

## Heat Exchanger

H e a t   E x c h a n g e r



## 8. HEAT EXCHANGER

Heat exchangers find wide applications in such industries as finechemicals, food, pharmaceutical and leather, with large exchange surface area, high efficiency and other features.

### 8.1 Boilers

Coil Type Boilers have the following advantages:

- Heat exchange pipes connect directly with the shell, without seals between the jacketed tube and endings.
- With the use of borosilicate glass 3.3, the boilers have strong corrosion-resistant feature without infiltration of heavy metals and other impurities, providing the best condition for extra-pure products.
- Flexibility in assembling, making series or parallel connection possible to meet the requirement of different exchange surface area.

The boilers are mainly used for condensing and cooling, and also for the heating of the liquid heat carrier.

The calculation of K value is:

Liquid – liquid exchange:  $K=120-175\text{W/m}^2$  ( $k=100-150\text{Kcal/m}^2\text{h}^{\circ}\text{C}$ )

Condensation:  $K=230-315\text{W/m}^2$  ( $k=200-270\text{Kcal/m}^2\text{h}^{\circ}\text{C}$ )



Application Range:

Corrosion-resistant against all organic and inorganic substances with the exception of hydrofluoric acid, fluoride, phosphoric acid and concentrated alkali.

Maximum working temperature:  $150^{\circ}\text{C}$

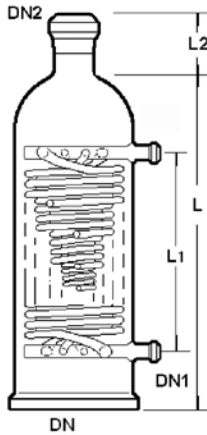
Maximum temperature variation:  $120^{\circ}\text{C}$

Maximum working pressure: (gauge pressure)

Normal pressure: 0.1Mpa

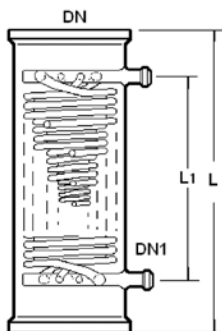
Negative pressure: pressure difference between the shell and coil wall is  $\leq 0.1\text{Mpa}$ .

## 8.1.1 Boilers A



AREA m <sup>2</sup>	DN	DN1	DN2	L mm	L1 mm	L2 mm	CAT. NO.
0.3	100	15	25	450	300	65	QHR-PG-100/25A
	100	15	40	450	300	80	QHR-PG-100/40A
	100	15	50	450	300	85	QHR-PG-100/50A
	100	15	80	450	300	100	QHR-PG-100/80A
0.6	150	25	25	525	355	65	QHR-PG-150/25A
	150	25	40	525	355	80	QHR-PG-150/40A
	150	25	50	525	355	85	QHR-PG-150/50A
	150	25	80	525	355	100	QHR-PG-150/80A
	150	25	100*	525	355	125	QHR-PG-150/100A
1	Φ180	25	25	620	430	65	QHR-PG-180/25A
	Φ180	25	40	620	430	80	QHR-PG-180/40A
	Φ180	25	50	620	430	85	QHR-PG-180/50A
	Φ180	25	80	620	430	100	QHR-PG-180/80A
	Φ180	25	100*	620	430	125	QHR-PG-180/100A
1.5	Φ230	40	25	725	485	65	QHR-PG-230/25A
	Φ230	40	40	725	485	80	QHR-PG-230/40A
	Φ230	40	50	725	485	85	QHR-PG-230/50A
	Φ230	40	80	725	485	100	QHR-PG-230/80A
	Φ230	40	100*	725	485	125	QHR-PG-230/100A
2	300	50	50	760	485	85	QHR-PG-300/50A
	300	50	80	760	485	100	QHR-PG-300/80A
	300	50	100*	760	485	125	QHR-PG-300/100A

\* DN100 is plane joint.

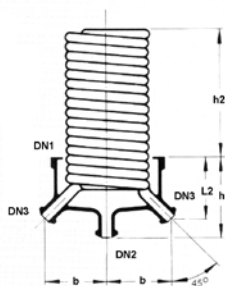


## 8.1.2 Boilers B

AREA m <sup>2</sup>	DN	DN1	L mm	L1 mm	CAT. NO.
0.3	100*	15	450	300	QHR-PG-100/0.3B
0.6	150	25	525	355	QHR-PG-150/0.6B
1	Φ180	25	620	430	QHR-PG-180/1B
1.5	Φ230	40	725	485	QHR-PG-230/1.5B
2	300	50	765	485	QHR-PG-300/2B

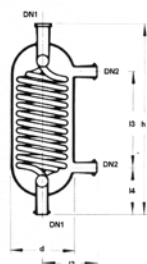
\* DN100 is plane joint.

