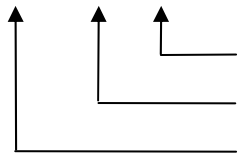
Technical Specification
High Velocity Burner Type HV

Content

1 Type Designation Code Key

HV-BG 3-G



Fuel (possible are G [gas] and EL [fuel oil, extra light])
Installation Size (available for gas: 1, 2, 3 and 4; for oil: 3 and 4)
High Velocity (high-speed)

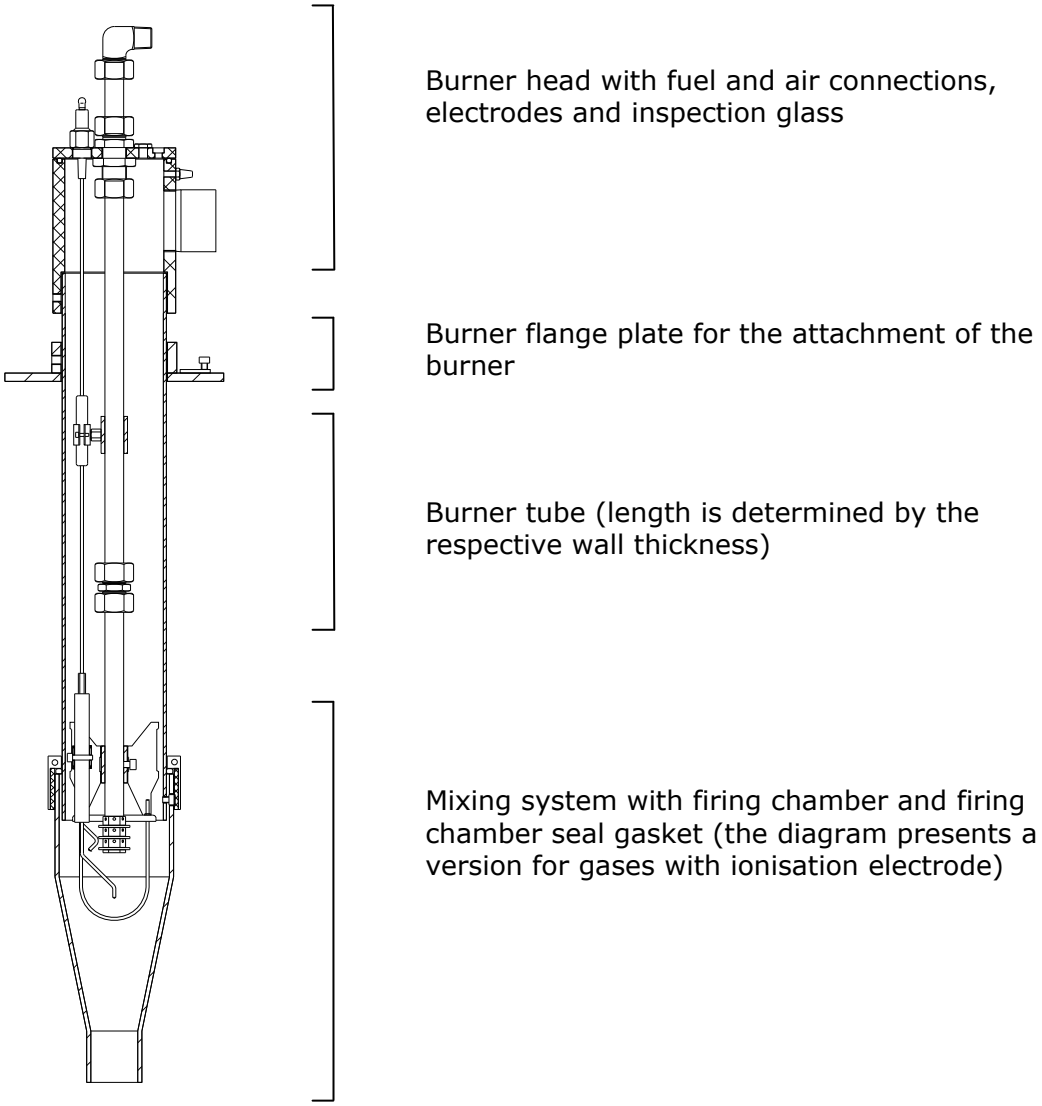
2 Technical Data

Nominal Heat Output	10 to 600 kW (see type plate)
Fuel	all combustible gases and fuel oil, extra light
Fuel Pressure	gases up to 1 bar, fuel oil up to 40 bar
Fuel Connection	gases ½", fuel oil ¼"
Throughput Control	externally, via pressure or volume flow control
Air Pressure	up to 60 mbar at the burner head, depending on version
Air Connection	depends on installation size, 1 ¼", 1 ½", 2" or 2x2"
Air Temperature	max. 350°C (see type plate)
Air Flow	depending on installation size, up to 600 Nm³/h
Air Flow Control	externally, via pressure or volume flow control
Hot Gas Outlet Port	depends on installation size, graded as of ø 30 up to ø 120
Firing Chamber Material	depends on application, available are: SiSiC (up to approx. 1350°C combustion chamber temperature) ReSiC (up to approx. 1550 °C combustion chamber temperature) HEXOLOY® (up to approx. 1700°C combustion chamber temperature)
Hot Gas Exit Speed	up to 250 m/s
Ignition	ignition electrode (s), ignition transformer 2 x 7,5 kV (fuel oil) or 1 x 15 kV (gases)
Flame Monitoring	ionisation electrode, UV cell (gases) or photo cell (fuel oil)

3 Deployment and Mode of Operation

Type HV burners are preferably deployed as side and roof burners both in continuously and intermittently operated industrial furnaces. They can however also be deployed as bar burner or in air heaters.
As each burner is separately equipped with a ignition unit and a flame monitoring system, the deployment within temperature ranges below the fuel ignition limit is possible without any problems.
As Type HV burners can reach high hot gas exit speeds, they are also often used as recirculation burners.
To ignite the burner, the set λ-value should not be higher than 5. During operation, it is possible to reach λ-values of up to 10 in modulating operation mode.

4 Basic Construction of the Burner



Burner head with fuel and air connections, electrodes and inspection glass

Burner flange plate for the attachment of the burner

