

# WATER COOLED – FIXED BUNDLE HEAT EXCHANGERS

A Series



**NON-FERROUS CONSTRUCTION**

**AVAILABLE FROM STOCK**

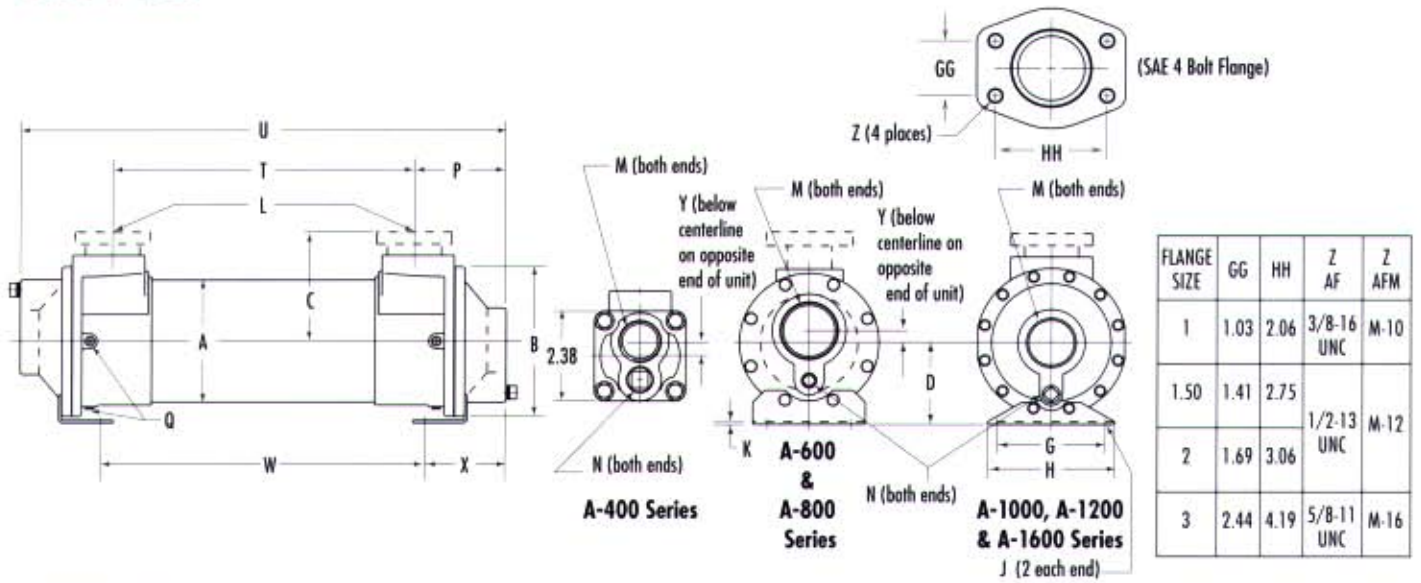
**COMPETITIVELY PRICED**

- Non-Ferrous Construction (Preferred for 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)



