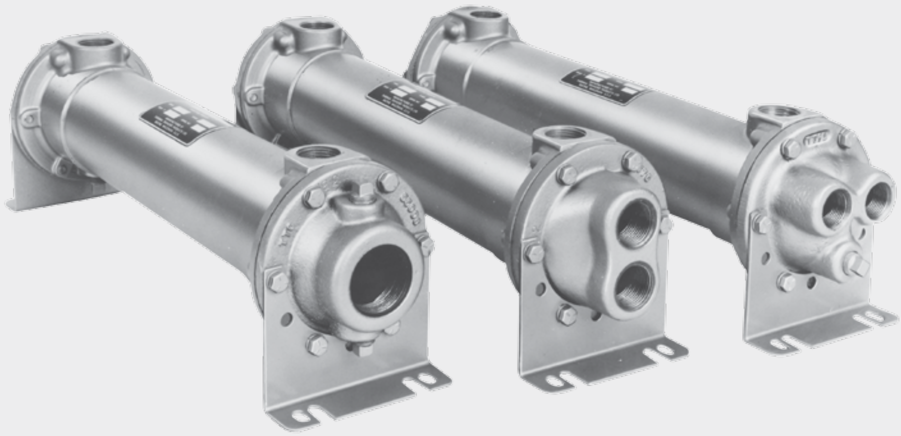
Fluid Cooling Shell & Tube B Series

COPPER & STEEL CONSTRUCTION

Features

- **Young Touchstone Interchange (Thermal)**
- **Optional Non-Ferrous Construction**
- **Competitively Priced**
- **1/4" or 3/8" Tubes Standard**
- **Water to Water Applications**
- **Sea Water Applications**
- Optional 90/10 Copper Nickel Cooling Tubes and Bronze End Bonnets for Sea Water Service
- NPT, SAE O-Ring, SAE Flange, or BSPP Shell Side Connections Available
- End Bonnets Removable for Servicing
- Mounting Feet Included (May be Rotated in 90° Increments)



Ratings

Maximum Shell Pressure 250 psi

Maximum Tube Side Pressure 150 psi

Maximum Temperature 350° F

Materials

Tubes Copper

Hubs & Tubesheets Steel or Brass

Shell Steel or Brass

Baffles Brass

End Bonnets Cast Iron

Mounting Brackets Steel

Gaskets Nitrile Rubber/Cellulose Fiber

Nameplate Aluminum Foil

How to Order

Model Series	Model Size Selected	Baffle Spacing	Tube Diameter Code	Tubeside Passes	Shell Material	Cooling Tube Material	End Bonnet Material	Zinc Anodes
SB SBF B BS BM BF BFM		A - 1.125 B - 2.25 C - 4.5 D - 9.0	4 - 1/4" 6 - 3/8"	0 - One Pass T - Two Pass F - Four Pass	Blank - Steel BR - Brass	Blank - Copper CN - CuNi	Blank - Cast Iron B - Bronze	Blank - None Z - Zinc

