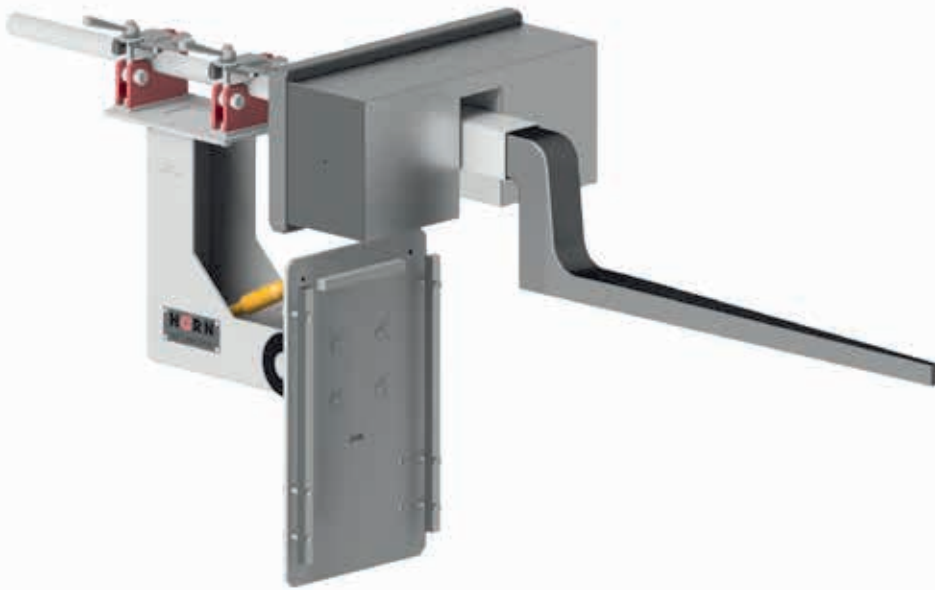


GRAPHITE EQUIPMENT

TIN BATH

HORN
GLASS INDUSTRIES

innovation
ENGINEERED IN GERMANY



HORN® Submerged flag type HFS

The working element of the **full depth flag** consists of a thin graphite rectangle which is fixed on a stainless steel holder. These flags are placed near the shoulder of the tin bath, where the bottom graphite barrier is installed, and serve to close the gap between the bottom graphite barrier and the side wall. For a HORN® standard tin bath the required length of the graphite element is 400 mm. This length can be adapted to the requirements of a particular tin bath.

Submerged flags are used near the front of the tin bath. The graphite working element of these flags is designed in such a way that it can be placed underneath the glass ribbon without touching it.

The length of the working element depends on the selected location. Shorter working elements are used in the forming section, where the glass ribbon is wider. Longer working elements are used in the sections where the glass ribbon has reached its final width.

The standard lengths of the working elements of the HORN® submerged flags are 1000 mm, 750 mm and 500 mm. These lengths can be customised to the specific requirements of a tin bath.

BENEFITS

- **Improved production stability**
- **Smoothly running glass ribbon**
- **Reduction of undesirable tin flows**
- **Simple and compact structure**
- **No water cooling required**
- **Safe and proven design**
- **Easy and ergonomic handling**
- **Quick and easy installation**

TIN BATH GRAPHITE EQUIPMENT

In addition to forming and cooling the glass ribbon, other functions need to be performed in the tin bath, such as keeping the glass ribbon centred or limiting tin flows.

HORN® tin bath graphite equipment offers effective solutions for a wide variety of functions.

The fence guides the glass ribbon safely and smoothly through the tin bath.

If the glass ribbon is too wide, the pusher folds the edges of the glass ribbon, thus protecting the subsequent equipment parts from damage.

Tin flows can be controlled by means of graphite flags, thus creating optimal production conditions.

FENCE AND PUSHER

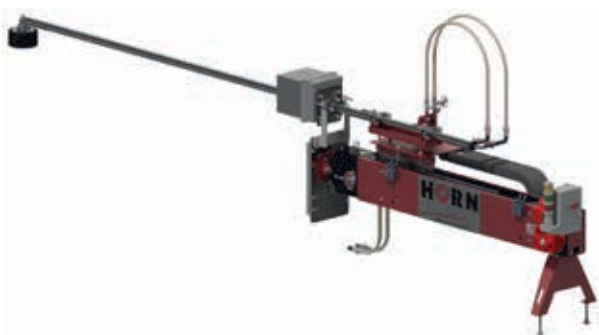
The fence and the pusher are relatively simple machines, which, however, have a considerable impact on the production process. Both machines consist of a motorised positioning unit, a water-cooled supporting tube made of stainless steel and a graphite working element. The fence and the pusher are similar in design except for the shape of the working elements.

By means of the motorised positioning unit, the respective working element can be precisely positioned in the tin bath at the touch of a button. It is possible to control the machine locally at the machine itself or remotely from the control room.

The double-walled, water-cooled stainless steel tube serves purely as a support for the working element. It is

fixed on the motorised positioning unit by a quick fastener and is inserted into the tin bath via a side sealing specially designed for this application. The respective graphite working element is fixed at the end of the support tube.

The working element of the fence is a rotary graphite cylinder. Placed in pairs behind the last pair of top rollers, the fences are used to centre the glass ribbon in the tin bath and guide it safely to the exit.



