

# CPC COOPERATIVE PATENT CLASSIFICATION

## C03B MANUFACTURE, SHAPING, OR SUPPLEMENTARY PROCESSES

### WARNING

The following IPC groups are not used in the CPC system. Subject matter covered by these groups is classified in the following CPC groups:

C03B 8/00	covered by	C03B 19/00, C03B 37/00
C03B 8/02	covered by	C03B 19/1065, C03B 19/12, C03B 37/011, C03B 37/016
C03B 8/04	covered by	C03B 19/106, C03B 19/14, C03B 37/014

### Melting the raw material

#### 1/00 Preparing the batches (chemical compositions C03C)

- 1/02 . Compacting the glass batches, e.g. pelletising

#### 3/00 Charging the melting furnaces

- 3/005 . {using screw feeders}
- 3/02 . combined with preheating, premelting or pretreating the glass-making ingredients, pellets or cullet
- 3/023 . . {Preheating}
- 3/026 . . {by charging the ingredients into a flame, through a burner or equivalent heating means used to heat the melting furnace}

#### 5/00 Melting in furnaces; Furnaces so far as specially adapted for glass manufacture

- 5/005 . {of glass-forming waste materials (disposal or transformation of solid waste in general B09B; treatment of radioactive waste G21F 9/00)}
- 5/02 . in electric furnaces, {e.g. by dielectric heating (electric heating in general H05B)}
- 5/021 . . {by induction heating}
- 5/023 . . {by microwave heating}
- 5/025 . . {by arc discharge or plasma heating}
- 5/027 . . by passing an electric current between electrodes immersed in the glass bath, i.e. by direct resistance heating
- 5/0272 . . . {Pot furnaces}
- 5/0275 . . . {Shaft furnaces (C03B 5/0277 takes precedence)}
- 5/0277 . . . {Rotary furnaces}
- 5/03 . . . Tank furnaces
- 5/031 . . . . {Cold top tank furnaces}
- 5/033 . . by using resistance heaters above or in the glass bath, i.e. by indirect resistance heating
- 5/0332 . . . {Tank furnaces}
- 5/0334 . . . {Pot furnaces; Core furnaces}
- 5/0336 . . . {Shaft furnaces (C03B 5/0338 takes precedence)}
- 5/0338 . . . {Rotary furnaces}
- 5/04 . in tank furnaces {(C03B 5/02 takes precedence)}
- 5/05 . . Discontinuously-working tank furnaces, e.g. day tanks
- 5/06 . in pot furnaces {(C03B 5/02 takes precedence)}
- 5/08 . . Glass-melting pots
- 5/10 . in combined tank furnaces and pots {(C03B 5/02 takes precedence)}
- 5/12 . in shaft furnaces {(C03B 5/02 takes precedence)}
- 5/14 . in revolving cylindrical furnaces {(C03B 5/02 takes precedence)}

- 5/16 . Special features of the melting process; Auxiliary means specially adapted for glass-melting furnaces
- 5/163 . . {Electrochemical treatments, e.g. to prevent bubbling or to create bubbles (C03B 5/1672, C03B 5/185 take precedence)}
- 5/167 . . Means for preventing damage to equipment, e.g. by molten glass, hot gases, batches (C03B 5/20, C03B 5/42 take precedence)
- 5/1672 . . . {Use of materials therefor}
- 5/1675 . . . . {Platinum group metals}
- 5/1677 . . . {by use of electrochemically protection means, e.g. passivation of electrodes}
- 5/173 . . Apparatus for changing the composition of the molten glass in glass furnaces, e.g. for colouring the molten glass (chemical aspects C03C)
- 5/18 . . Stirring devices; Homogenisation {(mixing in general B01F)}
- 5/182 . . . by moving the molten glass along fixed elements, e.g. deflectors, weirs, baffle plates
- 5/183 . . . using thermal means, e.g. for creating convection currents
- 5/185 . . . . Electric means
- 5/187 . . . with moving elements
- 5/1875 . . . . {of the screw or pump-action type}
- 5/193 . . . using gas, e.g. bubblers
- 5/20 . . Bridges, shoes, throats, or other devices for withholding dirt, foam, or batch
- 5/202 . . . {Devices for blowing onto the melt surface, e.g. high momentum burners}
- 5/205 . . . {Mechanical means for skimming or scraping the melt surface}
- 5/207 . . . {Foraminous or mesh screens, e.g. submerged sieves}
- 5/225 . . Refining (C03B 5/18 takes precedence; {Refining agents C03C 1/004})
- 5/2252 . . . {under reduced pressure, e.g. with vacuum refiners}
- 5/2255 . . . {by centrifuging}
- 5/2257 . . . {by thin-layer fining}
- 5/23 . . Cooling the molten glass (C03B 5/18, C03B 5/225 take precedence)
- 5/235 . . Heating the glass (C03B 5/02, C03B 5/18, C03B 5/225 take precedence)

### NOTE

Devices for withholding dirt, foam, or batch are also classified in C03B 5/202

- 5/2353 . . . {by combustion with pure oxygen or oxygen-enriched air, e.g. using oxy-fuel burners or oxygen lances}

- 5/2356 . . . {Submerged heating, e.g. by using heat pipes, hot gas or submerged combustion burners (bubblers C03B 5/193)}
- 5/237 . . . Regenerators or recuperators specially adapted for glass-melting furnaces
- 5/2375 . . . . {Regenerator brick design (brick shapes in general F27D 1/042); Use of materials therefor; Brick stacking arrangements}
- 5/24 . . Automatically regulating the melting process
- 5/245 . . . {Regulating the melt or batch level, depth or thickness}
- 5/26 . . Outlets, {e.g. drains, siphons}; Overflows, {e.g. for supplying the float tank, tweels}
- 5/262 . . . {Drains, i.e. means to dump glass melt or remove unwanted materials}
- 5/265 . . . {Overflows; Lips; Tweels}
- 5/267 . . . . {specially adapted for supplying the float tank}
- 5/28 . . Siphons
- 5/42 . . Details of construction of furnace walls, e.g. to prevent corrosion; Use of materials for furnace walls
- 5/425 . . . Preventing corrosion or erosion (C03B 5/44 takes precedence)
- 5/43 . . . Use of materials for furnace walls, e.g. fire-bricks
- 5/435 . . . Heating arrangements for furnace walls
- 5/44 . . . Cooling arrangements for furnace walls
- 7/00 Distributors for the molten glass; Means for taking-off charges of molten glass; Producing the gob, {e.g. controlling the gob shape, weight or delivery tact}**
- 7/005 . {Controlling, regulating or measuring}
- 7/01 . Means for taking-off charges of molten glass {(C03B 7/08, C03B 7/14 - C03B 7/22 take precedence)}
- 7/02 . Forehearths, i.e. feeder channels
- 7/04 . . Revolving forehearths
- 7/06 . . Means for thermal conditioning or controlling the temperature of the glass
- 7/065 . . . {by combustion with pure oxygen or oxygen-enriched air}
- 7/07 . . . Electric means
- 7/08 . Feeder spouts, e.g. gob feeders
- 7/082 . . Pneumatic feeders
- 7/084 . . Tube mechanisms
- 7/086 . . Plunger mechanisms
- 7/088 . . Outlets, e.g. orifice rings
- 7/09 . . Spout blocks
- 7/092 . . Stirring devices; Homogenisation (C03B 5/18 takes precedence)
- 7/094 . . Means for heating, cooling or insulation
- 7/096 . . . for heating
- 7/098 . . . . electric
- 7/10 . Cutting-off {or severing} the glass flow with the aid of knives or scissors {or non-contacting cutting means, e.g. a gas jet}; Construction of the blades used
- 7/11 . . Construction of the blades
- 7/12 . . Cutting-off {or severing} a free-hanging glass stream, {e.g. by the combination of gravity and surface tension forces}

- 7/14 . Transferring molten glass or gobs to glass blowing or pressing machines (C03B 7/18 - C03B 7/22 take precedence)
- 7/16 . . using deflector chutes
- 7/18 . Suction feeders
- 7/20 . Scoop feeders
- 7/22 . Gathering-devices in the form of rods or pipes

