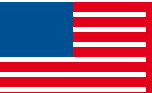




B



ADVANCED HEAT EXCHANGERS

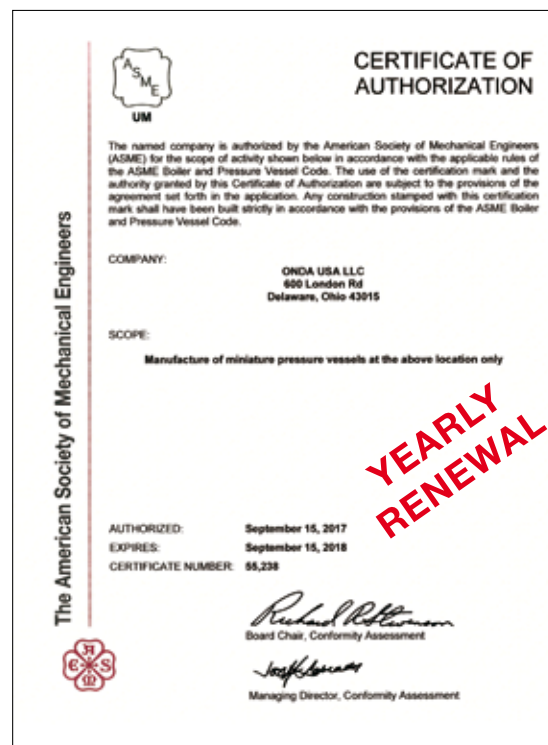
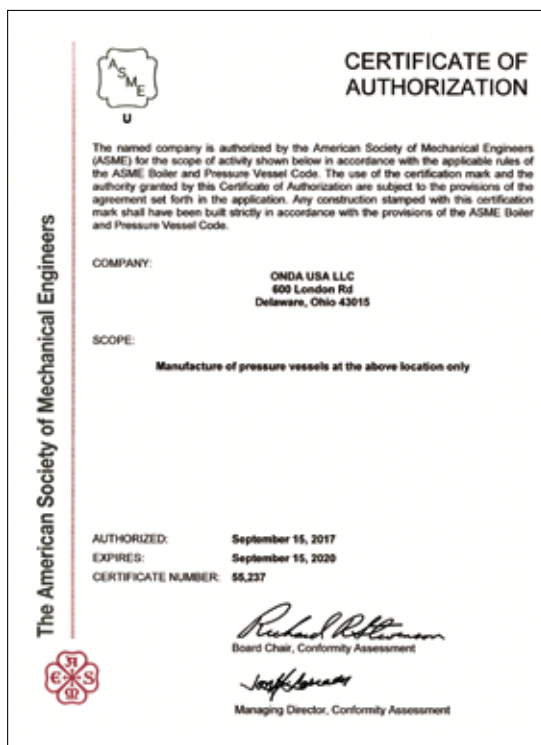
SHELL & TUBE CONDENSERS



SHELL & TUBE CONDENSERS

COMPANY OVERVIEW

For more than 20 years, ONDA has been a leading manufacturer of process heat exchangers for the refrigeration and air conditioning markets, partnering with many key OEM customers throughout the world. We offer a full range of shell & tube (DX & Flooded) and brazed-plate heat exchangers, in standard and custom configurations. Our heat exchangers are available with different raw materials and can be used with a variety of fluids. Our systems are compatible with many different refrigerants, including R410A, R134a, R22, R407C, R404A, R507 and others. We can provide multiple certifications, including ASME, P.E.D. and others. All products are manufactured in compliance with ISO 9001 standards.



B SHELL & TUBE CONDENSERS

TECHNICAL INFORMATION

The Onda " B "condenser line has been designed for air conditioning and process cooling applications using HFC and HFO refrigerants as primary fluid, the secondary fluid is usually water.

Thanks to its high thermal performance tube the B condenser has a compact design reducing the refrigerant charge of 20% - 35% vs traditional condensers with a competitive market price.

The capacity range at AHRI 440 standard is from 200 to 5000 kBTU/h, custom models are also available for higher capacity demand

Two model range are available at MAWP 450 and 650 psig on shell side.

The standard configuration is 2 passes with 60" tube length, optional tube length are available to match different operating conditions.

