

FLUID COOLING | Shell & Tube A Series

COPPER & STEEL CONSTRUCTION

Features

- ITT Interchange
- B or C Series is Recommended for New Applications
- Competitively Priced
- Optional Non-Ferrous Construction (Water-to-Water Service)
- 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 300 psi
Maximum Tube Side Pressure 150 psi
Maximum Temperature 300° F

Materials

Tubes Copper
Hubs & Tubesheets Steel or Brass
Shell Steel
Baffles Brass
End Bonnets Cast Iron
Mounting Brackets Steel
Gaskets Nitrile Rubber/Cellulose Fiber
Nameplate Aluminum Foil

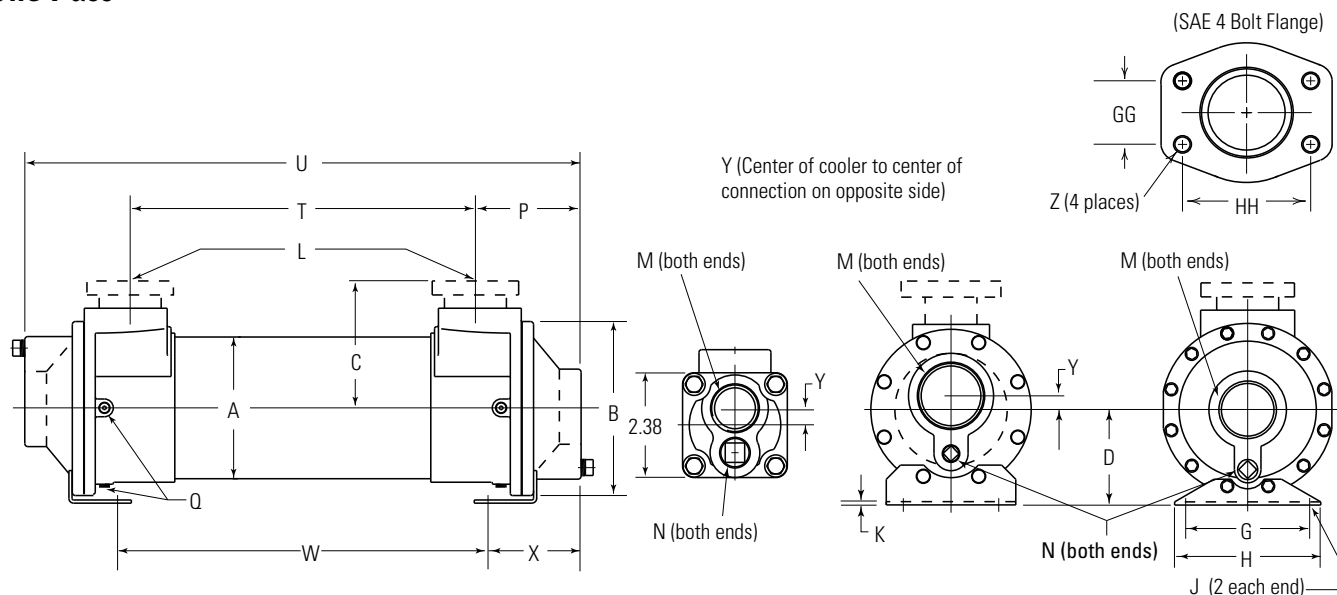
How to Order

	-		-		-		-		-		-		-		-		-		-	
Model Series		Model Size Selected		Baffle Spacing		Tube Diameter Code		Tubeside Passes		Shell Material		Cooling Tube Material		End Bonnet Material		Zinc Anodes				
SA SAF A AS AM AF AFM						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				

SA = NPT Shell side, NPT Tube
SAF = SAE 4 Bolt Flange (with UNC threads) Shell side connections; NPT Tube side connections
A = NPT Shell side connections; NPT Tube side connections
AS = SAE O-Ring Shell side connections; NPT Tube side connections
AM = BSPP Shell side connections; BSPP Tube side connections
AF = SAE 4 Bolt Flange (with UNC threads) Shell side connections; NPT Tube side connections
AFM = SAE 4 Bolt Flange (with Metric threads) Shell side connections; BSPP Tube side connections
SAE flanges available on some models. Consult factory for details.

