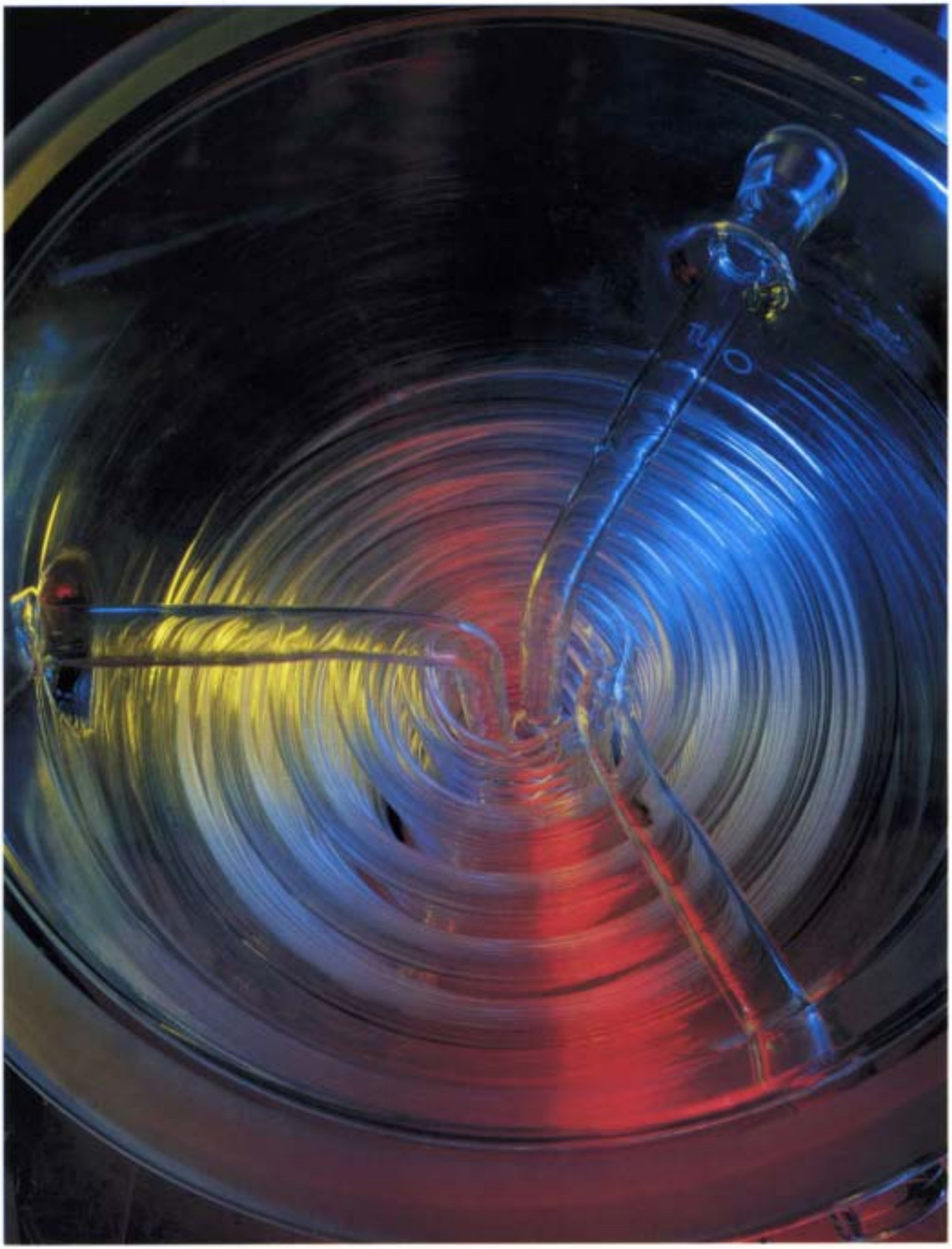


Introduction

The overall heat transfer co-efficients of borosilicate glass equipment compare favourably with many alternative process plant construction materials. This is because the smooth surfaces of the glass improve the film coefficient and reduce the tendency for fouling.

Two basic types of glass heat exchanger are described in this section: coil type and shell and tube type. These are complemented by a range of stainless steel and tantalum immersion type units described on pages 5.12 and 5.13, quartz immersion heaters on page 5.14/E and heating baths and mantles described in Section 4 – *Vessels & Stirrers*. A further complementary factor is the availability of various shell/tube/end fitting combinations of glass, exotic metal and fluoroplastics to special order on shell and tube type heat exchangers.

Glass coil type heat exchangers – available as condensers, boilers or immersion type units – have proved themselves in service for over 40 years and are available with heat transfer areas up to 12m^2. There are no internal sealing problems as the coil is welded to the jacket making a one-piece unit.

Shell and tube heat exchangers are engineered to be compatible in operation with coil-type units and complement and extend the heat transfer capacities available.

Both types of heat exchanger are available in a wide range of nominal bores and are totally compatible with the other glass process plant and pipeline components described in the other sections of this catalogue.

Glass heat exchangers have standard flat buttress end connections (with the exception of service connections on some smaller units). Further details of these are provided in Section 1 – *Technical Information*.

For standard flat buttress end connections from DN 15 to DN 150, it is possible to achieve a 3° deflection in the joint by using a flexible gasket. Details of these and all other couplings and gaskets can be found in Section 9 – *Couplings*.

DN refers to the nominal bore. Unless otherwise stated, all dimensions are given in mm.

The majority of glass heat exchangers can be either CORWRAPped or CORCOATed and these are identified by a bold blue line at the foot of each appropriate page. Full details of both CORWRAP and CORCOAT can be found in Section 1 – *Technical Information*. For CORWRAP items, add a suffix **C** to the standard catalogue reference. For CORCOAT items, add a suffix **L**. Therefore a HE 4 becomes a HE 4C or a HE 4L respectively.

For details of supporting equipment, please see Section 10 – *Structures*.

Permissible Operating Conditions

For both coil type and shell and tube type heat exchangers, the permissible operating conditions for glass shells and headers can be determined from section 1 – *Technical Information*.

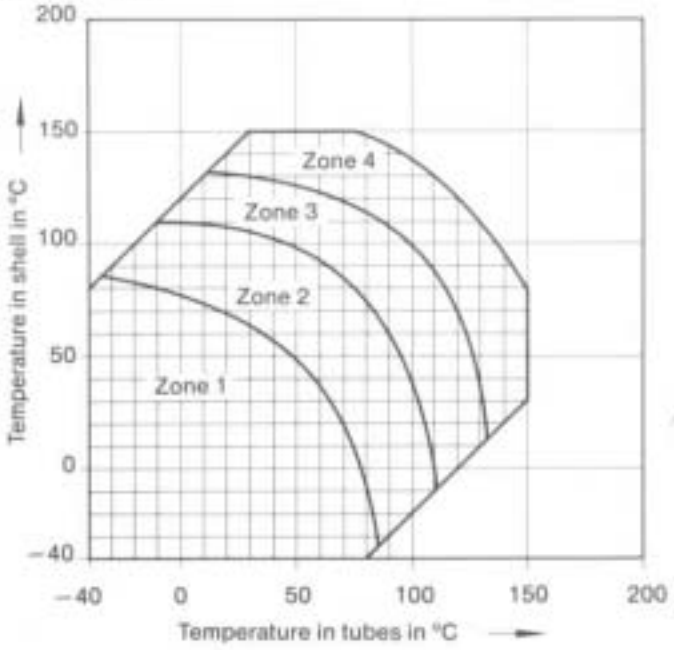
The internal heat transfer surface of glass heat exchangers are considered differently. For further information on permissible temperature differences please contact our Technical Department.

For shell and tube type heat exchangers, the permissible operating conditions for the PTFE tube plates and steel shells and header can be determined from the diagram and tables below.