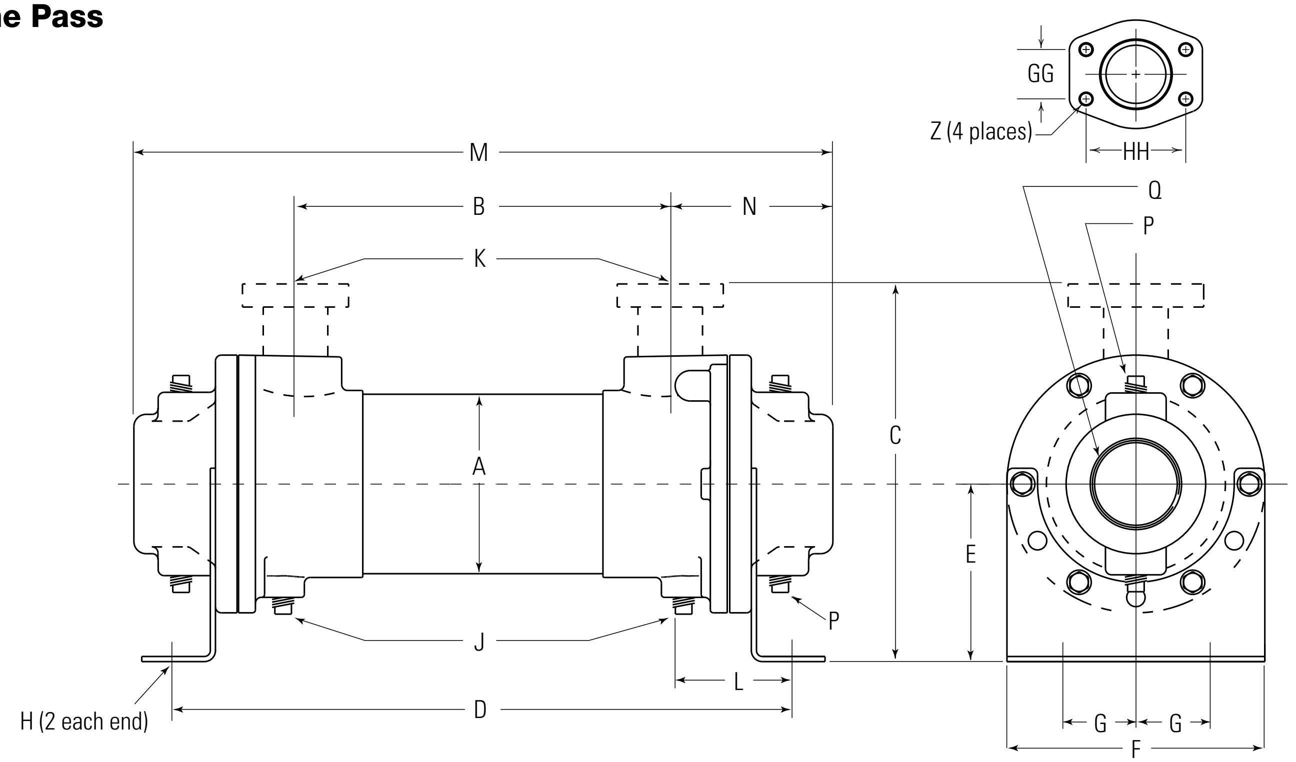
ADD FOR B SERIES MODELS ONLY:
BR-CN-B-Z is to be used for all seawater/dirty water applications.

Steel Hub
SB = NPT Shell Side, NPT Tube Side
SBF = SAE Flange (with UNC threads) Shell Side connections; NPT Tube Side connections

Brass Hub
B = NPT Shell Side connections; NPT Tube Side connections
BS = SAE O-Ring Shell Side connections; NPT Tube Side connections
BM = BSPP Shell Side connections; BSPP Tube Side connections
BF = SAE Flange (with UNC threads) Shell Side connections; NPT Tube Side connections
BFM = SAE Flange (with Metric threads) Shell Side connections; BSPP Tube Side connections
SAE flanges available on some models. Consult factory for details.

