polybloc
SWITZERLAND

GD - Gastight High Temperature Plate Exchanger

Index

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

GD - Gastight High Temperature PHE

Application

For applications with very high temperature and tightness requirements (for example: heat recovery from industrial catalysts), we offer the gastight welded POLYBLOC, made from stainless steel. This heat exchanger is entirely welded using a microplasma process and therefore requires no additional sealing material. Different pressure tests confirm the absolute tightness of the unit. Temperatures far over 600 °C or 1150 F are possible, depending on the selected alloy used.

Construction

The heat exchangers essentially consist of three components: the separating plates, the spacers (corrugated or folded sheets) and the connection ducts. The separating plates (standard material thickness 0.5 mm) with spot-welded spacers are stacked crosswise and welded together. Connection ducts made of the same material (standard material thickness 1.0 mm) are then welded on.
Due to the dimensional changes in the material thickness of approx. 1:2 within the heat exchanger construction, a minimum material stress is achieved during temperature-related expansion.
Weldable steels such as 1.4301 and 1.4571 are used as standard, but also other alloys such as 1.4435, 1.4539, 1.4841, C22, etc.

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

polybloc SWITZERLAND

Available Standard GD-Types

Following dimensions (mm) are available:

plate surface mm	outer dimensions mm	plate spacing mm	max. active width mm
240	340 x 340	3, 4, 5	1000
480	580 x 580	3, 4, 5, 6	1500
960	1160 x 1160	3, 4, 5, 6, 8, 10	1500
1200	1400 x 1400	3, 4, 5, 6, 8, 10	1500

Type: **GD - 35 45 . 96 0680.05**

- Plate thickness (05 = 0.5 mm)
- Active width (mm)
- Plate square (dm)
- Plate spacing 2 flow (Code)
- Plate spacing 1 flow (Code)
- Type GD (Gastight) or HT (**H**igh **T**emperature)

Plate spacing Code:
15 = 3 mm
25 = 4 mm
35 = 5 mm
45 = 6 mm
65 = 8 mm
85 = 10 mm

Material : Standard 1.4571, other material also available

The sheet thickness can be between 0.5 and 1.0 mm: Standard 0.5 mm (only choice)

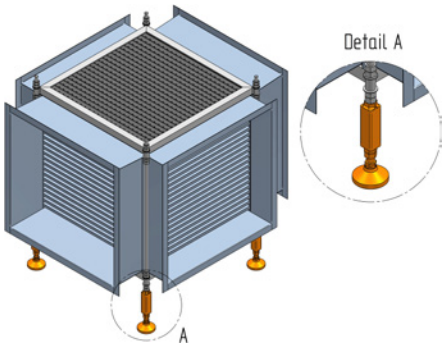
POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

Engineering information

Engineering information

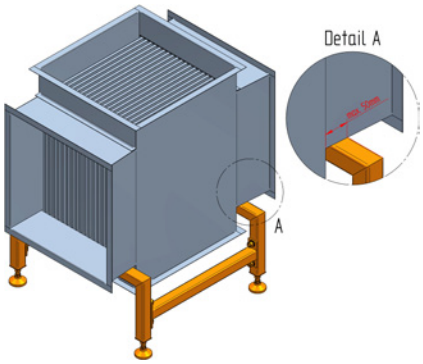
- The customer is responsible for selecting material of the heat exchanger that is suitable for the pollutants, temperatures, conditions, and safety requirements of the application. Depending on requirements, Polybloc may provide a recommendation, but such recommendation is not to be construed as any sort of approval or warranty for any particular purpose, and POLYBLOC will not be liable for any damages. For this reason, the customer and/or user must carefully check the suitability of the selected material and approve it before any order is accepted by Polybloc.



Example – positioned on the support frame

- The heat exchanger may only be installed and supported on the parts provided for this purpose, such as the additional support frame or the heat exchanger connection ducts. On-site installations must not make direct contact with the heat exchanger, **so that the temperature-related expansion of the heat exchanger is not affected.**

- No external weight (external forces), e.g. the dead weight of the connection ducts or expansion joints, may be applied to the heat exchanger so that the temperature-related expansion of the heat exchanger is not affected.



Example – positioned on heat exchanger connection ducts

- When connecting the heat exchanger connection ducts to the duct system, the temperature-related expansion must be taken into account. **Expansion joints or an equivalent system must be installed all the way round**. (Expansion joints not included in the standard delivery.)

- The heat exchanger can be welded into the duct system on site so as to be gas-tight or, if appropriately designed, it can be flanged on. In this case a multi-part loose flange must be provided. (Loose flange not included in the standard delivery.)