B Construction:

Shell	Seamless carbon steel pipe, SA 2.5 shot blasted and cleaned prior to assembly.
Tubes	Copper, high-performance, enhanced design, roll expanded into multiple-grooved tubesheet.
Tubesheets	Carbon steel plate, precision machined by ONDA
Tube Supports	Carbon steel plate, machined by ONDA, with close tolerances to minimize vibrations.
Covers	Cast iron or carbon steel plate,
Water connections	FPT or flanged for corner joint to pipe welding
Refrigerant connections	Carbon steel pipe, suitable for ODS copper pipe brazing. ANSI flanges are available.
Other connections	All condensers include additional fittings for safety valves, auxiliary connections, vents and drains.
Finish	Exterior surfaces are cleaned and painted with a high quality alkydik-phenolic primer, for rust prevention.

The refrigerant circuit of each condenser meets the ASME Sect. VIII Div. 1 code requirement and is stamped accordingly.

The water and refrigerant circuits are pneumatically tested, to avoid any contamination caused by humidity.

ONDA B Condenser Design Suggestions

The fouling factor (f.f.) is essential for the correct condenser selection. ONDA uses the following guidelines:

- Normal city water f.f. =	0.000244 [ft ² h°F/Btu]
- Treated tower water f.f. =	0.000244 [ft ² h°F/Btu]
- River water f.f. =	0.000488 [ft ² h°F/Btu]
- Glycol solutions < 40% f.f. =	0.000488 [ft ² h°F/Btu]
- Glycol solutions > 40% f.f. =	0.000977 [ft ² h°F/Btu]

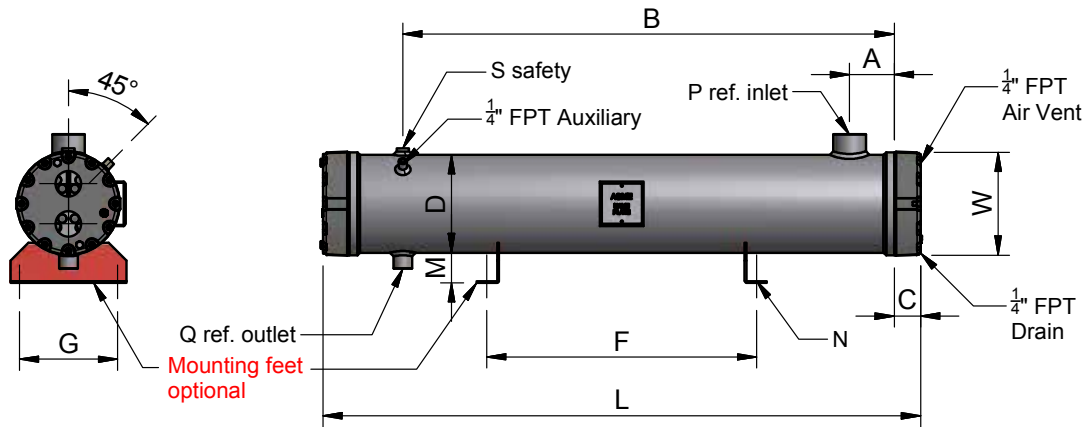
It is recommended that the water velocity inside the tubes is between 3.94 and 9.19 ft/s.

PLEASE READ OPERATING AND INSTRUCTIONS MANUAL BEFORE USE

DESIGN PRESSURE AT 149°F	R 410A	R134a	WATER
	650psi	450psi	150psi

NOMENCLATURE

ODS	Outer brazing diameter
FPT	Female American Standard Taper pipe threads



MODEL	B	17.301	17.302	17.304	17.305
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Total heat of rejection	R 410A	kBtu/h	209	279	349	415
Water pressure drop		psi	5,80	5,90	6,00	6,00
Water flow rate		gpm	42,0	56,1	70,2	83,5

Total heat of rejection	R 134a	kBtu/h	204	272	340	405
Water pressure drop		psi	5,60	5,60	5,70	5,70
Water flow rate		gpm	41,0	54,7	68,4	81,5