Dimensions

One Pass



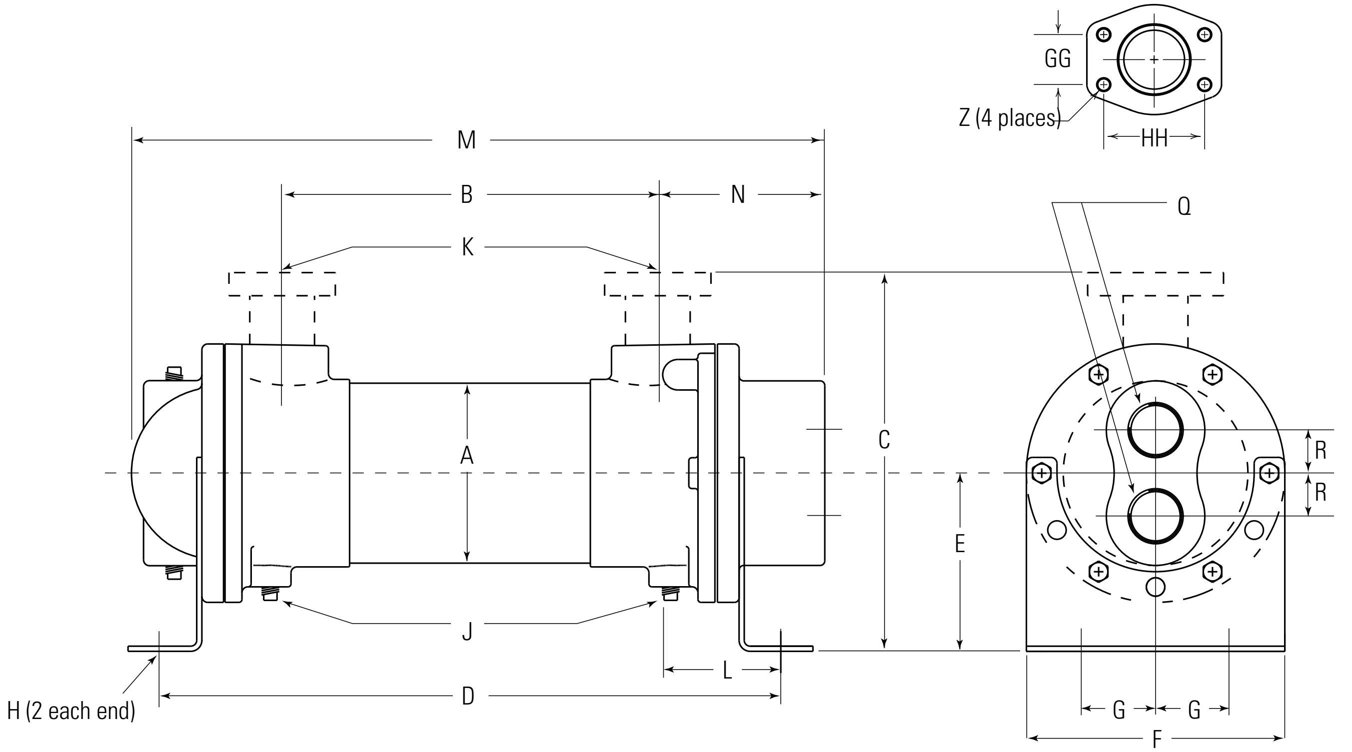
Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06		
3	2.44	4.19	5/8-11 UNC	M-16

MODEL	A	B	C		D	E	F	G	H	J	K		L	M	N	P	Q
			NPT/BSPP SAE O-RING	SAE FLANGE						NPT	NPT/BSPP FLANGE	SAE O-RING				NPT	NPT
B-401	2.125	7.62	3.50	—	11.01	1.94	2.62	.88	.41 Dia.	—	*.50	#8, 3/4-16 UNF-2B	1.72	11.24	1.81	—	1.00
B-402		16.62			20.01									20.24			
B-701	3.656	7.00	6.25	C/F	12.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00	#16, $1^{5}/_{16}$-12 UNF-2B	2.69	13.64	3.24	(4) .38	1.50
B-702		16.00			21.01									22.64			
B-703		25.00			30.01									31.64			
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00		(6) .38	1.50	#24, $1^{7}/_{8}$-12 UN-2B	3.06	23.60	4.05		2.00
B-1003		24.50			30.71									32.60			
B-1004		33.50			39.71									41.60			
B-1202	6.125	14.62	8.81	10.50	21.50	4.75	7.50	2.50	.44 x .88		2.00	#32, $2^{1}/_{2}$-12 UN-2B	3.44	24.38	4.88	(4) .50	3.00
B-1203		23.50			30.38									33.25			
B-1204		32.38			39.25									42.12			
B-1205		41.38			48.25									51.12			
B-1206		50.50			57.38									60.25			
B-1207		59.50			66.38									69.25			
B-1208		68.38			75.25									78.12			
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00		3.00	—	4.39	26.62	6.52		4.00
B-1603		22.60			31.38									35.62			
B-1604		31.60			40.38									44.62			
B-1605		40.60			49.38									53.62			
B-1606		49.60			58.38									62.62			
B-1607		58.60			67.38									71.62			
B-1608		67.60			76.38									80.62			
B-1609		76.60			85.38									89.62			
B-1610		85.60			94.38									98.62			

B-401 and B-402 SAE Flange not available. NOTE: We reserve the right to make reasonable design changes without notice. Consult factory. All dimensions are inches.