#### Shaping of glass (manufacture of fibres C03B 37/00)

- 9/00 Blowing glass; Production of hollow glass articles**
- 9/02 . with the mouth; Auxiliary means therefor
- 9/03 . . Blow pipes
- 9/04 . . Making hollow glass articles with feet or projections
- 9/06 . . Making hollow glass articles with double walls, e.g. vacuum flasks
- 9/08 . Finish-blowing with compressed air of blanks blown with the mouth
- 9/10 . Blowing glass cylinders for sheet manufacture
- 9/12 . starting from a ribbon of glass; Ribbon machines
- 9/13 . in gob feeder machines (C03B 9/28, C03B 9/29 take precedence)
- 9/14 . . in "blow" machines or in "blow-and-blow" machines (C03B 9/193, C03B 9/20 take precedence)
- 9/145 . . . {Details of machines without turn-over moulds}
- 9/16 . . . in machines with turn-over moulds
- 9/165 . . . . {Details of such machines, e.g. guide funnels, turn-over mechanisms (C03B 9/18 takes precedence)}
- 9/18 . . . . Rotary-table machines
- 9/185 . . . . . {having at least two rotary tables}
- 9/19 . . . . having only one rotary table
- 9/193 . . in "press-and-blow" machines
- 9/1932 . . . {Details of such machines, e.g. plungers or plunger mechanisms for the press-and-blow machine, cooling of plungers (C03B 9/195 takes precedence)}
- 9/1934 . . . . {Mechanical displacement means of the plunger}
- 9/1936 . . . . {Hydraulic or pneumatic displacement means of the plunger}
- 9/1938 . . . . {Electrical means for the displacement of the plunger}
- 9/195 . . . Rotary-table machines
- 9/1955 . . . . {having at least two rotary tables}
- 9/197 . . . Construction of the blank mould
- 9/20 . in "vacuum blowing" or in "vacuum-and-blow" machines
- 9/22 . . Rotary-table machines
- 9/225 . . . {having at least two rotary tables}
- 9/24 . . Construction of the blank mould
- 9/28 . in machines of the endless-chain type (C03B 9/12 takes precedence)
- 9/29 . Paste mould machines (C03B 9/28 takes precedence)
- 9/292 . . {Details of such machines (C03B 9/295 takes precedence)}
- 9/295 . . Rotary-table machines
- 9/2955 . . . {having at least two rotary tables}
- 9/30 . Details of blowing glass (for blowing with the mouth C03B 9/02); Use of materials for the moulds

- 9/31 . . . Blowing laminated glass articles or glass with enclosures, e.g. wires, bubbles
- 9/32 . . . Giving special shapes to parts of hollow glass articles
- 9/325 . . . Forming screw-threads or lips at the mouth of hollow glass articles; Neck moulds
- 9/33 . . . Making hollow glass articles with feet or projections; Moulds therefor
- 9/335 . . . Forming bottoms to blown hollow glass articles; Bottom moulds
- 9/34 . . . Glass-blowing moulds not otherwise provided for
- 9/342 . . . {Neck moulds (C03B 9/325 takes precedence)}
- 9/344 . . . {Bottom moulds (C03B 9/335 takes precedence)}
- 9/347 . . . Construction of the blank or blow mould
- 9/353 . . . Mould holders; {Mould opening and closing mechanisms}
- 9/3532 . . . . {Mechanisms for holders of half moulds moving by rotation about a common vertical axis}
- 9/3535 . . . . . {with the half moulds parallel upon opening and closing}
- 9/3537 . . . . . {Mechanisms for holders of half moulds moving by linear translation}
- 9/36 . . . Blow heads; Supplying, ejecting or controlling the air
- 9/3609 . . . . {Selection or characteristics of the blowing medium, e.g. gas composition, moisture content, cryogenic state}
- 9/3618 . . . . {Means for holding or transferring the blow head}
- 9/3627 . . . . {Means for general supply or distribution of the air to the blow heads}
- 9/3636 . . . . . {Manifolds or regulating devices, e.g. valves}
- 9/3645 . . . . {Details thereof relating to plungers}
- 9/3654 . . . . {Details thereof relating to neck forming}
- 9/3663 . . . . {Details thereof relating to internal blowing of the hollow glass}
- 9/3672 . . . . . {using a tube}
- 9/3681 . . . . . {Movable tubes}
- 9/369 . . . . {Details thereof relating to bottom forming}
- 9/38 . . . Means for cooling, heating, or insulating glass-blowing machines {or for cooling the glass moulded by the machine}
- 9/3808 . . . . {Selection or characteristics of the cooling, heating or insulating medium, e.g. gas composition, moisture content, cryogenic state}
- 9/3816 . . . . {Means for general supply, distribution or control of the medium to the mould, e.g. sensors, circuits, distribution networks}
- 9/3825 . . . . {Details thereof relating to plungers}
- 9/3833 . . . . {Details thereof relating to neck moulds}
- 9/3841 . . . . {Details thereof relating to direct cooling, heating or insulating of the moulded glass}
- 9/385 . . . . . {using a tube for cooling or heating the inside, e.g. blowheads}
- 9/3858 . . . . . {Movable tubes}
- 9/3866 . . . . {Details thereof relating to bottom moulds, e.g. baffles}
- 9/3875 . . . . {Details thereof relating to the side-wall, body or main part of the moulds}
- 9/3883 . . . . . {Air delivery thereto, e.g. plenum, piping}
- 9/3891 . . . . {Manifolds or regulating devices, e.g. valves, injectors}
- 9/40 . . . Gearing or controlling mechanisms specially adapted for glass-blowing machines
- 9/403 . . . . {Hydraulic or pneumatic systems}
- 9/406 . . . . . {Manifolds or regulating devices, e.g. valves}
- 9/41 . . . . Electric or electronic systems (in general G05B 19/00)
- 9/42 . . . Means for fusing, burning-off, or edge-melting combined with glass-blowing machines (uniting glass pieces by fusing C03B 23/20)
- 9/44 . . . Means for discharging combined with glass-blowing machines, e.g. take-outs
- 9/447 . . . . Means for the removal of glass articles from the blow-mould, e.g. take-outs
- 9/453 . . . . Means for pushing newly formed glass articles onto a conveyor, e.g. sweep-out mechanisms; Dead-plate mechanisms
- 9/4535 . . . . . {Dead-plate mechanisms}
- 9/46 . . . Means for cutting the hot glass in glass-blowing machines (burning-off C03B 9/42)
- 9/48 . . . Use of materials for the moulds
- 11/00 **Pressing {molten} glass {or performed glass reheated to equivalent low viscosity without blowing (shaping molten glass by a press-blow process C03B 9/00, e.g. C03B 9/193; re-forming shaped glass C03B 23/00; re-heating the performed glass C03B 29/00; transporting the performed or pressed glass during its manufacture C03B 35/00)}**
- 11/005 . . . {Pressing under special atmospheres, e.g. inert, reactive, vacuum, clean}
- 11/02 . . . in machines with rotary tables
- 11/04 . . . in machines with moulds fed by suction
- 11/05 . . . in machines with reciprocating moulds
- 11/06 . . . Construction of plunger or mould
- 11/07 . . . Suction moulds
- 11/08 . . . for making solid articles, e.g. lenses
- 11/082 . . . . {having profiled, patterned or micro-structured surfaces}
- 11/084 . . . . {material composition or material properties of press dies therefor}
- 11/086 . . . . . {of coated dies (use of materials as release or lubricating compositions C03B 40/02)}
- 11/088 . . . . {Flat discs}
- 11/10 . . . for making hollow {or semi-hollow} articles
- 11/12 . . . Cooling, heating, or insulating the plunger, the mould, or the glass-pressing machine; {cooling or heating of the glass in the mould} (C03B 9/38 takes precedence)
- 11/122 . . . . {Heating}
- 11/125 . . . . {Cooling}
- 11/127 . . . . {of hollow or semi-hollow articles or their moulds}
- 11/14 . . . {Pressing laminated glass articles or glass} with metal inserts {or enclosures, e.g. wires, bubbles, coloured parts}
- 11/16 . . . Gearing or controlling mechanisms specially adapted for glass presses
- 13/00 **Rolling {molten} glass, [i.e. where the molten glass is shaped by rolling (re-forming shaped glass by rolling C03B 23/004, C03B 23/033, C03B 23/055)]**

