

# GAS MIXING TECHNOLOGY

**HORN**  
GLASS INDUSTRIES

*innovation*  
ENGINEERED IN GERMANY

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**Shield gas, a mixture of nitrogen and hydrogen, prevents the oxidation of molten tin in the tin bath. Protecting tin from oxidation is one of the most important components for the quality of the glass produced in the tin bath. HORN® offers its customers a complete system for the supply and control of shield gas.**

Nitrogen is used in the tin bath to purge certain equipment parts and measuring instruments, as well as to clean the tin bath roof. These procedures also produce a cooling effect, increase the operating life of the tin bath equipment and reduce the frequency of maintenance operations.

## SHIELD GAS MIXING STATION

The shield gas mixing station is integrated in a container. A gas-tight wall divides the container into two separate compartments. The process chamber contains two shield gas mixing stations and two nitrogen pressure control stations. The shield gas mixing stations mix the shield gas required for the tin bath. Each station consists of a main line and a back-up line. The electrical compartment comprises switch cabinets for operating the gas stations and for controlling the hydrogen content in nitrogen.

For the installation of the shield gas mixing station, a double winged door is provided at the front of the container. At the back, a door is installed for accessing the electrical compartment without having to enter the process chamber. Nitrogen supply must be ensured at all times according to the tin bath requirements in order to avoid any major impairment of the glass quality and damage to the tin bath. In no circumstances is the nitrogen supply stopped automatically. The nitrogen supply can only be stopped manually.

In case of any leakage inside the container, forced ventilation is activated to ensure that a sufficient amount of oxygen is available in the container and that any explosive gas mixtures of air and hydrogen are discharged.



## SHIELD GAS FLOW CONTROL STATION

The shield gas control station serves to control the quantity of nitrogen and shield gas in the tin bath. Each bay in the tin bath has its own shield gas control station. The purpose of using shield gas is to displace oxygen from the tin bath and prevent the oxidation of the molten tin.

Each shield gas control station contains one flow adjustment line for shield gas and one for nitrogen. The current flow rate is indicated by flow meters. Control valves enable manual adjustment of the flow rates and individual dilution of the shield gas with nitrogen for each bay of the tin bath.

Adjustable contacts at the flow meters enable monitoring of the minimum flow rates of shield gas and nitrogen. To perform maintenance at the flow control line, a bypass line can be activated.



## NITROGEN FLOW CONTROL STATION

For each nitrogen consumer, a flow control line is installed at a nitrogen flow control station.

The nitrogen flow rate will be adjusted according to the requirements of the equipment. The flow meter indicates the adjusted flow rate. Adjustable contacts at the flow meter enable monitoring of the minimum flow rates.

To perform maintenance at the flow control line, a bypass line can be activated.

## BENEFITS

- Highest reliability of nitrogen supply to the tin bath by virtue of the HORN® control system at shield gas mixing station
- Very high safety concept for the dosing of hydrogen with regard to SIL
- Individual adjustment of N<sub>2</sub> and H<sub>2</sub>N<sub>2</sub> ratio for each tin bath bay
- Optimisation of dew point along the tin bath
- Cost effective dosing of the relatively expensive H<sub>2</sub> gas