

Düsseldorf
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1
Glass production/Production Technology

- 1.1** Raw material for glass production
- 1.2** Auxiliary and operating materials
 - 1.2.1 Refractories
 - 1.2.2 Industrial gases
 - 1.2.3 Lubricants and coolants
 - 1.2.4 Laboratory equipment
- 1.3** Preparation of raw materials and batches
 - 1.3.1 Crushing and grading
 - 1.3.2 Drying technology
 - 1.3.3 Metering and weighing technology
 - 1.3.4 Mixing technology
 - 1.3.5 Pelletising technology
 - 1.3.6 Cullet preparation
 - 1.3.7 Refuse collection and glass recycling
 - 1.3.8 Raw material technology and prewarming cullet technology
 - 1.3.9 Colour sorting (cullet)
 - 1.3.10 Ventilation systems
 - 1.3.11 Batch calculation and assessment of glass properties
- 1.4** Glass melting technology
 - 1.4.1 Batch charging technology
 - 1.4.2 Forehearth technology
 - 1.4.3 Melting technology for tank furnaces
 - 1.4.4 Melting technology for pot furnaces
 - 1.4.5 Gas equipment and supply systems
 - 1.4.6 Regenerative systems
 - 1.4.7 Recuperative systems
 - 1.4.8 Electrically heated systems
 - 1.4.9 Combustion technology
 - 1.4.9.1 Combustion technology for oil and gas fired melting furnaces
 - 1.4.9.2 Combustion technology for oxy-fired systems
 - 1.4.10 Feeder colouring
- 1.5** Forming for flat glass
 - 1.5.1 Float glass technique
 - 1.5.2 Glass drawing technique
 - 1.5.3 Casting and rolling technology
- 1.6** Forming for hollow glass
 - 1.6.1 Gob feeder
 - 1.6.2 Ball gatherer
 - 1.6.3 Suction feeder
 - 1.6.4 Platinum feeder
 - 1.6.5 Shear blades
 - 1.6.6 Blowing machines
 - 1.6.7 Press machines
 - 1.6.8 Press-blow-machines
 - 1.6.9 Spinning machines
 - 1.6.10 Injection machines
 - 1.6.11 Ampoule and laboratory glass machines
 - 1.6.12 Bottle and glass container machines
 - 1.6.13 Moulds for glass production
 - 1.6.14 Flash welding and fire polishing machines
 - 1.6.15 Dosing systems
 - 1.6.16 Glass mould spray systems
 - 1.6.17 Aids for the forming of hollow glass
- 1.7** Equipment for glass tube production

1.8
Equipment for glass fibre production

- 1.8.1 Glass wool technology
- 1.8.2 Rock wool technology
- 1.8.3 Textile glass fibre technology
- 1.9** Kiln technology
 - 1.9.1 Transport systems
 - 1.9.2 Stackers systems
 - 1.9.3 Annealing lehrs, continuous/intermittent operation
 - 1.9.4 Decorating lehrs
 - 1.9.5 Pre-heating furnaces
 - 1.9.6 Fusing Kilns
- 1.10** Cold end technology for float glass, laminated glass, wired glass and other types of flat glass
 - 1.10.1 Cullet transportation
 - 1.10.2 Inspection systems
 - 1.10.3 Paper applying machines
 - 1.10.4 Separator applying machines
 - 1.10.5 Stacking machines
- 1.11** Suppliers for the glass machinery industry
- 1.12** Coating technology for hollow glass
 - 1.12.1 Hot end coating
 - 1.12.2 Cold end coating
 - 1.12.3 Strengthening coating
- 1.13** Conveying, transport, packing and warehouse technology
 - 1.13.1 Feeding and stacking systems
 - 1.13.2 Transport and handling systems
 - 1.13.3 Conveying, sorting and storage facilities
 - 1.13.4 Packing lines - boxes, shrinking, hoop-casing machinery
 - 1.13.5 Warehouse technology
 - 1.13.6 Glass racks for transport and warehouse
 - 1.13.7 Vehicles for glass transport
 - 1.13.8 Construction and glazing equipment
 - 1.13.9 Parts for conveying, transport, packing and warehouse technology
- 1.14** Photovoltaic production/Production Technologies
 - 1.14.1 Wafer production
 - 1.14.1.1 Etching (wet/dry)
 - 1.14.1.2 Edge isolation (wet/laser)
 - 1.14.1.3 Coating systems
 - 1.14.1.4 Metallisation
 - 1.14.1.5 Printing machines
 - 1.14.1.6 Other technologies for cell production
 - 1.14.2 Panel production
 - 1.14.2.1 Laminators
 - 1.14.2.2 Coating/sputtering systems
 - 1.14.2.3 Structuring
 - 1.14.2.4 Tempering furnaces
 - 1.14.2.5 Edge deletion
 - 1.14.2.6 Contacting
 - 1.14.2.7 Foil handling
 - 1.14.2.8 Laminating
 - 1.14.2.9 Butyl edge application and other encapsulation methods
 - 1.14.2.10 Panel sorting and packaging
 - 1.14.2.11 Other technologies for panel production (thin-film)