- 13/01 . Rolling profiled glass articles, {e.g. with I, L, T cross-sectional profiles}
- 13/02 . Rolling non-patterned sheets discontinuously
- 13/04 . Rolling non-patterned sheets continuously
- 13/06 . Rolling corrugated sheets, {e.g. with undulating waving form}
- 13/08 . Rolling patterned sheets, {e.g. sheets having a surface pattern}
- 13/10 . Rolling multi-layer sheets, {e.g. sheets having a coloured glass layer}
- 13/12 . Rolling glass with enclosures, e.g. wire, {bubbles, fibres, particles} or asbestos
- 13/14 . Rolling other articles, {i.e. not covered by [C03B 13/01](#) - [C03B 13/12](#), e.g. channeled articles, briquette-shaped articles}
- 13/16 . Construction of the glass rollers
- 13/18 . Auxiliary means for rolling glass, e.g. sheet supports, gripping devices, hand-ladles, means for moving glass pots
- 13/183 . . {Receiving tables or roller beds for the rolled plateglass}
- 13/186 . . {Pot gripping devices}
- 15/00 Drawing glass upwardly from the melt**
- 15/02 . Drawing glass sheets
- 15/04 . . from the free surface of the melt
- 15/06 . . from a debiteuse
- 15/08 . . by means of bars below the surface of the melt
- 15/10 . . multi-layer glass sheets or glass sheets coated with coloured layers
- 15/12 . . Construction of the annealing tower
- 15/14 . Drawing tubes, cylinders, or rods from the melt
- 15/16 . . Drawing tubes, cylinders or rods, coated with coloured layers
- 15/18 . Means for laying-down and conveying combined with the drawing of glass sheets, tubes or rods
- 17/00 Forming {molten} glass by flowing-out, pushing-out, {extruding} or drawing downwardly or laterally from forming slits or by overflowing over lips**
- 17/02 . Forming {molten} glass coated with coloured layers; {Forming molten glass of different compositions or layers; Forming molten glass comprising reinforcements or inserts}
- 17/025 . . {Tubes or rods}
- 17/04 . Forming tubes or rods by drawing from stationary or rotating tools or from forming nozzles
- 17/06 . Forming glass sheets
- 17/061 . . {by lateral drawing or extrusion}
- 17/062 . . . {combined with flowing onto a solid or gaseous support from which the sheet is drawn}
- 17/064 . . {by the overflow downdraw fusion process; Isopipes therefor}
- 17/065 . . {Forming profiled, patterned or corrugated sheets}
- 17/067 . . {combined with thermal conditioning of the sheets}
- 17/068 . . {Means for providing the drawing force, e.g. traction or draw rollers}
- 18/00 Shaping glass in contact with the surface of a liquid**
- 18/02 . Forming sheets
- 18/04 . . Changing or regulating the dimensions of the molten glass ribbon
- 18/06 . . . using mechanical means, e.g. restrictor bars, edge rollers
- 18/08 . . . using gas
- 18/10 . . . using electric means
- 18/12 . . Making multi-layer, coloured or armoured glass ([chemical aspects C03C](#))
- 18/14 . . Changing the surface of the glass ribbon, e.g. roughening ([by chemical methods C03C](#))
- 18/16 . . Construction of the float tank; Use of material for the float tank; Coating or protection of the tank wall
- 18/18 . . Controlling or regulating the temperature of the float bath; Composition or purification of the float bath
- 18/20 . . Composition of the atmosphere above the float bath; Treating or purifying the atmosphere above the float bath
- 18/22 . . . Controlling or regulating the temperature of the atmosphere above the float tank
- 19/00 Other methods of shaping glass (manufacture or treatment of flakes, fibres or filaments from softened glass, minerals or slags [C03B 37/00](#))**
- 19/01 . by progressive fusion {or sintering} of powdered glass onto a shaping substrate, i.e. accretion, {e.g. plasma oxidation deposition ([making fibre preforms C03B 37/01291](#))}
- 19/02 . by casting {molten glass, e.g. injection moulding}
- 19/025 . . {by injection moulding, e.g. extrusion}
- 19/04 . by centrifuging ({[C03B 19/095](#) takes precedence})
- 19/06 . by sintering, {e.g. by cold isostatic pressing of powders and subsequent sintering, by hot pressing of powders, by sintering slurries or dispersions not undergoing a liquid phase reaction}
- 19/063 . . {by hot-pressing powders}
- 19/066 . . {for the production of quartz or fused silica articles ([other processes specially adapted for the production of quartz or fused silica articles C03B 20/00](#))}
- 19/08 . by foaming
- 19/09 . by fusing powdered glass in a shaping mould
- 19/095 . . {by centrifuging, e.g. arc discharge in rotating mould ([crucibles for crystal pulling in general C30B 15/10, C30B 35/002](#))}
- 19/10 . Forming beads
- 19/1005 . . {Forming solid beads ([chemical aspects C03C 12/00](#))}
- 19/101 . . . {by casting molten glass into a mould or onto a wire}
- 19/1015 . . . {by using centrifugal force or by pouring molten glass onto a rotating cutting body, e.g. shredding}
- 19/102 . . . {by blowing a gas onto a stream of molten glass or onto particulate materials, e.g. pulverising}
- 19/1025 . . . . {Bead furnaces or burners}
- 19/103 . . . . {Fluidised-bed furnaces}
- 19/1035 . . . {by pressing}
- 19/104 . . . {by rolling, e.g. using revolving cylinders, rotating discs, rolls}
- 19/1045 . . . {by bringing hot glass in contact with a liquid, e.g. shattering}

- 19/105 . . . . {the liquid being a molten metal or salt}
- 19/1055 . . . {by extruding, e.g. dripping molten glass in a gaseous atmosphere}
- 19/106 . . . {by chemical vapour deposition; by liquid phase reaction}
- 19/1065 . . . . {by liquid phase reactions, e.g. by means of a gel phase}
- 19/107 . . {Forming hollow beads (chemical aspects [C03C 11/002](#))}
- 19/1075 . . . {by blowing, pressing, centrifuging, rolling or dripping}
- 19/108 . . {Forming porous, sintered or foamed beads (chemical aspects [C03C 11/00](#))}
- 19/1085 . . . {by blowing, pressing, centrifuging, rolling or dripping}
- 19/109 . . {Glass-melting furnaces specially adapted for making beads}
- 19/1095 . . {Thermal after-treatment of beads, e.g. tempering, crystallisation, annealing}
- 19/12 . . by liquid-phase reaction processes
- 19/14 . . by gas- {or vapour-} phase reaction processes
- 19/1407 . . {Deposition reactors therefor}
- 19/1415 . . {Reactant delivery systems}
- 19/1423 . . . {Reactant deposition burners}
- 19/143 . . . . {Plasma vapour deposition}
- 19/1438 . . . {for delivering and depositing additional reactants as liquids or solutions, e.g. solution doping of the article or deposit}
- 19/1446 . . {Means for after-treatment or catching of worked reactant gases}
- 19/1453 . . {Thermal after-treatment of the shaped article, e.g. dehydrating, consolidating, sintering}
- 19/1461 . . . {for doping the shaped article with flourine}
- 19/1469 . . {Means for changing or stabilising the shape or form of the shaped article or deposit}
- 19/1476 . . {Means for heating during or immediately prior to deposition ([C03B 19/1415](#) takes precedence)}
- 19/1484 . . {Means for supporting, rotating or translating the article being formed}
- 19/1492 . . . {Deposition substrates, e.g. targets}
- 20/00 Processes specially adapted for the production of quartz or fused silica articles, {not otherwise provided for ([C03B 19/01](#), [C03B 19/066](#), [C03B 19/106](#), [C03B 19/12](#), [C03B 19/14](#), [C03B 37/00](#) take precedence)}**
- 21/00 Severing glass sheets, tubes or rods while still plastic**
- 21/02 . . by cutting ([C03B 9/46](#) takes precedence)
- 21/04 . . by punching out
- 21/06 . . by flashing-off, burning-off or fusing ([C03B 9/42](#) takes precedence)
- 23/00 Re-forming shaped glass (re-forming fibres or filaments [C03B 37/14](#))**
- 23/0006 . . {by drawing ([C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#) take precedence)}
- 23/0013 . . {by pressing ([C03B 21/04](#), [C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#), [C03B 23/26](#) take precedence)}
- 23/002 . . {Re-forming the rim portions}
- 23/0026 . . {by gravity, e.g. sagging ([C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#) take precedence)}
- 23/0033 . . {by centrifuging ([C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#) take precedence)}
- 23/004 . . {by rolling ([C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#) take precedence)}
- 23/0046 . . {Re-forming the rim portions}
- 23/0053 . . . {Hand tools therefor}
- 23/006 . . {by fusing, e.g. for flame sealing ([C03B 9/42](#), [C03B 21/06](#), [C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#), [C03B 33/08](#) take precedence)}
- 23/0066 . . {by bending ([C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#) take precedence)}
- 23/0073 . . {by blowing ([C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#) take precedence)}
- 23/008 . . {Vacuum-blowing}
- 23/0086 . . {Heating devices specially adapted for re-forming shaped glass articles in general, e.g. burners ([C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#) take precedence)}
- 23/0093 . . {Tools and machines specially adapted for re-forming shaped glass articles in general, e.g. chucks ([C03B 23/0086](#), [C03B 23/02](#), [C03B 23/04](#), [C03B 23/18](#) take precedence)}
- 23/02 . . Re-forming glass sheets
- 23/023 . . by bending
- 23/0235 . . . {involving applying local or additional heating, cooling or insulating means}
- 23/025 . . . by gravity
- 23/0252 . . . . {by gravity only, e.g. sagging ([C03B 23/035](#) takes precedence)}
- 23/0254 . . . . . {in a continuous way, e.g. gravity roll bending}
- 23/0256 . . . . {Gravity bending accelerated by applying mechanical forces, e.g. inertia, weights or local forces}
- 23/0258 . . . . {Gravity bending involving applying local or additional heating, cooling or insulating means}
- 23/027 . . . . with moulds having at least two upward pivotable mould sections
- 23/03 . . . by press-bending between shaping moulds
- 23/0302 . . . . {between opposing full-face shaping moulds}
- 23/0305 . . . . {Press-bending accelerated by applying mechanical forces, e.g. inertia, weights or local forces}
- 23/0307 . . . . {Press-bending involving applying local or additional heating, cooling or insulating means}
- 23/031 . . . . the glass sheets being in a vertical position ([C03B 23/033](#) takes precedence)
- 23/0315 . . . . . {and supported on the lower edge}
- 23/033 . . . . in a continuous way, e.g. roll forming, {or press-roll bending}
- 23/035 . . . using a gas cushion or by changing gas pressure, e.g. by applying vacuum {or blowing for supporting the glass while bending}
- 23/0352 . . . . {by suction or blowing out for providing the deformation force to bend the glass sheet}
- 23/0355 . . . . . {by blowing without suction directly on the glass sheet}
- 23/0357 . . . . . {by suction without blowing, e.g. with vacuum or by venturi effect}
- 23/037 . . by drawing
- 23/04 . . Re-forming tubes or rods