- If the heat exchanger is welded into the duct system on site so as to be gas-tight, dimensional changes in the material thickness of max. 1:2 are allowed as a result of the **temperature-related expansion**
  - ✓ Connection to the heat exchanger connection duct: max. 2 mm..
  - ✓ Direct connection to the separating layer pack: max. 1 mm.

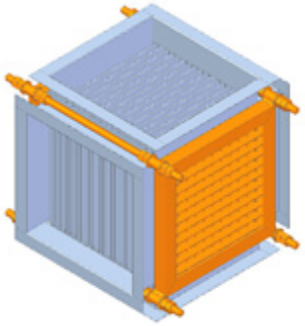
- The pressure differential between the air flows must not exceed 0.2 bar.

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

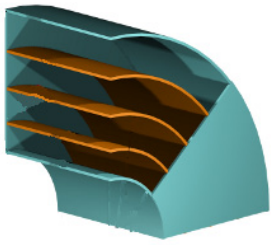
T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

polybloc SWITZERLAND

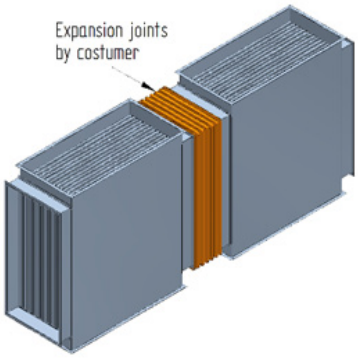
Engineering information



Polybloc-support frame construction



Example – baffle plates in the duct system for even flow to the heat exchanger surface



2 heat exchangers connected in series

- If the heat exchanger is operated at an overpressure relative to the environment, i.e. one or both fans convey air through the heat exchanger, a reinforcing installation of the side end plates is required. This can be implemented on site (e.g. supporting the side end plates through casing constructions) or optionally by selecting the Polybloc support frame construction. The overpressure of an air flow relative to the environment must not exceed 0.2 bar.
- It must be ensured that the flow to the heat exchanger surfaces is even and straight. If it is not possible to channel the flow straight to the heat exchanger due to space restrictions, it is necessary to install turning vanes in the duct system to direct the air flow evenly and with a homogeneous temperature profile onto the heat exchanger surfaces.
- Standing condensate in the heat exchanger must be prevented as it can lead to damage. The heat exchanger must have a slight fall so that any condensate produced can drain off.
- Due to the **temperature-related expansion,** 2 heat exchangers connected in series can be linked to one expansion joint or equivalent system. (Expansion joints not included in the standard delivery.)
- Depending on the operating conditions, it is to be expected that the heat exchanger will get dirty. Appropriate filtration and cleaning intervals must observed.
- The leakage test can also be performed in the presence of the customer as a factory acceptance test.

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

polybloc SWITZERLAND

Engineering information

Heat-up/cool-down rate and process cycles

The number of process cycles (heating up – cooling down) and the speed of the heat-up and cool-down rate influences the life cycle time and leads to material fatigue. Material fatigue can result in leakage. The fewer cycles and the slower the temperature change, the better.

The following information is intended as a guide:
(These parameters should not be exceeded, otherwise a drastic reduction of the service life must be expected.)

- ✓ The heat-up/cool-down rate (factor X) must not exceed 50 Kelvin per minute.
- ✓ Value Y can be exceeded according to the following formula, but not more than four times per day.

Formula: $Y = 2500 / X$

X = heat-up/cool-down rate (max. 50 Kelvin per minute)
Y = temperature differential (ΔT) before and after heat-up or cool-down

Example 1:
A maximum heat-up rate of 50 Kelvin per minute is achieved.

$$Y = 2500/(50\ K/min) = 50K$$

As long as the heating or cooling of the air flow does not exceed 50 Kelvin, you can continue as often as necessary. If the air flow is heated or cooled to more than 50 Kelvin (up to a maximum temperature according to the material specification), this is permitted four times a day.

Example 2:
A heat-up rate of 20 Kelvin per minute is achieved.

$$Y = 2500/(20\ K/min) = 125K$$

As long as the heating or cooling of the air flow does not exceed 125 Kelvin, you can continue as often as necessary. If the air flow is heated or cooled to more than 125 Kelvin (up to a maximum temperature according to the material specification), this is permitted four times a day.

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

Installation

Installation / operating

- With different plate spacings, the heat exchanger must be positioned according to the given air flows.
- The heat exchanger must be connected to the air ducts properly and without tension.
- The maximum temperature, according to the material specification, must not be exceeded.
- Defined parameters of the heat-up/cool-down rate as well as the number of process cycles must be observed.
- The maximum pressure differential between the air flows and the maximum overpressure of an air flow relative to the environment must not be exceeded.
- If the heat exchanger is installed horizontally (horizontal plates), standing condensate in the heat exchanger must be prevented. Install with a slight fall.