# STANDARD MODELS & DIMENSIONS

## One Pass



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	.38	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	—	1.00	#16, 1 5/16-12 UNF-2B	1.50		.38	2.56	(2) .25	6.12	11.25	5.47	
A-614													A-624				A-814	A-824	A-836	3.50
A-1014	A-1024	A-1036	A-1224	A-1236	A-1248	A-1260	.50 x .88	.12	1.50	#32, 2 1/2-12 UN-2B	2.50	.38		3.69	—	11.12				
A-1624													A-1636			A-1648	A-1660	A-1672	4.34	4.00
A-1648	A-1660	A-1672	6.12	7.50	4.25	4.84	4.12	5.00	6.00	2.00	—	3.00		.50	4.25					
A-1648													A-1660			A-1672	8.00	9.75	5.62	6.12
A-1648	A-1660	A-1672	8.00	9.75	5.62	6.12	5.38	7.00	8.25	.62 x 1.12	.19	3.00		—	6.00					
A-1648													A-1660			A-1672	8.00	9.75	5.62	6.12
A-1648	A-1660	A-1672	8.00	9.75	5.62	6.12	5.38	7.00	8.25	.62 x 1.12	.19	3.00		—	6.00					
A-1648													A-1660			A-1672	8.00	9.75	5.62	6.12
A-1648	A-1660	A-1672	8.00	9.75	5.62	6.12	5.38	7.00	8.25	.62 x 1.12	.19	3.00		—	6.00					
A-1648													A-1660			A-1672	8.00	9.75	5.62	6.12
A-1648	A-1660	A-1672	8.00	9.75	5.62	6.12	5.38	7.00	8.25	.62 x 1.12	.19	3.00		—	6.00					
A-1648													A-1660			A-1672	8.00	9.75	5.62	6.12

\* A-408 SAE Flange Not Available. All dimensions in inches. NOTE: We reserve the right to make reasonable design changes without notice.

## SPECIFICATIONS

### RATINGS

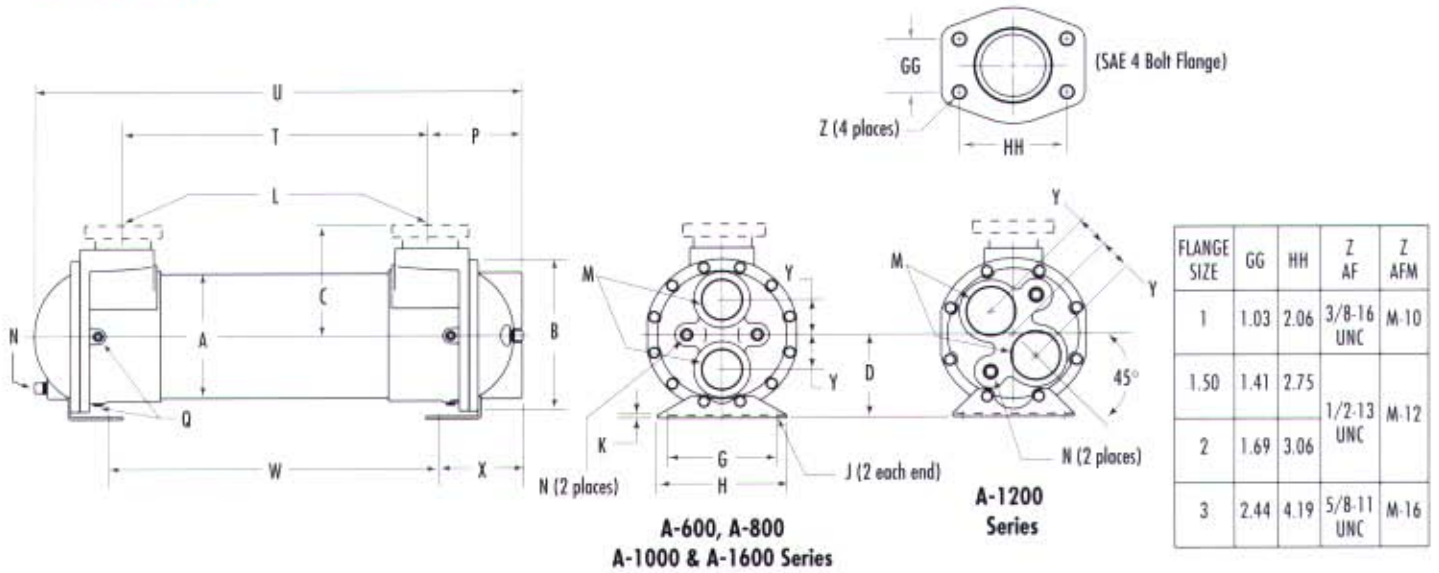
Maximum Shell Pressure .....	300 PSI
Maximum Tube Side Pressure.....	150 PSI
Maximum Temperature.....	300° F