Dimensions

One Pass



A-400 Series

**A-600 &
A-800 Series**

**A-1000, A-1200
& A-1600 Series**

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

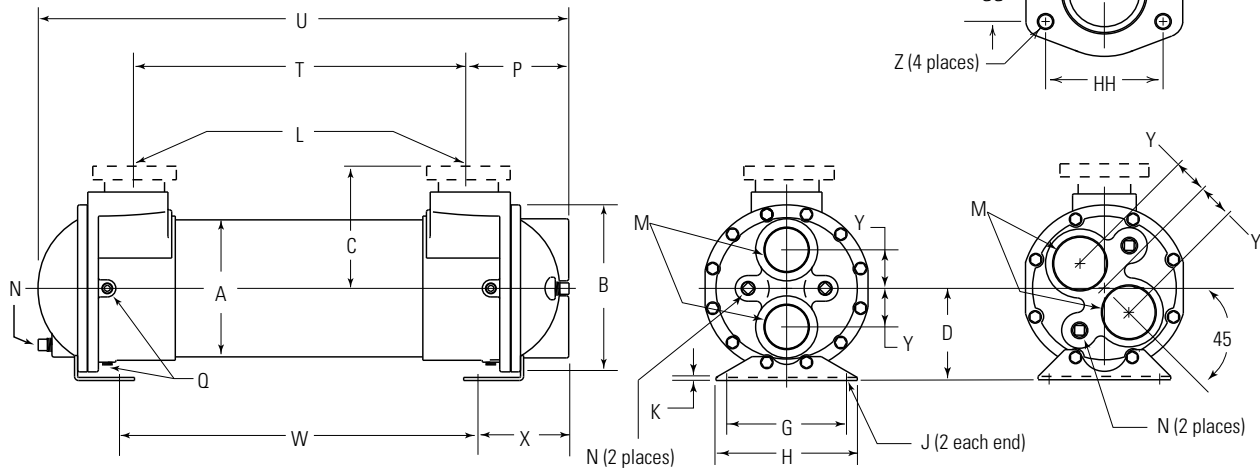
MODEL	A DIA.	B DIA.	C		D	G	H	J	K	L		M NPT	N NPT	P	Q NPT	T	U	W	X	Y
			NPT/BSPP SAE O-RING	SAE 4 BOLT FLANGE						NPT/BSPP FLANGE	SAE O-RING									
A-408	2.12	—	1.69	—	—	—	—	—	—	*1.00	N/A	.75	—	2.38	—	6.25	11.00	—	—	.38
A-608	3.12	4.19	2.44	C/F	2.44	2.50	3.50	.38 x .88	.12	1.00	15/16-12 UNF-2B	1.50	.38	2.56	(2) .25	6.12	11.25	5.47	3.06	.38
A-614																12.12	17.25	11.47		
A-624																22.12	27.25	21.47		
A-814	4.12	5.88	3.12	C/F	3.50	3.50	4.75	.50 x 1.62	.12	1.50	#24, 17/8-12 UN-2B	2.00	.38	3.44	(6) .38	11.12	18.00	12.88	2.56	.50
A-824																21.12	28.00	22.88		
A-836																33.12	40.00	34.88		
A-1014	5.12	6.50	3.62	4.34	4.12	5.00	6.00	.50 x .88	.12	2.00	#32, 21/2-12 UN-2B	2.50	.38	3.69	(6) .25	11.12	18.50	11.75	3.38	.38
A-1024																21.12	28.50	21.75		
A-1036																33.12	40.50	33.75		
A-1224	6.12	7.50	4.25	4.84**	4.12	5.00	6.00	.50 x .88	.12	2.00	#32, 21/2-12 UN-2B	3.00	.50	4.25	(6) .25	20.50	29.00	21.50	3.75	.38
A-1236																32.50	41.00	33.50		
A-1248																44.50	53.00	45.50		
A-1260	8.00	9.75	5.62	6.12***	5.38	7.00	8.25	.62 x 1.12	.19	3.00	—	3.00	.50	6.00	(6) .25	56.50	65.00	57.50	5.25	.38
A-1624																19.00	31.00	20.50		
A-1636																31.00	43.00	32.50		
A-1648	8.00	9.75	5.62	6.12***	5.38	7.00	8.25	.62 x 1.12	.19	3.00	—	3.00	.50	6.00	(6) .25	43.00	55.00	44.50	5.25	.38
A-1660																55.00	67.00	56.50		
A-1672																67.00	79.00	68.50		