Maximum differential pressure between the tube side and the shell side

DN	Δ p			
	Zone 1	Zone 2	Zone 3	Zone 4
150	3.5	3.1	2.8	2.1
225	3	2.7	2.4	1.8
300	2.8	2.3	2	1.4

Differential pressure as a function of temperature

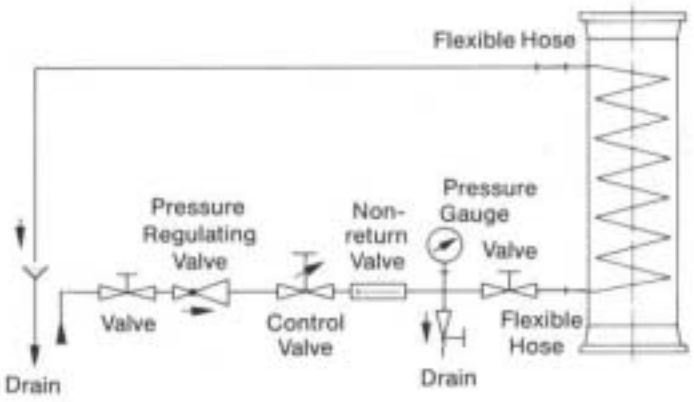


Maximum Working Pressures

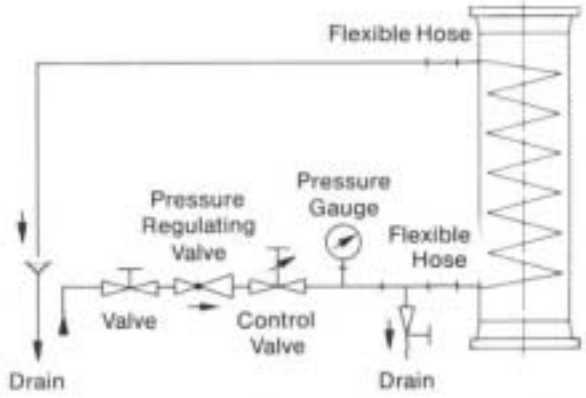
Details of construction		DN150		DN225		DN300	
		Max.	Min.	Max.	Min.	Max.	Min.
Shell side	Glass Shell	2 bar g	Vacuum	1 bar g	Vacuum	1.0	Vacuum
	Steel Shell	3.5 bar g	Vacuum	3.5 bar g	Vacuum	3.5 bar g	Vacuum
Tube side	Glass Tubes Single Pass	2.0 bar g	Vacuum	1.0 bar g	Vacuum	1.0 bar g	Vacuum
	Glass Tubes Triple Pass	2.5 bar g	Vacuum	2.5 bar g	Vacuum	2.5 bar g	Vacuum

Glass Condensers

- When connecting coil-type condensers to the coolant supply, adequate flexible hose should be used to ensure that stresses are not transmitted to the glass.
- Condensers should never be operated with steam in the coils. They should always be used with an adequate flow of coolant through the coils and care should be taken to ensure that the coolant does not become heated to boiling point.
- Coolant control valves should always be turned on and off slowly, particularly when air is present in the line. Coolant should be allowed to drain freely to a point as close as practicable to the heat exchanger.
- Care should be taken in arranging the coolant supply in order that water hammer is avoided. A uniform, continuous supply of coolant should be ensured. When using type HE 600 condensers, the fitting of an anti-water hammer device is recommended – see page 5.4.
- Brine or other coolants in closed circuit can be used as coolant provided that suitable precautions against water hammer are taken.
- If a condenser is out of service for any length of time, it is advisable to drain the coils, especially in winter when suitable precautions should be taken to prevent freezing of any water remaining after draining.
- Condensers can be mounted in series to provide larger surface areas.
- When connecting direct to the mains water supply, the local water authority regulations should be considered.



Typical condenser arrangement
(direct connection to water mains)



Typical condenser arrangement

Performance Data for Glass Coil-Type Condensers

The heat transferred in coil type condensers can be considered on average as 310 W/m²K although the figure may vary from 50 to 410 W/m²K according to conditions of use. The following are examples of this variation in some common applications.

The heat transfer coefficient also varies from one size of condenser to another, but, as a guide, the table below gives an indication of the performance of condensers at atmospheric pressure, using water (inlet temperature 20°C) as a coolant in the coils and steam condensing in the jackets. The figures do not show the maximum performance of the units but are a general indication of typical working conditions.

Jacket side	Vapour to be condensed	Liquid	Gas
Coil side	Cooling water	Cooling water	Cooling water
Heat transfer coefficient W/m²K	290	175	60

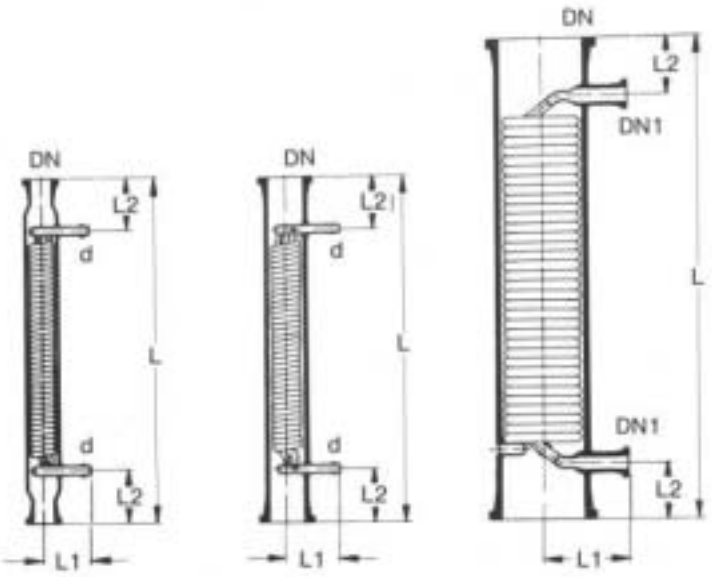
Catalogue reference	**Surface area (m²)**	**Coolant throughput (kg/h)**	**Steam condensed (kg/h)**
HE 1.5	0.2	700	7
HE 2	0.3	1000	12
HE 3	0.3	1000	12
HE 4	0.5	1500	18
HE 6/10	1.0	1600	32
HE 6/15	1.5	1500	50
HEU 9A	2.5	3000	90
HEU 12/25	2.5	2700	80
HEU 12/40	4.0	4750	128
HEU 450/60	6.0	5000	200
HEU 450/80	8.0	4200	265
HE 600	12.0	6500	385

Glass Condensers

Glass coil-type condensers from DN 225 upwards have two inlets and one outlet arranged at 120° to one another.

Please refer to the performance data for glass coil-type condensers given on page 5.1 to complement the technical information given in the individual item descriptions.

The maximum pressure in the coils is 2.7 bar.g. The maximum differential pressure across the coils is 2.7 bar.



