

Technical Specification

for the Design of a Glass Melting Furnace Project with Electric Boosting System

1. Project Objective

To develop a modern and energy-efficient glass melting furnace project incorporating an electric boosting system.

The furnace design must ensure:

optimal glass pull rate;
economical energy consumption;
high-quality glass production;
minimal environmental impact;
extended service life of the furnace.

2. Main Technical Characteristics

Furnace type: glass melting furnace with horseshoe flame direction

Furnace area: 60 m²

Product: glass containers

Glass color: flint , green, QV, amber (brown)

Nominal pull rate: 180 tons/day

Maximum pull rate: 210 tons/day

Fuel type: natural gas

Gas calorific value: 8200 kcal/Nm³

Specific gas consumption: ≤ 900 kcal/kg

Cullet content: 25%

Burners: 2 per side, located at burner ports

NOx emission limit: ≤ 800 ppm

Environmental compliance: in accordance with European standards

Heating type: electric boosting

Transformer capacity: 1600 kVA

Cooling: cooling tower

Electrodes: 2 pcs, installed in the throat

Bubbling system: 18 nozzles

Batch chargers: 2 pcs, closed type

Throat: 1

Glass level control: non-contact level sensor

3. Regenerator

Packing type: cross-shape

Packing material: refractory materials resistant to thermal, mechanical, and chemical loads

4. Working End (Refining Zone)

Glass output: 210 tons/day

Heat source: natural gas

Burner system: multi-gas burners

Temperature control: fully automatic for all zones

Temperature measurement:

One single thermocouple, type S, per zone

One triple thermocouple, type S, in transition zones to feeders

5. Feeder Channels

Number of production lines: 3

Nominal capacity: 40–90 tons/day per line

Transition temperature (working end → feeder): 1160–1200 °C

Heat source: natural gas
Burner system: multi-gas burners
Temperature control: automatic in all zones
Temperature measurement:
One triple thermocouple, type S, per zone (except conditioning zones)
Conditioning zones: three triple thermocouples, type S
9-point glass homogeneity control
Agitators must be installed in all 3 feeders and controlled by appropriate systems
Feeder steel structure must allow for inclination adjustment
Zone 1 of each feeder must allow individual flame adjustment on each side
Bottom cooling under casing must be provided in Zone 1
Stationary water-cooled batch stoppers must be installed between the tank and conditioning zones
Use of 10" ceramic forehearth bowls must be included

6. Refractories

Refractory materials with appropriate chemical composition must be used for the construction of: the glass melting furnace, regenerators, packing, flues, working end, and feeders
Refractory materials should ensure durability and longevity of all furnace components.
Chrome-alumina refractory materials must be used for corner blocks of the batch chargers and throat.
All refractories must be supplied by top-tier European manufacturers.

7. Steel Structures

A complete proposal must be provided for all metal structures necessary to support and reinforce the furnace, working end, and feeder lines.

8. Furnace Tank Cooling System

A new cooling system project must be proposed for the furnace tank, including all necessary components and the location of two fans.

9. Throat Cooling System

A new cooling system project must be proposed for the throat, including all necessary components and the location of two fans.

10. Digital Color Camera / Monitor

A proposal must be provided for a digital color camera and monitor for monitoring:
flame behavior,
batch movement,
refractory damage inside the furnace.
The system must operate under extreme temperatures at the probe tip.
Delivery must include all necessary accessories.

11. Batch and Cullet Charging System

The chargers must handle the required material volume at a maximum pull rate of 210 t/day.
Three chargers must be included in the supply package, along with all necessary equipment.
Monitoring and control of the chargers must be available both from the control room and from the charger service platform.

12. Batch Bunkers

Design two receiving bunkers near the furnace.

Each bunker must have a capacity of 30 tons to store raw materials, providing 6 hours of uninterrupted charger operation at the maximum pull rate of 210 t/day.

13. New Combustion System for Furnace, Working End, and Feeders

A proposal must be provided for gas regulating stations equipped with sensors, actuators, combustion air fans, and cooling fans.

14. Gas Burner Equipment

A proposal must be provided for adjustable gas burners for the furnace, working end, and feeders. All necessary connection accessories must be included.

15. New Exhaust Gas / Combustion Air Switching System

A proposal must be provided for the supply of a switching system for exhaust gas and combustion air flow.

16. Exhaust Stack

Design a new exhaust gas stack with the possibility of installing a filtration system.

17. Project Requirements

1. Engineering design must consider the limitations of the existing building and include complete design documentation for the furnace, working end, feeders, and steel structures.
2. Design drawings must be compiled using different colors for refractory materials and steel structures.
3. Detailed manufacturing drawings for refractories and steel structures must include material specifications.
4. Compliance with all European standards on ecology and energy efficiency is mandatory.
5. All supplied components must be accompanied by quality certificates.
6. Project development deadline: 1 month.