*A-408 SAE Flange not available. **SAF-1200 5.88. ***SAF-1600 7.38.

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

Dimensions

Two Pass



**A-600, A-800, A-1000
& A-1600 Series**

A-1200 Series

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

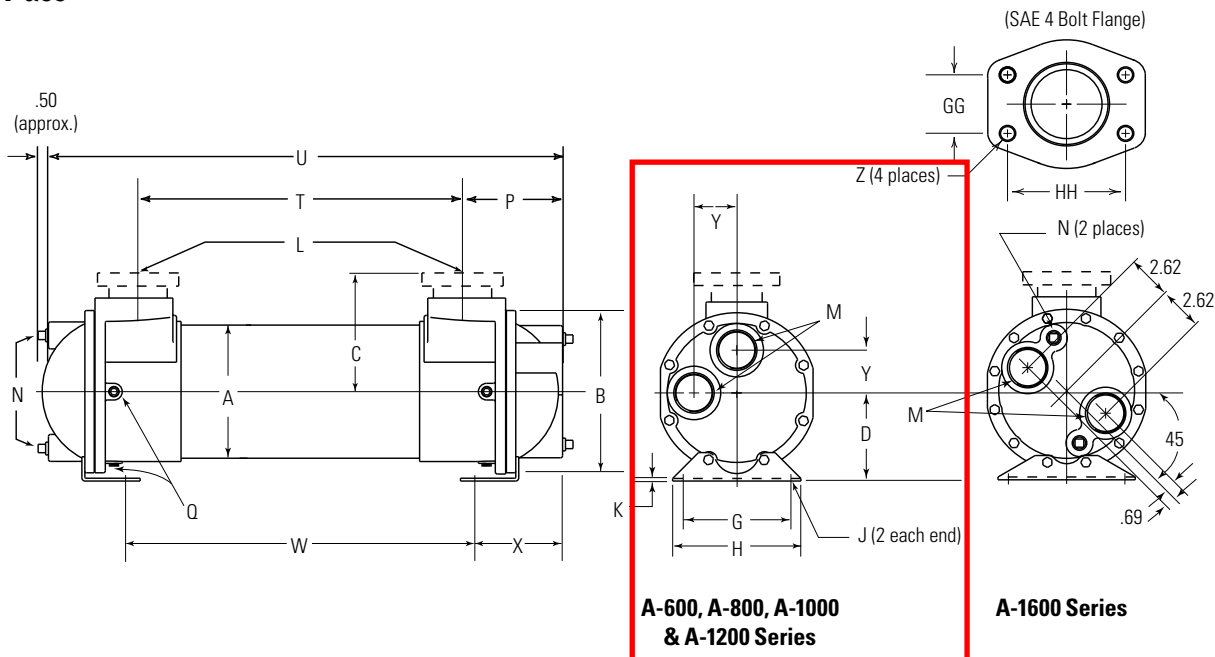
MODEL	A DIA.	B DIA.	C		D	G	H	J	K	L		M NPT	N NPT	P	Q NPT	T	U	W	X	Y
			NPT/BSPP SAE O-RING	SAE 4 BOLT FLANGE						NPT/BSPP FLANGE	SAE O-RING									
A-608	3.12	4.19	2.44	C/F	2.44	2.50	3.50	.38 x .88	.12	1.00	#16, 15/16-12 UNF-2B	1.00	.38	2.44	(2) .25	6.12	10.75	5.47	2.94	1.00
A-614																12.12	16.75	11.47		
A-624																22.12	26.75	21.47		
A-814	4.12	5.88	3.12		3.50	3.50	4.75	.50 x 1.62		1.50	#24, 17/8-12 UN-2B	1.25		3.44	(6) .38	11.12	17.62	12.88	2.56	1.19
A-824																21.12	27.62	22.88		
A-836																33.12	39.62	34.88		
A-1014	5.12	6.50	3.62	4.34	4.00	5.00	.50 x .88	2.00	#32, 2 1/2-12 UN-2B	1.50	3.69	.50	3.69	(6) .25	11.12	18.31	11.75	3.38	1.50	
A-1024															21.12	28.31	21.75			
A-1036															33.12	40.31	33.75			
A-1224	6.12	7.50	4.25	4.84*	4.12	5.00	6.00	.50 x .88	2.00	2.00	4.25		6.00		(6) .25	20.50	28.75	21.50	3.75	1.56
A-1236																32.50	40.75	33.50		
A-1248																44.50	52.75	45.50		
A-1260	8.00	9.75	5.62	6.12**	5.38	7.00	8.25	.62 x 1.12	.19	3.00	—	2.50	.50	6.00	(6) .25	56.50	64.75	57.50	5.25	2.25
A-1624																19.00	30.50	20.50		
A-1636																31.00	42.50	32.50		
A-1648																43.00	54.50	44.50		
A-1660																55.00	66.50	56.50		
A-1672																67.00	78.50	68.50		