HE 1.5
HE 2

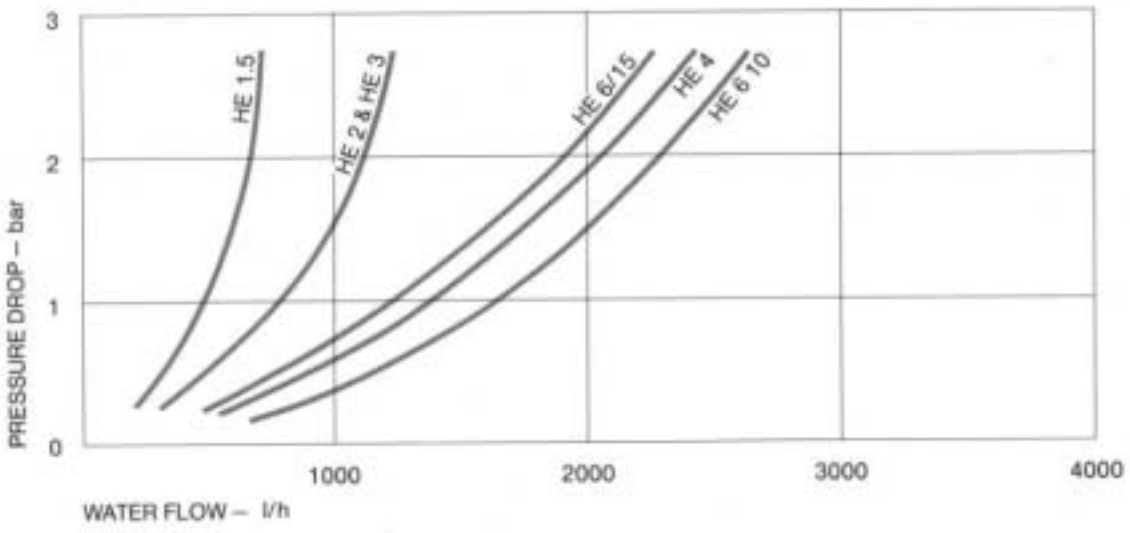
HE 3
HE 4

HE 6/10
HE 6/15

Catalogue reference		HE 1.5	HE 2	HE 3	HE 4	HE 6/10	HE 6/15
Heat transfer area	m^2	0.2	0.3	0.3	0.5	1.0	1.5
DN	mm	40	50	80	100	150	150
DN1	mm	–	–	–	–	25	25
d[1]	mm	16	16	16	20	–	–
L	mm	610	610	610	610	610	840
L1	mm	85	90	90	120	150	150
L2	mm	100	95	95	80	100	100
Free cross sectional area	cm^2	4.5	5.0	5.0	30	52	52
Equivalent pipe diameter	mm	24	26	26	62	81	81
Weight empty	kg	1.0	1.5	1.8	4.5	6.8	10
Weight with coils full (water)	kg	1.3	2.0	2.4	5.3	9.5	14
Jacket capacity	l	1.0	1.25	1.8	4.5	9	11

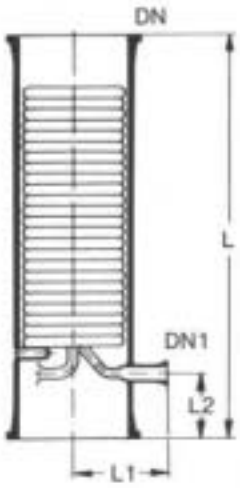
[1]d is the bore of the mating hose.

Cooling Water Consumption/Pressure Drop

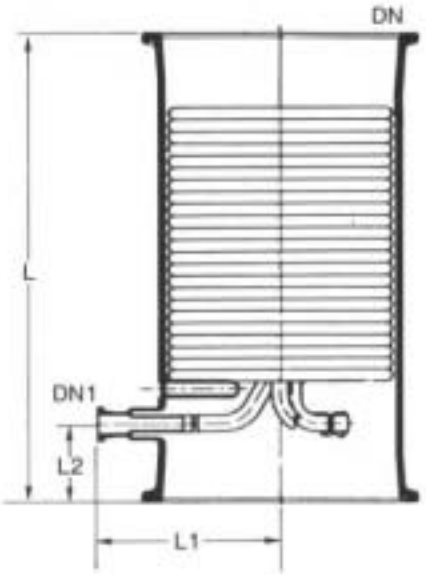


For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

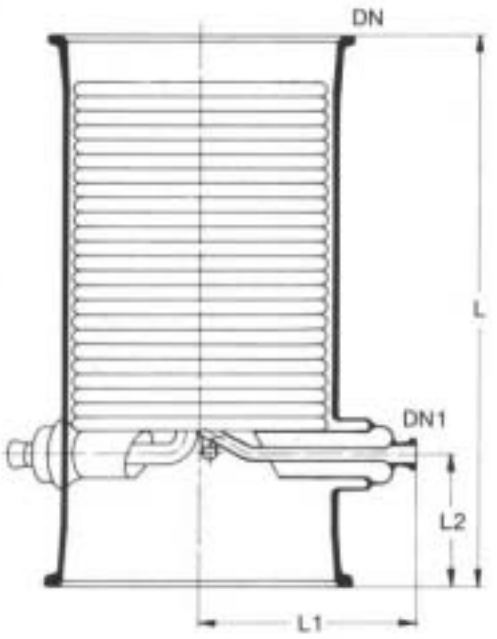
Glass Condensers



HEU 9A
HEU 12/25
HEU 12/40



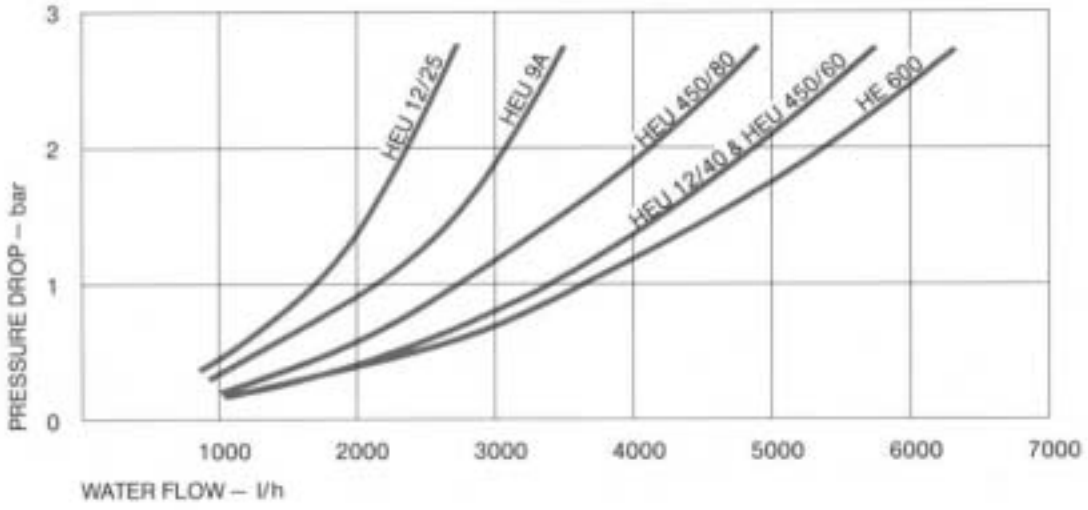
HEU 450/60
HEU 450/80



HE 600

Catalogue reference		HEU 9A	HEU 12/25	HEU 12/40	HEU 450/60	HEU 450/80	HE 600
Heat transfer area	m^2	2.5	2.5	4.0	6.0	8.0	12.0
DN	mm	225	300	300	450	450	600
DN1	mm	25	25	25	40	40	50
L	mm	790	610	900	760	900	1250
L1	mm	180	250	250	325	325	485
L2	mm	125	125	125	150	150	300
Free cross sectional area	cm^2	142	210	258	820	820	1520
Equivalent pipe diameter	mm	135	164	180	325	325	440
Weight empty	kg	16	21	30	45	54	122
Weight with coils full (water)	kg	23	29	43	61	74	173
Jacket capacity	l	20	38	40	100	107	265

Cooling Water Consumption/Pressure Drop



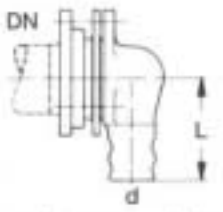
For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

Angled Hose Connector Assemblies

These metal connectors are used to connect flexible hoses to the inlets and outlets of coil type condensers. In applications where corrosive coolants are being used, we recommend the use of glass hose connectors – see Section 2 of this catalogue – *Pipeline Components*.