- 23/043 . . Heating devices specially adapted for re-forming tubes or rods in general, e.g. burners
- 23/045 . . Tools or apparatus specially adapted for re-forming tubes or rods in general, e.g. glass lathes, chucks ([C03B 23/043 takes precedence](#))
- 23/047 . . by drawing ([C03B 23/091](#)), [C03B 37/025 takes precedence](#))
- 23/0473 . . . {for forming constrictions}
- 23/0476 . . . {onto a forming die, e.g. a mandrel or a wire}
- 23/049 . . by pressing ([C03B 21/04](#), [C03B 23/092](#)), [C03B 23/26 take precedence](#))
- 23/0493 . . . {in a longitudinal direction, e.g. for upsetting or extrusion}
- 23/0496 . . . {for expanding in a radial way, e.g. by forcing a mandrel through a tube or rod}
- 23/051 . . by gravity, e.g. sagging ([C03B 23/093 takes precedence](#))
- 23/053 . . by centrifuging ([C03B 23/094](#)), [C03B 37/04 takes precedence](#))
- 23/055 . . by rolling ([C03B 23/095 takes precedence](#))
- 23/057 . . by fusing, e.g. for flame sealing ([C03B 9/42](#), [C03B 21/06](#) [C03B 23/099](#)), [C03B 33/08 take precedence](#))
- 23/06 . . by bending ([C03B 23/096 takes precedence](#))
- 23/065 . . . {in only one plane, e.g. for making circular neon tubes}
- 23/07 . . by blowing, e.g. for making electric bulbs ([C03B 23/097 takes precedence](#))
- 23/073 . . . {Vacuum-blowing}
- 23/076 . . . . {Shrinking the glass tube on to a mandrel}
- 23/08 . . to exact dimensions, e.g. calibrating
- 23/09 . . Reshaping the ends, e.g. as grooves, threads or mouths
- 23/091 . . . {by drawing}
- 23/092 . . . {by pressing}
- 23/093 . . . {by gravity, e.g. sagging}
- 23/094 . . . {by centrifuging}
- 23/095 . . . {by rolling}
- 23/096 . . . {by bending}
- 23/097 . . . {by blowing}
- 23/098 . . . . {Vacuum-blowing}
- 23/099 . . . {by fusing, e.g. flame sealing}
- 23/11 . . Reshaping by drawing without blowing, in combination with separating, e.g. for making ampoules
- 23/112 . . . {Apparatus for conveying the tubes or rods in a curved path around a vertical axis through one or more forming stations}
- 23/114 . . . . {Devices for feeding tubes or rods to these machines}
- 23/116 . . . {Apparatus for conveying the tubes or rods in a curved path around a horizontal axis through one or more forming stations}
- 23/118 . . . {Apparatus for conveying the tubes or rods in a horizontal or an inclined plane through one or more forming stations}
- 23/13 . . Reshaping combined with uniting or heat sealing, e.g. for making vacuum bottles
- 23/18 . . Re-forming and sealing ampoules
- 23/20 . . Uniting glass pieces by fusing without substantial reshaping
- 23/203 . . Uniting glass sheets ([C03B 23/24 takes precedence](#))

- 23/207 . . Uniting glass rods, glass tubes, or hollow glassware ([C03B 23/24 takes precedence](#))
- 23/213 . . . Joining projections or feet
- 23/217 . . . for the production of cathode ray tubes or similarly shaped tubes
- 23/22 . . Uniting glass lenses, e.g. forming bifocal lenses
- 23/24 . . Making hollow glass sheets or bricks
- 23/245 . . . {Hollow glass sheets}
- 23/26 . . Punching reheated glass

#### After-treatment of glass products (of fibres [C03B 37/10](#))

##### 25/00 Annealing glass products

- 25/02 . . in a discontinuous way
- 25/025 . . . {Glass sheets}
- 25/04 . . in a continuous way
- 25/06 . . with horizontal displacement of the glass products
- 25/08 . . . of glass sheets
- 25/087 . . . . being in a vertical position
- 25/093 . . . . being in a horizontal position on a fluid support, e.g. a gas or molten metal
- 25/10 . . with vertical displacement of the glass products
- 25/12 . . . of glass sheets

##### 27/00 Tempering {or quenching} glass products

- 27/004 . . by bringing the hot glass product in contact with a solid cooling surface, e.g. sand grains
- 27/008 . . by using heat of sublimation of solid particles
- 27/012 . . by heat treatment, e.g. for crystallisation; Heat treatment of glass products before tempering by cooling ([C03B 27/008](#), [C03B 27/016 take precedence](#))
- 27/016 . . by absorbing heat radiated from the glass product
- 27/02 . . using liquid
- 27/022 . . . {the liquid being organic, e.g. an oil}
- 27/024 . . . . {the liquid being sprayed on the object}
- 27/026 . . . {the liquid being a liquid gas, e.g. a cryogenic liquid, liquid nitrogen}
- 27/028 . . . {the liquid being water-based}
- 27/03 . . the liquid being a molten metal or a molten salt
- 27/035 . . . . {the liquid being sprayed on the object}
- 27/04 . . using gas
- 27/0404 . . . {Nozzles, blow heads, blowing units or their arrangements, specially adapted for flat or bent glass sheets}
- 27/0408 . . . . {being dismountable}
- 27/0413 . . . {Stresses, e.g. patterns, values or formulae for flat or bent glass sheets}
- 27/0417 . . . {Controlling or regulating for flat or bent glass sheets}
- 27/0422 . . . {for flat or bent glass sheets starting in an horizontal position and ending in a non-horizontal position}
- 27/0426 . . . . {for bent glass sheets}
- 27/0431 . . . . . {the quench unit being adapted to the bend of the sheet ([C03B 27/0435 takes precedence](#))}
- 27/0435 . . . . . {the quench unit being variably adaptable to the bend of the sheet}
- 27/044 . . for flat or bent glass sheets being in a horizontal position
- 27/0442 . . . . {for bent glass sheets}
- 27/0445 . . . . . {the quench unit being adapted to the bend of the sheet ([C03B 27/0447 takes precedence](#))}

- 27/0447 . . . . {the quench unit being variably adaptable to the bend of the sheet}
- 27/048 . . . on a gas cushion
- 27/052 . . for flat or bent glass sheets being in a vertical position
- 27/0522 . . . {Nozzles, blow heads, blowing units or their arrangements}
- 27/0524 . . . . {being dismountable}
- 27/0526 . . . {Stresses, e.g. patterns, values or formulae}
- 27/0528 . . . {Controlling or regulating}
- 27/056 . . . supported on the lower edge
- 27/06 . . for glass products other than flat or bent glass plates, e.g. hollow glassware, lenses
- 27/062 . . . {Nozzles or blow-heads, e.g. tubes}
- 27/065 . . . {Stresses, e.g. patterns, values or formulae}
- 27/067 . . . {Controlling or regulating}
- 29/00 Reheating glass products for softening or fusing their surfaces; Fire-polishing; Fusing of margins**
- 29/02 . . in a discontinuous way
- 29/025 . . {Glass sheets}
- 29/04 . . in a continuous way
- 29/06 . . with horizontal displacement of the products
- 29/08 . . . Glass sheets
- 29/10 . . . . being in a vertical position
- 29/12 . . . . being in a horizontal position on a fluid support, e.g. a gas or molten metal
- 29/14 . . with vertical displacement of the products
- 29/16 . . . Glass sheets
- 31/00 Manufacture of rippled or crackled glass**
- 32/00 Thermal after-treatment of glass products not provided for in groups {C03B 19/00} , C03B 25/00 - C03B 31/00 {or C03B 37/00}, e.g. crystallisation, eliminating gas inclusions or other impurities; {Hot-pressing vitrified, non-porous, shaped glass products}**
- 32/005 . {Hot-pressing vitrified, non-porous, shaped glass products}
- 32/02 . Thermal crystallisation, e.g. for crystallising glass bodies into glass-ceramic articles {(C03B 27/012 takes precedence)}
- 33/00 Severing cooled glass (severing glass fibres C03B 37/16)**
- 33/02 . Cutting or splitting sheet glass {or ribbons}; Apparatus or machines therefor (C03B 33/09 takes precedence; glass-cutting tools C03B 33/10)
- 33/0207 . . {the sheet being in a substantially vertical plane}
- 33/0215 . . {the ribbon being in a substantially vertical plane}
- 33/0222 . . {Scoring using a focussed radiation beam, e.g. laser}
- 33/023 . . the sheet {or ribbon} being in a horizontal position
- 33/0235 . . . {Ribbons}
- 33/027 . . . Scoring tool holders; Driving mechanisms therefor
- 33/03 . . . Glass cutting tables; Apparatus for transporting or handling sheet glass during the cutting or breaking operations
- 33/033 . . . Apparatus for opening score lines in glass sheets
- 33/037 . . . Controlling or regulating
- 33/04 . . Cutting or splitting in curves, especially for making spectacle lenses
- 33/06 . Cutting or splitting glass tubes, rods, or hollow products (C03B 33/09 takes precedence)
- 33/07 . Cutting armoured, {multi-layered, coated} or laminated, glass products
- 33/072 . . {Armoured glass, i.e. comprising reinforcement}
- 33/074 . . {Glass products comprising an outer layer or surface coating of non-glass material}
- 33/076 . . {Laminated glass comprising interlayers}
- 33/078 . . . {Polymeric interlayers}
- 33/08 . by fusing, {i.e. by melting through the glass}
- 33/082 . . {using a focussed radiation beam, e.g. laser (C03B 33/0855 takes precedence)}
- 33/085 . . Tubes, rods or hollow products
- 33/0855 . . . {using a focussed radiation beam, e.g. laser}
- 33/09 . by thermal shock
- 33/091 . . {using at least one focussed radiation beam, e.g. laser beam (C03B 33/0955 takes precedence)}
- 33/093 . . . {using two or more focussed radiation beams}
- 33/095 . . Tubes, rods or hollow products
- 33/0955 . . . {using a focussed radiation beam, e.g. laser}
- 33/10 . Glass-cutting tools, e.g. scoring tools
- 33/102 . . {involving a focussed radiation beam, e.g. lasers}
- 33/105 . . {Details of cutting or scoring means, e.g. tips}
- 33/107 . . . {Wheel design, e.g. materials, construction, shape}
- 33/12 . . Hand tools (wheel design C03B 33/107)
- 33/14 . . . specially adapted for cutting tubes, rods, or hollow products {(for cutting ampoules B67B 7/92)}
- 35/00 Transporting of glass products during their manufacture, {e.g. hot glass lenses, prisms} (conveying systems for fragile sheets, e.g. glass B65G 49/06)**
- 35/005 . {Transporting hot solid glass products other than sheets or rods, e.g. lenses, prisms, by suction or floatation}
- 35/04 . Transporting of hot hollow {or semi-hollow} glass products (C03B 35/26 takes precedence)
- 35/06 . . Feeding of hot hollow glass products into annealing or heating kilns
- 35/062 . . . {using conveyors, e.g. chain- or roller conveyors, dead-plates}
- 35/064 . . . . {specially adapted as a Lehr loader}
- 35/066 . . . . {combined with article distributing means, e.g. pivoting deflectors, arresting fingers, stationary guides}
- 35/068 . . . {by gravitational force, e.g. via chutes}
- 35/08 . . . using rotary means directly acting on the products
- 35/085 . . . . {Transfer mechanisms of the "endless-chain" type}
- 35/10 . . . using reciprocating means directly acting on the products, e.g. pushers, stackers
- 35/12 . . . by picking-up and depositing
- 35/125 . . . . {Transfer mechanisms of the "rotary" type, e.g. "take-outs", "setting-over" mechanisms}
- 35/14 . Transporting hot glass sheets {or ribbons, e.g. by heat-resistant conveyor belts or bands}
- 35/142 . . {by travelling transporting tables}
- 35/145 . . {by top-side transfer or supporting devices, e.g. lifting or conveying using suction}