# HEAT EXCHANGER



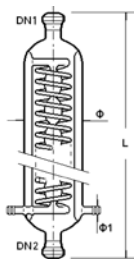
## 8.1.3 Immersions

AREA m <sup>2</sup>	DN1	N2	DN3	b mm	h mm	h2 mm	L2 mm	CAT. NO.
0.6	Φ180	25	25	122	175	290	122	QHR-PGCR-0.6
1	Φ230	25	25	146	175	310	146	QHR-PGCR-1



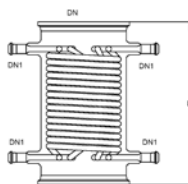
## 8.1.4 Product coolers

AREA m <sup>2</sup>	DN1	DN2	d mm	h mm	l2 mm	l3 mm	l4 mm	CAT. NO.
0.3	25	25	110	500	125	300	100	QHR-PGCP-0.3



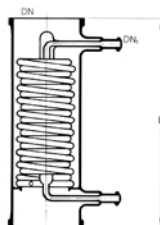
## 8.1.5 Vent Condensers

TYP A	AREA m <sup>2</sup>	Φ	DN1	DN2	L mm	Φ1	CAT. NO.
A	0.6	120	50	50	1000	22	QHR-FB-50/50

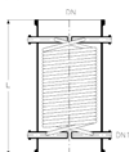


## 8.1.6 Big Area Cooler

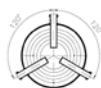
AREA m <sup>2</sup>	DN	DN1	L mm	CAT. NO.
2.5	300	4×25	600	QHR-PG-300/2.5 A



AREA m <sup>2</sup>	DN	DN1	L mm	CAT. NO.
2.5N	300	2×25	600	QHR-PG-300/2.5 B



AREA m <sup>2</sup>	DN	DN1	L mm	CAT. NO.
6.5	400	6×50	850	QHR-PG-400/6.5



It is under testing.





## 8.2 SHELL AND TUBE HEAT EXCHANGER

Shell and Tube Heat Exchangers are widely used in many industries, such as chemical, pharmaceutical, food, salt chemicals, with large heat exchange surface area, high efficiency and other features.

To meet higher technical demand in chemical research and production, BOMEX has developed Model N heat exchangers, the design of which gives full consideration to exchange efficiency to meet the requirement of cool condensation and heating, and to raise the flexibility in choosing in or out openings. To make installation easier, supporting board is added to the exchanger.

- Model N heat exchangers make it possible in China for the Shell and Tube Heat Exchangers not only to have cool condensation function but also to allow two mutually reactive substances to heat up and to have heat exchange, thus widening the application of such heat exchangers even further.
- In design, the exchangers use unique countercurrent flow system, prolonging the exchange time of the substance and greatly raising the efficiency.
- Patented PTFE sealing technology is used as the sealing material for the exchange tubes, boosting the reliability of the seals and the durability of the equipment under high temperature and highly corrosive conditions, widening the application of the glass Shell and Tube Heat Exchangers in organic solvents and others.
- The substance can go through the shell pass in small flow resistance, reducing losses due to system pressure. For the transit of the substance, a vacuum draining passage is specially designed, (it could also be used for complete drainage ) making the installation and operation much easier.
- The supporting board is fixed to Model N Heat Exchangers to meet the requirement of both horizontal and vertical installation.
- The increase in the length of the tubes makes heat exchange time longer. Because the substance goes through the shell, complete drainage is possible even in horizontal installation. With the exchange condition improved, a single heat source (gas, liquid) is needed, or higher temperature substance is used to heat up the other substance.
- According to customer's demand, we use large diameter devices to suit uses in various processing conditions, thus greatly reducing the vaporization and the flow resistance of the substance.



# HEAT EXCHANGER



Shell and Tube Heat Exchangers have the following advantages:

- Corrosion-proof
- Excellent heat conductivity
- Extremely small pressure loss
- Horizontal or vertical installation, saving space
- Easy maintenance and easy tube re-assembling

**Application range:**

Corrosion-proof against all organic and inorganic substances with the exception of hydrofluoric, fluorosilicic, phosphoric acids and hot concentrated lyes.