*SAF-1200 5.88. **SAF-1600 7.38.

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 DIA.	B DIA.	C		D	G	H	J	K	L		M NPT	N NPT	P	Q NPT	T	U	W	X	Y	
			NPT/BSPP SAE O-RING	SAE 4 BOLT FLANGE						NPT/BSPP FLANGE	SAE O-RING										
A-608	3.12	4.19	2.44	C/F	2.44	2.50	3.50	.38 x .88	.12	1.00	#16, 15/16-12 UNF-2B	.75	.38	2.31	(2) .25	6.12	10.88	5.47	2.81	1.00	
A-614																12.12	16.88	11.47			
A-624																22.12	26.88	21.47			
A-814	4.12	5.88	3.12		3.50	4.75	.50 x 1.62	1.50		#24, 17/8-12 UN-2B	1.00	3.56	11.12	17.62	12.88	2.56	1.06				
A-824													21.12	27.62	22.88						
A-836													33.12	39.62	34.88						
A-1014	5.12	6.50	3.62		4.34	4.00	5.00	.50 x .88		2.00	#32, 2 1/2-12 UN-2B	1.50	4.25	(6) .25	11.12	18.38	11.75	3.25	1.69		
A-1024															21.12	28.38	21.75				
A-1036															33.12	40.38	33.75				
A-1224	6.12	7.50	4.25		4.84*	4.12	5.00	6.00		.50 x .88	2.00	#32, 2 1/2-12 UN-2B	1.50	.50	4.25	(6) .25	20.50	29.00	21.50	3.75	2.00
A-1236																	32.50	41.00	33.50		
A-1248																	44.50	53.00	45.50		
A-1260	8.00	9.75	5.62		6.12**	5.38	7.00	8.25	.62 x 1.12	.19	3.00	—	2.00	6.00		56.50	65.00	57.50	5.25	—	
A-1624																19.00	30.75	20.50			
A-1636																31.00	42.75	32.50			
A-1648	8.00	9.75	5.62		6.12**	5.38	7.00	8.25	.62 x 1.12	.19	3.00	—	2.00	6.00		43.00	54.75	44.50	5.25	—	
A-1660																55.00	66.75	56.50			
A-1672																67.00	78.75	68.50			