Dimensions

Two Pass



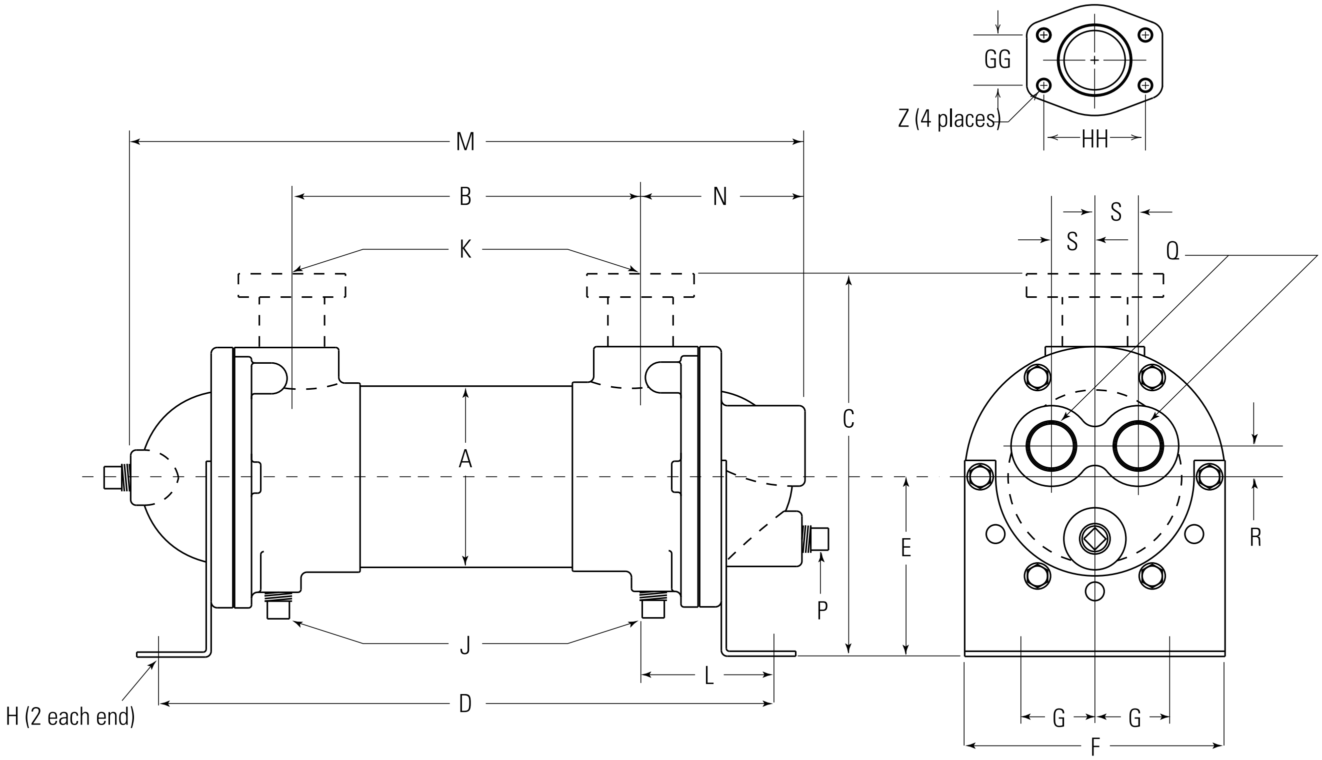
Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06		
3	2.44	4.19	5/8-11 UNC	M-16

MODEL	A	B	C NPT/BSPP SAE O-RING	C SAE FLANGE	D	E	F	G	H	J NPT	K NPT/BSPP FLANGE	K SAE O-RING	L	M	N	P NPT	Q NPT	R
B-701	3.656	7.00	6.25	C/F	12.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00	#16, $1\frac{5}{16}$-12 UNF-2B	2.69	13.28	3.30	(2) .38	1.00	.88
B-702		16.00			21.01									22.28				
B-703		25.00			30.01									31.28				
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00		(6) .38	1.50	#24, $1\frac{7}{8}$-12 UN-2B	3.06	23.29	3.80		1.50	1.19
B-1003		24.50			30.71									32.29				
B-1004		33.50			39.71									41.29				
B-1202	6.125	14.62	8.81	10.50	21.50	4.75	7.50	2.50	.44 x .88		2.00	#32, $2\frac{1}{2}$-12 UN-2B	3.44	23.94	4.56	(2) .50	2.00	1.44
B-1203		23.50			30.38									32.81				
B-1204		32.38			39.25									41.69				
B-1205		41.38			48.25									50.69				
B-1206		50.50			57.38									59.81				
B-1207		59.50			66.38									68.81				
B-1208		68.38			75.25									77.69				
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00		3.00	—	4.39	25.10	6.08		2.50	1.88
B-1603		22.60			31.38									34.10				
B-1604		31.60			40.38									43.10				
B-1605		40.60			49.38									52.10				
B-1606		49.60			58.38									61.10				
B-1607		58.60			67.38									70.10				
B-1608		67.60			76.38									79.10				
B-1609		76.60			85.38									88.10				
B-1610		85.60			94.38									97.10				

