Glass production/Production Technology

1.11 Suppliers for the glass machinery industry

1.1 Glass production/Production Technology
1.1.1 Raw material for glass production
1.1.2 Auxiliary and operating materials
1.1.2.1 Refractories
1.1.2.2 Industrial gases
1.1.2.3 Lubricants and coolants
1.1.2.4 Laboratory equipment
1.1.3 Preparation of raw materials and batches
1.1.3.1 Crushing and grinding
1.1.3.2 Drying technology
1.1.3.3 Measuring and weighing technology
1.1.3.4 Mixing technology
1.1.3.5 Pelletising technology
1.1.3.6 Cullet preparation
1.1.3.7 Refuse collection and glass recycling
1.1.3.8 Raw material technology and prewarming cullet technology
1.1.3.9 Colour sorting (cullet)
1.1.3.10 Ventilation systems
1.1.3.11 Batch calculation and assessment of glass properties
1.1.4 Glass melting technology
1.1.4.1 Batch charging technology
1.1.4.2 Forehearth technology
1.1.4.3 Melting technology for tank furnaces
1.1.4.4 Melting technology for pot furnaces
1.1.4.5 Gas equipment and supply systems
1.1.4.6 Regenerative systems
1.1.4.7 Recuperative systems
1.1.4.8 Electrically heated systems
1.1.4.9 Combustion technology
1.1.4.9.1 Combustion technology for gas-fired melting furnaces
1.1.4.9.2 Combustion technology for oxy-fired furnaces
1.1.4.10 Feeder colouring
1.1.4.11 Alternative energy systems
1.1.4.12 Hydrogen technologies
1.1.4.13.1 Renewable energy systems
1.1.4.13.2 Other energy systems
1.1.5 Forming for flat glass
1.1.5.1 Float glass technique
1.1.5.2 Glass drawing technique
1.1.5.3 Casting and rolling technology
1.1.6 Forming for hollow glass
1.1.6.1 Gob feeder
1.1.6.2 Ball gatherer
1.1.6.3 Suction feeder
1.1.6.4 Platinum feeder
1.1.6.5 Shear blades
1.1.6.6 Blowing machines
1.1.6.7 Press machines
1.1.6.8 Press-blow-machines
1.1.6.9 Spinning machines
1.1.6.10 Injection machines
1.1.6.11 Ampule and laboratory glass machines
1.1.6.12 Bottle and glass container machines
1.1.6.13 Molds for glass production
1.1.6.14 Flash welding and fire polishing machines
1.1.6.15 Dosing systems
1.1.6.16 Glass mould spray systems
1.1.6.17 Aids for the forming of hollow glass
1.1.7 Equipment for glass tube production
1.1.8 Equipment for glass fibre production
1.1.8.1 Glass wool technology
1.1.8.2 Rock wool technology
1.1.8.3 Textile glass fibre technology
1.1.9 Kiln technology
1.1.9.1 Transport systems
1.1.9.2 Stacker systems
1.1.9.3 Annealing lehrs, continuous/intermittent operation
1.1.9.4 Decorating lehrs
1.1.9.5 Pre-heating furnaces
1.1.9.6 Fusing Kilns
1.1.10 Cold end technology for float glass, laminated glass, wired glass and other types of flat glass
1.1.10.1 Cullet transportation
1.1.10.2 Inspection systems
1.1.10.3 Paper applying machines
1.1.10.4 Separator applying machines
1.1.10.5 Stacking machines
1.1.11 Coating technology for hollow glass
1.1.11.1 Hot end coating
1.1.11.2 Cold end coating
1.1.11.3 Strengthening coating
1.1.12 Conveying, transport, packing and warehouse technology
1.1.12.1 Feeding and stacking systems
1.1.12.2 Transport and handling systems
1.1.12.3 Conveying, sorting and storage facilities
1.1.12.4 Packing lines – boxes, shrinking, hoop-casing machinery
1.1.12.5 Warehouse technology
1.1.12.6 Glass racks for transport and warehouse
1.1.12.7 Vehicles for glass transport
1.1.12.8 Construction and glazing equipment
1.1.12.9 Parts for conveying, transport, packing and warehouse technology
1.1.13 Photovoltaic production/Production Technologies
1.1.13.1 Wafer production
1.1.13.2 Etching (wet/dry)
1.1.13.3 Edge isolation (wet/laser)
1.1.13.4 Coating systems
1.1.13.5 Metallisation
1.1.13.6 Printing machines
1.1.13.7 Other technologies for cell production
1.1.13.8 Panel production
1.1.13.9 Laminators
1.1.13.10 Coating/spattering systems
1.1.13.11 Structuring
1.1.13.12 Tempering furnaces
1.1.13.13 Edge deletion
1.1.13.14 Contacting
1.1.13.15 Foil handling
Glass processing and finishing