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- 1.14.2.12 Coating material, sputtering targets
- 1.14.2.13 Distribution bars and soldering material
- 1.14.3 Sealants and foils (PVB)
- 1.14.4 Other materials

2

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

2.3 Edge and surface finishing technology

- 2.3.1 Grinding techniques for flat glass
 - 2.3.1.1 Grinding techniques for straight edges
 - 2.3.1.2 Grinding techniques for shaped glass
 - 2.3.1.3 Grinding techniques for moulded glass
- 2.3.2 Grinding techniques for hollow glass/moulded glass
 - 2.3.2.1 Decorative grinding technology
 - 2.3.2.2 Surface grinding technology
- 2.3.3 Matting/Supercalendering/etching/sand blasting technologies
- 2.3.4 Glass frosting
- 2.3.5 Polishing technology
- 2.3.6 UV edge taping technology
- 2.3.7 Printing technology
 - 2.3.7.1 Screen printing techniques
 - 2.3.7.2 Digital printing technology
 - 2.3.7.3 Pad printing technology
 - 2.3.7.4 Spraying technology
 - 2.3.7.5 Inkjet, 3D printing technology
 - 2.3.7.6 Other printing / coating technology

2.4 Forming and bending technology

2.5 Laser technology

- 2.5.1 Laser cutting technology
- 2.5.2 Laser marking technology
- 2.5.3 Laser drilling technology
- 2.5.4 Laser removing technology
- 2.5.5 Laser fusing technology
- 2.5.6 Components and accessories (Laser technology)

2.6 Coating technology

- 2.6.1 Vacuum coating equipment
- 2.6.2 Enameling machines, thermal printing equipment
- 2.6.3 Mirror coating equipment
- 2.6.4 Metallizing machines
- 2.6.5 Dryers and enameling furnaces
- 2.6.6 UV-Absorption - Coating (pyrolytic)
- 2.6.7 IR-Reflective Coating (pyrolytic)

2.7

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

2.8

- 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

2.9

- 2.9.1 Safety glass technology
 - 2.9.1.1 Pre-tempering technology
 - 2.9.1.2 Furnaces for thermal pre-tempering of glass
 - 2.9.1.3 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 (storing, climate control, uncoiling)
- 2.9.4 Autoclaves

2.10

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

2.11

- 2.11.1 Auxiliary products
 - 2.11.1.1 Tools
 - 2.11.1.2 Spare parts and consumables
 - 2.11.1.3 Insulating materials
 - 2.11.1.4 Sealants
 - 2.11.1.5 Spacers
 - 2.11.1.6 Compressors
 - 2.11.1.7 Vacuum pumps
 - 2.11.1.8 Chemicals
 - 2.11.1.8.1 Chemical drying - dessiccants
 - 2.11.1.8.2 Chemical grinding and polishing materials
 - 2.11.1.8.3 Chemical coolants
 - 2.11.1.8.4 Chemical rust prevention agents
 - 2.11.1.8.5 Chemical protection material for glass
 - 2.11.1.8.6 Chemical cleaning agents
 - 2.11.1.8.7 Other chemicals

2.12

- 2.12.1 Environmental protection/Recycling
 - 2.12.1.1 Recycling/treatment of waste glass
 - 2.12.1.2 Recording and collection
 - 2.12.1.3 Transport
 - 2.12.1.4 Crushing
 - 2.12.1.5 Sorting
 - 2.12.1.6 Glass Melting / Waste gas technologies
- 2.12.2 Filter technologies (flue gas and electrostatic)