- 35/147 . . . {of the non-contact type}
- 35/16 . . by roller conveyors
- 35/161 . . . {specially adapted for bent sheets or ribbons  
(C03B 35/166 takes precedence)}
- 35/162 . . . {combined with means for thermal adjustment  
of the rollers, e.g. cooling (C03B 35/183 takes  
precedence)}
- 35/163 . . . {Drive means, clutches, gearing or drive speed  
control means}
- 35/164 . . . . {electric or electronicsystems therefor, e.g.  
for automatic control}
- 35/165 . . . {Supports or couplings for roller ends, e.g.  
trunions, gudgeons}
- 35/166 . . . {specially adapted for both flat and bent sheets  
or ribbons}
- 35/167 . . . {specially adapted for removing defect sheets,  
ribbons or parts thereof}
- 35/168 . . . {Means for cleaning the rollers}
- 35/18 . . . Construction of the conveyor rollers  
{Materials, coatings or coverings thereof}
- 35/181 . . . . {Materials, coatings, loose coverings or  
sleeves thereof}
- 35/182 . . . . {specially adapted for bent sheets or ribbons  
(C03B 35/187 takes precedence)}
- 35/183 . . . . {specially adapted for thermal adjustment of  
the rollers, e.g. insulating, heating, cooling  
thereof}
- 35/184 . . . . . {Cooling}
- 35/185 . . . . . {having a discontinuous surface for  
contacting the sheets or ribbons other than  
cloth or fabric, e.g. having protrusions or  
depressions, spirally wound cable, projecting  
discs or tires}

**NOTE**

Disc rollers having a discontinuous  
surface are also classified in [C03B 35/189](#)

- 35/186 . . . . {End caps, end fixtures or roller end shape  
designs}
- 35/187 . . . . {Rollers specially adapted for both flat  
and bent sheets or ribbons, i.e. rollers of  
adjustable curvature}
- 35/188 . . . . {Rollers specially adapted for supplying a  
gas, e.g. porous or foraminous rollers with  
internal air supply}
- 35/189 . . . . {Disc rollers}

**NOTE**

Disc rollers having a discontinuous  
surface are also classified in [C03B 35/185](#)

- 35/20 . . by gripping tongs or supporting frames
- 35/202 . . . {by supporting frames (C03B 35/145 takes  
precedence)}
- 35/205 . . . . {the glass sheets being in a vertical position}
- 35/207 . . . . {Construction or design of supporting  
frames}
- 35/22 . . on a fluid support bed, e.g. on molten metal
- 35/24 . . . on a gas support bed
- 35/243 . . . . {having a non-planar surface, e.g. curved, for  
bent sheets}
- 35/246 . . . . {Transporting continuous glass ribbons}
- 35/26 . . Transporting of glass tubes or rods

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

- 37/005 . Manufacture of flakes
- 37/01 . Manufacture of glass fibres or filaments
- 37/011 . . {starting from a liquid phase reaction process, e.g.  
through a gel phase}
- 37/012 . . Manufacture of preforms for drawing fibres or  
filaments
- 37/01202 . . . . {Means for storing or carrying optical fibre  
preforms, e.g. containers}
- 37/01205 . . . . {starting from tubes, rods, fibres or filaments  
(C03B 37/014 takes precedence)}
- 37/01208 . . . . . {for making preforms of microstructured,  
photonic crystal or holey optical fibres}
- 37/01211 . . . . . {by inserting one or more rods or tubes into  
a tube}
- 37/01214 . . . . . {for making preforms of multifibres, fibre  
bundles other than multiple core preforms}
- 37/01217 . . . . . {for making preforms of polarisation-  
maintaining optical fibres (polarisation-  
maintaining optical fibres per se  
[G02B 6/105](#))}
- 37/0122 . . . . . {for making preforms of photonic crystal,  
microstructured or holey optical fibres}
- 37/01222 . . . . . {for making preforms of multiple core  
optical fibres (preforms of multifibres  
[C03B 37/01214](#))}
- 37/01225 . . . . . {Means for changing or stabilising the shape,  
e.g. diameter, of tubes or rods in general, e.g.  
collapsing}
- 37/01228 . . . . . {Removal of preform material  
(C03B 37/01251 takes precedence)}
- 37/01231 . . . . . {to form a longitudinal hole, e.g. by  
drilling}
- 37/01234 . . . . . {to form longitudinal grooves, e.g. by  
chamfering}
- 37/01237 . . . . . {to modify the diameter by heat-  
polishing, e.g. fire-polishing}
- 37/0124 . . . . . {Means for reducing the diameter of rods  
or tubes by drawing, e.g. for preform  
draw-down}
- 37/01242 . . . . . {Controlling or regulating the down-  
draw process}
- 37/01245 . . . . . {by drawing and collapsing}
- 37/01248 . . . . . {by collapsing without drawing}
- 37/01251 . . . . . {Reshaping the ends}
- 37/01254 . . . . . {by expanding radially, e.g. by forcing a  
mandrel through or axial pressing a tube or  
rod}
- 37/01257 . . . . . {Heating devices therefor}
- 37/0126 . . . . . {Means for supporting, rotating,  
translating the rod, tube or preform}
- 37/01262 . . . . {Depositing additional preform material as  
liquids or solutions, e.g. solution doping of  
preform tubes or rods}
- 37/01265 . . . {starting entirely or partially from molten glass,  
e.g. by dipping a preform in a melt}
- 37/01268 . . . . {by casting}
- 37/01271 . . . . {by centrifuging}
- 37/01274 . . . . {by extrusion or drawing}
- 37/01277 . . . . {by projecting or spraying the melt, e.g. as  
droplets, on a preform}
- 37/0128 . . . {starting from pulverulent glass}
- 37/01282 . . . . {by pressing or sintering, e.g. hot-pressing}