DN[1]	d[2]	L	Catalogue reference
25	20	70	PMC 1/.75
40	26	80	PMC 1.5/1
50	42	90	PMC 2/1.5

[1]DN is the nominal bore of the condenser inlet/outlet
[2]d is the bore of the mating hose



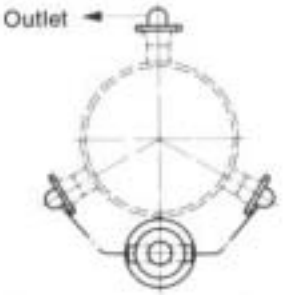
The complete assembly comprises:

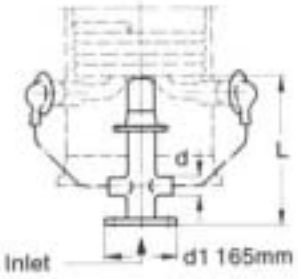
1 x Metal hose connector
1 x Flange and insert
1 x Compressed fibre gasket
3 x Nuts and bolts complete with springs and plain washers

Anti-Water Hammer Device

In order to prevent damage to type HE600 condensers caused by water hammer, we recommend the fitting of an anti-water hammer device in the water feed line.

	d[1]	L	Catalogue reference
	42	450	WMC 2/1.5





The complete assembly comprises:

1 x Air vessel
1 x Closure
1 x Flange and insert
1 x Gasket
3 x Metal hose connectors
2 x PVC hoses
4 x Hose clips
3 x Nuts and bolts complete with springs and plain washers

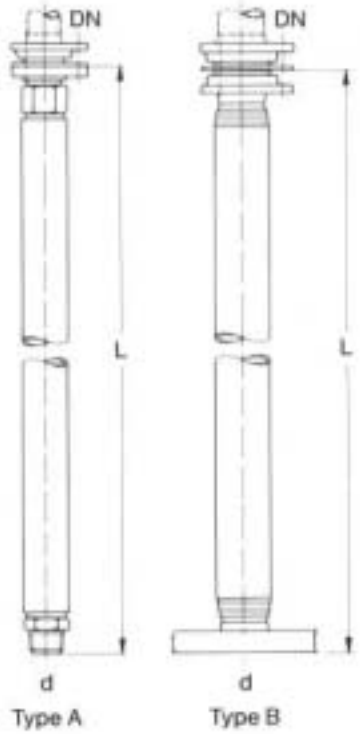
[1]d is the bore of the mating hose

Steam Hose Assemblies

Flexible steam hose assemblies are recommended for use with glass coil-type boilers. Due to the narrow bore of the rubber hoses, boilers of DN 225 and above should only be used with the metal hoses. Similarly, the rubber hoses should not be used where temperatures in excess of 150°C are likely to be encountered, for example where heat transfer fluids are used.

DN[1]	d	L	Maximum temp. (°C)	Max. pressure bar.g.	Type	Catalogue reference
25	R½	915	150	5	A (Rubber)	SHC 1/.5
25	25/PN 16	1000	300	5	B (Metal)	MSC 1
40	40/PN 16	1000	300	5	B (Metal)	MSC 1.5

[1]DN is the nominal bore of the boiler inlet/outlet



The complete assembly comprises:

Type A (Rubber)

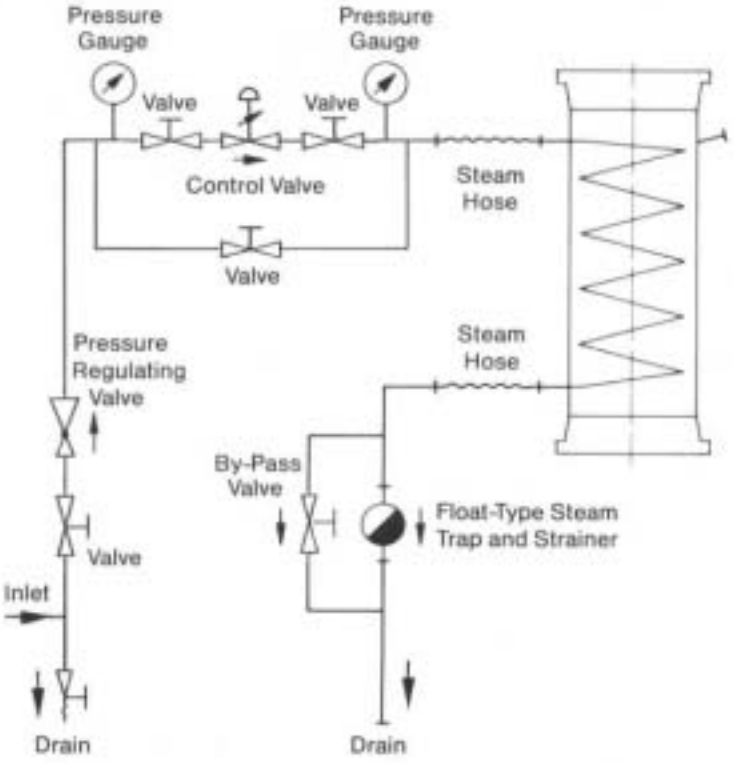
1 x Rubber hose
1 x Flange and insert
1 x Compressed fibre gasket
3 x Nuts and bolts complete with springs and plain washers

Type B (Metal)

1 x Flanged metal hose
1 x Flange (CF)
1 x Insert (CN)
1 x Compressed fibre gasket
3 x Nuts and bolts complete with springs and washers

Glass Boilers

- Flexible hoses must be used on the coil inlet and outlet and must have sufficient fall to avoid the collection of condensate. Details of flexible hoses have been given on the previous page.
- To avoid the possibility of steam hammer, the steam main should be adequately trapped.
- To clear the line of the very heavy condensate flow produced on start-up, by-pass valves must be installed around the trap on the coil outlet.
- Control valves and pressure gauges should be positioned near to the heat exchanger.
- Coil type boilers should not be fitted at the bottom of flasks or columns. They are designed to be mounted on an external circulatory loop. This ensures a rapid uni-directional flow across the heating surfaces which improves the heat transfer performance and promotes smooth operation.
- The steam pressure should always be adequate enough to ensure effective and smooth condensate removal. This pressure will vary according to conditions of use and size of heat exchanger. for example, with the HEB 12/12 and HEB 450, a minimum pressure of 2 bar.g will probably be required.
- On start-up, the steam should be admitted positively and progressively to the coil battery to remove the condensate as it is formed and with the by-pass valve left open until a uniform flow of condensate is being vented.
- Depending upon the overall operating conditions, the use of boilers under high vacuum is not always recommended.



Typical boiler arrangement

Performance Data for Glass Coil-Type Boilers

The maximum permissible steam pressure at the coil inlets of boilers is 3.0 bar.g which is equivalent to a temperature of about 143°C with saturated steam. Higher temperatures can be achieved by using heat transfer fluids.

The heat transferred in most sizes can be considered on average as 400 W/m²K with a steam pressure in the coils of 3.0 bar.g, although this figure declines marginally at lower pressures.

With the HEB 12/12 and the HEB 450 the overall heat transfer coefficients are 370 and 290 W/m²K respectively.

The table shows typical performances of boilers indicating the amount of water evaporated at atmospheric pressure with steam in the coils at various pressures.

Note: if the feed is cold, the performance of the boiler will be only about 85% of the figures quoted.

