Brazed Heat Exchangers for Refrigeration

A product catalogue for refrigeration

The brazed plate heat exchanger (BHE) is a well-established component in a refrigeration plant. In refrigeration plants where Alfa Laval BHEs are installed, typical equipment includes:

- Chiller: Cools water or brine and rejects the heat to air or water. The water is transported by a hydraulic system through different types of heat exchanger to cool air in an air conditioning system or to cool manufacturing or ind strial processes. Two basic systems are normally used to drive chillers: a compressor driven by an electric motor, based on a vapour compression refrigeration cycle; or a heat-driven system (steam, burning natural gas), based on an absorption refrigeration cycle.

- Heat pump: A type of water chiller that can also run in a reverse cycle, also called a water-source heat pump. In this case the primary function is heating water and rejecting the cool to air or water. The heated water warms up air in the air conditioning system. Another variation of this system is ground source heat pumps, using the earth or water surface to add or reject the heat.

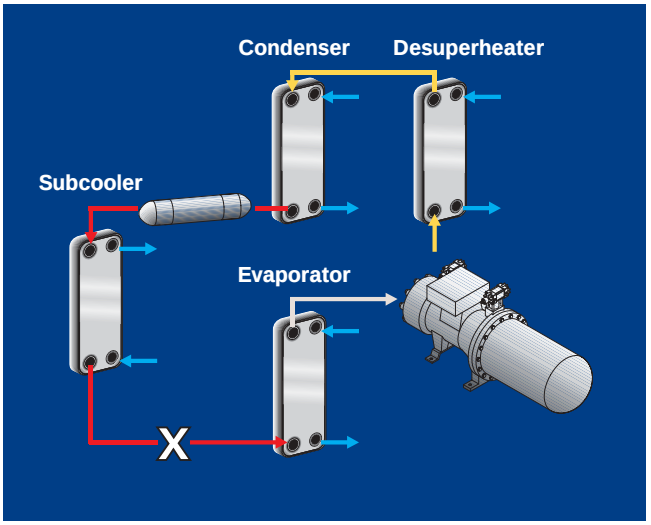
The BHE is an efficient solution for a range of functions in the refrigeration plant. The most common of these involve transferring heat from two basic media: the refrigerant as the primary fluid (HFC or natural gas) and water or brines as the secondary fluid:
- Evaporator, dry expansion, cooling water,
- Condenser, rejecting or recovering heat to water,
- Desuperheater for partial heat recovery to water,
- Economizer, cooling liquid refrigerant and superheating vapour refrigerant.

Other possible functions:
- Subcooler to cool down the liquid refrigerant using well water,
- Intermediate heat exchangers used in the absorption cycl to preheat the diluted solution or to pre-cool the concentrated solution.

Air Conditioning

Commercial refrigeration

Industrial refrigeration



Chiller component scheme

1 Extensive range of BHE models providing wide range of cooling capacities from 0.5 to 500 kW.

2 Patented innovations, the Equalancer and Dualaced systems, give high heat transfer performance.

3 Equalancer system provides a heat transfer surface saving of –15% compared to BHE with traditional distribution system.

4 –40% m^3/kW space saving due to the compact design of BHE compared to S&T heat exchangers.

5 +7% water chiller COP due to high BHE performance compared with traditional heat exchangers.

6 Rapid response to changes in temperature due to small hold-up volume and lower refrigerant charge.

7 Optimized design for every duty with customized BHE configuration to customer's own specifications.

8 All widely recognized pressure vessel codes available as a standard.

9 Every BHE is pressure and leak tested before delivery, ensuring top quality products.

The Alfa Laval brazed heat exchanger

Developed in the late seventies, the Alfa Laval BHE is the original brazed plate heat exchanger. The BHE concept is a variation on the traditional plate and frame heat exchanger, but without gaskets and frame parts.

- Compact and tough
- Easy to install
- Cost efficient

Material

The brazed plate heat exchanger (BHE) consists of a plate package in stainless steel AISI 316. Thin corrugated plates are contained by cover plates and connections. The package is vacuum brazed together using either copper or nickel as the brazing material. For HVAC applications copper brazed units are most frequently used, while nickel-brazed units are preferred for applications involving aggressive fluids

Design

Brazing the stainless steel plates together eliminates the need for sealing gaskets and thick frame plates. As well as holding the plates together at the contact points, the brazing material seals the package. Alfa Laval's brazed heat exchangers are brazed at all contact points, ensuring optimal heat transfer efficiency and pressure resistance. The plates are designed to achieve longest possible lifetimes.