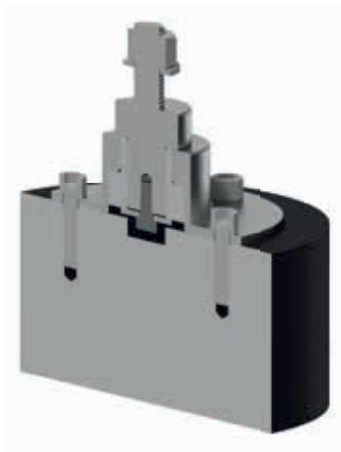
HORN® fence type HMPUF



HORN® pusher type HMPUP

GRAPHITE PART - FENCE

The graphite part can be ordered as a spare part.



GRAPHITE PART - PUSHER

The graphite part can be ordered as a spare part.



FEATURES

- **Easy and ergonomic handling**
- **Simple and compact structure**
- **Quick and easy installation**
- **Rotary graphite part reduces wear**
- **Can be operated both from the control room and locally at the machine**
- **Unified design: the two machines only differ with regard to the graphite working element**
- **High safety standard - safe handling and safe operation for the user**
- **Supplied mechanically and electrically preassembled and fully tested**

The pusher has a rotary graphite cylinder in diabolo shape as the working element and is used in the tin bath shoulder (the transition area between the wide and the narrow parts). Both working elements are positioned parallel and opposite to each other. The distance between the two elements is adjusted to a distance which is safe for the dross box and the annealing Lehr.

In the unlikely event of the glass ribbon becoming too wide, the edges will be folded by the special shape of the pusher working element. This process prevents the excessively wide glass ribbon from reaching the narrow section of the tin bath, which may damage the equipment such as the dross box or annealing Lehr.

FLAGS

Flags are used to control the tin flows at the sides of the tin bath. Uncontrolled tin flows in the tin bath can lead to undesired optical distortions in the glass. Such flows may be caused by a glass ribbon not running smoothly. To enable the flags to achieve their full performance potential, it is vital to install them in pairs, symmetrically positioned opposite each other.

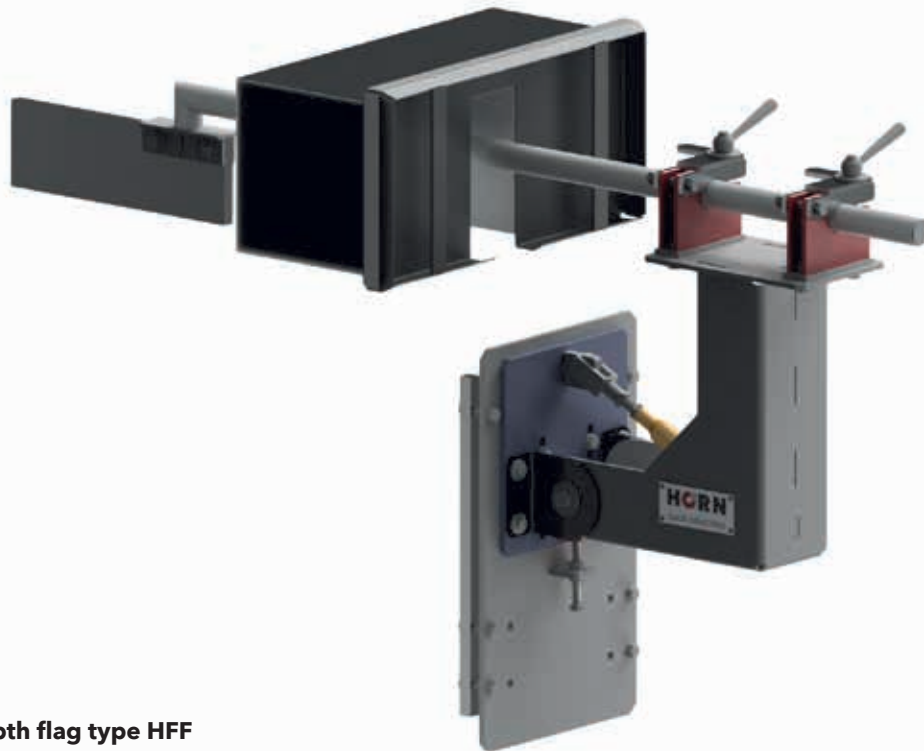
Flags consist of a support made of stainless heat-resistant steel, a specially designed side sealing, a manual positioning unit and a graphite working element.

The working element can be adjusted to various specific tin bath depths and installation locations.

HORN® flags come in two types:

- HORN® full depth flags - type HFF
- HORN® submerged flags - type HFS

Irrespective of the type and location, both flags serve the same purpose, i. e. controlling the tin flows in the tin bath and thus increasing production quality.



HORN® full depth flag type HFF

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The key to HORN®s extensive expertise in all fields of glass melting technology is the profound understanding of each detail within the entire process, making HORN® the specialist for technological progress and innovation for each aspect of a glass plant. In addition to its knowhow about individual elements such as furnaces, HORN® has expanded its services to become a one-stop supplier for turn-key plants. From initial planning to full operation - HORN® stands by you all the way.



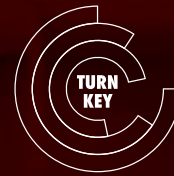
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INSTALLATION +
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