### MATERIALS

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

# STANDARD MODELS & DIMENSIONS

## Two Pass



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, 1 1/16-12 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	C/F	3.50	3.50	4.75	.50 x 1.62	.12	1.50	#24, 1 1/8-12 UN-2B	1.25	.38	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	.19	.12	2.00	#32, 2 1/2-12 UN-2B	2.00	.50	4.25	(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	.62 x 1.12	.19	3.00	—	2.50	6.00	4.30	(6) .25	20.50	28.75	21.50	5.25	2.25
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	6.00	4.30	(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	8.00	9.75	5.62	6.12	5.38	7.00	8.25	.62 x 1.12	.19	3.00	—	2.50	6.00	4.30	(6) .25	43.00	54.50	44.50	5.25	2.25
A-1660																55.00	66.50	56.50		
A-1672																67.00	78.50	68.50		

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

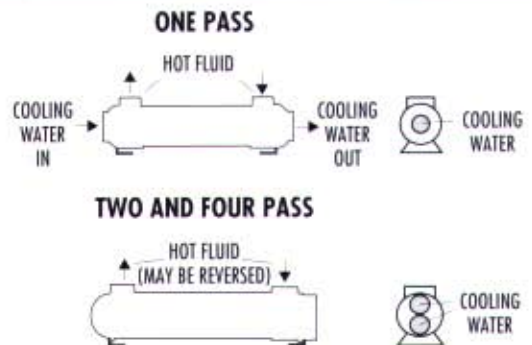
## MAXIMUM FLOW RATES

Caution: Incorrect installation can cause this product to fail prematurely, causing the shell-side and tube-side fluids to intermix. Maximum allowable rates are as charted below.

Model No. Example: A - 1024 - 2 - 6 - F

Unit Size	Baffle Spacing	Shell Side (GPM)	Tube Side (GPM)		
			O	T	F
400	.75, 2	7, 19	18	—	—
600	1, 1.5, 2, 4	14, 21, 29, 29	48	24	12
800	1.5, 2, 3, 4	29, 38, 57, 69	87	43	21
1000		32, 42, 64, 69	146	73	37
1200	2, 3, 4, 6	51, 77, 103, 115	224	112	56
1600		66, 100, 133, 200	280	203	101