Number of water passes		2
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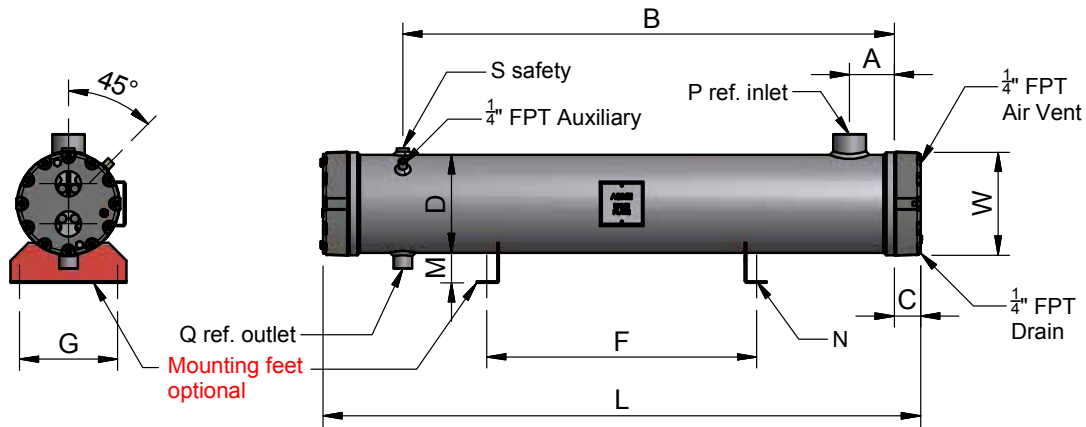
Dimensions [inches]	A	4,00
	B	56,00
	C	1,75
	D	6 5/8
	F	45,50
	G	6,30
	M	2,25
	N	0,50
	L	63,50
	W	7,00

Refrigerant connections	P R134a (ODS)	1 5/8
	P R410A (ODS)	1 1/8
	Q (ODS)	1 1/8
	S	1/2

Water connections	FPT	2
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Nominal data		AHRI 440-2007
	Inlet water temperature	85 °F
	Outlet water temperature	95 °F
	Condensing temperature (bubble)	105 °F
	Subcooling	5 °F
Waterside fouling factor	0,000244 ft ² h °F/Btu	

B SHELL & TUBE CONDENSERS



MODEL	B	22.305	22.306	22.303	22.304	22.302
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Total heat of rejection	R 410A	kBtu/h	483	550	619	687	825
Water pressure drop		psi	5,70	5,60	5,70	5,70	5,70
Water flow rate		gpm	97,1	110,6	124,5	138,1	165,9

Total heat of rejection	R 134a	kBtu/h	470	535	606	669	803
Water pressure drop		psi	5,40	5,30	5,40	5,40	5,50
Water flow rate		gpm	94,5	107,6	121,3	134,5	161,5

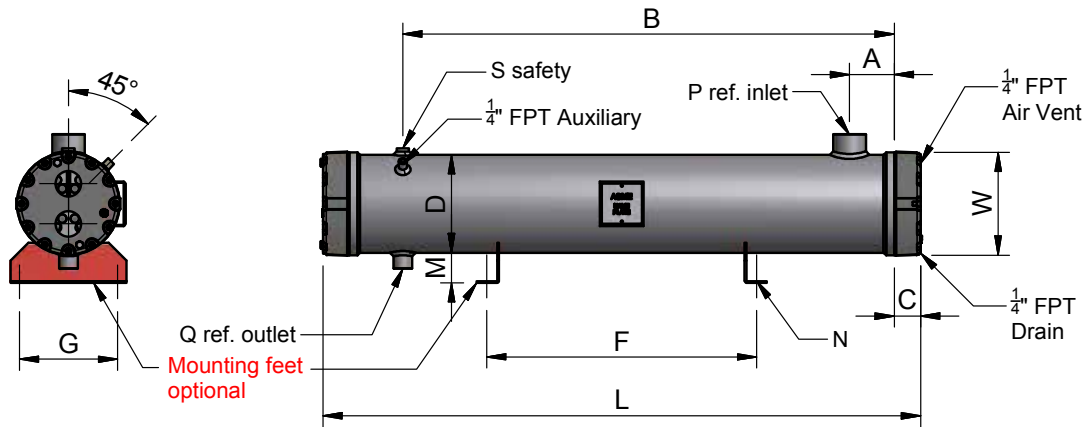
Number of water passes		2
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Dimensions [inches]	A	4,00
	B	56,00
	C	2,33
	D	8 5/8
	F	45,50
	G	8,63
	M	2,63
	N	0,50
	L	64,67
	W	9,00