NOTE: We reserve the right to make reasonable design changes without notice. Consult factory. All dimensions are inches.

Dimensions

Four Pass

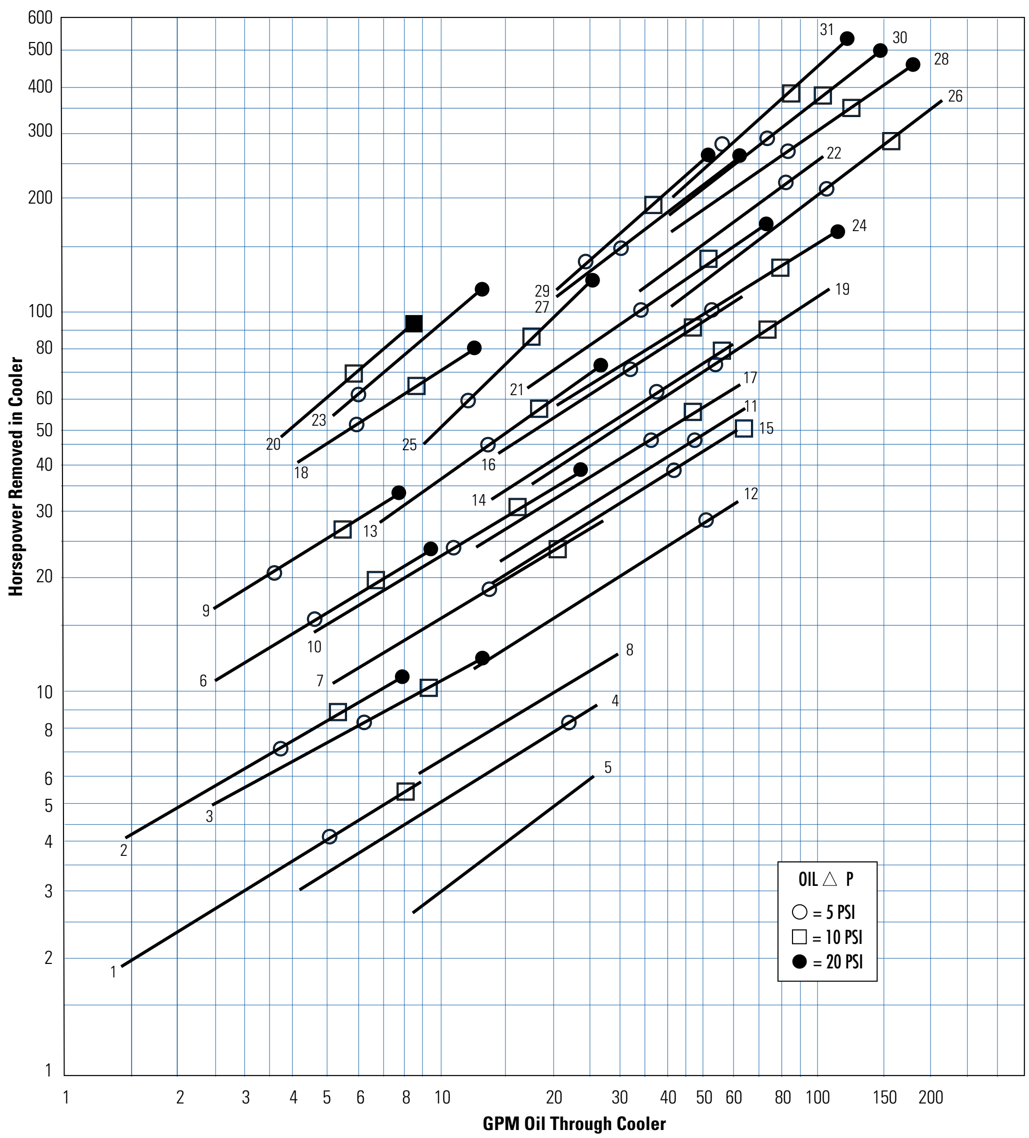


Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06		
3	2.44	4.19	5/8-11 UNC	M-16