- 37/01285 . . . . {by centrifuging}
- 37/01288 . . . . {by extrusion, e.g. of glass powder and binder (moulding plastics around a core using a cross-head annular extrusion nozzle B29C 47/28; extrusion presses in general B30B 11/22)}
- 37/01291 . . . . {by progressive melting, e.g. melting glass powder during delivery to and adhering the so-formed melt to a target or preform, e.g. the Plasma Oxidation Deposition [POD] process}
- 37/01294 . . . . {by delivering pulverulent glass to the deposition target or preform where the powder is progressively melted, e.g. accretion}
- 37/01297 . . . . {by melting glass powder in a mould}
- 37/014 . . . . made entirely or partially by chemical means, {e.g. vapour phase deposition of bulk porous glass either by outside vapour deposition [OVD], or by outside vapour phase oxidation [OVPO] or by vapour axial deposition [VAD] (C03C 17/02 takes precedence)}
- 37/01406 . . . . {Deposition reactors therefor}
- 37/01413 . . . . {Reactant delivery systems (C03B 37/01807 takes precedence; devices therefor in general B01D 1/00, B01J 4/00)}
- 37/0142 . . . . {Reactant deposition burners}
- 37/01426 . . . . {Plasma deposition burners or torches}
- 37/01433 . . . . {for delivering and depositing additional reactants as liquids or solutions, e.g. for solution doping of the porous glass preform}
- 37/0144 . . . . {Means for after-treatment or catching of worked reactant gases (C03B 37/01846 takes precedence)}
- 37/01446 . . . . {Thermal after-treatment of preforms, e.g. dehydrating, consolidating, sintering (C03B 37/01853 takes precedence)}
- 37/01453 . . . . {for doping the preform with fluorine}
- 37/0146 . . . . {Furnaces therefor, e.g. muffle tubes, furnace linings}
- 37/01466 . . . . {Means for changing or stabilising the diameter or form of tubes or rods (C03B 37/01861 takes precedence)}
- 37/01473 . . . . {Collapsing}
- 37/0148 . . . . {Means for heating preforms during or immediately prior to deposition (C03B 37/0142, C03B 37/01876 take precedence)}
- 37/01486 . . . . {Means for supporting, rotating or translating the preforms being formed, e.g. lathes (C03B 37/01884 takes precedence)}
- 37/01493 . . . . {Deposition substrates, e.g. targets, mandrels, start rods or tubes}
- 37/016 . . . . by a liquid phase reaction process, e.g. through a gel phase
- 37/018 . . . . by glass deposition on a glass substrate, e.g. by {inside-, modified-, plasma-, or plasma modified- chemical vapour deposition [ICVD, MCVD, PCVD, PMCV], i.e. by thin layer coating on the inside or outside of a glass tube or on a glass rod} (C03B 37/016 takes precedence; {bulk deposition of porous glass by OVD or VAD C03B 37/014} ; surface treatment of glass by coating C03C 17/02)
- 37/01807 . . . . {Reactant delivery systems, e.g. reactant deposition burners}
- 37/01815 . . . . {Reactant deposition burners or deposition heating means}
- 37/01823 . . . . {Plasma deposition burners or heating means}
- 37/0183 . . . . {for plasma within a tube substrate}
- 37/01838 . . . . {for delivering and depositing additional reactants as liquids or solutions, e.g. for solution doping of the deposited glass}
- 37/01846 . . . . {Means for after-treatment or catching of worked reactant gases}
- 37/01853 . . . . {Thermal after-treatment of preforms, e.g. dehydrating, consolidating, sintering}
- 37/01861 . . . . {Means for changing or stabilising the diameter or form of tubes or rods}
- 37/01869 . . . . {Collapsing}
- 37/01876 . . . . {Means for heating tubes or rods during or immediately prior to deposition, e.g. electric resistance heaters (C03B 37/01815 takes precedence)}
- 37/01884 . . . . {Means for supporting, rotating and translating tubes or rods being formed, e.g. lathes}
- 37/01892 . . . . {Deposition substrates, e.g. tubes, mandrels}
- 37/02 . . . . by drawing or extruding, {e.g. direct drawing of molten glass from nozzles; Cooling fins therefor (C03B 37/04 takes precedence; sizing of the fibres C03C 25/00)}
- 37/0203 . . . . {Cooling non-optical fibres drawn or extruded from bushings, nozzles or orifices}
- 37/0206 . . . . {by contacting of the fibres with liquid or mist}
- 37/0209 . . . . {by means of a solid heat sink, e.g. cooling fins}
- 37/0213 . . . . {by forced gas cooling, i.e. blowing or suction}
- 37/0216 . . . . {Solving the problem of disruption of drawn fibre, e.g. breakage, start-up, shut-down procedures}
- 37/022 . . . . from molten glass in which the resultant product consists of different sorts of glass or is characterised by shape, e.g. hollow fibres, {undulated fibres, fibres presenting a rough surface (C03B 37/025 takes precedence)}
- 37/023 . . . . Fibres composed of different sorts of glass, {e.g. glass optical fibres, made by the double crucible technique}
- 37/0235 . . . . {Thermal treatment of the fibre during the drawing process, e.g. cooling (C03B 37/02718 takes precedence; coating C03C 25/10)}

37/025	. . . from reheated softened tubes, rods, fibres or filaments, {e.g. drawing fibres from preforms (draw-down of tubes, rods or preforms to reduced diameter preforms <a href="#">C03B 37/0124</a> )}	37/048	. . . {Means for attenuating the spun fibres, e.g. blowers for spinner cups}
37/0253	. . . . {Controlling or regulating (for glass fibre manufacture in general <a href="#">C03B 37/07</a> )}	37/05	. . . by projecting {molten glass} on a rotating body having no radial orifices
37/0256	. . . . {Drawing hollow fibres ( <a href="#">C03B 37/02781</a> takes precedence)}	37/055	. . . . {by projecting onto and spinning off the outer surface of the rotating body}
37/026	. . . . Drawing fibres reinforced with a metal wire {or with other non-glass material}	37/06	. . by blasting or blowing molten glass, e.g. for making staple fibres
37/027	. . . . Fibres composed of different sorts of glass, {e.g. glass optical fibres} ( <a href="#">C03B 37/0253</a> , <a href="#">C03B 37/028</a> take precedence)	37/065	. . . starting from tubes, rods, fibres or filaments
37/02709	. . . . . {Polarisation maintaining fibres, e.g. PM, PANDA, bi-refrangent optical fibres}	37/07	. Controlling or regulating ({ <a href="#">C03B 37/0253</a> takes precedence } ; controlling or regulating in general <a href="#">G05</a> )
37/02718	. . . . . {Thermal treatment of the fibre during the drawing process, e.g. cooling (coating <a href="#">C03C 25/10</a> )}	37/075	. Manufacture of {non-optical} fibres or filaments consisting of different sorts of glass or characterised by shape, e.g. undulated fibres ( <a href="#">C03B 37/022</a> , <a href="#">C03B 37/027</a> , <a href="#">C03B 37/028</a> take precedence; light guides <a href="#">G02B 6/00</a> )
37/02727	. . . . . . {Annealing or re-heating}	37/0753	. . {consisting of different sorts of glass, e.g. bi-component fibres}
37/02736	. . . . . {Means for supporting, rotating or feeding the tubes, rods, fibres or filaments to be drawn, e.g. fibre draw towers, preform alignment, butt-joining preforms or dummy parts during feeding (uniting rods or tubes <a href="#">C03B 23/207</a> )}	37/0756	. . {Hollow fibres}
37/02745	. . . . . {Fibres having rotational spin around the central longitudinal axis, e.g. alternating +/- spin to reduce polarisation mode dispersion}	37/08	. Bushings, {e.g. construction, bushing reinforcement means}; Spinnerettes; Nozzles; Nozzle plates
37/02754	. . . . . {Solid fibres drawn from hollow preforms}	37/0805	. . {Manufacturing, repairing, or other treatment of bushings, nozzles or bushing nozzle plates}
37/02763	. . . . . {Fibres having axial variations, e.g. axially varying diameter, material or optical properties (rotational spin <a href="#">C03B 37/02745</a> )}	37/081	. . Indirect-melting bushings
37/02772	. . . . . {shaping the preform lower end or bulb, e.g. pre-gobbing, controlling draw bulb shape, or preform draw start-up procedures}	37/083	. . Nozzles; Bushing nozzle plates ( <a href="#">C03B 37/095</a> takes precedence)
37/02781	. . . . . {Hollow fibres, e.g. holey fibres}	37/085	. . Feeding devices therefor
37/0279	. . . . . {Photonic crystal fibres or microstructured optical fibres other than holey optical fibres}	37/09	. . electrically heated
37/028	. . . . Drawing fibre bundles, e.g. for making fibre bundles of multifibres, {image fibres; (Drawing multicore or photonic crystal fibres <a href="#">C03B 37/027</a> )}	37/091	. . . {Indirect-resistance heating}
37/029	. . . . Furnaces therefor	37/092	. . . Direct-resistance heating
37/03	. . . Drawing means, e.g. drawing drums; {Traction or tensioning devices}	37/095	. . Use of materials therefor
37/032	. . . . {for glass optical fibres}	37/10	. Non-chemical treatment ( <a href="#">C03C 25/00</a> takes precedence; yarns or threads <a href="#">D02</a> ; woven fabrics <a href="#">D03</a> ; non-woven fabrics <a href="#">D04</a> )
37/035	. . . . having means for deflecting or stripping-off fibres {or for removing defective parts}	37/12	. . of fibres or filaments during winding up
37/04	. . by using centrifugal force, {e.g. spinning through radial orifices; Construction of the spinner cups therefor (bonder application <a href="#">C03C 25/00</a> )}	37/14	. . Re-forming fibres or filaments, {i.e. changing their shape} ( <a href="#">C03B 37/025</a> takes precedence)
37/041	. . . {Transferring molten glass to the spinner}	37/15	. . . with heat application, e.g. for making optical fibres (fusion-splicing of light guides <a href="#">G02B 6/255</a> ; treatment of light guides to shape optical elements <a href="#">G02B 6/28</a> )
37/042	. . . {starting from tubes, rods, fibres or filaments}	37/16	. . Cutting or severing (light guides <a href="#">G02B 6/25</a> )
37/044	. . . {for producing fibres of at least two distinct glass compositions, e.g. bi-component fibres (conjugated artificial filaments or the like, e.g. with glass fibres, <a href="#">D01F 8/00</a> )}	<b>40/00</b>	<b>Preventing adhesion between glass and glass or between glass and the means used to shape it, {hold it or support it}</b>
37/045	. . . {Construction of the spinner cups}	40/005	. {Fabrics, felts or loose covers}
37/047	. . . {Selection of materials for the spinner cups}	40/02	. by lubrication; Use of materials as release or lubricating compositions
		40/027	. . Apparatus for applying lubricants to glass shaping moulds or tools
		40/033	. . Means for preventing adhesion between glass and glass
		40/04	. using gas
		<b>2201/00</b>	<b>Type of glass produced</b>
		2201/01	. Antique glass imitations
		2201/02	. Pure silica glass, e.g. pure fused quartz
		2201/03	. . Impurity concentration specified
		2201/04	. . . Hydroxyl ion (OH)
		2201/06	. Doped silica-based glasses