Maintenance

Dirt and residues on the heat exchanger plates increase the pressure drop and reduce the thermal efficiency. An optimum cleaning interval must be determined on the basis of operating times and operating conditions. An increase in the pressure drop can be reduced by regular cleaning.

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

polybloc SWITZERLAND

GD - Application and Installation

Checklist:

- The stainless steel alloy selected must be suitable for the defined application and the corrosive medium to be used. The customer is responsible for the suitability of the selected material.
- The heat exchanger may only be installed and supported on the parts provided for this purpose, such as the additional support frame or the heat exchanger connection ducts.
- No external weight (external forces), e.g. the dead weight of the connection ducts or expansion joints, may be applied to the heat exchanger.
- The connection of the heat exchanger connection ducts to the duct system must take the temperature-related expansion into account. Expansion joints or an equivalent system must be installed all the way round. (Expansion joints not included in the standard delivery.)
- 2 heat exchangers connected in series must be connected to each other with an expansion joint or equivalent system. (Expansion joints not included in the standard delivery.)
- The heat exchanger can be welded into the duct system on site so as to be gastight or, if appropriately designed, it can be flanged on. In this case a multi-part loose flange must be provided. (Loose flange not included in the standard delivery.)
- If the heat exchanger is welded into the duct system on site so as to be gastight, dimensional changes in the material thickness of max. 1:2 are allowed as a result of the **temperature-related expansion.**
  - ✓ Connection to the heat exchanger connection duct: max. 2 mm.
  - ✓ Direct connection to the separating layer pack: max. 1 mm.
- It must be ensured that the flow to the heat exchanger plates is even and straight.
- If the heat exchanger is operated at an overpressure relative to the environment, i.e. one or both fans convey air through the heat exchanger, a reinforcing installation of the side end plates is required. The overpressure of an air flow relative to the environment must not exceed 0.2 bar.
- The pressure differential between the air flows must not exceed 0.2 bar.
- The number of process cycles (heating up – cooling down) and the speed of the heat-up and cool-down rate will influence the life cycle of the heat exchanger. Parameters of the heat-up/cool-down rate and the number of process cycles must be observed.
- Standing condensate in the heat exchanger must be prevented as it can lead to damage. The heat exchanger must have a slight fall so that any condensate produced can drain off.
- Depending on the operating conditions, it is to be expected that the heat exchanger will get dirty. Appropriate filtration and cleaning intervals must observed.

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

polybloc SWITZERLAND

References and Special types

Image 1

Image 1 and 2
2GD's with length 960 mm, width approx. 1000 mm,
application: Paris extraction system for diesel locomotives.

Image 2

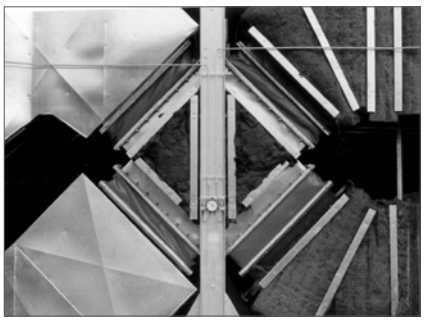


Image 3

Image 3
Mounting of soft material compensator

Image 4

Image 4
Detail mounting flange

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com

Examples of use

Image 5

Images 5 und 6
GD-Plate Heat Exchanger in special housing

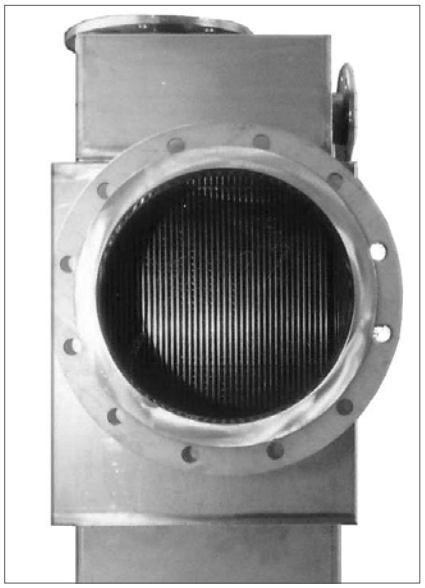


Image 6

Image 7

Image 7
GD for an Industrial catalytic converter

POLYBLOC AG
Fröschenweidstrasse 12
8404 Winterthur
Switzerland

T +41 52 235 0190
F +41 52 235 0191
info@polybloc.com
www.polybloc.com