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- 2.12.2.2 NOx reduction technology, emission reduction technology
- 2.12.3 Heat recovery installations
- 2.12.4 Waste water treatment
- 2.12.4.1 Processing of water cooling for cullet treatment
- 2.12.4.2 Wastewater treatment and cleaning lines
- 2.12.4.3 Water treatment for grinding technology
- 2.12.5 Treatment of auxiliary materials
- 2.12.6 Special glass recycling
- 2.12.6.1 Lamps/Lights
- 2.12.6.2 Electrical and optical glass
- 2.12.6.3 Technical glass
- 2.12.6.4 Solar glass and modules
- 2.12.6.5 Window disposal

2.13 Nanotechnology

3 Glass products and applications

3.1 Flat glass

- 3.1.1 Float and mirror glass
- 3.1.2 Drawing glass
- 3.1.3 Mouth-blown glass
- 3.1.4 Cast glass, ornamental glass
- 3.1.5 Thin glass
- 3.1.6 Horticultural glass
- 3.1.7 Wired glass
- 3.1.8 Figured glass/Profiled architectural glass
- 3.1.9 Antique and coloured glass
- 3.1.10 Flashed glass
- 3.1.11 Tiffany glass
- 3.1.12 Decorative colored glass
- 3.1.13 Glass jewellery
- 3.1.14 Glass facets
- 3.1.15 Cross out glass for melting/Fusing glass
- 3.1.16 Glass for restoration work
- 3.1.17 X-ray protection glass
- 3.1.18 Window pictures

3.2 Processed glass

- 3.2.1 Tempered glass
- 3.2.2 Laminated glass
- 3.2.2.1 Laminated safety glass (LSG)
- 3.2.2.2 Laminated glass, synthetic-coated
- 3.2.2.3 Casting resin combinations
- 3.2.2.4 Laminated glass (other)
- 3.2.3 Insulating glass
- 3.2.4 Function glasses
- 3.2.4.1 Fireproof glass
- 3.2.4.2 Noise absorbing glass
- 3.2.4.3 Heat insulation glass
- 3.2.4.4 Sun protection glass
- 3.2.4.5 Switchable glass/electrochromic glass/smart glass
- 3.2.5 Alarm glass
- 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 Nano 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 Solar panels
- 3.4.1.1.1 Crystalline PV panels
- 3.4.1.1.2 Thin film PV panels
- 3.4.1.1.3 Organic Photovoltaics
- 3.4.1.1.4 Multi functional PV panels and elements
- 3.4.1.2 PV system components
- 3.4.2 Solar thermal energy
- 3.4.2.1 Solar mirrors / CSP
- 3.4.2.2 Solar thermal system components
- 3.4.3 Solar architecture and building integrated photovoltaics (BIPV)
- 3.4.4 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 Pellets
- 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 Balustrade panels
- 3.7.1.1 Balcony glazing
- 3.7.1.2 Spandrel panels (general)
- 3.7.1.3 Construction with glass
- 3.7.2 Transparent glass facade systems
- 3.7.2.1 Mullion-transom systems
- 3.7.2.1.1 Mullion-transom constructions made of metal
- 3.7.2.1.2 Mullion-transom constructions made of plastic
- 3.7.2.1.3 Mullion-transom constructions made of other materials
- 3.7.2.2 Element facades made of glass
- 3.7.2.3 Structural-sealant-glazing facades
- 3.7.2.4 Double facades
- 3.7.2.5 Other facade systems