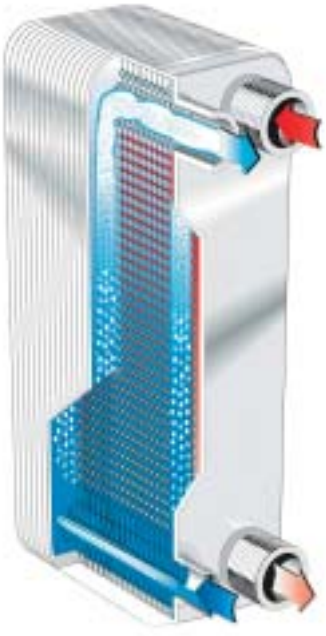
Since virtually all material is used for heat transfer, the BHE is very compact in size and has a low weight and a low hold-up volume. Alfa Laval offers a flexible design that can be customized to meet customer-specific requirements. Alfa Laval brazed plate heat exchangers ensure the customer the most cost-efficient solution for his heat transfer duties.

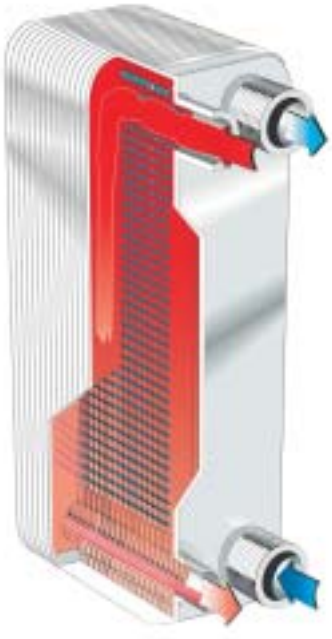
- First class manufacturing facilities
- High and consistent quality
- Leak and pressure testing of all units before delivery

Flow principle
The basic flow principle in a brazed heat exchanger for HVAC applications is parallel and current flow to achieve the most efficient heat transfer process. In a single pass design all connections are located on one side of the heat exchanger, making installation very easy.

Evaporator flow principle
The channels formed between the corrugated plates and corners are arranged so that the two media flow through alternate channels, always in opposite directions (counter current flow).The two phase refrigerant (vapour + liquid) enters the bottom left of the exchanger with a vapour quality depending on the operating condition of the plant. Inside the channels evaporation of the liquid phase takes place and some degrees of superheat are always requested, for the reason the process is called "dry expansion". In the enclosed evaporator picture the dark and light blue arrows show the location of the refrigerant connections. The water (brine) to be cooled flows counter current in the opposite channel; the dark and light red arrows show the location of the water (brine) connections.

Brazed Plate Condensers – flow principle
The main components are the same as for the evaporator. The refrigerant enters at top left of the exchanger as hot gas and starts to condense on the surface of the channels until fully condensed, and is then slightly subcooled. The process is called "free condensation". In the enclosed condenser picture the light and dark blue arrows show the location of the refrigerant connections. The cooling water (brine) flows counter current in the opposite channel and is heated. The light and dark red arrows indicate the locations of the water (brine) connections.





Equalancer system™

Alfa Laval Research & Development has developed innovative solutions for the refrigerant fluid distribution inside a BHE. These have been laboratory tested using HCFC and HFC refrigerants with excellent results.

The two phase flow coming into the evaporators is mixed by the patented distribution system " X " which stabilizes the flow and increases performance.

The performance of the evaporators in the Alpha Chill series (AC80,120,130,250) has been continuously improved. Using the patented Equalancer system it is possible to obtain a double mixing of refrigerant into two successive volumes. This ensures a more balanced distribution system through all the plate channels which reduces fluctuations in the super-heating effect.

Pressed into the plate, the Equalancer system guarantees high quality and repeatability of plate design and performance.

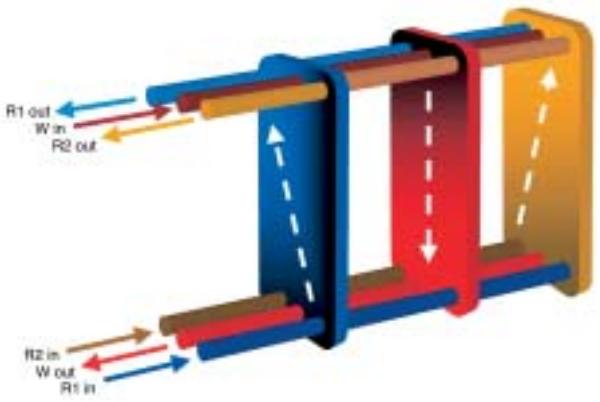
The Equalancer system does not have an adverse effect on the BHE operating as condenser since the pressure drop is negligible.

