

Düsseldorf, Germany  
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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 Disposal collection and glass recycling
- 1.3.8 Raw material technology and preheater 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
- 1.4.11 Alternative energy systems
- 1.4.11.1 Hydrogene technologies
- 1.4.11.2 Renewable energysystems
- 1.4.11.3 Other energy systems

### 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 Stacker 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

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- 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)
- 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)
- 2.6.8 Sealing- and Barrier-Coatings

#### 2.7 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

#### 2.8 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

#### 2.9 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 (storing, climate control, uncoiling)
- 2.9.4 Autoclaves

#### 2.10 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

#### 2.11 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 grinding and polishing materials
- 2.11.8.3 Chemical coolants
- 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

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- 2.12** Environmental protection/Recycling
  - 2.12.1 Recycling/treatment of waste glass
    - 2.12.1.1 Recording and collection
    - 2.12.1.2 Transport
    - 2.12.1.3 Crushing
    - 2.12.1.4 Sorting
  - 2.12.2 Glass Melting/Waste gas technologies
    - 2.12.2.1 Filter technologies (flue gas and electrostatic)
    - 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
    - 3.2.4.6 Antibacterial glass/Antiviral 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

- 3.3** 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

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- 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
    - 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 smelting/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** Surface treatment, Printing Technology,

- Coating Technology, Adhesive Technology
- 4.3.1 Paints for Inkjet, 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

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<b>4.7</b>	Working clothing	<b>6</b>	Decarbonisation
<b>4.8</b>	Cable and hose drag chains	<b>6.1</b>	Analysis of the CO2 footprint
<b>4.9</b>	Lifting and working platforms	<b>6.2</b>	Financing
<b>4.10</b>	Adhesive technology	<b>6.3</b>	Engineering consulting
<b>5</b>	Measurement, testing, control technology and software	<b>7</b>	Contracting, consulting, engineering, services, test institute
<b>5.1</b>	Measurement and control technology, sensing	<b>8</b>	Research and teaching, trade literature, trade associations and organisations
5.1.1	Measurement and control	<b>8.1</b>	Universities and colleges
5.1.1.1	Measurement and control of glass level	<b>8.2</b>	Specialised Publishers
5.1.1.2	Measurement and control of viscosity	<b>8.3</b>	Trade associations/Organisations
5.1.1.3	Measurement and control of radiation in the melt	<b>8.4</b>	Research institutes and projects
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		
5.1.2.5	Hot end inspection / monitoring		
5.1.3	Measuring devices to be used on site		
5.1.4	Detectors for laminated glass		
5.1.5	Control and automation technology		
<b>5.2</b>	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		
<b>5.3</b>	Host computer systems, IT, Communication and Security Technology		
5.3.1	MRP/CAD/CIM/ERP systems		
5.3.2	Inspection, protocolling and diagnostic systems		
5.3.3	Process control systems		
5.3.4	Other control systems		
<b>5.4</b>	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		
<b>5.5</b>	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		
<b>5.6</b>	Motorized Technology		
<b>5.7</b>	Hydraulics/Pneumatics		