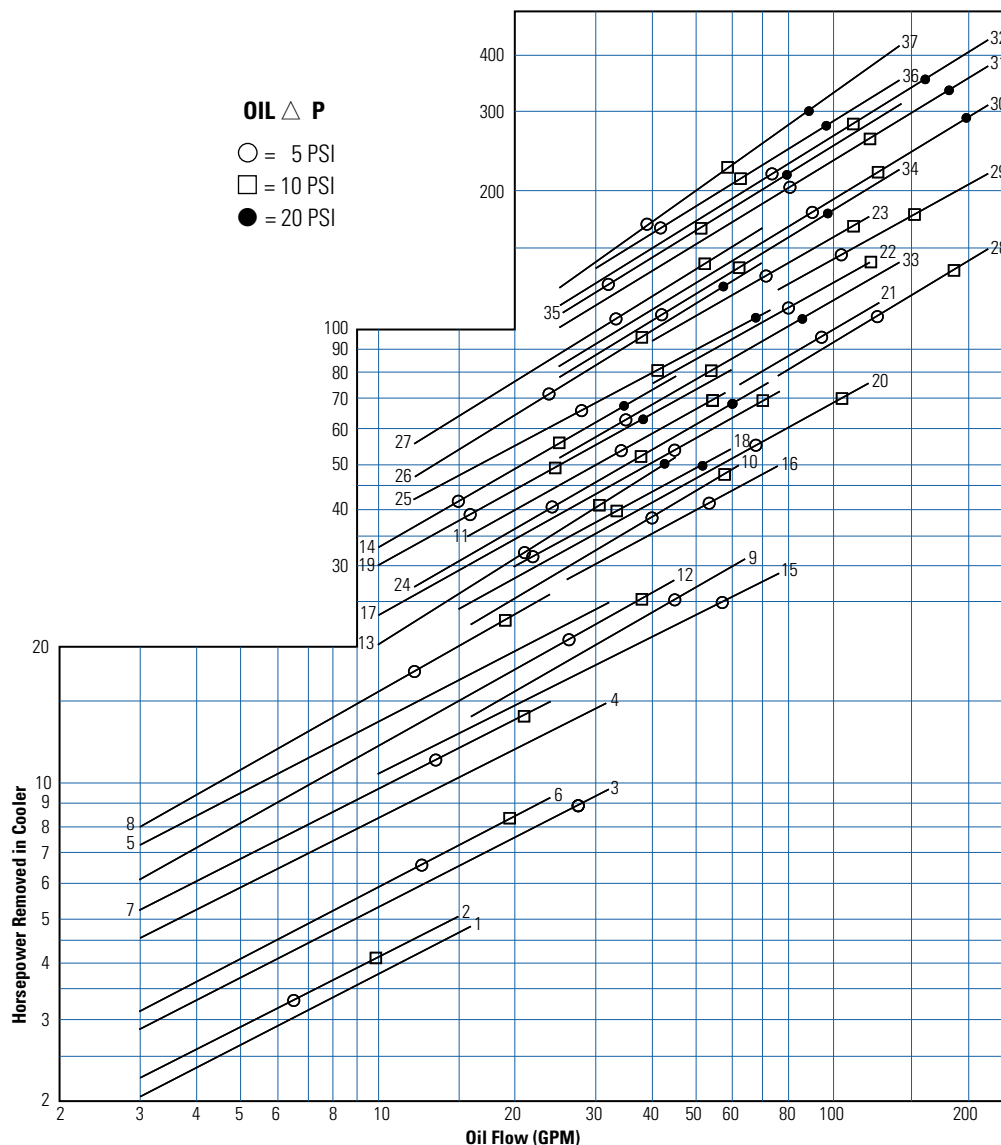
*SAF-1200 5.88. **SAF-1600 7.38.

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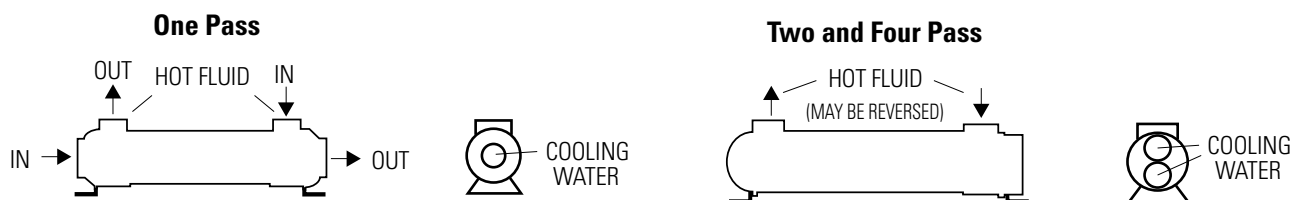
Performance Curves