EQUALANCER SYSTEM™

Dualaced system™

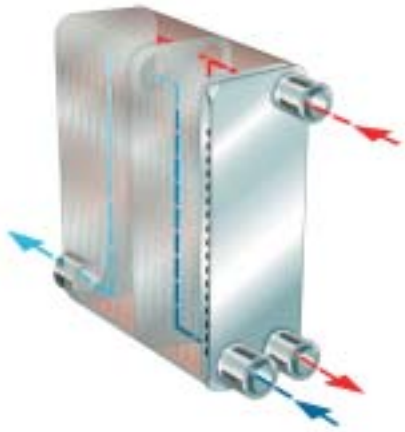
The real dual circuit patented by Alfa Laval in a solution with diagonal flow is obtained by means of pressed plates. The BHE can be connected with two independent refrigerant circuits. The special design ensures that each refrigerant circuit is in contact with the entire water flow. The main advantage is that at partial load (only one compressor running) water cooling is uniform and performance is maximized. Alfa Laval has implemented the Dualaced™ real dual circuit (DQ) in the AC80, 130 and 250 BHE models.

DUALACED SYSTEM™



Multipass

The design options of the brazed heat exchanger are extensive. The heat exchanger can be designed as a multipass unit, different types of connections are available, and there is the option of choosing the location of the connections.
Alfa Laval offers a wide range of standard heat exchanger models and sizes, tailor-made for HVAC applications and available from stock. Naturally, customer-specific designs are available on request.



Production

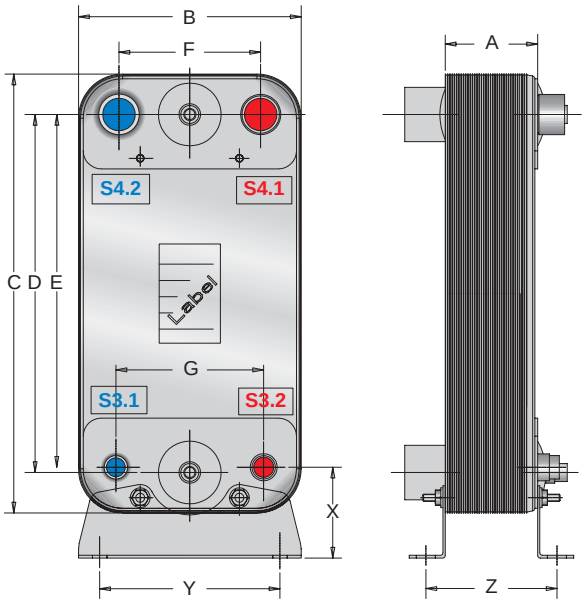
Alfa Laval is leading the trend towards optimal quality. We do it with advanced production technology in high volumes. We do it with new technology through constant research and development. We do it through deliveries and service. As a leading global manufacturer we do it by offering a complete range of heat exchangers. Our knowledge gives you the best solutions, products with higher technical performance and a focus on energy savings. Quality must prevail through the whole chain from development to aftersales. All our brazed heat exchangers are individually leak and pressure tested to ensure first-class quality, and Alfa Laval has approvals from all major approval bodies.

Stacking machine

Brazing oven

Testing machine

Dimensional data



BHE Data & Dimensions	AC10	CB26
Cooling capacity range CC [kW]	1-5	5-12
Channel type	H	L, M, H
Distribution system type	-	-
Double refrigerant circuits “Dualacer”	-	-
Standard Design pressure S1-S2/S3-S4 side [barg]	32/32	32/32
Standard Min./max design temp. [°C]	-160/175	-160/175
High Design pressure S1-S2/S3-S4 side [barg]		50/50
Channel volume, S1-S2/S3-S4 side [L]	0.02/0.02	0.05/0.05
Max. number of plates	50	150
Height, C [mm]	208	310
Width, B [mm]	77	111
Vertical connection distance, E, D [mm]	172	250
Horizontal connection distance, F, G [mm]	42	50
Weight, empty [kg]	0.7+(0.06*NP)	1.2+(0.13*NP)
Plate material		
Brazing material		
Connection material		

(*) reccomended only for applications with low refrigerant pressure drop request as desuperheater and economizer • NP = number of plates • Design pressure and temperature could have different values depending on the notified body.