2.1 Cutting, breaking and snapping technology
2.1.1 Cutting technology
2.1.1.1 Cutting technology for float glass
2.1.1.2 Cutting technology for laminated safety glass (LSG)
2.1.1.3 Cutting technology for technical glass
2.1.2 Glass saws
2.1.3 Devices for coating removal
2.1.4 Snapping technology flat glass
2.1.4.1 Mechanical snapping devices
2.1.4.2 Thermal snapping devices
2.1.5 Crack-off technology hollow glass
2.1.5.1 Mechanical crack-off devices
2.1.5.2 Thermal crack-off devices
2.1.6 Rim polishing machines

2.2 Drilling technology
2.2.1 Edge and surface finishing technology
2.2.1.1 Grinding techniques for float glass
2.2.1.2 Grinding techniques for shaped glass
2.2.1.3 Grinding techniques for moulded glass
2.2.1.4 Decorative grinding technology
2.2.1.5 Surface grinding technology
2.2.2 Matting/Supercalendering/etching/sand blasting technologies
2.2.3 Glass frostig
2.2.4 Polishing technology
2.2.5 UV edge lapping technology
2.2.6 Printing technology
2.2.7 Screen printing techniques
2.2.7.1 Digital printing technology
2.2.7.2 Pad printing technology
2.2.7.3 Inkjet, 3D printing technology
2.2.7.4 Other printing/coating technology

2.3 Forming and bending technology
2.3.1 Laser technology
2.3.1.1 Laser cutting technology
2.3.1.2 Laser marking technology
2.3.1.3 Laser-drilling technology
2.3.1.4 Laser removing technology
2.3.1.5 Laser fusing technology
2.3.1.6 Components and accessories (Laser technology)

2.4 Coating technology
2.4.1 Vacuum coating equipment
2.4.2 Enameling machines, thermal printing equipment
2.4.3 Mirror coating equipment
2.4.4 Metallizing machines
2.4.5 Dryers and enameling furnaces
2.4.6 UV-Absorption – Coating (pyrolytic)
2.4.7 IR-Reflective Coating (pyrolytic)
2.4.8 Sealing- and Barrier-Coatings

Electronic display glass technology
2.7.1 Machines and equipment for the production of display glass
2.7.2 Components and accessories for display glass technology

Insulation glass technology
2.8.1 Plants for insulating glass production
2.8.1.1 Plants for triple glazing
2.8.1.2 Plants for quadruple glazing
2.8.2 Production equipment for spacers
2.8.3 Production equipment for insulating glass frames
2.8.4 Edge deletion equipment
2.8.5 Gas filling machines and gas devices
2.8.6 Sealing techniques
2.8.7 Production equipment for vacuum insulating glass

Safety glass technology
2.9.1 Pre-tempering technology
2.9.1.1 Furnaces for thermal pre-tempering of glass
2.9.1.2 Furnaces for chemical pre-tempering of glass
2.9.2 Laminated glass technology
2.9.2.1 Laminated glass technology with foil for architectural glass
2.9.2.2 Laminated glass technology with foil for automotive glass
2.9.2.3 Laminated glass technology with adhesives, casting resin and laminate film
2.9.3 Foil treating technology
2.9.3.1 Storing, climate control, uncoiling
2.9.3.2 Autoclaves

Cleaning technology
2.10.1 Washing machines and equipment
2.10.2 Brushing, high-pressure and ultrasonic systems
2.10.3 Screen washing machines and plants for screen de-laminating

Auxiliary products
2.11.1 Tools
2.11.2 Spare parts and consumables
2.11.3 Insulating materials
2.11.4 Sealants
2.11.5 Spacers
2.11.6 Compressors
2.11.7 Vacuum pumps
2.11.8 Chemicals
2.11.8.1 Chemical drying – desiccants
2.11.8.2 Chemical grading and polishing materials
2.11.8.3 Chemical sealants
2.11.8.4 Chemical rust prevention agents
2.11.8.5 Chemical protection material for glass
2.11.8.6 Chemical cleaning agents
2.11.8.7 Other chemicals
3.2.6 Display glass
3.2.6.1 LED/OLED technology
3.2.6.2 LCD glass technology
3.2.6.3 Touch screen display glass
3.2.7 Other coated types of glass
3.2.8 Antireflective glass/frosted glass
3.2.9 Curved glass
3.2.10 Printed glass
3.2.11 Optical glass
3.2.12 Self-cleaning glass
3.2.13 Solar glass
3.2.13.1 Solar Float glass
3.2.13.2 Solar Rolled glass
3.2.14 Vacuum Insulating glass
3.2.15 Aluminium silicate glass
3.2.16 Processed flat glass (general)

3.3 Automotive glass
3.3.1 Vehicle glass
3.3.1.1 Sealants and adhesives
3.3.1.2 Foils (PVB)
3.3.1.2.1 Polymer foils for smart glass
3.3.1.2.2 Other foils
3.3.1.3 Name coating technology
3.3.2 Materials
3.3.3 Bonding technology
3.3.4 Tools
3.3.5 Trade