Allowed operating temperature for shell wall:  $\leq 150^{\circ}\text{C}$

Allowed operating pressures for shell: 3m2, 4m2:  $\leq 0.15\text{Mpa}$   
5m2, 6m2, 10m2, 12m2, 16m2, 20m2, 25m2,  $\leq 0.1\text{Mpa}$

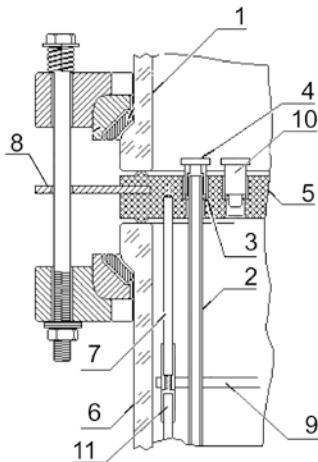
Allowed operating pressures for tube : 3m2, 4m2:  $\leq 0.10\text{Mpa}$   
5m2, 6m2, 10m2, 12m2, 16m2, 20m2, 25m2,  $\leq 0.1\text{Mpa}$

Press difference between shell and tube :  $\leq 0.25\text{Mpa}$

Maximum temperature difference:  $\leq 120^{\circ}\text{C}$

The flow resistance of the liquid in the Shell and Tube( take 5m2 as example):

$$\Delta P_{H_2O} = 0.10275 \text{ H}_2\text{O} \cdot m \quad (Vt = 1.9906\text{L/S})$$



The feature of the Shell and Tube Heat Exchanger is the high efficiency of heat transfer.

Heat exchange rate is calculated as follows:

Liquid – liquid heat exchange:  $K = 250\text{--}400\text{W/m}^2\text{K}$  ( $k = 200\text{--}350\text{Kcal/m}^2\text{h}^{\circ}\text{C}$ )

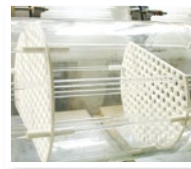
Condensation:  $K = 500\text{--}700\text{W/m}^2\text{K}$  ( $k = 430\text{--}600\text{Kcal/m}^2\text{h}^{\circ}\text{C}$ )

- |                       |                                    |
|-----------------------|------------------------------------|
| 1. glass cover        | 7. glass spacer rod                |
| 2. glass tube         | 8. supporting ring                 |
| 3. O-ring             | 9. baffle                          |
| 4. PTFE threaded bush | 10. blank threaded bush            |
| 5. PTFE tube plate    | 11. guide bush for the spacer rods |
| 6. glass shell        |                                    |



### Heat Exchange Internal Tubes

Standardized diameter glass tubes are used for heat exchange internal tubes of all our glass heat exchangers.



### Baffle

The unique system, with nylon or PTFE baffles ensures stability of the baffle and internal tube, speeding up the flow rate, prolonging the stay time of the substance, thus greatly boosting heat exchange efficiency.



### PTFE Tube Plate

PTFE Tube Plate is resistant to all kinds of corrosive materials.



### Passing Channel

Large diameter pipes are used to suit the application of various processes, effectively reducing evaporation and flow resistance.



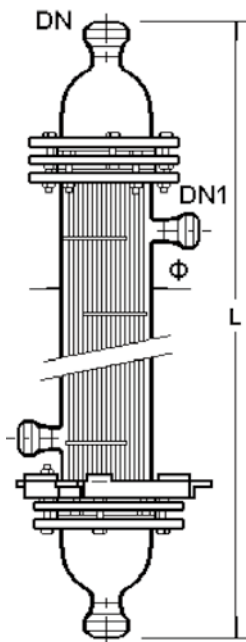
### Seals

O-rings or PTFE seals are used as the material for glass heat exchange tubes to suit the use of various solvents and high temperature conditions.



### Lifting and Supporting

The glass heat exchangers are equipped with lifting and saddle support, making the installation convenient.



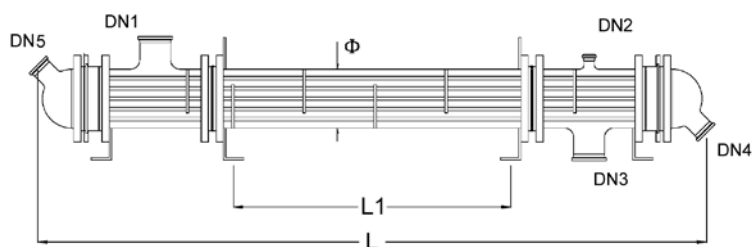
### 8.2.1 Type A

AREA m <sup>2</sup>	Φ mm	DN	DN1	L mm	CAT. NO.
3(vertical)	Φ180	DN25-N100	25	~2000	QHR-LG-180/3/DN/L
3(horizontal)			25	~2000	QHR-LG-180/3/DN/W
5(vertical)	Φ230		40	~2350	QHR-LG-230/5/DN/L
5(horizontal)			40	~2350	QHR-LG-230/5/DN/W
10(horizontal)	Φ315		50	~2200	QHR-LG-300/10/DN/W



- The joint diameter of the above heat exchanger is standard, but the size and direction can be changed upon request.
- Please specify the way of assembly when ordering.
- If it works under vacuum condition, please specify.

