaning of glass (cleaning of window panes 34c-1, 34c-2; cleaning of bottles and glasses after use 64b-1 – 64b-7)

**32b Chemical composition of glasses, glazes, or vitreous enamels; Surface treatment of glass; Joining glass to glass or other materials**

**Chemical composition of glasses, glazes, or vitreous enamels**

- 32b-1/00 Ingredients generally applicable to manufacture of glasses, glazes, and vitreous enamels**
- 32b-1/02 . Pretreated ingredients
- 32b-1/04 . Opacifiers, e.g. fluorides or phosphates; Pigments
- 32b-1/06 . . to produce non-uniformly pigmented, e.g. speckled, marbled, or veined products

32b-1/08	. to produce crackled effects
32b-1/10	. to produce uniformly-coloured transparent products
<b>32b-3/00</b>	<b>Compositions specially applicable to manufacture of glass</b>
32b-3/02	. containing materials to produce uncoloured glass
32b-3/04	. with silica as the essential glass-former
32b-3/06	. . with more than 90% silica, e.g. quartz
32b-3/08	. . with silica and boron oxide as the essential glass-formers
32b-3/10	. . modified with lead monoxide, barium monoxide, or strontium monoxide
32b-3/12	. with glass-formers other than silica
32b-3/14	. . with boron oxide as the essential glass-former
32b-3/16	. . with oxides of phosphorus as the essential glass-formers
32b-3/18	. . with fluorides as the essential glass-formers
32b-3/20	. for producing colours developed by special heat-treatment, e.g. gold-ruby
32b-3/22	. for crystallised glass
32b-3/24	. for glass absorbing selectively outside the visual spectrum
32b-3/26	. for photo-sensitive glass
32b-3/28	. for luminescent glass
32b-3/30	. for glass with other special properties
<b>32b-5/00</b>	<b>Compositions applicable to manufacture of vitreous enamels or glazes</b>
32b-5/02	. for opaque enamels or glazes
32b-5/04	. . using substances which generate gas to opacify the glass, e.g. methylene blue
32b-5/06	. containing ingredients for altering the consistency of the slurry
<b>32b-7/00</b>	<b>Compositions specially applicable to manufacture of vitreous enamels</b>
32b-7/02	. containing ingredients for securing a good bond between the vitrified enamel and the metal
32b-7/04	. for steel (32b-7/02 takes precedence)
32b-7/06	. for cast iron (32b-7/02 takes precedence)
32b-7/08	. for light metals (32b-7/02 takes precedence)
32b-7/10	. for copper, silver, or gold (32b-7/02 takes precedence)
<b>32b-9/00</b>	<b>Compositions specially applicable to manufacture of vitreous glazes</b>
32b-9/02	. Engobes
32b-9/04	. to produce non-uniformly coloured glazes
<b>32b-11/00</b>	<b>Multi-cellular glass</b>
<b>32b-12/00</b>	<b>Powdered glass</b>
<b>32b-13/00</b>	<b>Chemical composition of glass fibres or slag wool (manufacture 32a-37/00)</b>
<b><u>Surface treatment of glass</u></b>	
<b>32b-15/00</b>	<b>Surface treatment of glass by etching (etching fibres 32b-25/06)</b>
32b-15/02	. for making a smooth surface
<b>32b-17/00</b>	<b>Surface treatment of glass, other than fibres, by coating</b>
32b-17/02	. with glass
32b-17/04	. . by fritting glass powder
32b-17/06	. with metals
32b-17/08	. . by dry methods (32b-17/20 takes precedence)
32b-17/10	. . by wet methods (32b-17/20 takes precedence)
32b-17/12	. . . Silvering
32b-17/14	. . . . of plane or curved sheet glass
32b-17/16	. . . . Protective coatings for mirrors
32b-17/18	. . . . of hollow glass articles on the inside
32b-17/20	. . Lustring
32b-17/22	. with other inorganic material
32b-17/26	. . with surface colours
32b-17/28	. with organic material
32b-17/30	. . with silicon-containing compounds

32b-17/32	. . with synthetic or natural resins (32b-17/30 takes precedence)
<b>32b-19/00</b>	<b>Surface treatment of glass by mechanical means</b> (sand blasting, grinding, or polishing glass 67a – 67c)
<b>32b-21/00</b>	<b>Treatment of glass by diffusing ions or metals in the surface</b>
<b>32b-23/00</b>	<b>Other surface treatment of glass not in the form of fibres</b>
<b>32b-25/00</b>	<b>Surface treatment of fibres or filaments from glass, minerals, or slags</b>
32b-25/02	. Coating
32b-25/04	. . Metallising
32b-25/06	. Etching
<b><u>Joining glass to glass or to other materials</u></b>	
<b>32b-27/00</b>	<b>Joining pieces of glass to pieces of other inorganic material; Joining glass to glass other than by fusing</b> (32b-17/00 takes precedence; wired glass 32a-11/14; joining glass to ceramics 80b-23/20)
32b-27/02	. by fusing glass directly to metal
32b-27/04	. joining glass to metal by means of an interlayer
32b-27/06	. joining glass to glass by methods other than fusing (fusing 32a-23/20)
32b-27/08	. . with the aid of intervening metal
32b-27/10	. . with the aid of adhesive specially adapted for that purpose
32b-27/12	. . . Laminated glass (mechanical features in manufacture of glass laminates part of which is of plastic material 39a3-9/02)
<b>32b-29/00</b>	<b>Joining metals with the aid of glass</b>