3.4 Solar technology
3.4.1 Photovoltaics
3.4.1.1 Crystalline PV panels
3.4.1.1.1 Thin film PV panels
3.4.1.1.2 Multi functional PV panels and elements
3.4.1.1.3 Organic Photovoltaics
3.4.1.1.4 Solar thermal energy
3.4.1.2 Solar thermal system components
3.4.1.3 Solar architecture and building integrated photovoltaics (BIPV)
3.4.1.4 Other accessories and services

3.5 Other glasses
3.5.1 Paving blocks, roof tiles
3.5.2 Glass spheres and stones
3.5.3 Quartz glass
3.5.4 Polysters
3.5.5 Foam glass
3.5.6 Laboratory glass
3.5.7 Glass bricks
3.5.8 Other types of special glass

3.6 Glass and mineral fibres
3.6.1 Glass and mineral fibres (general)
3.6.2 Glass fibres made of optical glass

3.7 Processed flat glass
3.7.1 Bulletproof panels
3.7.1.1 Ballistic glass
3.7.1.2 Spandrel panels (general)
3.7.1.3 Construction with glass
3.10 Interior design and decoration
3.10.1 Glass furniture
3.10.2 Parting walls in glass
3.10.3 Panelling and countertops
3.10.4 Glass stairs
3.10.5 Showers and bathrooms
3.10.6 Glass sinks
3.10.7 Mirrors
3.11 LED technology
3.11.1 LED fixture technology
3.11.2 LED display technology
3.12 Lamps
3.12.1 Energy saving lamps
3.12.2 Tube lamp technology
4 Tools, replacement and spare parts, auxiliary equipment and fittings
4.1 Glazing tools
4.1.1 Mechanical tools
4.1.2 Electromechanical tools
4.1.3 Tools and smelting equipment for glass makers
4.1.4 Turning aids and lifting tools for glass makers
4.2 Cutting, grinding and drilling tools
4.3 Surface treatment, Printing Technology, Coating Technology, Adhesive Technology
4.3.1 Points for Dejka, digital printing
4.3.2 Screenprinting, framing, painting and texturing tools
4.3.3 Pad printing
4.3.4 Spray tools, equipment and spray paints
4.3.5 Sputtering targets for flat glass coating
4.3.6 Mirror coating products
4.3.7 Highly opaque special colours and conductive silver pastes for automotive glasses
4.3.8 Highly opaque special colours and conductive silver pastes for PV glasses
4.4 Handling tools, hand-guided
4.5 Spare and wearing parts
4.6 Protection devices
<table>
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<th>Working clothing</th>
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<td>Cable and hose drag chains</td>
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<td>Lifting and working platforms</td>
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<td>4.10</td>
<td>Adhesive technology</td>
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### 5 Measurement, testing, control technology and software

#### 5.1 Measurement and control technology, sensing

- 5.1.1 Measurement and control
- 5.1.2 Measurement and control of glass level
- 5.1.3 Measurement and control of viscosity
- 5.1.4 Measurement and control of radiation in the melt
- 5.1.5 Measurement and control of glass thickness
- 5.1.6 Measurement and control of glass temperature
- 5.1.7 Measurement and control of glass tension
- 5.1.8 Inspection technology
- 5.1.9 Inspection of surface, contour and imperfection
- 5.1.10 Measurement, control and inspection of gas mixture
- 5.1.11 Measurement, control and inspection of gas-filling levels
- 5.1.12 Video inspection glass furnace
- 5.1.13 Measuring devices to be used on site
- 5.1.14 Detectors for laminated glass
- 5.1.15 Control and automation technology

#### 5.2 Regulation technology

- 5.2.1 MRP machine and transport adjustment
- 5.2.2 CNC control for handling machines
- 5.2.3 Electronically controlled machine cooling
- 5.2.4 Controls for glass inspection machines

#### 5.3 Host computer systems, IT, Communication and Security Technology

- 5.3.1 MRP/CAD/CIM systems
- 5.3.2 Inspection, protocolling and diagnostic systems
- 5.3.3 Process control systems
- 5.3.4 Other control systems

#### 5.4 Software

- 5.4.1 Gob control software
- 5.4.2 Optimization of glass cutting and glass production yield
- 5.4.3 Machine control software
- 5.4.4 Software and applications for architects and planners
- 5.4.5 BIM - Building Integrated Modeling
- 5.4.6 Artificial Intelligence
- 5.4.7 Standardized interfaces
- 5.4.8 Additive manufacturing/3D printing

#### 5.5 Measuring and testing technology/Software

- 5.5.1 Single cell and string testers, module testers, test chambers
- 5.5.2 Visual inspection systems
- 5.5.3 Process control
- 5.5.4 Software

#### 5.6 Motorized Technology

#### 5.7 Hydraulics/Pneumatics

### 6 Decarbonisation

#### 6.1 Analysis of the CO2 footprint

#### 6.2 Financing

#### 6.3 Engineering consulting

### 7 Contracting, consulting, engineering, services

#### 8 Research and teaching, trade literature, trade associations and organisations