Support feet	AC10	CB26
Height, X (mm)	-	-
Width, Y (mm)	-	-
Length, Z (mm)	-	-
Support feet material	-	-

Standard connections

AC10	POSITION	NAME	SIZE	TYPE
Ref IN	S3	G21	ODS 18mm	Internal soldering
Ref OUT	S4			
Water side	S1-S2 , T1-T2	A21	3/4”	Ext. threaded (ISO 228/1-G)

CB26	STD POSITION	NAME	SIZE	TYPE
Ref IN	S3	H21	ODS 1”1/8	Internal soldering
	S3	R21	1”1/4 – 12UNF	Rotalock
Ref OUT	S4	H21	ODS 1”1/8	for soldering
	S4	R21	1”1/4 – 12UNF	Rotalock
Water side	S1-S2	B21	1”	Ext. threaded (ISO 228/1-G)
	T1-T2			

CB52	STD POSITION	NAME	SIZE	TYPE
Ref IN	S3	H21	ODS 1”1/8	Internal soldering
	S3	R21	1”1/4 - 12UNF	Rotalock
Ref OUT	S4	H21	ODS 1”1/8	for soldering
	S4	R21	1”1/4 - 12UNF	Rotalock
Water side	S1-S2	B21	1”	Ext. threaded (ISO 228/1-G)
	T1-T2			

AC50	STD POSITION	NAME	SIZE	TYPE
Ref IN	S3	H24	ODS 1/2”	Internal soldering
	S3	H22	ODS 5/8”	Internal soldering
	S3	H30	ODS 7/8”	Internal soldering
Ref OUT	S4	H21	ODS 1”1/8	Internal soldering
	S4	H34	ODS 1”3/8	Internal soldering
Water side	S1-S2 , T1-T2	B21	1”	Ext. threaded (ISO 228/1-G)
	S1-S2 , T1-T2	B32	1”1/4	Ext. threaded (ISO 228/1-G)

CB76	POSITION	NAME	SIZE	TYPE
Ref IN	S3	D21	ODS 2”1/8	Internal soldering
Ref OUT	S4			
Water side	S1-S2 , T1-T2	B23	2”	Ext. threaded (ISO 228/1-G)

CB52	AC50	CB76	AC80	AC120	AC130	AC250-EQ	AC250-DQ
(*)	10-55	(*)	40-80	50-200	50-200	150-450	150-450
L, M, H	HX	H,L,M	EQ	EQ	DQ	EQ	DQ
-	X	-	Equalancer	Equalancer	Equalancer	Equalancer	Equalancer
-	-	-	Dualacer	-	Dualacer	-	Dualacer
32/32	32/30	32/32	42/25	32/30	34/25	32/25	32/25
-160/175	-50/+150	-160/175	-50/150	-50/150	-50/150	-50/150	-50/150
	45/32			45/45			
0.095/0.095	0.095/0.095	0.25/0.25	0.08/0.08	0.21	0.16	0.45/042	0.45/042
150	150	190	118	200	198	250	250
526	526	618	390	617	487	741	741
111	111	191	195	192	247	324	324
466	466	519	296	519	391/397	599/628	599/628
50	50	92	120.8/119.6	92	157.2/163.7	211/232	211/232
1.8+(0.23*NP)	1.8+(0.23*NP)	7+(0.44*NP)	3.45+(0.24*NP)	7.6+(0.44*NP)	6.5+(0.38*NP)	13+(0.8*NP)	13+(0.8*NP)
AISI 316 (DIN 1.4401)							
Copper							
AISI 316L (DIN 1.4404)							

CB52	AC50	CB76	AC80	AC120	AC130	AC250
-	-	199	-	199	101	135
-	-	208	-	208	200	290
-	-	A+120	-	A+120	A+42	A+54
-	-	Carbon steel galvanized				

AC80DQ	POSITION	NAME	SIZE	TYPE
Ref IN	S3	H51, H52, D57	ODS 5/8”	Internal soldering
	S3	H56, H58	ODS 7/8”	
Ref OUT	S4	D27	ODS 1”1/8	
	S4	D26	ODS 1”3/8	
Water side	S1-S2 , T1-T2	C31	1/2”	Int. threaded (ISO 228/1-G)
	S1-S2 , T1-T2	C31	1/2”	Ext. threaded (ISO 228/1-G)

AC120EQ	POSITION	NAME	SIZE	TYPE
Ref IN	S3	H56, H57	ODS 7/8”	Internal soldering
	S3	L54, L55	ODS 1”1/8	
Ref OUT	S4	D21	ODS 2”1/8	
Water side	S1-S2 T1-T2	B23	2” BSP	Ext. threaded (pipe thread ISO 228/1)

AC130DQ	POSITION	NAME	SIZE	TYPE
Ref IN	S3	H59	ODS 7/8”	Internal soldering
	S3	L56, L58	ODS 1”1/8	
Ref OUT	S4	H25	ODS 1”5/8	
	S4	D21	ODS 2”1/8	
Water side	S1-S2 , T1-T2	C31	1/2” FBSP	Int. threaded (ISO 228/1-G)
	S1-S2 , T1-T2	P32	2”	For flexible joint type (Victaulic)
	S1-S2 , T1-T2	P31	2”1/2	