Catalogue reference	Surface area (m^2)	Steam pressure (bar.g)	Water evaporated (kg/h)
HEB 4	0.15	1.0	1.9
		3.0	4.1
HEB 6	0.5	1.0	6.5
		3.0	13
HEB 9	1.5	1.0	19
		3.0	41
HEB 4/4	0.15	1.0	1.9
		3.0	4.1
HEB 6/6	0.5	1.0	6.5
		3.0	13
HEB 9/9	1.2	1.0	14
		3.0	41
HEB 12/12	2.0	3.0	51
HEB 450	4.5	3.0	90

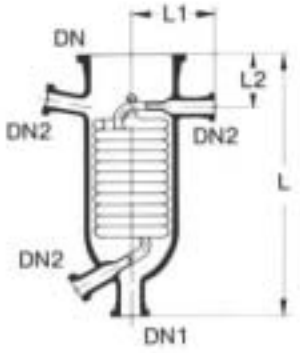
Glass Boilers

Type HEB 4, HEB 6 and HEB 9 glass coil-type boilers are normally mounted in external circulatory loops using a spherical vessel as the main still. They should not be installed in the bottom of a flask or column.

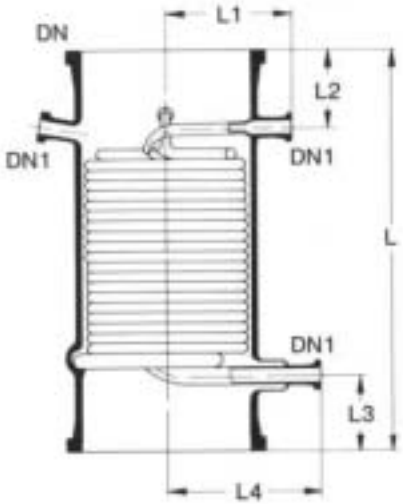
The other types of glass coil-type boilers detailed on this page are again mounted in circulatory loops but as their nominal bore is the same at the top and bottom, these units can, under certain circumstances, be installed one above the other to achieve multiples of the basic heat transfer area.

Please refer to the performance data for glass coil-type boilers on page 5.5 to complement the technical information given below.

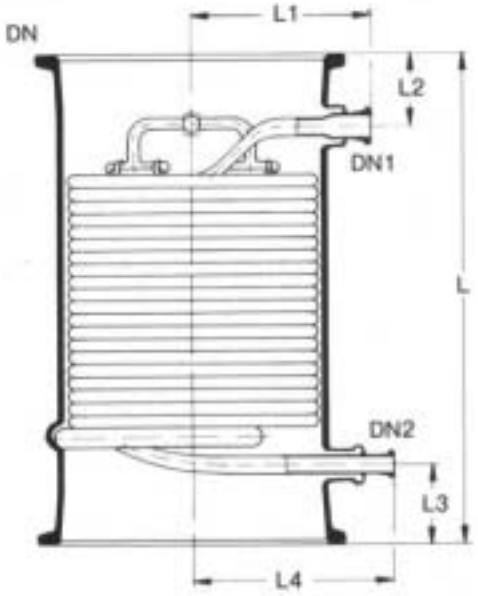
The maximum pressure in the coils is 3.0 bar.g. The maximum differential pressure across the coils is 3.0 bar.



Type A



Type B



Type C

Catalogue reference		HEB 4	HEB 4/4	HEB 6	HEB 6/6	HEB 9	HEB 9/9	HEB 12/12	HEB 450
Type		A	B	A	B	A	B	B	C
Heat transfer area	m^2	0.15	0.15	0.5	0.5	1.5	1.2	2.0	4.5
DN	mm	100	100	150	150	225	225	300	450
DN1	mm	25	25	40	25	40	25	25	40
DN2	mm	25	–	25	–	25	–	25	25
L	mm	380	405	455	510	710	710	700	915
L1	mm	125	125	150	150	180	180	215	325
L2	mm	100	100	90	100	140	115	135	125
L3	mm	–	100	–	100	–	100	135	140
L4	mm	–	125	–	150	–	180	270	350
Free cross sectional area	cm^2	40	41	51	51	147	193	330	770
Equivalent pipe diameter	mm	71	70	81	80	137	157	205	315
Weight empty	kg	2.2	3.2	4	6.3	10	15	21	56
Jacket capacity	l	2.5	3.3	4.5	7.5	17	21	42.5	122
Coil capacity	l	0.25	0.25	1.3	1.3	4.5	4.5	5.0	23

For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

Glass Immersion Heat Exchangers

Immersion heat exchangers are used to control exothermic reactions in glass vessels. In most applications, cooling water is used in the coils, but they can also be used with steam. In the latter case the coils must always be completely immersed in the liquid.

The HEM 6 is used in type R spherical vessels and the HEM 9 and HES 9 are used in type E vessels. They can also be used in cylindrical vessels with DN 150 or 225 bottom outlet (supplied to special order).

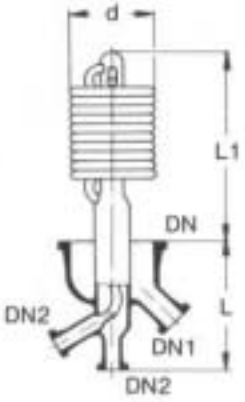
The HEM 9 has a central hole through the coil battery so that an extended type stirrer shaft (see Section 4 – *Vessels & Stirrers*) can be fitted. This extends to the bottom of the heat exchanger and provides a thorough mixing action.

The HES 9 has a sealed-in draught tube and is specifically designed for use with the PTFE turbine stirrer (see Section 4 – *Vessels & Stirrers*). Due to its extra height it cannot be used with standard glass stirrers. An additional feature of the HES 9 is the sealed-in seat for bottom outlet valve type BAS (see Section 3 – *Valves & Filters*).

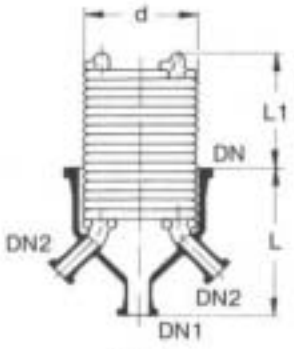
These heat exchangers are not recommended for use with products which have a tendency to crystallise.

The maximum pressure in the coils is 3.0 bar.g. The maximum differential pressure across the coils is 3.0 bar.

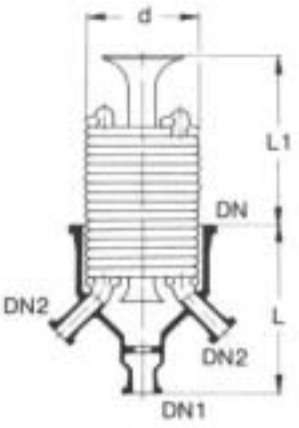
Catalogue reference		HEM 6	HEM 9	HES 9
Heat transfer area	m^2	0.5	0.7	0.7
DN	mm	150	225	225
DN1	mm	40	40	40
DN2	mm	25	25	25
L	mm	230	275	275
L1	mm	330	205	300
d	mm	145	210	210
Water throughput at 2 bar.	l/h	1350	2050	2050



HEM 6

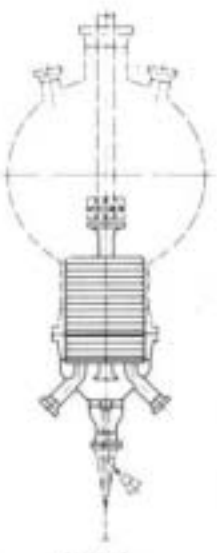


HEM 9



HES 9


HEM 9


HES 9

For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

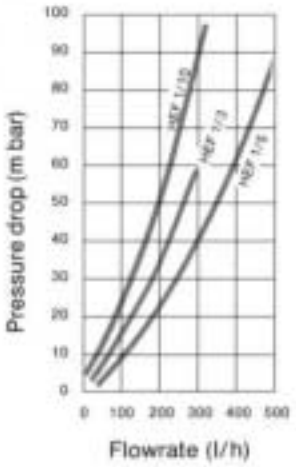
Product Coolers

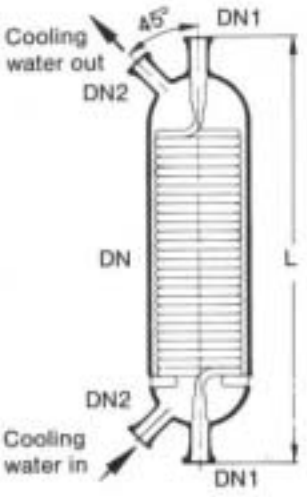
HEF product coolers are general purpose coolers used, typically, for the cooling of products from distillation columns.