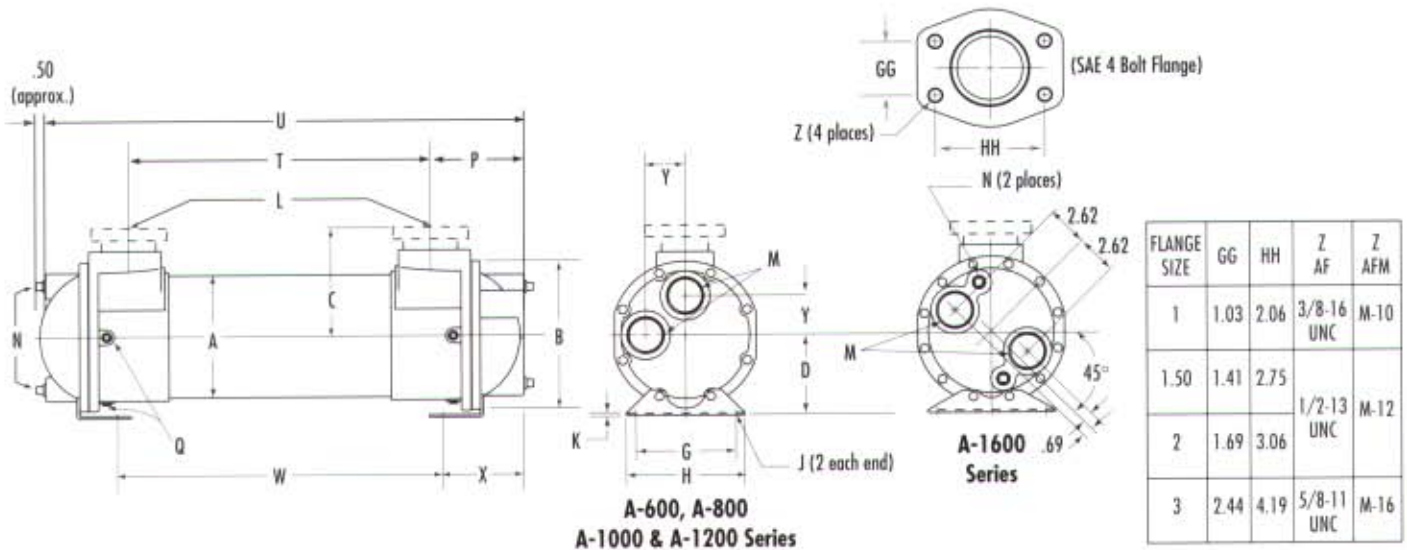
## PIPING HOOK-UP



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

# STANDARD MODELS & DIMENSIONS

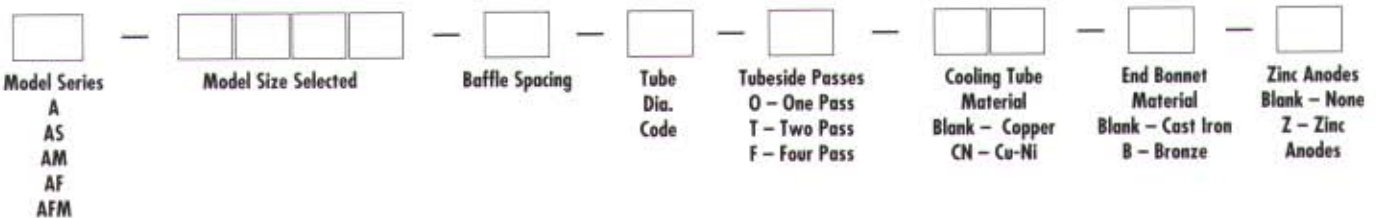
## Four Pass



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, 1 1/8-12 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	C/F	3.50	3.50	4.75	.50 x 1.62	.12	1.50	#24, 1 7/8-12 UN-2B	.38	.50	3.44	(6) .38	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	.19	.12	1.50	#24, 1 7/8-12 UN-2B	.38	.50	3.56	(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	.19	2.00	#32, 2 1/2-12 UN-2B	.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	.50	6.00	(6) .25	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	.50	6.00	(6) .25	43.00	54.75	44.50	5.25	—
A-1660																55.00	66.75	56.50		
A-1672																67.00	78.75	68.50		