Refrigerant connections	P R134a (ODS)	2 1/8
	P R410A (ODS)	1 3/8
	Q (ODS)	1 3/8
	S	1

Water connections	FPT	2
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Nominal data	AHRI 440-2007	
	Inlet water temperature	85 °F
	Outlet water temperature	95 °F
	Condensing temperature (bubble)	105 °F
	Subcooling	5 °F
Waterside fouling factor	0,000244 ft ² h °F/Btu	



MODEL	B	27.305	27.301	27.302	27.306	27.307
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Total heat of rejection	R 410A	kBtu/h	893	1032	1164	1300	1530
Water pressure drop		psi	5,50	5,60	5,50	5,50	5,60
Water flow rate		gpm	180	208	234	261	308

Total heat of rejection	R 134a	kBtu/h	870	1400	1133	1266	1500
Water pressure drop		psi	5,30	5,30	5,30	5,30	5,30
Water flow rate		gpm	175	202	228	255	302

Number of water passes		2
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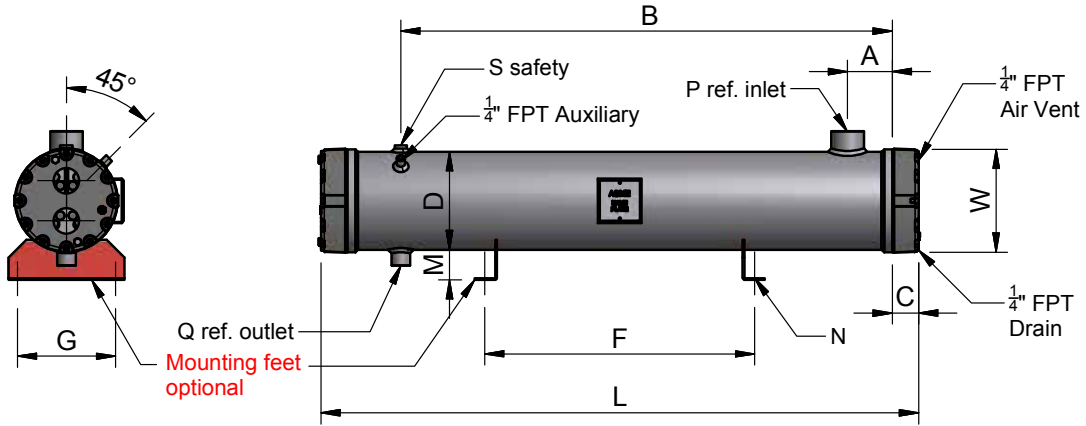
Dimensions [inches]	A	4,71
	B	55,29
	C	2,57
	D	10 ³ / ₄
	F	45,50
	G	11,00
	M	3,50
	N	0,63
	L	65,17
	W	11,22

Refrigerant connections	P R134a (ODS)	2 ⁵ / ₈
	P R410A (ODS)	2 ¹ / ₈
	Q (ODS)	2 ¹ / ₈
	S	1

Water connections	FPT	3
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Nominal data	AHRI 440-2007	
	Inlet water temperature	85 °F
	Outlet water temperature	95 °F
	Condensing temperature (bubble)	105 °F
	Subcooling	5 °F
Waterside fouling factor	0,000244 ft ² h °F/Btu	

B SHELL & TUBE CONDENSERS



MODEL		B	32.304	32.305	32.306	32.307
Total heat of rejection	R 410A	kBtu/h	1569	1705	1903	2073
Water pressure drop		psi	5,50	5,50	5,50	5,50
Water flow rate		gpm	316	343	383	417

Total heat of rejection	R 134a	kBtu/h	1527	1659	1851	2015
Water pressure drop		psi	5,20	5,20	5,50	5,20
Water flow rate		gpm	307	334	372	405