The coolers are connected directly to the product outlet of the column by means of DN1. The product then flows from the top to the bottom of the unit through the coil battery across which the cooling water flows countercurrently from bottom to top.

For connection of the cooling water inlet and outlets, we recommend the use of angled hose connections which can be found on page 5.4.

Catalogue reference		HEF 1/3	HEF 1/5	HEF 1/10
Heat transfer area	m^2	0.3	0.5	1.0
DN	mm	100	150	150
DN1	mm	25	25	25
DN2	mm	25	25	25
L	mm	550	550	750



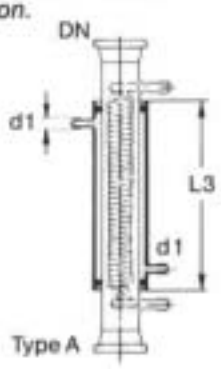


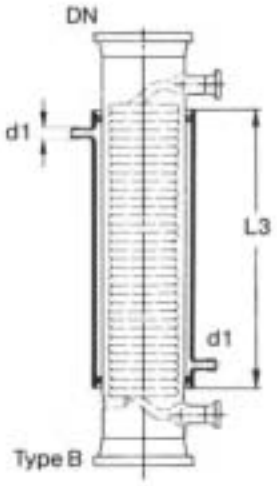
The maximum pressure in the coils is 2.7 bar.g. The maximum differential pressure across the coils is 2.7 bar.

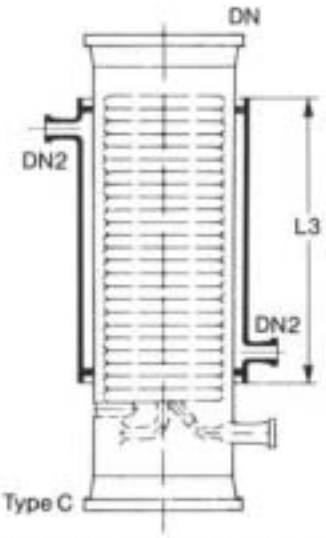
Jacketed Condensers

In some heat exchanger applications, particularly where temperature differences are small, vapours can bypass the coil between the battery and jacket. This can be prevented by the use of jacketed heat exchangers which have the added bonus of significantly increasing the heat exchange area.

Further information on the operation of jacketed components can be found in Section 1 of this catalogue – *Technical Information.*







Catalogue reference[1]		DHE 2	DHE 3	DHE 4	DHE 6/10	DHE 6/15	DHEU 9A	DHEU 12/25	DHEU 12/40
Type		A	A	A	B	B	C	C	C
Heat transfer area of the jacket	m^2	0.09	0.09	0.1	0.13	0.24	0.3	0.2	0.47
DN[1]		50	80	100	150	150	225	300	300
DN2		–	–	–	–	–	25	25	25
d1[2]	mm	18	18	18	18	18	–	–	–
L3	mm	370	370	370	310	540	480	260	550
Free cross sectional area of the jacket	cm^2	24	24	52	62	62	156	225	225
Volume of the jacket	l	0.8	0.8	1.7	1.6	3.0	6.7	4.9	12

[1] For further details and dimensions of condensers see pages 5.2 and 5.3
[2] d1 is the bore of the mating hose for the jacket connections

For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

Shell and Tube Heat Exchangers

Shell and tube heat exchangers are particularly suitable for applications where large heat transfer areas are required in relatively confined spaces.

Two basic versions are available:

Type RGG single pass units with glass shell, tubes and headers for heat transfer between two aggressive media.

Type RGM triple pass units with glass shell, glass tubes and steel headers for heat transfer between aggressive media in the shell and non-aggressive media in the tubes.

In each unit, the glass tubes are sealed individually into the PTFE end tube plate with special PTFE bushes and olives. This unique sealing arrangement, further details of which can be seen in the diagram below, permits easy replacement of accidentally broken tubes.

Another key maintenance factor is that all shell and tube heat exchangers use tubes of identical diameter. Only four different tube lengths are incorporated throughout the entire range and therefore for glass plant users with several different units on site, spares procurement is made much easier.

Shell and tube heat exchangers are designed to operate horizontally but can be supplied for vertical operation if required.

Shell and tube heat exchangers can be supplied in a wide variety of shell/tube/end fittings combinations of glass, exotic metals and fluoroplastics, to special order. Details of these will be supplied on request.

Permissible operating conditions for shell and tube heat exchangers can be found on page 5.0.

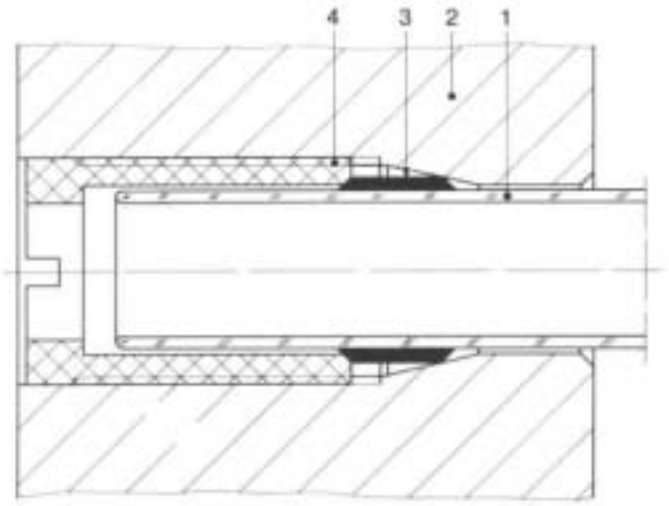
The following spares are supplied with each unit:

- 1 x Installation and maintenance manual
- 1 x Special tube positioning tool
- 1 x Socket spanner
- 16 x PTFE olives
- 8 x PTFE bushes
- 8 x PTFE plugs
- 15 x Glass tubes

Heat Transfer in Shell and Tube Heat Exchangers

The table below gives an indication of the performance of glass shell and tube heat exchangers in several typical applications. For advice on more specific applications, please contact our Technical Department.