AC250EQ	POSITION	NAME	SIZE	TYPE
Ref IN	S3	M54, 55, 56, 57	ODS 1”3/8	Internal soldering
	S3	M58	ODS 42mm	
Ref OUT	S4	L33	ODS 2”5/8	
	S4	L35	ODS 3”1/8	
Water side	S1-S2 , T1-T2	C31	1/2”	inside threaded (pipe thread ISO 228/1-G)
	S1-S2 , T1-T2	P35	3”	For flexible joint type (Victaulic)

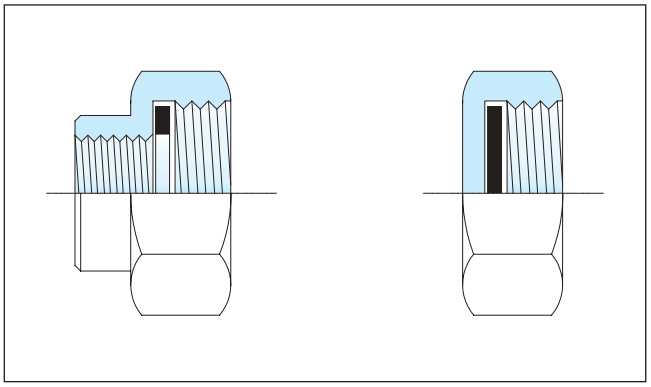
AC250DQ	POSITION	NAME	SIZE	TYPE
Ref IN	S3	D55, D54	ODS 1”1/8	for soldering
	S3	M51, 52, 53, 54, 55, 56, 57	ODS 1”3/8	
Ref OUT	S4	L33	ODS 2”5/8	
	S4	L35	ODS 3”1/8	
Water side	S1-S2 , T1-T2	C31	1/2”	Inside threaded (pipe thread ISO 228/1-G)
	S1-S2 , T1-T2	P35	3”	For flexible joint type (Victaulic)

Cleaning-In-Place (CIP)

All types of heat exchangers need to be cleaned regularly to remove deposits such as scale, sludge and microorganisms. Alfa-CIP is a convenient solution that carefully removes the deposit on all heat transfer surfaces in the heat exchanger. Alfa-CIP 75, 200 and 400 are constructed in stainless steel using high quality components (pumps, valves etc.) according to ISO 9001 and with the CE-mark. The smaller units Alfa-CIP 20 and 40 are made of industrial grade plastic. Alfa-CIP is mobile due to its compact design. The units have reversible flow, and Alfa-CIP 75, 200 and 400 also have a built in heater. All cleaning detergents used by Alfa Laval are environmentally friendly and do not damage the equipment.

Kit adaptor sensors and blinding plugs

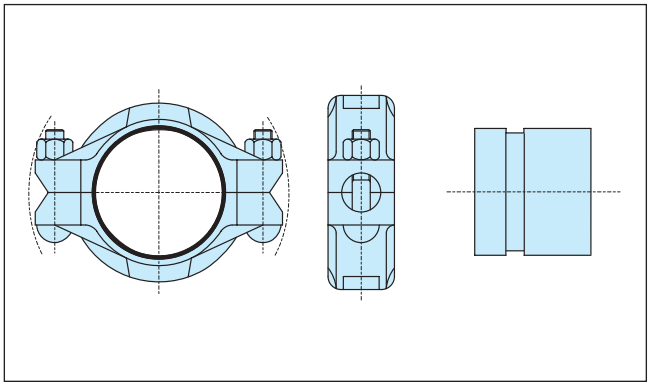
These extra connections are normally used with 6 connections BHE, material is stainless steel AISI 316L. The adaptor KIT is mainly used to fit in the water temperature relief sensors for the chiller control devices. Blinding plugs are common tap to close connections are not used.



BHE type	To fit conn. type	Adaptor size	Type
CB14 CB26H CB52 AC50	B21	from 1” to 1/2”	Int. threaded (ISO 228/1-G)
AC50	B32	from 1”1/4 to 1/2”	Int. threaded (ISO 228/1-G)
CB76 AC130	B23	from 1”1/4 to 1/2”	Int. threaded (ISO 228/1-G)

KIT water connections

The KIT is for flexible joint connection VicatulicTM or GruvlockTM type. They are based on two components the clamp with gasket seal and the counter pipe. The seal is in EPDM and therefore must not be used in contact with oil and hydrocarbons in general and outside the tempertaure range of –40/+80 °C. For these or other special applications, to evaluate which type of seal should be used, contact the Alfa Laval sales department.