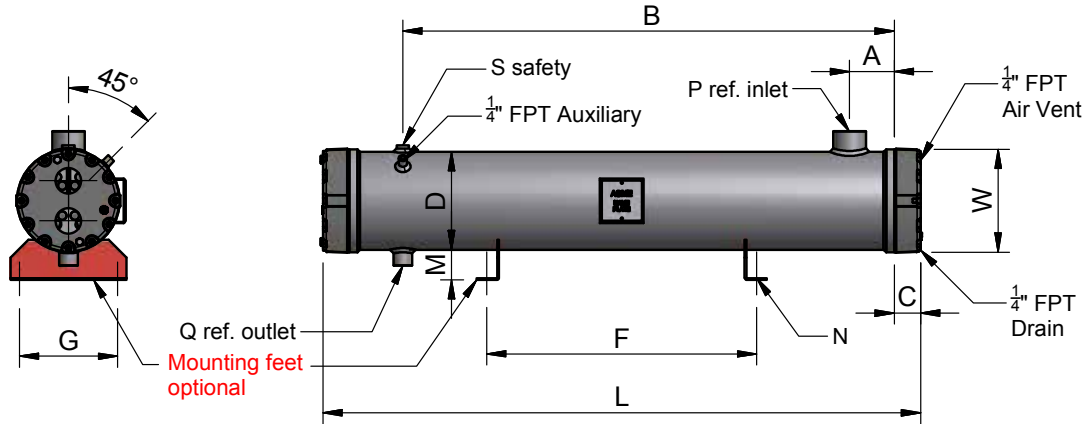
Number of water passes						2
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Dimensions [inches]	A					6,00
	B					54,00
	C					3,00
	D					12 3/4
	F					45,50
	G					11,75
	M					3,75
	N					0,63
	L					65,83
	W					13,20

Refrigerant connections	P R134a (ODS)					3 1/8
	P R410A (ODS)					2 1/8
	Q (ODS)					2 1/8
	S					N°2x1

Water connections		FPT				4
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Nominal data						AHRI 440-2007
	Inlet water temperature					85 °F
	Outlet water temperature					95 °F
	Condensing temperature (bubble)					105 °F
	Subcooling					5 °F
Waterside fouling factor						0,000244 ft ² h °F/Btu



MODEL		B	36.301	36.302	36.303	36.304
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Total heat of rejection	R 410A	kBtu/h	2173	2379	2575	2710
Water pressure drop		psi	5,50	5,60	5,60	5,60
Water flow rate		gpm	437	478	518	545

Total heat of rejection	R 134a	kBtu/h	2115	2313	2503	2634
Water pressure drop		psi	5,30	5,30	5,30	5,30
Water flow rate		gpm	425	465	503	530

Number of water passes						2
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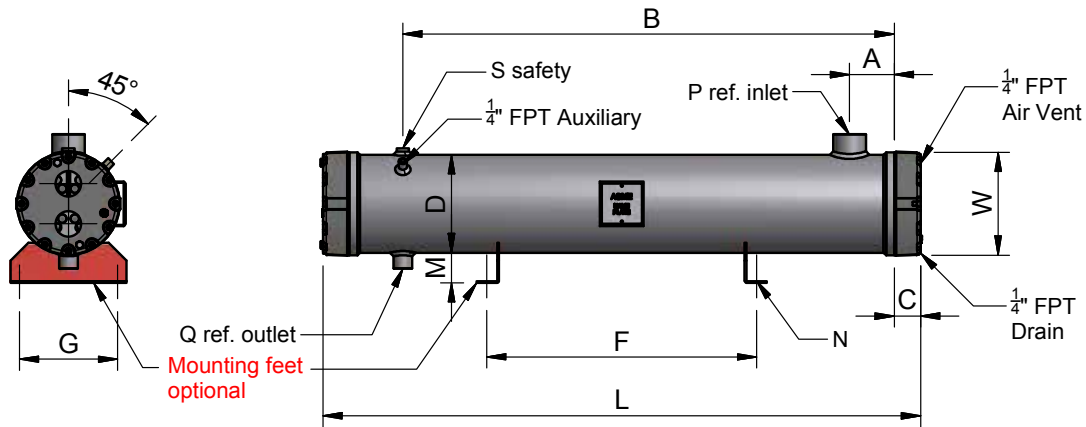
Dimensions [inches]	A	6,00
	B	54,00
	C	3,11
	D	14
	F	45,50
	G	11,80
	M	3,75
	N	0,63
	L	66,22
	W	16,50

Refrigerant connections	P R134a (ODS)	3 1/8
	P R410A (ODS)	2 5/8
	Q (ODS)	2 5/8
	S	N°3x1