# HEAT EXCHANGER



DN1: inlet  
 DN2: vacuum or discharge outlet  
 DN3: outlet  
 DN4: inlet of condensed water  
 DN5: outlet of condensed water

## 8.2.2 Type B

AREA m <sup>2</sup>	Φ mm	DN1	DN2	DN3	DN4 DN5	L mm	L1 mm	CAT. NO.
4 (horizontal)	Φ180	50	50	50	50	~2200	~900	QHR-LG-180/4W
6 (horizontal)	Φ230	100	50	50	50	~2400	~900	QHR-LG-230/6W
10 (horizontal)						~3500	~2000	QHR-LG-230/10W
12 (horizontal)	300	150	50	150	100	~2600	~550	QHR-LG-300/12W
16 (horizontal)						~3100	~1050	QHR-LG-300/16W
20 (horizontal)						~3600	~1550	QHR-LG-300/20W
25 (horizontal)						~4100	~2050	QHR-LG-300/25W

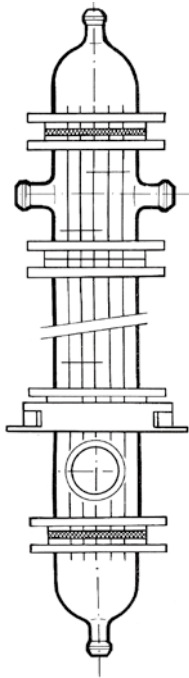


- The joint diameter of the above heat exchanger is standard, but the size and direction can be changed upon request.
- Please specify the way of assembly when ordering.
- If it works under vacuum condition, please specify.

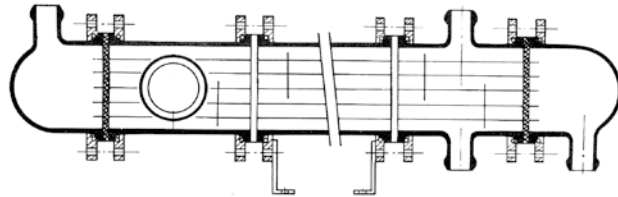


## The Choice of Installation Mode:

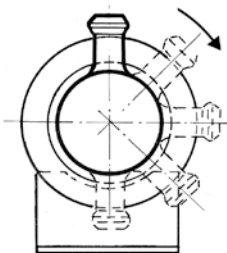
The Shell and Tube Heat Exchangers are installed either horizontally or vertically, with attached holders for easy installation.



Vertical installation



Level Installation



## The Choice of Substance Passage Angle in the Shell:

Any angle can be provided according to customer's demand to meet the need of both installation and production process.

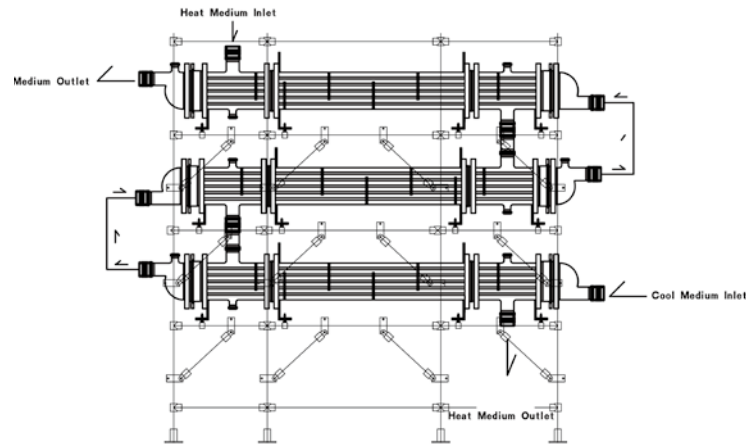
The condensation drain opening is specified as zero degree. Turn clockwise and you can specify your needed angle when ordering.

# HEAT EXCHANGER



Shell and Tube assembly:

By serial assembly of the exchangers, a 100 m<sup>2</sup> heat exchanger set can be reached.



Groups of 75 square meters and tube heat exchanger