BHE type	To fit conn. type	Pipe size	Type
AC130	P32	2”	Flexible joint KIT
AC130	P31	2” 1/2	Flexible joint KIT
AC250	P35	3”	Flexible joint KIT

Feet and mounting brackets

CB26 and larger units can be delivered with feet or mounting brackets. These make the installation work easier and minimise stresses in the connected pipes. The unit can also be bolted to the floor. CB26, AC50, AC80 can be wall mounted using the standard feet frame.
AC120, AC130, AC250 can be supplied with feet and a lifting hook to ensure safe and functional installation.

How to calculate and select a heat exchanger with webcALc™
For duties that are not covered in the selection tables, and if you want to get a more tailor made design, you can design your heat exchanger on-line on the internet site www.alfalaval.com using a selection tool called webcALc™. It should be noted that webcALc™ is a simplified version of the software used by Alfa Laval, and therefore the result may differ slightly when comparing with the selection tables and/or quotations made by Alfa Laval representatives. webcALc™ is quite easy to use, but if you need instructions just follow the step by step instructions below. You enter the data for your fluids into the different input fields in webcALc™. Move between the different input fields by using either the mouse or the tabulator.

How to use webcALc™'s control panel
Design pressure: Select the required pressure resistance for the heat exchanger. (Default 10 bar)

Display: webcALc™ selects from the complete range of gasketed and brazed heat exchangers included in the software (default). You can specify if you only want a choice of either PHEs or BHEs or standard sizes of BHEs.

Max no. of exchangers: webcALc™ will select one or more identical units (maximum 9 units) depending on the requirement of the thermal duty (default). If you want webcALc™ to suggest only solutions with a certain number of identical units, then select from one unit to nine units.

After you have entered the data
When you have entered your data, press the heat balance button and webcALc™ will present the temperatures graphically. Via the heat balance webcALc™ will calculate the missing parameters (heat load, flows or temperatures).
Heat balance will also indicate if any input parameters for a successful thermal calculation are missing. Please note that if both heat load and flows have been specified, webcALc™ will give higher priority to the heat load.

Press calculate to perform the thermal calculation. webcALc™ will present up to nine alternative heat exchanger solutions. It is possible to use the calculate button without previous usage of heat balance.
Press reset to empty your input before entering new data for a new thermal calculation. The input fields will be reset to webcALc™'s default values.

How to use and interpret webcALc™'s results
The heat exchanger solutions can be sorted by four different criteria: price (default sorting is based on an approximate price comparison between the different solutions), height, weight, and extension capacity.
Brazed heat exchangers do not offer any extension possibility. Please note that the specified weights may be slightly lower due to different pressure vessel codes and local standards. Select your solution by clicking on the unit type in the table.

The output of webcALc™
Each solution is presented with a standardised drawing and the specific technical parameters. Each solution also has a corresponding AutoCAD drawing, which can be downloaded to your computer. To print the technical parameters use the printer friendly page offered at the bottom of the result page. It is also possible to download specification texts for different types of heat exchangers.

AC10 Evaporator						
	R407CTdev = 4.5°C H2O 12/7°C Tc = 50°C		R404a Tdev = -10°C 30% eth gly 0/-5°C Tc = 40°C		R404a Tdev = -15°C 35% eth gly -5/-10°C Tc = 40°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
10	0,6	0,6				
14	0,9	0,6				
20	1,3	0,7				
28	2,0	0,8				

CB26H Evaporator						
	R407CTdev = 4.5°C H2O 12/7°C Tc = 50°C		R404a Tdev = -10°C 30% eth gly 0/-5°C Tc = 40°C		R404a Tdev = -15°C 35% eth gly -5/-10°C Tc = 40°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
10	2,6	5,0	1,6	2,8	1,4	2,5
14	3,7	5,0	2,2	2,9	1,9	2,5
20	5,3	6,0	3,1	3,0	2,7	2,5
24	5,9	6,0	4,2	3,2	3,7	2,9
30	7,5	6,0	5,3	3,5	4,7	3
34	8,4	6,0	6,0	3,5	5,3	3,2
40	9,5	6,0	7,0	3,6	6,5	3,3
50	11,0	6,0	8,8	3,8	7,9	3,4