Water connections	Victaulic	5
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Nominal data		AHRI 440-2007
	Inlet water temperature	85 °F
	Outlet water temperature	95 °F
	Condensing temperature (bubble)	105 °F
	Subcooling	5 °F
Waterside fouling factor	0,000244 ft ² h °F/Btu	

B SHELL & TUBE CONDENSERS



MODEL		B	41.302	41.303	41.304	46.302	46.303
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Total heat of rejection	R 410A	kBtu/h	2916	3118	3381	\	\
Water pressure drop		psi	5,80	5,90	5,90	\	\
Water flow rate		gpm	586	627	680	\	\

Total heat of rejection	R 134a	kBtu/h	2834	3031	3289	3692	4075
Water pressure drop		psi	5,50	5,50	5,60	5,10	5,00
Water flow rate		gpm	570	610	662	743	820

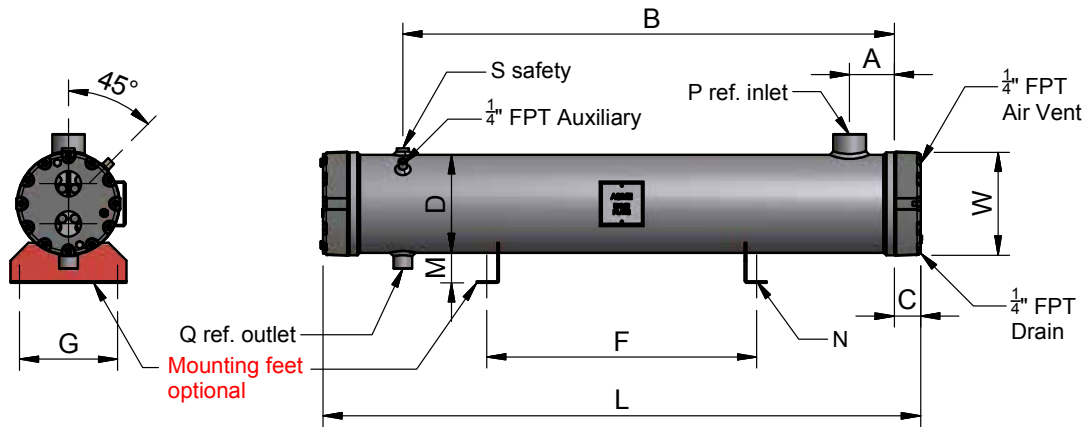
Number of water passes			2				
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Dimensions [inches]	A		6,00			7,88
	B		54,00			52,13
	C		3,50			4,29
	D		16			18
	F		45,50			45,50
	G		15,75			15,75
	M		3,75			3,75
	N		0,63			0,63
	L		67,00			68,57
	W		16,50			22,44

Refrigerant connections	P R134a (ODS)		3 ⁵ / ₈			3 ⁵ / ₈
	P R410A (ODS)		2 ⁵ / ₈			\
	Q (ODS)		2 ⁵ / ₈			3 ¹ / ₈
	S		N°3x1			N°3x1

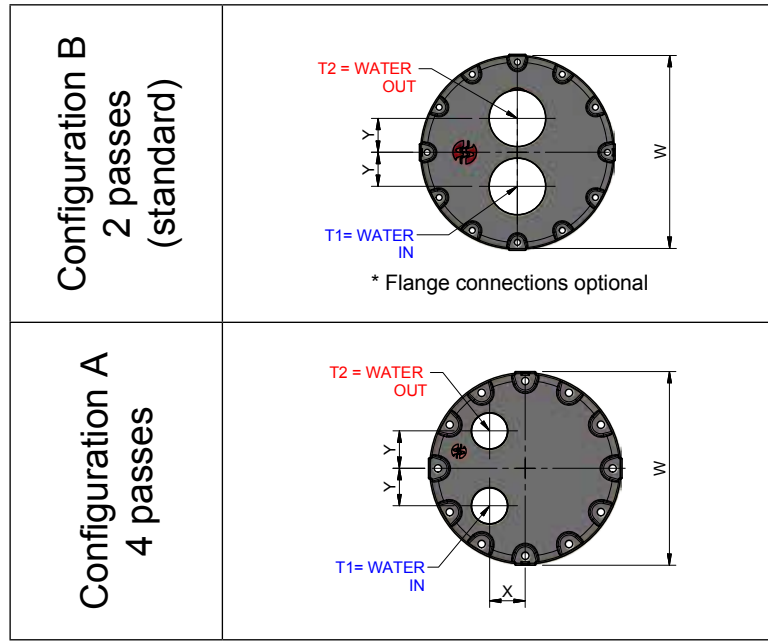
Water connections	Victaulic		6			6
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Nominal data			AHRI 440-2007			
	Inlet water temperature		85 °F			
	Outlet water temperature		95 °F			
	Condensing temperature (bubble)		105 °F			
	Subcooling		5 °F			
Waterside fouling factor		0,000244 ft ² h °F/Btu				