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- 3.7.2.6 Transparent insulation
- 3.7.3 Ventilated curtain walls
- 3.7.4 Technologies for multifunctional facades
- 3.7.4.1 Photovoltaic systems
- 3.7.4.2 Solar thermal system
- 3.7.4.3 Systems for sun and glare protection
- 3.7.4.4 Heat insulation
- 3.7.4.5 Fire protection
- 3.7.4.6 Soundproofing
- 3.7.5 Exterior wall cladding
- 3.7.6 Glass roofs and porches
- 3.7.6.1 Aluminium glass roofs
- 3.7.6.2 Glass roofs and porches (general)
- 3.7.7 Elevator glazings
- 3.7.8 Window constructions
- 3.7.8.1 Windows and window systems with aluminium/metal frames
- 3.7.8.2 Windows and window systems with concrete frames
- 3.7.8.3 Windows and window systems with wooden frames
- 3.7.8.4 Windows and window systems with plastic frames
- 3.7.8.5 Windows made from figured glass
- 3.7.8.6 Windows and window systems with steel frames
- 3.7.9 Muntin bar windows
- 3.7.10 Tempered glass doors
- 3.7.11 Safety doors
- 3.8** locking systems (for windows/doors/gates)
- 3.8.1 Mechanical locking systems
- 3.8.1.1 Security fixtures and fittings
- 3.8.1.2 Security locks
- 3.8.1.3 Panic fitting and locks
- 3.8.2 Electrical and electronic safety and security technology
- 3.8.3 Integration into building technology
- 3.9** Technical processing, treatment, finishing design.
- 3.9.1 Glazing, glass building
- 3.9.1.1 Construction with glass, specialist glazing systems
- 3.9.1.1.1 Specialist construction (shower partition walls)
- 3.9.1.1.2 Glass door systems
- 3.9.1.1.3 Railings and balustrades
- 3.9.1.1.4 Walk-on glazing
- 3.9.1.1.5 Fire protection
- 3.9.1.1.6 Brackets and glass fittings
- 3.9.2 Glass picture frames
- 3.9.3 Glass products (museum glass and anti-reflective glass)
- 3.9.4 Windows and glass façades
- 3.9.4.1 Glass facade elements
- 3.9.4.2 Windows/window systems (wood, plastic, metal)
- 3.9.4.3 Functional fittings and brackets
- 3.9.5 Glass finishing
- 3.9.5.1 Edge and surface finishing technology/grinding, engraving, printing
- 3.9.5.1.1 Grinding technology
- 3.9.5.1.2 Grinding, polishing and blasting materials
- 3.9.5.1.3 Etching lubricants and cover materials
- 3.9.5.2 Surface Finishing Technology/Print
- 3.9.5.2.1 Printing techniques
- 3.9.5.2.2 Other surface coating materials
- 3.9.5.3 Glass painting/glass art
- 3.9.5.3.1 Glass products/compounds
- 3.9.5.3.2 Bonding technology
- 3.9.5.3.3 Decorative foils
- 3.9.5.3.4 Metallic tapes

- 3.9.5.3.5 Glass melting/fusion technology
- 3.9.5.3.6 Glass paints
- 3.9.5.3.7 Precious metal preparations
- 3.9.5.3.8 Lustre, painting materials and adhesive agents
- 3.9.5.3.9 Creative glass products (glass art)

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**

- 4.3.1 Surface treatment, Printing Technology, Coating Technology, Adhesive Technology
- 4.3.2 Paints for Injket, digital printing
- 4.3.3 Screenprinting, framing, painting and texturing tools
- 4.3.4 Pad printing
- 4.3.5 Spray tools, equipment and spray paints
- 4.3.6 Sputtering targets for flat glass coating
- 4.3.7 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****4.7****Working clothing****4.8****Cable and hose drag chains****4.9****Lifting and working platforms****4.10****Adhesive technology**

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5**Measurement, testing, control technology and software**

- 5.1** Measurement and control technology, sensing
 - 5.1.1 Measurement and control
 - 5.1.1.1 Measurement and control of glass level
 - 5.1.1.2 Measurement and control of viscosity
 - 5.1.1.3 Measurement and control of radiation in the melt
 - 5.1.1.4 Measurement and control of glass thickness
 - 5.1.1.5 Measurement and control of glass temperature
 - 5.1.1.6 Measurement and control of glass tension
 - 5.1.1.7 Measurement and control of glass colour
 - 5.1.2 Inspection technology
 - 5.1.2.1 Inspection of surface, contour and imperfection
 - 5.1.2.2 Measurement, control and inspection of gas mixture
 - 5.1.2.3 Measurement, control and inspection of gas-filling levels
 - 5.1.2.4 Video inspection glass furnace
 - 5.1.3 Measuring devices to be used on site
 - 5.1.4 Detectors for laminated glass
 - 5.1.5 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
- 5.5** 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**Contracting, consulting, engineering, services****7****Research and teaching, trade literature, trade associations and organisations**

- 7.1** Universities and colleges
- 7.2** Specialised Publishers

7.3

Trade associations/Organisations

7.4

Test institutes

7.5

Research institutes and projects