MODEL	A	B	C		D	E	F	G	H	J	K		L	M	N	P	Q	R	S
			NPT/BSPP SAE O-RING	SAE FLANGE						NPT	NPT/BSPP FLANGE	SAE O-RING				NPT	NPT		
B-701	3.656	7.00	6.25	C/F	12.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00	#16, $1^{5}/_{16}$-12 UNF-2B	2.69	13.57	3.32	(3) .38	.75	.62	.88
B-702		16.00			21.01									22.57					
B-703		25.00			30.01									31.57					
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00		(6) .38	1.50	#24, $1^{7}/_{8}$-12 UN-2B	3.06	23.57	4.12		1.00	.75	1.34
B-1003		24.50			30.71									32.57					
B-1004		33.50			39.71									41.57					
B-1202	6.125	14.62	8.81	10.50	21.50	4.75	7.50	2.50	.44 x .88		2.00	#32, $2^{1}/_{2}$-12 UN-2B	3.44	24.44	4.90	(2) .38 (1) .50	1.50	1.06	1.40
B-1203		23.50			30.38									33.31					
B-1204		32.38			39.25									42.19					
B-1205		41.38			48.25									51.19					
B-1206		50.50			57.38									60.31					
B-1207		59.50			66.38									69.31					
B-1208		68.38			75.25									78.19					
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00		3.00	—	4.39	26.72	6.48	(3) .50	2.00	1.38	1.88
B-1603		22.60			31.38									35.72					
B-1604		31.60			40.38									44.72					
B-1605		40.60			49.38									53.72					
B-1606		49.60			58.38									62.72					
B-1607		58.60			67.38									71.72					
B-1608		67.60			76.38									80.72					
B-1609		76.60			85.38									89.72					
B-1610		85.60			94.38									98.72					

NOTE: We reserve the right to make reasonable design changes without notice. Consult factory. All dimensions are inches.

Performance Curves



Model	Ship Wt. (lbs)
*1. B-401-A4-0	7
*2. B-402-A4-0	10
*3. B-701-A4-T	23
4. B-701-B6-F	23
5. B-701-C6-T	23
*6. B-702-A4-T	28
7. B-702-B4-F	28
8. B-702-C6-T	28
*9. B-703-A4-T	35
10. B-703-B4-F	35
11. B-1002-C4-T	49
12. B-1002-C6-T	49
13. B-1003-B4-F	65
14. B-1003-C4-T	65
15. B-1003-C6-T	65
16. B-1004-C4-T	72
17. B-1004-C6-T	72
*18. B-1202-A4-F	72
19. B-1202-C4-F	72
*20. B-1204-A4-F	110
21. B-1204-C4-F	110
22. B-1206-D4-F	160
*23. B-1602-A4-F	145
24. B-1602-C4-F	145
25. B-1604-B4-F	195
26. B-1604-D4-F	195
27. B-1606-C4-F	259
28. B-1606-D4-F	259
29. B-1608-C4-F	310
30. B-1608-D4-F	310
31. B-1610-D4-F	400

Shipping weights are approximate

Maximum Flow Rates

Example Model No.

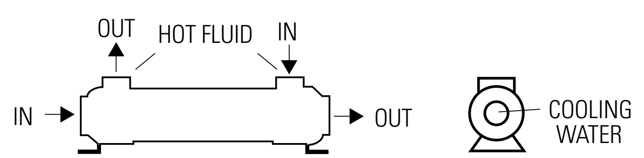
B - 1003 - C4 - F

Unit Size	Shell Side (GPM)		Baffle Spacing		Tube Side (GPM)		
	A	B	C	D	0	T	F
400	9.6	—	—	—	25	—	—
700	17	29	29	—	61	31	15
1000	24	48	69	69	146	73	37
1200	29	57	115	115	224	112	56
1600	37	74	149	253	363	181	91

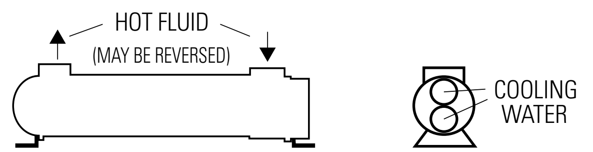
Caution: *Incorrect installation can cause this product to fail prematurely, causing the shell side and tube side fluids to intermix.*

Piping Hook-up

One Pass



Two and Four Pass



Specific applications may have different piping arrangements. Contact factory for assistance.