MODEL		B	51.301	51.302	51.303	51.304	
Total heat of rejection	R 410A	kBtu/h	\	\	\	\	
Water pressure drop		psi	\	\	\	\	
Water flow rate		gpm	\	\	\	\	
Total heat of rejection	R 134a	kBtu/h	4544	4800	5187	5317	
Water pressure drop		psi	5,10	5,10	5,10	5,10	
Water flow rate		gpm	914	965	1043	1069	
Number of water passes			2				
Dimensions [inches]	A	7,88					
	B	52,13					
	C	5,50					
	D	20					
	F	45,50					
	G	15,75					
	M	4,00					
	N	0,63					
	L	71,00					
	W	22,44					
Refrigerant connections	P R134a (ODS)	4 1/8					
	P R410A (ODS)	\					
	Q (ODS)	3 5/8					
	S	N°3x1					
Water connections	Victaulic	6					
Nominal data						AHRI 440-2007	
	Inlet water temperature						85 °F
	Outlet water temperature						95 °F
	Condensing temperature (bubble)						105 °F
	Subcooling						5 °F
Waterside fouling factor						0,000244 ft ² h °F/Btu	

WATER CONNECTIONS



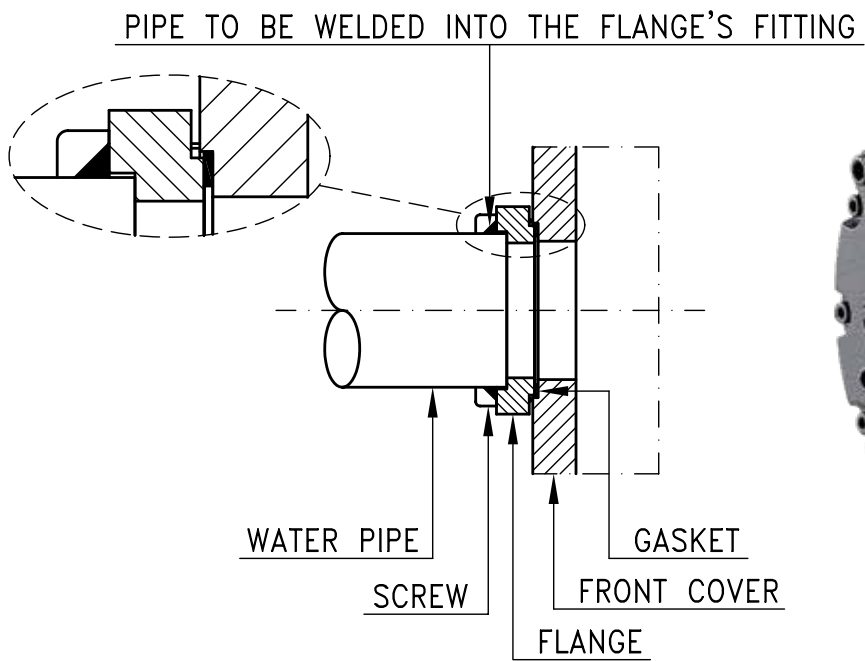
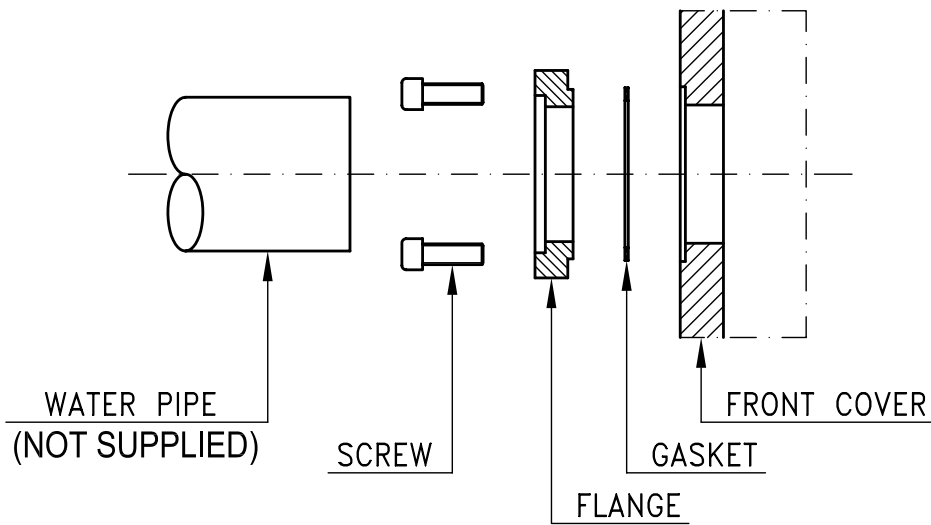
FOR MODEL B		B-17	B-17	B-22	B-22	B-27	B-27	B-32	B-32
Figure		B	A	B	A	B	A	B	A
Passes		2	4	2	4	2	4	2	4
W	inches	7,00	7,00	9,00	9,00	11,22	11,22	13,20	13,20
X		\	1,13	\	1,75	\	2,00	\	2,50
Y		1,38	1,38	1,50	1,75	2,50	2,00	3,00	2,50
T1		2" FPT	1"½ FPT	2"½ FPT	2" FPT	3" FPT	2"½ FPT	4" FPT	3" FPT
T2		2" FPT	1"½ FPT	2"½ FPT	2" FPT	3" FPT	2"½ FPT	4" FPT	3" FPT