AC50 Evaporator						
	R407CTdev = 4.5°C H2O 12/7°C Tc = 50°C		R404a Tdev = -10°C 30% eth gly 0/-5°C Tc = 40°C		R404a Tdev = -15°C 35% eth gly -5/-10°C Tc = 40°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
10	5,6	33	3,8	23	3,1	18
14	8,5	39	5,7	26	4,7	21
20	12,5	45	8,4	27	6,9	22
30	19,4	45	13,1	29	10,7	24
34	22,0	45	14,9	29	12,1	24
40	25,5	44	17,2	29	14,0	23
50	31,0	42	20,9	28	17,1	23
60	36,0	40	24,3	27	19,8	22
80	46,0	39	31,1	26	25,3	21
100	52,5	34	35,4	23	28,9	18
120	55,0	30	37,1	19	30,3	15

AC80 Evaporator						
	R407CTdev = 4.5°C H2O 12/7°C Tc = 50°C		R404a Tdev = -10°C 30% eth gly 0/-5°C Tc = 40°C		R404a Tdev = -15°C 35% eth gly -5/-10°C Tc = 40°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
42	31	23	20	15	16	15
50	38	24	25	15,5	20	15
58	44	25	29	16	23	15
66	50	26	32	16	26	15
74	56	26	36	16	29	15
86	63	26	41	16	33	15
102	72	26	47	16	38	15
118	80	26	52	16	42	15

AC120EQ Evaporator						
	R407CTdev = 4.5°C H2O 12/7°C Tc = 50°C		R404a Tdev = -10°C 30% eth gly 0/-5°C Tc = 40°C		R404a Tdev = -15°C 35% eth gly -5/-10°C Tc = 40°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
40	54	39	36	26	28	17
50	68	40	45	26	35	18
60	82	41	54	26	42	18
70	95	41	63	26	49	18
90	119	40	78	25	61	17
110	141	40	93	25	72	17
130	159	38	104	24	81	16
150	173	37	114	23	89	15

AC130DQ Evaporator						
	R407CTdev = 4.5°C H2O 12/7°C Tc = 50°C		R404a Tdev = -10°C 30% eth gly 0/-5°C Tc = 40°C		R404a Tdev = -15°C 35% eth gly -5/-10°C Tc = 40°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
82	99	36,0	55	18	42	17
102	123	37,0	68	19	52	18
122	146	38,0	80	20	62	17
142	167	38,0	92	19	71	16
162	187	39,0	103	19	80	16
182	204	39,0	112	19	88	16
202	218	38,4	120	18	93	15

AC250EQ / AC250DQ Evaporator						
	R407CTdev = 4.5°C H2O 12/7°C Tc = 50°C		R404a Tdev = -10°C 30% eth gly 0/-5°C Tc = 40°C		R404a Tdev = -15°C 35% eth gly -5/-10°C Tc = 40°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
60	134	32	102	26	79,5	19
70	156	32	119	27	93,0	20
80	179	32	136	27	106,1	20
90	200	32	152	27	118,6	20
100	221	33	168	26	131,1	20
120	260	32	198	26	154,2	19
140	293	32	223	25	173,7	19
160	322	31	245	24	190,9	18
180	344	29	261	24	203,0	17
200	359	27	273	22	212,9	16

Notes:
Evaporator performances are reffered to counter current flow, superheating 5K

	Multiplier factor kW
R134a Tdew 2°C	0.9 x R407C
R22 Tdew 2°C	1 x R407C

AC10 Condenser						
	R407C Tdew = 52.5°C H2O 40/45°C		R134a Tdew = 50°C H2O 40/45°C		R404a Tc = 50°C H2O 40/45°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
10	1,2	1,0	1,0	0,9	1,0	1,0
14	1,6	1,0	1,4	1,0	1,0	1,0
20	2,3	1,1	2,0	1,0	1,1	1,1
28	3,2	1,2	2,8	1,2	1,2	1,2

CB26H Condenser						
	R407C Tdew = 52.5°C H2O 45/40°C		R134a Tdew = 50°C H2O 35/30°C		R404a Tc = 50°C H2O 30/15°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
10	3,0	5,7	2,6	4,2	5,7	2,6
14	4,2	5,8	3,6	4,2	5,8	3,6
20	6,0	5,9	5,1	4,3	5,9	5,1
24	7,2	6,0	6,1	4,3	6,0	6,1
30	9,0	6,1	7,7	4,4	6,1	7,7
34	10,2	6,1	8,7	4,5	6,1	8,7
40	12,0	6,4	10,2	4,7	6,4	10,2
50	15,0	6,7	12,8	4,9	6,7	12,8

AC50 Condenser						
	R407C Tdew = 51 °C H2O 45/40°C		R134a Tdew = 49°C H2O 35/30°C		R404a Tc = 49°C H2O 30/15°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
10	7,0	45	6,0	37	7,0	45
14	9,8	46	8,3	37	9,8	46
20	14,0	47	11,9	37	14,0	47
30	21,0	47	17,9	38	21,0	47
34	23,8	47	20,2	38	23,8	47
40	28,0	47	23,8	38	28,0	47
50	35,0	48	29,8	39	35,0	48
60	42,0	48	35,7	40	42,0	48
80	56,0	51	47,6	43	56,0	51
100	70,0	55	59,5	44	70,0	55
120	84,0	58	71,4	47	84,0	58