Selection Procedure

Performance Curves are based on 100SSU oil leaving the cooler 40°F higher than the water temperature used for cooling. This is also referred to as a 40°F approach temperature. Curves are based on a 2:1 oil to water flow ratio. *Curves are 1:1.

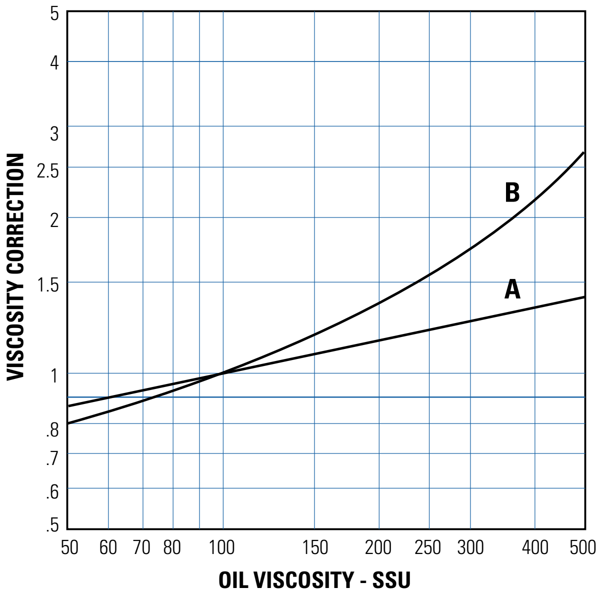
Step 1 **Determine the Heat Load.** This will vary with different systems, but typically coolers are sized to remove 25 to 50% of the input nameplate horsepower. (Example: 100 HP Power Unit x .33 = 33 HP Heat load.)
If BTU/Hr. is known: $HP = \frac{BTU/Hr}{2545}$

Step 2 **Determine Approach Temperature.** Desired oil leaving cooler °F – Water Inlet temp. °F = Actual Approach (Max. reservoir temp.)

Step 3 **Determine Curve Horsepower Heat Load.** Enter the information from above:
$$\text{Horsepower heat load} \times \frac{40}{\text{Actual Approach}} \times \text{Viscosity Correction A} = \text{Curve Horsepower}$$

Step 4 **Enter curves** at oil flow through cooler and curve horsepower. Any curve above the intersecting point will work.

Step 5 **Determine Oil Pressure Drop from Curves:**
◯ = 5 PSI; ☐ = 10 PSI; ● = 20 PSI. Multiply pressure drop from curve by correction factor B found on oil viscosity correction curve.



Oil Temperature

Oil coolers can be selected using entering or leaving oil temperatures.

Typical operating temperature ranges are:

Hydraulic Oil	110°F - 130°F
Hydrostatic Drive Oil	130°F - 180°F,
Bearing Lube Oil	120°F - 160°F
Lube Oil Circuits	110°F - 130°F.

Desired Reservoir Temperature

Return Line Cooling: Desired temperature is the oil temperature leaving the cooler. This will be the same temperature that will be found in the reservoir.

Off-Line Recirculation Cooling Loop: Desired temperature is the oil temperature *entering* the cooler. In this case, the oil temperature change must be determined so that the actual oil leaving temperature can be found. Calculate the oil temperature change (oil ▲T) with this formula:

Oil ▲T = (BTU's/Hr.) / (GPM Oil Flow x 210).

To calculate the oil leaving temperature from the cooler, use this formula:

Oil Leaving Temp. = Oil Entering Temp – Oil ▲T.

This formula may also be used in any application where the only temperature available is the entering oil temperature.

Oil Pressure Drop: Most systems can tolerate a pressure drop through the heat exchanger of 20 to 30 PSI. Excessive pressure drop should be avoided. Care should be taken to limit pressure drop to 5 PSI or less for case drain applications where high back pressure may damage the pump shaft seals.