- 2201/07 . . Impurity concentration specified
- 2201/075 . . . Hydroxyl ion (OH)
- 2201/08 . . doped with boron or fluorine or other refractive index decreasing dopant
- 2201/10 . . . doped with boron ([C03B 2201/14 takes precedence](#))
- 2201/12 . . . doped with fluorine ([C03B 2201/14 takes precedence](#))
- 2201/14 . . . doped with boron and fluorine
- 2201/20 . . doped with non-metals other than boron or fluorine
- 2201/21 . . . doped with molecular hydrogen
- 2201/22 . . . doped with deuterium
- 2201/23 . . . doped with hydroxyl groups
- 2201/24 . . . doped with nitrogen, e.g. silicon oxy-nitride glasses

**NOTE**

Codes [C03B 2201/28](#), [C03B 2201/31](#) and [C03B 2201/32](#) for the common dopants P, Ge and Al respectively, are only used for features specific to such dopants and not for general cases, such as for increasing the refractive index of silica glass.

- 2201/28 . . . doped with phosphorus
- 2201/30 . . doped with metals, e.g. Ga, Sn, Sb, Pb or Bi
- 2201/31 . . . doped with germanium
- 2201/32 . . . doped with aluminium ([C03B 2201/36 takes precedence](#))
- 2201/34 . . . doped with rare earth metals, i.e. with Sc, Y or lanthanides, e.g. for laser-amplifiers
- 2201/36 . . . . doped with rare earth metals and aluminium, e.g. Er-Al co-doped
- 2201/40 . . . doped with transition metals other than rare earth metals, e.g. Zr, Nb, Ta or Zn
- 2201/42 . . . . doped with titanium
- 2201/50 . . . doped with alkali metals
- 2201/54 . . . doped with beryllium, magnesium or alkaline earth metals
- 2201/58 . . . doped with metals in non-oxide form, e.g. CdSe
- 2201/60 . Silica-free oxide glasses
- 2201/62 . . containing boron
- 2201/70 . . containing phosphorus
- 2201/78 . . containing germanium
- 2201/80 . Non-oxide glasses or glass-type compositions
- 2201/82 . . Fluoride glasses, e.g. ZBLAN glass
- 2201/83 . . . Ionic or single crystal type, e.g. NaF, LiF, CaF<sub>2</sub>
- 2201/84 . . Halide glasses other than fluoride glasses, i.e. Cl, Br or I glasses, e.g. AgCl-AgBr "glass"
- 2201/86 . . Chalcogenide glasses, i.e. S, Se or Te glasses
- 2201/88 . . Chalcohalide glasses, i.e. containing one or more of S, Se, Te and one or more of F, Cl, Br, I

**2203/00 Fibre product details, e.g. structure, shape**

- 2203/02 . External structure or shape details
- 2203/04 . . Polygonal outer cross-section, e.g. triangular, square
- 2203/06 . . Axial perturbations, e.g. twist, by torsion, undulating, crimped
- 2203/10 . Internal structure or shape details
- 2203/12 . . Non-circular or non-elliptical cross-section, e.g. planar core

- 2203/14 . . Non-solid, i.e. hollow products, e.g. hollow clad or with core-clad interface
- 2203/16 . . . Hollow core
- 2203/18 . . Axial perturbations, e.g. in refractive index or composition
- 2203/19 . . . Alternating positive/negative spins or twists
- 2203/20 . . . helical
- 2203/22 . . Radial profile of refractive index, composition or softening point
- 2203/222 . . . Mismatching viscosities or softening points of glass layers
- 2203/223 . . . Matching viscosities or softening points of glass layers
- 2203/224 . . . Mismatching coefficients of thermal expansion [CTE] of glass layers
- 2203/225 . . . Matching coefficients of thermal expansion [CTE] of glass layers
- 2203/23 . . . Double or multiple optical cladding profiles
- 2203/24 . . . Single mode [SM or monomode]
- 2203/26 . . . Parabolic or graded index [GRIN] core profile
- 2203/28 . . . Large core fibres, e.g. with a core diameter greater than 60 micrometers
- 2203/29 . . . Segmented core fibres
- 2203/30 . Polarisation maintaining [PM], i.e. birefringent products, e.g. with elliptical core, by use of stress rods, "PANDA" type fibres
- 2203/302 . . Non-circular core cross-sections
- 2203/31 . . by use of stress-imparting rods, e.g. by insertion
- 2203/32 . Eccentric core or cladding
- 2203/34 . Plural core other than bundles, e.g. double core
- 2203/36 . Dispersion modified fibres, e.g. wavelength or polarisation shifted, flattened or compensating fibres (DSF, DFF, DCF)
- 2203/40 . Multifibres or fibre bundles, e.g. for making image fibres
- 2203/42 . Photonic crystal fibres, e.g. fibres using the photonic bandgap PBG effect, microstructured or holey optical fibres

**2205/00 Fibre drawing or extruding details**

- 2205/02 . Upward drawing
- 2205/04 . Non-vertical drawing
- 2205/06 . Rotating the fibre fibre about its longitudinal axis
- 2205/07 . . Rotating the preform about its longitudinal axis
- 2205/08 . Sub-atmospheric pressure applied, e.g. vacuum
- 2205/09 . . to the outside of the preform or fibre
- 2205/10 . pressurised
- 2205/12 . Drawing solid optical fibre directly from a hollow preform
- 2205/13 . . from a hollow glass tube containing glass-forming material in particulate form, e.g. to form the core by melting the powder during drawing
- 2205/14 . . comprising collapse of an outer tube onto an inner central solid preform rod
- 2205/16 . . the drawn fibre consisting of circularly symmetric core and clad
- 2205/20 . Irradiation of the base fibre during drawing to modify waveguide properties
- 2205/30 . Means for continuous drawing from a preform
- 2205/32 . Simultaneous drawing of multiple preforms to separate multiple fibres
- 2205/40 . Monitoring or regulating the draw tension or draw rate
- 2205/42 . Drawing at high speed, i.e. > 10 m/s