Burner tube (length is determined by the respective wall thickness)

Mixing system with firing chamber and firing chamber seal gasket (the diagram presents a version for gases with ionisation electrode)

5 Installation and Startup

The burner and the firing chambers are separately packed and transported. Before conducting the installation of the burner, the firing chamber must be mounted and the gasket ring for the firing chamber sealing must be brought into the correct position. After this, the burner is inserted into the fire hole and, if necessary, fixed using he flange plate.

> ***The firing chamber is made of ceramic and very shock-sensitive, respectively prone to breakage!***

After both the fuel and air supply lines have been connected and the ignition and flame monitoring devices have been installed, the burner can be set into operation.

It is necessary to observe that the clearances between the deployed electrodes to each other, respectively against the ground potential are correctly installed according to the specifications.
The setting of the fuel and air flow is conducted according to the provided throughput curves.

5.1 Electrical Control

If the burner is deployed within temperature ranges below the fuel ignition limit, an automatic ignition device and an ignition transformer must be allocated to the burner.

> *In order to be able to utilise the complete possible operational range of the burner, we recommend to deploy automatic firing devices of the type series LFL, LGK or LOK.*
> *In connection with an ignition device Type TQO as well as an optical flame monitoring unit, very good results were achieved in regard to operational safety even under extreme operational conditions.*

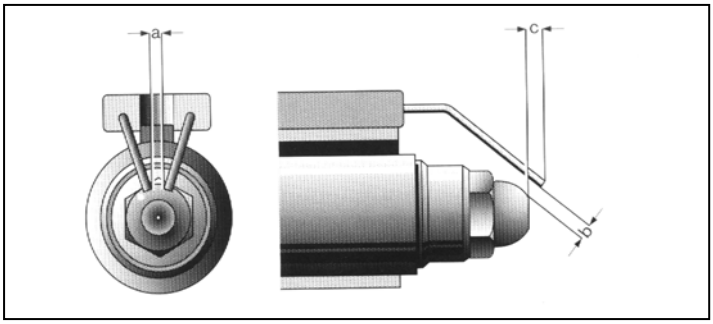
After activation of the automatic ignition device and the expiry of the pre-rinsing period, the ignition transformer starts up and the fuel nozzles open up. The fuel is now ignited, the burner is in operation, and the flame monitoring unit reports the existence of the flame.
If the ful is not ignited after expiry of the ignition time, the fuel nozzles are closed and the automatic ignition device will report a malfunction. After the unlocking of the automatic ignition device, the start programme will start again.