AC120EQ Condenser						
	R407C Tdew = 52.5°C H2O 45/40°C		R134a Tdew = 50°C H2O 35/30°C		R404a Tc = 50°C H2O 30/15°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
40	52	34	44	25	52	34
50	65	35	55	25	65	35
60	78	35	66	26	78	35
70	91	36	77	26	91	36
90	117	37	99	27	117	37
110	143	39	122	29	143	39
130	169	41	144	30	169	41
150	195	44	166	32	195	44

AC250EQ Condenser						
	R407C Tdew = 52.5°C H2O 45/40°C		R134a Tdew = 49°C H2O 35/30°C		R404a Tc = 49°C H2O 30/15°C	
N. of plates	kW	Δp (kPa)	kW	Δp (kPa)	kW	Δp (kPa)
60	144	37	122	27	144	37
70	168	38	143	27	168	38
80	192	38	163	27	192	38
90	216	39	184	28	216	39
100	240	39	204	28	240	39
120	288	41	245	29	288	41
140	336	42	286	31	336	42
160	384	44	326	32	384	44
180	432	47	367	34	432	47
200	480	50	408	36	480	50

Notes:
Condenser performances are referred to counter current flow with subcooling 3K and FF= 0 [m2K/W]
Same performances with water 30/35°C and Tdew=42.5°C or Tdew=40°C
Co-current flow need a higher Tdew +2K to get same performances, Tdew 52.5 -> Tdew 54.5, Tdew 50 -> Tdew 52°C

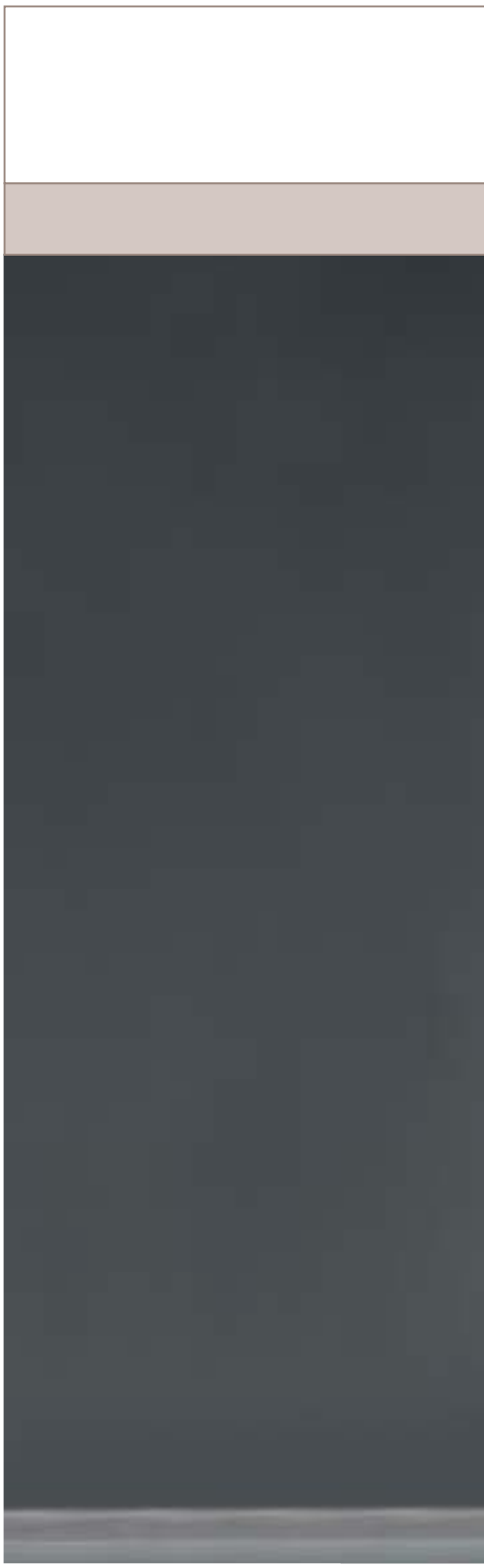
Alfa Laval in brief

Alfa Laval is leading global provider of specialized products and engineering solutions.

Our equipment, systems and services are dedicated to assisting customers in optimizing the performance of their processes. Time and time again.

We help them heat, cool, separate and trasport products such as oil, water, chemicals, beverages, foodstuff, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.



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