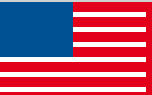
FOR MODEL B		B-36	B-36	B-41	B-41	B-46	B-46	B-51	B-51
Figure		B	A	B	A	B	A	B	A
Passes		2	4	2	4	2	4	2	4
W	inches	14,37	14,37	16,50	16,50	22,44	22,44	22,44	22,44
X		\	2,56	\	2,75	\	4,00	\	4,00
Y		2,95	2,56	3,50	2,75	5,00	4,00	5,00	4,00
T1		4" FPT	3" FPT	5" VIC	4" FPT	6" VIC	5" VIC	6" VIC	5" VIC
T2		4" FPT	3" FPT	5" VIC	4" FPT	6" VIC	5" VIC	6" VIC	5" VIC

Pump down capacity - weight

Model	Shell side volume [cft]	Pump down capacity R134a 90% volume [lbs]	Pump down capacity R410A 90% volume [lbs]	Condenser weight 450 psig [lbs]	Condenser weight 650 psig [lbs]
B17.301	0,79	55	48	150	161
B17.302	0,73	51	45	157	168
B17.304	0,68	46	41	164	172
B17.305	0,62	42	37	170	179
B22.305	1,26	87	77	232	269
B22.306	1,20	83	73	239	276
B22.303	1,14	79	70	245	283
B22.304	1,09	75	66	252	289
B22.302	0,97	67	59	263	303
B27.305	1,87	128	114	349	415
B27.301	1,75	120	106	360	428
B27.302	1,63	112	99	373	439
B27.306	1,51	104	92	384	452
B27.307	1,30	90	79	406	474
B32.304	2,42	166	147	486	580
B32.305	2,30	158	140	497	594
B32.306	2,12	146	129	516	611
B32.307	1,97	136	120	532	627
B36.301	2,72	187	165	640	704
B36.302	2,54	175	154	657	721
B36.303	2,36	163	144	677	741
B36.304	2,24	154	136	688	752
B41.302	3,52	243	214	821	898
B41.303	3,35	230	204	838	915
B41.304	3,11	214	189	863	940
B46.302	4,46	307	271	944	
B46.303	4,11	283	250	982	
B51.301	5,37	370	327	1211	
B51.302	5,37	370	327	1233	
B51.303	5,02	346	305	1268	
B51.304	4,90	338	298	1279	

(*) FLANGE CONNECTIONS OPTIONAL





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