5.2 Setting of the Media Throughput

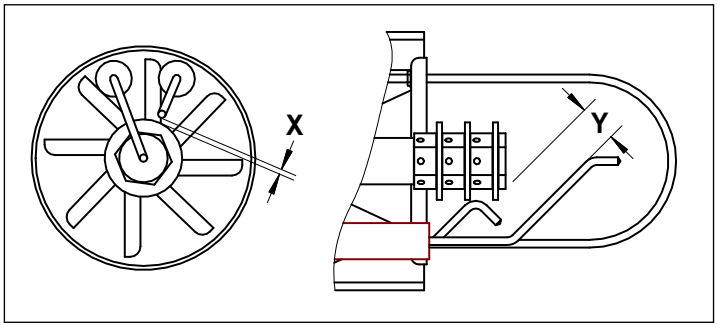
The setting of the fuel and air flow rate is conducted according to the provided throughput curves. The ideal burner setting depends on the respectively intended use of the burner.
For the initial setting of the fuel and air flow rate, flow rate measuring devices for both the fuel and air flow rate should be deployed. Later comparative measurements, respectively readjustments, can also be conducted using a manometer. For this purpose, the same are connected to the measuring nipple for fuel (at the magnetic valve), respectively for air (at the burner head – see also Attachment „A“)

5.3 Setting of the Ignition and Ionisation Electrodes

At Type HV gas burners, the ignition is conducted against ground. The ground is hereby represented by the gas nozzle. It is important to observe that the ignition spark is positioned directly in front of a gas nozzle bore (for this purpose, it may be necessary to slightly turn the nozzle fitting tube together with the gas nozzle in the orifice plate.)
At Type HV burners for fuel oil, the ignition is conducted between two electrodes. The position of the arc is hereby located, seen from the direction of the air flow, in front of the orifice plate.



Electrode Settings for
Fuel Oil:
a = 2.0 mm
b = 1.5 mm
c = 1.0 mm



Electrode Settings for
Gases:
x = 1.5 mm
y = 10 … 15 mm

5.4 Flame Temperature / Hot Gas Exit Temperature

The flame temperature is determined b the ratio of combustion air to fuel. The flame temperature is the temperature which can be measured at a combustion in the interior of the flame. The flame temperature depends on the degree of mixing of the combustible gases, the oxygen content of the gas mixture, the level of pre-heating of the gases, as well as the construction of the burner. Within a flame, there are usually different areas, the temperatures of which may vary by several hundred Kelvin.
The maximum flame temperature varies according to the characteristics of the combustible substance and is approximately situated with the following ranges:
liquid fuels: from 1300 to 1600 °C, gaseous fuels: from 1600 to 3000 °C.

6 Maintenance Instructions

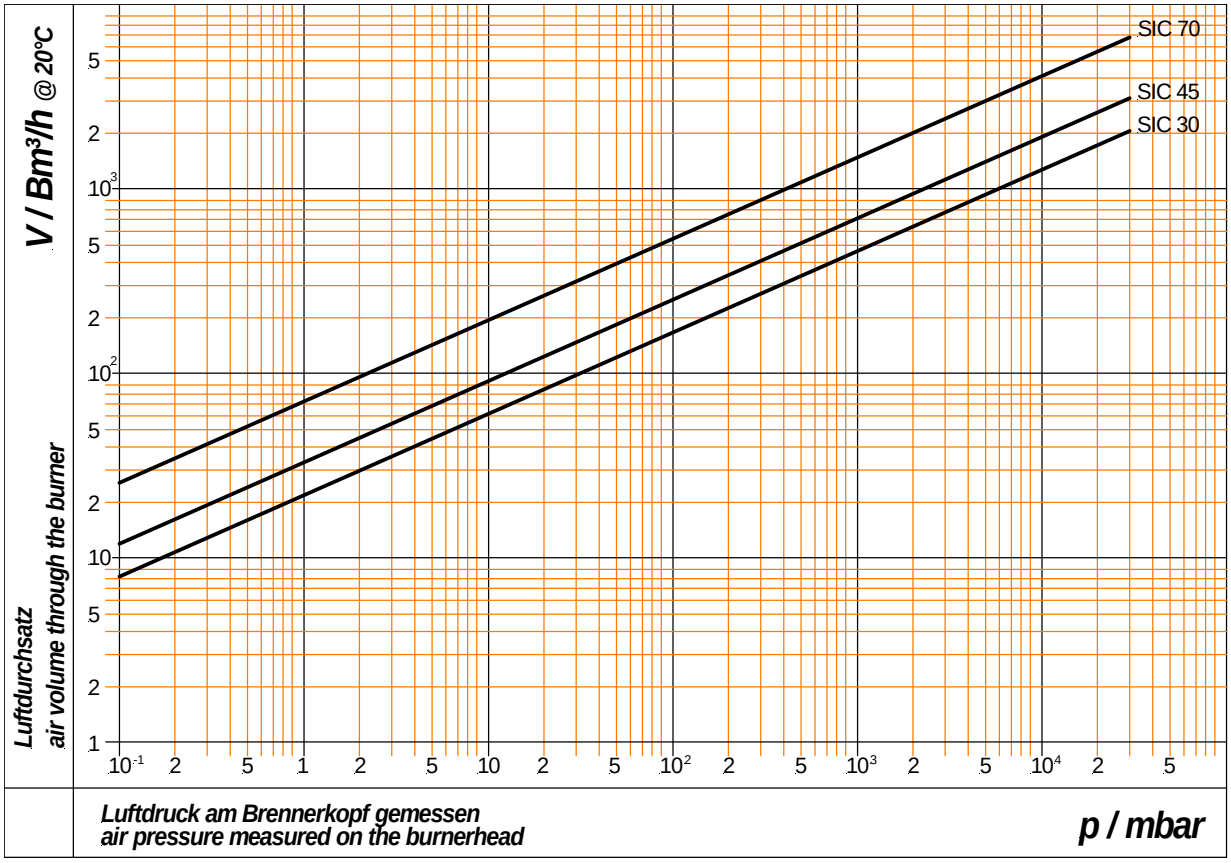
Type HV burners contain the following wear parts: electrodes, fuel nozzles, possibly optical flame monitoring devices. Consequently, it is necessary to regularly perform the following maintenance:

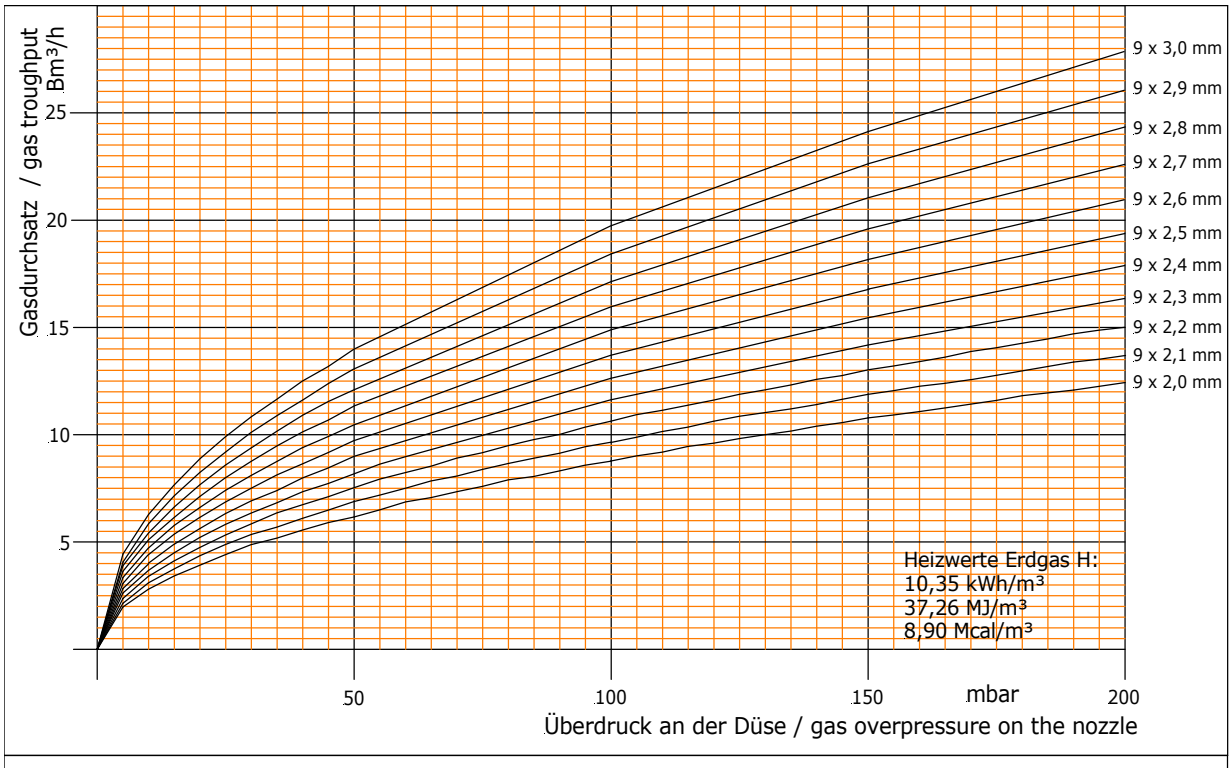
1.) **Semi-Annual**
Switch off the burner, turn off fuel supply, remove and clean inner section (e.g. by blowing out with compressed air), visual check for mechanical damage, if necessary, exchange parts
2.) **Annual** Maintenance
Switch off the burner, turn off fuel supply, remove and clean inner section, the electrodes (and, in case of gas burners, the stabilisation clamps) must be exchanged
3.) Maintenance after/every **18 Months**
Accords to the half-yearly maintenance plus the exchange of the optical flame monitoring device
4.) Maintenance after/every **24 Months**
Accords to the yearly maintenance plus the exchange of the fuel nozzle