- 2205/44 . . . Monitoring or regulating the preform feed rate
- 2205/45 . . . Monitoring or regulating the preform neck-down region with respect to position or shape
- 2205/46 . . . Monitoring or regulating the preform position with respect to the draw axis
- 2205/47 . . . Shaping the preform draw bulb before or during drawing
- 2205/50 . . . Cooling the drawn fibre using liquid coolant prior to coating, e.g. indirect cooling via cooling jacket
- 2205/51 . . . . . using liquified or cryogenic gas
- 2205/52 . . . . . by direct contact with liquid coolant, e.g. as spray, mist
- 2205/53 . . . . . by passage through liquid coolant bath
- 2205/54 . . . . . After-treatment to remove coolant attached to cooled fibre
- 2205/55 . . . Cooling or annealing the drawn fibre prior to coating using a series of coolers or heaters
- 2205/56 . . . Annealing or re-heating the drawn fibre prior to coating
- 2205/57 . . . Recovering, recycling or purifying the coolant, e.g. helium
- 2205/60 . . . Optical fibre draw furnaces
- 2205/61 . . . . . Recovering, recycling or purifying the inert gas, e.g. helium
- 2205/62 . . . . . Heating means for drawing
- 2205/63 . . . . . . . Ohmic resistance heaters, e.g. carbon or graphite resistance heaters
- 2205/64 . . . . . . . Induction furnaces, i.e. HF/RF coil, e.g. of the graphite or zirconia susceptor type
- 2205/66 . . . . . . . Microwave or similar electromagnetic wave heating, e.g. resonant cavity type
- 2205/67 . . . . . . . Laser heating
- 2205/68 . . . . . . . Hot gas, e.g. plasma, flame, burner
- 2205/69 . . . . . . . Auxiliary thermal treatment immediately prior to drawing, e.g. pre-heaters, laser-assisted resistance heaters
- 2205/70 . . . . . Draw furnace insulation
- 2205/72 . . . . . Controlling or measuring the draw furnace temperature
- 2205/74 . . . . . Means for moving at least a part of the draw furnace, e.g. by rotation or vertical or horizontal movement
- 2205/80 . . . . . Means for sealing the preform entry or upper end of the furnace
- 2205/81 . . . . . . . using gas
- 2205/82 . . . . . Means for sealing the fibre exit or lower end of the furnace
- 2205/83 . . . . . . . using gas
- 2205/90 . . . . . Manipulating the gas flow through the furnace other than by use of upper or lower seals, e.g. by modification of the core tube shape or by using baffles
- 2205/91 . . . . . . . by controlling the furnace gas flow rate into or out of the furnace
- 2205/92 . . . . . . . using means for gradually reducing the cross-section towards the outlet or around the preform draw end, e.g. tapered
- 2205/96 . . . . . . . using tangential feed approximately perpendicular to the draw axis
- 2205/98 . . . . . . . using annular gas inlet distributors
- 2207/00 Glass deposition burners**
- 2207/02 . . . Elongated flat flame or slit-nozzle type
- 2207/04 . . . Multi-nested ports
- 2207/06 . . . . . Concentric circular ports
- 2207/08 . . . . . Recessed or protruding ports
- 2207/10 . . . . . Split ports
- 2207/12 . . . . . Nozzle or orifice plates
- 2207/14 . . . . . Tapered or flared nozzles or ports angled to central burner axis
- 2207/16 . . . . . Non-circular ports, e.g. square or oval
- 2207/18 . . . . . Eccentric ports
- 2207/20 . . . . . Specific substances in specified ports, e.g. all gas flows specified
- 2207/22 . . . . . Inert gas details
- 2207/24 . . . . . Multiple flame type, e.g. double-concentric flame
- 2207/26 . . . . . Multiple ports for glass precursor
- 2207/28 . . . . . . . for different glass precursors, reactants or modifiers
- 2207/30 . . . For glass precursor of non-standard type, e.g. solid  $\text{SiH}_3\text{F}$
- 2207/32 . . . . . Non-halide
- 2207/34 . . . . . Liquid, e.g. mist or aerosol
- 2207/36 . . . Fuel or oxidant details, e.g. flow rate, flow rate ratio, fuel additives
- 2207/38 . . . . . Fuel combinations or non-standard fuels, e.g.  $\text{H}_2 + \text{CH}_4$ , ethane
- 2207/40 . . . Mechanical flame shields
- 2207/42 . . . Assembly details; Material or dimensions of burner; Manifolds or supports
- 2207/46 . . . . . Comprising performance enhancing means, e.g. electrostatic charge or built-in heater
- 2207/50 . . . . . Multiple burner arrangements
- 2207/52 . . . . . Linear array of like burners
- 2207/54 . . . . . combined with means for heating the deposit, e.g. non-deposition burner
- 2207/60 . . . Relationship between burner and deposit, e.g. position
- 2207/62 . . . . . Distance
- 2207/64 . . . . . Angle
- 2207/66 . . . . . Relative motion
- 2207/70 . . . Control measures
- 2207/80 . . . Feeding the burner or the burner-heated deposition site
- 2207/81 . . . . . Constructional details of the feed line, e.g. heating, insulation, material, manifolds, filters
- 2207/85 . . . . . with vapour generated from liquid glass precursors, e.g. directly by heating the liquid
- 2207/86 . . . . . . . by bubbling a gas through the liquid
- 2207/87 . . . . . . . Controlling the temperature
- 2207/88 . . . . . . . Controlling the pressure
- 2207/89 . . . . . . . Controlling the liquid level in or supply to the tank
- 2207/90 . . . . . with vapour generated from solid glass precursors, i.e. by sublimation
- 2211/00 Heating processes for glass melting in glass melting furnaces**
- 2211/20 . . . Submerged gas heating
- 2211/22 . . . . . by direct combustion in the melt
- 2211/23 . . . . . . . using oxygen, i.e. pure oxygen or oxygen-enriched air
- 2211/24 . . . . . by direct contact of non-combusting hot gas in the melt
- 2211/25 . . . . . by indirect heating, e.g. with heat pipes
- 2211/30 . . . introducing oxygen into the glass melting furnace separately from the fuel

- 2211/40 . using oxy-fuel burners
- 2211/60 . . oxy-fuel burner construction
- 2211/62 . . . flat-flame
- 2211/70 . Skull melting, i.e. melting or refining in cooled wall crucibles or within solidified glass crust, e.g. in continuous walled vessels
- 2211/71 . . within segmented wall vessels where the molten glass solidifies between and seals the gaps between wall segments
- 2215/00 Press-moulding glass**
- 2215/02 . Press-mould materials
- 2215/03 . . defined by material properties or parameters, e.g. relative CTE of mould parts
- 2215/05 . . Press-mould die materials
- 2215/06 . . . Metals or alloys
- 2215/07 . . . Ceramic or cermets
- 2215/08 . . Coated press-mould dies
- 2215/10 . . . Die base materials
- 2215/11 . . . . Metals
- 2215/12 . . . . Ceramics or cermets, e.g. cemented WC, Al<sub>2</sub>O<sub>3</sub> or TiC
- 2215/14 . . . Die top coat materials, e.g. materials for the glass-contacting layers
- 2215/16 . . . . Metals or alloys, e.g. Ni-P, Ni-B, amorphous metals
- 2215/17 . . . . . comprising one or more of the noble metals, i.e. Ag, Au, platinum group metals
- 2215/20 . . . . Oxide ceramics
- 2215/22 . . . . Non-oxide ceramics ([carbon C03B 2215/24](#))
- 2215/24 . . . . Carbon, e.g. diamond, graphite, amorphous carbon
- 2215/26 . . . . Mixtures of materials covered by more than one of the groups [C03B 2215/16](#) - [C03B 2215/24](#), e.g. C-SiC, Cr-Cr<sub>2</sub>O<sub>3</sub>, SIALON
- 2215/30 . . . Intermediate layers, e.g. graded zone of base/top material
- 2215/31 . . . . Two or more distinct intermediate layers or zones
- 2215/32 . . . . of metallic or silicon material
- 2215/34 . . . . of ceramic or cermet material, e.g. diamond-like carbon
- 2215/38 . . . . Mixed or graded material layers or zones
- 2215/40 . Product characteristics
- 2215/404 . . Products with identification marks
- 2215/406 . . Products comprising at least two different glasses
- 2215/41 . . Profiled surfaces
- 2215/412 . . . fine structured, e.g. fresnel lenses, prismatic reflectors, other sharp-edged surface profiles
- 2215/413 . . . optical fibre alignment, fixing or connecting members having V-grooves
- 2215/414 . . . Arrays of products, e.g. lenses
- 2215/44 . . Flat, parallel-faced disc or plate products
- 2215/45 . . Ring or doughnut disc products or their preforms
- 2215/46 . . Lenses, e.g. bi-convex
- 2215/47 . . . Bi-concave
- 2215/48 . . . Convex-concave
- 2215/49 . . . Complex forms not covered by groups [C03B 2215/47](#) or [C03B 2215/48](#)
- 2215/50 . Structural details of the press-mould assembly
- 2215/60 . Aligning press die axes
- 2215/61 . Positioning the glass to be pressed with respect to the press dies or press axis
- 2215/62 . Vibration-assisted pressing
- 2215/63 . Pressing between porous dies supplied with gas, i.e. contactless pressing
- 2215/64 . Spinning, centrifuging or using g-force to distribute the glass
- 2215/65 . Means for releasing gas trapped between glass and press die
- 2215/66 . Means for providing special atmospheres, e.g. reduced pressure, inert gas, reducing gas, clean room
- 2215/67 . Pressing between dies rotating about the press axis
- 2215/68 . Means for parting the die from the pressed glass other than by cooling or use of a take-out
- 2215/69 . Controlling the pressure applied to the glass via the dies
- 2215/70 . Horizontal or inclined press axis
- 2215/71 . Injecting molten glass into the mould cavity
- 2215/72 . Barrel presses or equivalent, e.g. of the ring mould type
- 2215/73 . . with means to allow glass overflow in a direction perpendicular to the press axis
- 2215/74 . . . with means to trim off excess material
- 2215/76 . Pressing whereby some glass overflows unrestrained beyond the press mould in a direction perpendicular to the press axis
- 2215/77 . . with means to trim off excess material
- 2215/78 . Pressing together along two or more perpendicular axes
- 2215/79 . Uniting product and product holder during pressing, e.g. lens and lens holder
- 2215/80 . Simultaneous pressing of multiple products; Multiple parallel moulds
- 2215/86 . Linear series of multiple press moulds
- 2215/87 . . with change of transportation direction in the horizontal plane, e.g. rectangular or "U" shape serial transport
- 2225/00 Transporting hot glass sheets during their manufacture**
- 2225/02 . Means for positioning, aligning or orientating the sheets during their travel, e.g. stops