Model	Ship Wt. (lbs)
1. A-408-2-4-0	7
2. A-408-.75-4-0	7
3. A-608-2-4-F	12
4. A-614-4-4-F	17
5. A-624-4-4-F	20
6. A-608-1-4-F	12
7. A-614-1.5-4-F	17
8. A-624-2-4-F	20
9. A-814-3-4-F	40
10. A-824-4-4-F	50
11. A-836-4-4-F	58
12. A-814-1.5-4-F	40
13. A-824-2-4-F	50
14. A-836-2-4-F	58
15. A-1014-3-6-F	49
16. A-1024-4-6-F	63
17. A-1036-4-6-F	72
18. A-1024-2-6-F	63
19. A-1036-2-6-F	72
20. A-1224-4-6-F	78
21. A-1236-6-6-F	118
22. A-1248-6-6-F	143
23. A-1260-6-6-F	165
24. A-1224-2-6-F	78
25. A-1236-3-6-F	118
26. A-1248-3-6-F	143
27. A-1260-4-6-F	165
28. A-1624-6-6-F	180
29. A-1636-6-6-F	210
30. A-1648-6-6-F	250
31. A-1660-6-6-F	286
32. A-1672-6-6-F	330
33. A-1624-2-6-F	180
34. A-1636-3-6-F	210
35. A-1648-3-6-F	250
36. A-1660-4-6-F	286
37. A-1672-4-6-F	330

Shipping Weights are approximate



Piping Hook-up



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.

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.)

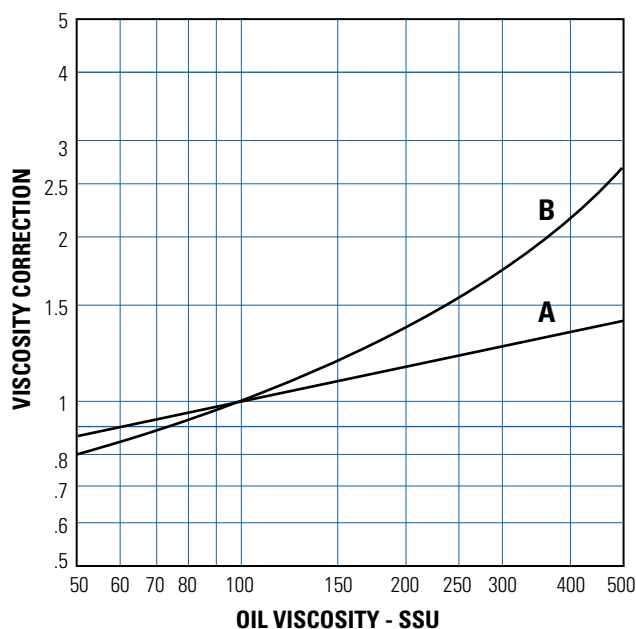
If BTU/Hr. is known: $HP = \frac{BTU/Hr}{2545}$

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:
Horsepower heat load x $\frac{40}{\text{Actual Approach}}$ x Viscosity = 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.

Maximum Flow Rates

Example Model No.

A - 1024 - 2 - 6 - F

Unit Size	Baffle Spacing	Shell Side (GPM)	Tube Side (GPM)		
			O	T	F
400	.75, 2	7, 19	18	—	—
608	1, 2	14, 29	48	24	12
614	1.5, 4	21, 29	48	24	12
624	2, 4	29	48	24	12
814	1.5, 3	29, 57	87	44	22
824 & 836	2, 4	38, 69	87	44	22
1014	1.5, 3	32, 64	146	73	37
1024 & 1036	2, 4	42, 69	146	73	37
1224	2, 4	51, 103	224	112	56
1236 & 1248	3, 6	77, 115	224	112	56
1260	4, 6	103, 115	224	112	56
1624	2, 6	66, 200	280	140	70
1636 & 1648	3, 6	100, 200	280	140	70
1660 & 1672	4, 6	133, 200	280	140	70

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