HIGH-TECH Brennsysteme GmbH

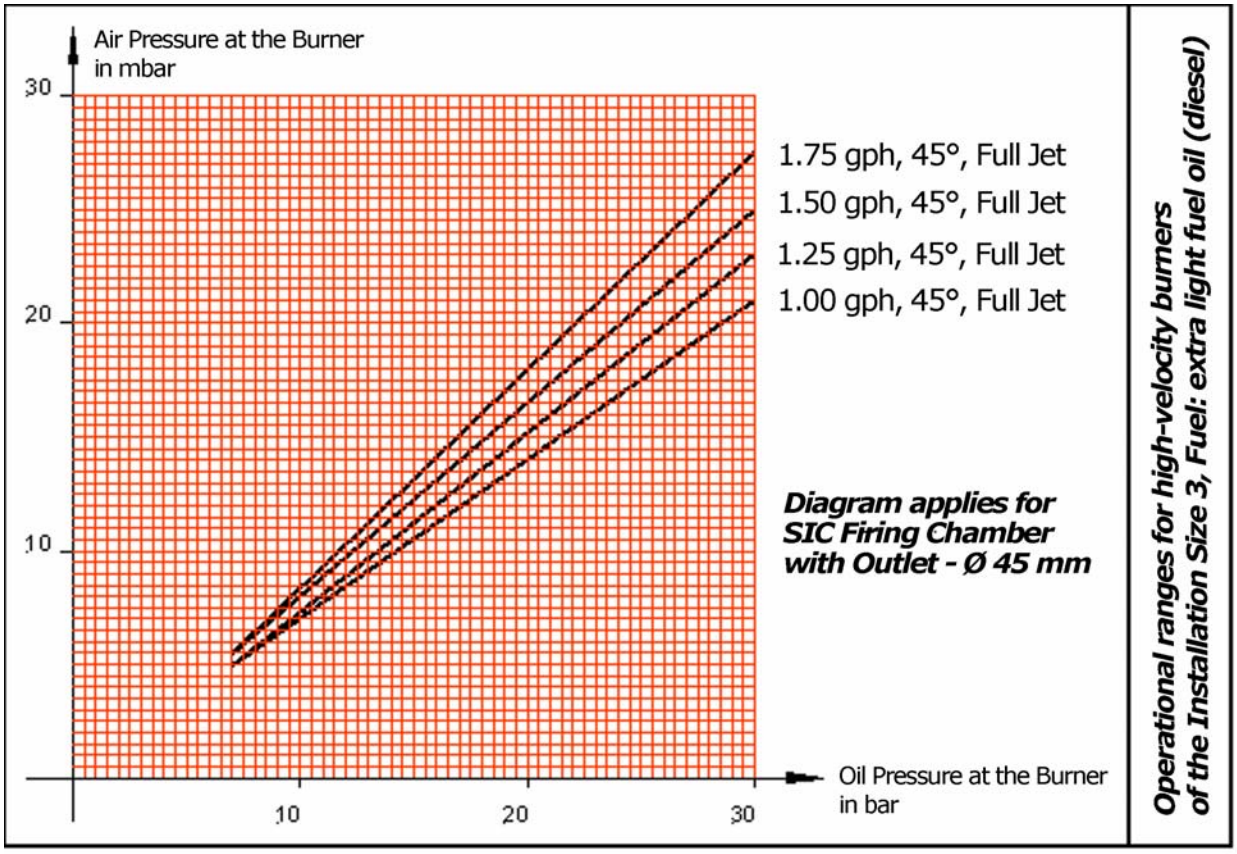
Attachment A – Throughput Diagrams

The throughput diagrams presented here are merely exemplary. Individual, special applications, due to the respectively specific construction, may generate different volumes.





Datenblatt Standarddüsen HV-BG3-G / data sheet standard nozzles HV-BG3-G


Air Pressure at the Burner
in mbar
30
20
10
1.75 gph, 45°, Full Jet
1.50 gph, 45°, Full Jet
1.25 gph, 45°, Full Jet
1.00 gph, 45°, Full Jet
Diagram applies for
SIC Firing Chamber
with Outlet - Ø 45 mm
10
20
30
Oil Pressure at the Burner
in bar
Operational ranges for high-velocity burners
of the Installation Size 3, Fuel: extra light fuel oil (diesel)