Type of heat transfer	Basis	W/m²K
Liquid	Water-water	580-700
	Water-organic solvents	290-700
	Water-oil	90-400
Liquid-gas	Water-air	30-90
Condensation	Water-water	450-950
	Water-organic solvents	470-700
Evaporation	Steam-water	580-950

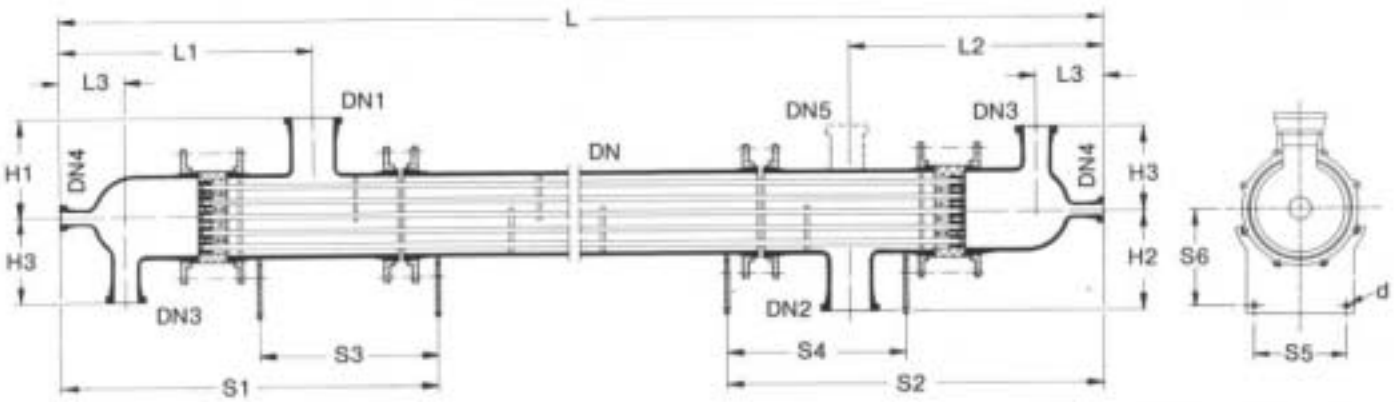


Tube sealing principle

1 Glass tube
2 PTFE tube sheet
3 PTFE olive
4 PTFE bush

Shell and Tube Heat Exchangers Single Pass

Type RGG



Catalogue reference	RGG 6/3	RGG 6/4	RGG 6/5	RGG 6/6	RGG 9/6	RGG 9/8	RGG 9/10	RGG 9/12	RGG 12/12	RGG 12/16	RGG 12/21	RGG 12/26
Heat exchange area (m^2)	3	4	5	6	6	8	10	12.5	12.5	16	21	26
L	2535	3035	3835	4535	2865	3365	4165	4865	2915	3415	4215	4915
Number of baffles	11	14	19	24	7	9	13	17	5	7	10	13
DN	150				225				300			
Number of tubes[1]	37				73				151			
DN1/DN2	80				100				150			
DN3	50				80				80			
DN4	25				40				40			
DN5[2]	50				50				50			
H1/H2	175				250				300			
H3	150				205				240			
L1/L2	440				690				730			
L3	115				175				200			
S1/S2	660				995				1045			
S3/S4	–				–	–	450	450	450			
S5	180				240				300			
S6	195				270				295			
d	14				14				14			

[1]All glass tubes have an external diameter of 14mm and a wall thickness of 1mm

[2]Optional vent to be specified when ordering

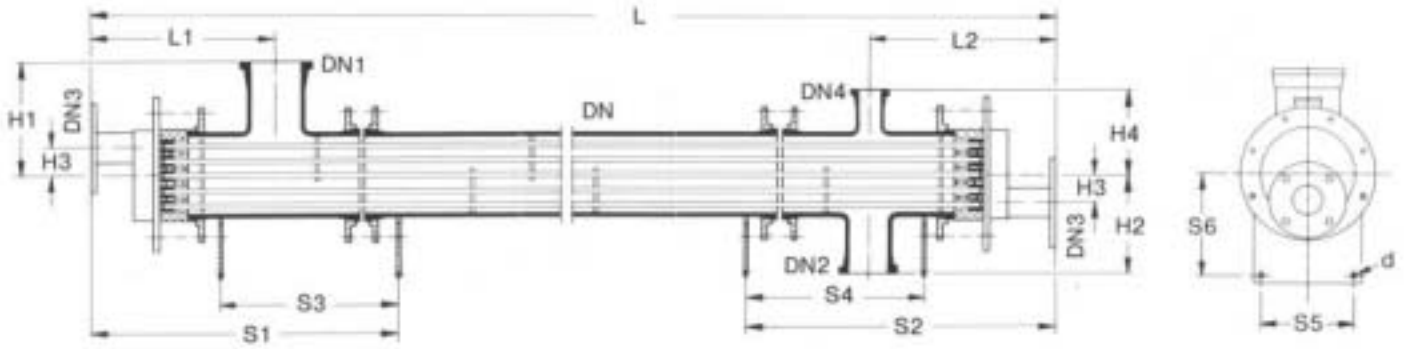
The following standard spares are available for these items:

- All major components

For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

Shell and Tube Heat Exchangers Triple Pass

Type RGM



Catalogue reference	RGM 6/3/3	RGM 6/4/3	RGM 6/5/3	RGM 6/6/3	RGM 9/6/3	RGM 9/8/3	RGM 9/10/3	RGM 9/12/3	RGM 12/12/3	RGM 12/16/3	RGM 12/21/3	RGM 12/26/3
Heat exchange area (m^2)	3	4	5	6	6	8	10	12.5	12.5	16	21	26
L	2295	2795	3595	4295	2305	2805	3605	4305	2335	2835	3635	4335
Number of baffles	11	14	19	24	7	9	13	17	5	7	10	13
DN	150				225				300			
Number of tubes[1]	37				73				151			
DN1	100				150				225			
DN2	80				100				150			
DN3[2]	50				80				80			
DN4	50				50				50			
H1	200				275				300			
H2	175				250				300			
H3	50				70				110			
H4	150				200				225			
L1	320				410				515			
L2	320				410				440			
S1	540				715				905			
S2	540				715				830			
S3	–				–	–	450	450	600			
S4	–				–	–	450	450	450			
S5	180				240				300			
S6	195				270				295			
d	14				14				14			

[1]All glass tubes have an external diameter of 14mm and a wall thickness of 1mm

[2]PN16

The following standard spares are available for these items:

- All major components

For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

Metal Immersion Heat Exchangers

Metal immersion heat exchangers are designed specifically for applications in which large heat transfer surfaces are required for use at high steam pressures.

The metal immersion heat exchangers shown on this and the following page are constructed from either stainless steel or tantalum as standard. Units constructed from other materials such as hastelloy or titanium can be supplied to special order.

Two basic types of metal immersion heat exchanger are available:

1 **Stainless steel**

These heat exchangers are manufactured from stainless steel but can be supplied in other materials such as hastelloy or titanium to special request.

Type **EH** units are designed for use in circulatory systems whilst type **EHS** units are fitted with spray guard for use in spherical vessels.

The units can be operated up to a maximum pressure of 20 bar.g and a maximum temperature of 300°C.

2 **Tantalum**

These heat exchangers are manufactured from tantalum and are designed for use in applications where the highest levels of corrosion resistance are required. The full range is detailed on the following page.

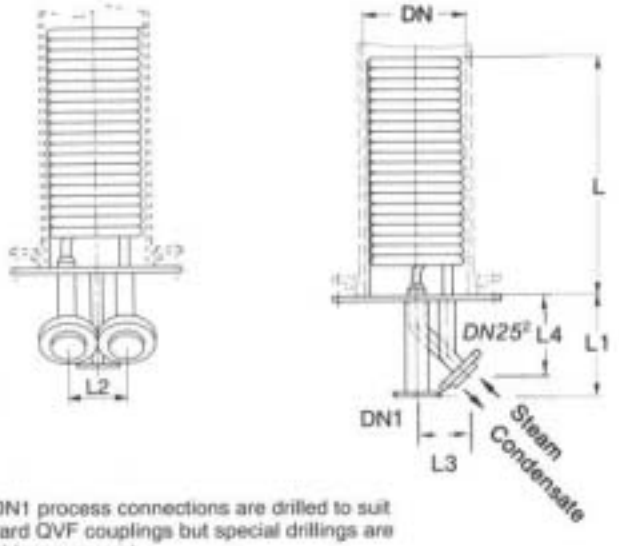
The units have a PN 40 steam connection and can be operated up to a maximum pressure of 6 bar.g and a maximum temperature of 210°C. Units capable of operating at higher pressure can be supplied to special request.

The use of hot oil is not recommended with these units.

