

GLASS CONTAINER TECHNOLOGY TRAINING

Empakglass Training & Support Programs

We combine the power of technology with knowledge and experience, so our customers gain a competitive edge in the container Glass Industry.

Choosing the right strategic partners is the key success factor to any business therefore EMPAKGLASS is the right partner choice for you.

We support you on...

management@empakglass.com
www.empakglass.com



EMPAKGLASS[®]
PERFORMANCE SOLUTIONS

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DETAILED TRAINING PROGRAM

GLASS CONTAINER TECHNOLOGY TRAINING

INTRO

The Quality Division of Empakglass prepared the Glass Container Technology training which provides a complete overview of the different technical aspects of the industry.

During the training are discussed the main characteristics of glass as a material and as well the causes for failure. All of the the manufacturing process stages are detailed and explained. The design requirements and its translation into container specifications are part of the training.

This training is suited for all the different industry supply chain players: from suppliers to glass manufacturers, downstream to the glass filers.

The detail level of the training is adjustable for both more experienced and industry newcomers. The training is structured either in a 5 days version or in a shorter 3 days version.



Performance Solutions

New markets / New Opportunities / Independency

We speak your language

Please contact us with your questions, even if you do not find the topic on this brochure, we will come back to you with an answer and proposal for solutions.

Inquires/orders can be made directly to:
management@empakglass.com

Standard quotes have been defined.
Depending on the customer's needs, modified quotes will be issued.

Two types of Glass Container Technology Training:

5 Days version

3 Days (shorter) version

The training can be provided either on customer site or on Empakglass premises.

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DETAILED TRAINING PROGRAM

GLASS CONTAINER TECHNOLOGY TRAINING

CONTENTS



1. GLASS

What is glass? Glass Properties - Brittleness. Density. Thermal Expansion. Glass Cord. Temperature vs Viscosity. Chemical Durability. De-alkalization. Liquidus temperature. Devitrification. Light Transmission - Colour. Glass Composition vs Glass Properties. Glass Composition - Commercial oxide glass compositions (approximate). Main Oxides. Oxides Role. Melting Loss Sources. Cullet.



2. STRENGTH OF GLASS. FRACTURE. STRESS CONCENTRATORS

Glass Containers - Terminology. Strength of Glass. Loads, Stresses and the Fracture Equation. Fracture Origin. Surface Discontinuities. Stress Concentrators.



3. PROCESSES OVERVIEW

Brief overview of the glass container production process.



4. BATCH

Just like making a cake... Batch house. Storing. Weighting. Mixing. Process concerns.



5. MELTING

Furnace Technology - Overview. Furnace Operation - Priorities. Furnace Technology - Regenerative Furnace. Recuperative Furnace. Boosting. Bubbler. Barrier wall. Refining bank. Drain. Cullet preheating. Melting Process and Glass Formation. Furnace Control.



6. GLASS CONDITIONING

Definition of Forehearth. Forehearth requirements. Forehearth temperature control. Forehearth primary inputs. Forehearth types: type K, longitudinally Cooled forehearths, Muffle cooled forehearths, System 500 forehearths.

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7. FORMING

Feeder Mechanism. Components (gob shape). Gob distributor. Mould equipment parts. Mould cooling. Blank mould cooling. Blow mould cooling. Forming process - Blow and Blow, Press and Blow (NNPB).



8. HOT END COATING

Purpose. Application. Concerns. Quality Control.



9. ANNEALING

Development of internal stresses. Purpose. Cycle. Lehr. Quality Control.



10. COLD END COATING

Purpose. Application. Concerns. Quality Control. Choosing the right combination - Permanent vs Temporary. Performance Conditions to consider. Examples of typical utilization.



11. INSPECTION AND QUALITY CONTROL

Overview. Raw Materials. Mould. Packaging materials. Furnace process control. Melting/Glass quality. Forming Machine. Hot End Coating. Annealing. Cold End Coating. Cold End. Sampling Plan. Defect Classification (example). Defect Classification and AQL level (example). Traceability. Quality Control laboratory.



12. PALLETIZING, SHRINK WRAPING AND WAREHOUSING

Overview. Packaging materials. Shrink Wrapping. Strapping. Warehousing. Technology. Quality Control. Concerns (food safety).



13. CONTAINER REQUIREMENTS

Requirements for specification. Choosing forming process. Calculation of mechanical strength of bottles. Effect of design on pressure resistance. Theoretical calculations of pressure resistance. Calculation of Mechanical strength of bottles. Effective mass. Radius of Gyration. Tip ratio. Theoretical Wall-thickness calculation.