Stainless Steel Immersion Heat Exchangers
For use in circulatory systems

Catalogue reference	EH 6/1.5	EH 6/2.5	EH 9/2.5	EH 9/5	EH 9/8
DN	150	150	225	225	225
Heat exchange area (m^2)	0.15	0.25	0.25	0.5	0.8
DN1[1]	25	25	40	40	40
L	200	325	175	275	400
L1	210	210	210	210	210
L2	120	120	120	120	120
L3	106	106	106	106	106
L4	166	166	166	166	166

Catalogue reference	EH 9/10	EH 9/15	EH 12/15	EH 12/20	EH 12/30
DN	225	225	300	300	300
Heat exchange area (m^2)	1.0	1.5	1.5	2.0	3.0
DN1[1]	40	40	40	40	40
L	500	725	525	675	1000
L1	210	210	212	212	212
L2	120	120	170	170	170
L3	106	106	106	106	106
L4	166	166	168	168	168



[1] The DN1 process connections are drilled to suit standard QVF couplings but special drillings are available on request.

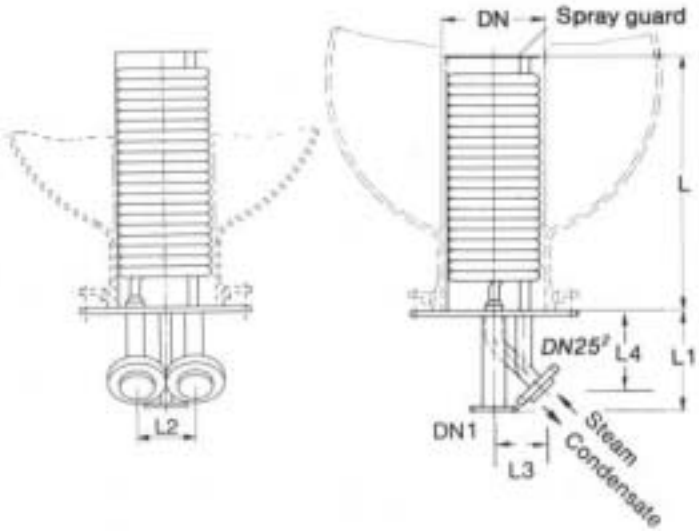
[2] PN40

Stainless Steel Immersion Heat Exchangers
With spray guard for use in spherical vessels

Catalogue[1] reference	EHS 6/1.5	EHS 6/2.5	EHS 9/2.5	EHS 9/5	EHS 9/8
L	225	350	200	300	425

Catalogue[1] reference	EHS 9/10	EHS 9/15	EHS 12/15	EHS 12/20	EHS 12/30
L	525	750	550	700	1025

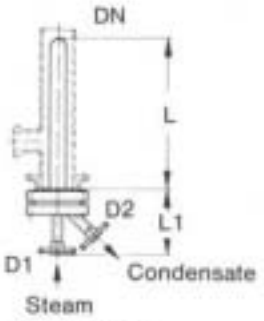
[1] All dimensional details as type **EH** above unless otherwise stated.



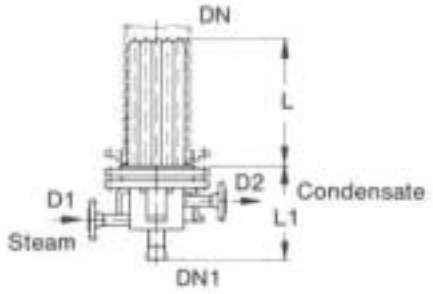
Tantalum
Immersion Heat Exchangers

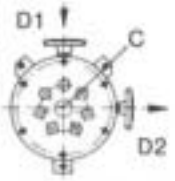
DN	Heat exchange area (m^2)	DN1	D1/D2[2]	L	L1	C[1]	Number of tubes	Catalogue reference
80	0.05	–	15/15	400	175	133	1	TK 3/05
80	0.1	–	15/15	800	175	133	1	TK 3/1
80	0.125	–	15/15	1000	175	133	1	TK 3/1.25
80	0.15	–	15/15	1200	175	133	1	TK 3/1.5
80	0.2	–	15/15	1600	175	133	1	TK 3/2
100	0.1	–	15/15	385	190	254	3	TK 4/1
100	0.2	–	15/15	770	190	254	3	TK 4/2
100	0.3	–	15/15	1155	190	254	3	TK 4/3
100	0.4	–	15/15	1540	190	254	3	TK 4/4
150	0.1	40	25/25	175	250	310	7	TK 6/1
150	0.2	40	25/25	335	250	310	7	TK 6/2
150	0.3	40	25/25	495	250	310	7	TK 6/3
150	0.4	40	25/25	660	250	310	7	TK 6/4
150	0.5	40	25/25	825	250	310	7	TK 6/5
150	0.6	40	25/25	990	250	310	7	TK 6/6
225	0.5	40	25/25	420	250	394	14	TK 9/5
225	0.6	40	25/25	500	250	394	14	TK 9/6
225	0.8	40	25/25	660	250	394	14	TK 9/8
225	1.0	40	25/25	825	250	394	14	TK 9/10
225	1.2	40	25/25	990	250	394	14	TK 9/12
300	1.0	80	50/25	580	350	585	20	TK 12/10
300	1.5	80	50/25	870	350	585	20	TK 12/15
300	2.0	80	50/25	1160	350	585	20	TK 12/20
300	2.5	80	50/25	1450	350	585	20	TK 12/25
450	2.0	80	50/25	630	400	710	37	TK 450/20
450	2.5	80	50/25	780	400	710	37	TK 450/25
450	3.0	80	50/25	945	400	710	37	TK 450/30
450	3.5	80	50/25	1100	400	710	37	TK 450/35
450	4.0	80	50/25	1260	400	710	37	TK 450/40
450	4.5	80	50/25	1410	400	710	37	TK 450/45
450	5.0	80	50/25	1560	400	710	37	TK 450/50
450	5.5	80	50/25	1725	400	710	37	TK 450/55
600	5.0	80	80/50	940	450	865	61	TK 600/50
600	5.5	80	80/50	1035	450	865	61	TK 600/55
600	6.0	80	80/50	1130	450	865	61	TK 600/60
600	6.5	80	80/50	1225	450	865	61	TK 600/65
600	7.0	80	80/50	1315	450	865	61	TK 600/70
600	7.5	80	80/50	1410	450	865	61	TK 600/75
600	8.0	80	80/50	1500	450	865	61	TK 600/80
600	8.5	80	80/50	1600	450	865	61	TK 600/85

[1] C is the PCD of the three support points
[2] PN40

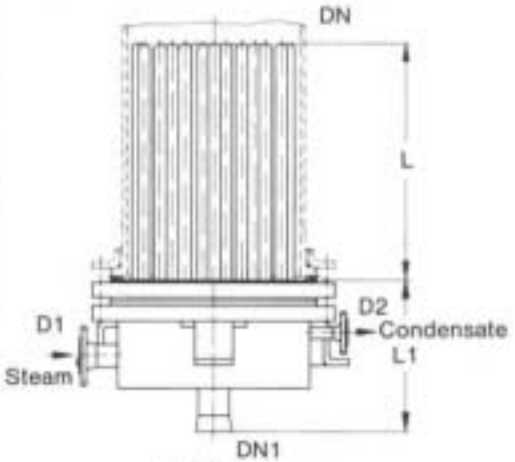


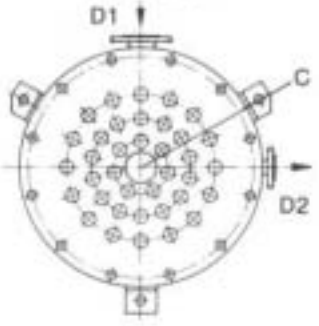
DN 80 to DN 100





DN 150 to DN 300





DN 450 to DN 600