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

## HOW TO ORDER

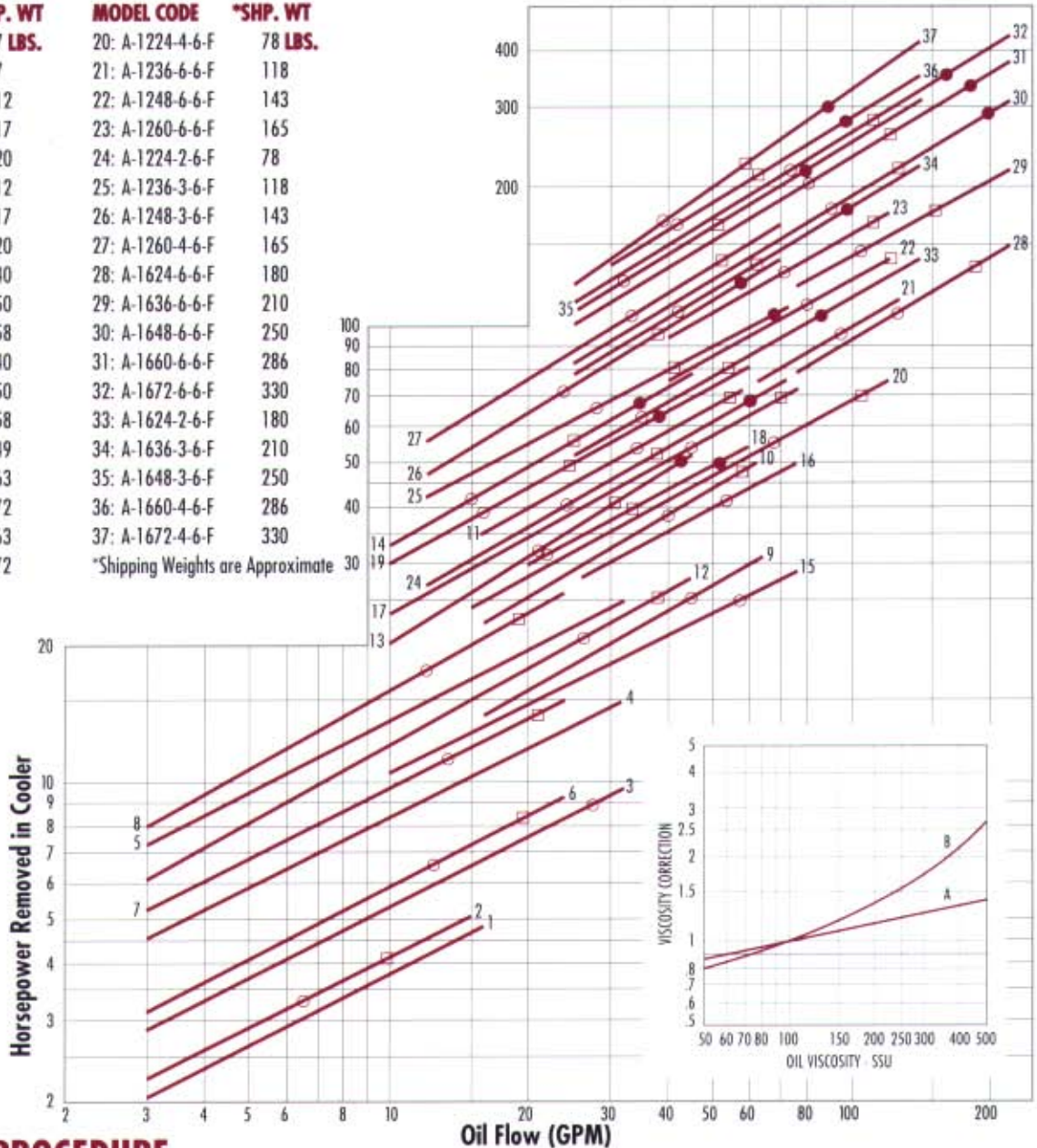


A = NPT Shell Side connections; NPT Tube Side connections  
 AS = SAE O-Ring Shell Side connections; NPT Tube Side connections  
 AM = BSPP Shell Side connections; BSPP Tube Side connections  
 AF = SAE 4 Bolt Flange (with UNC threads) Shell Side connections; NPT Tube Side connections  
 AFM = SAE 4 Bolt Flange (with Metric threads) Shell Side connections; BSPP Tube Side connections

# PERFORMANCE CURVES & WEIGHTS

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

\*Shipping Weights are Approximate



## SELECTION PROCEDURE

Performance Curves are based on 100SSU oil leaving the cooler 40°F higher than the incoming water temperature (40°F approach temperature). Curves are based on a 2:1 oil to water flow ratio. \*\*1:1 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:  
 $\text{Horsepower heat load} \times \frac{40}{\text{Actual Approach}} \times \text{Viscosity Correction A} = \text{Curve HP}$

### 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  $\Delta T$ ) with this formula:

$\text{Oil } \Delta T = \frac{(\text{BTU's/Hr.})}{(\text{GPM Oil Flow} \times 210)}$

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

$\text{Oil Leaving Temp.} = \text{Oil Entering Temp.} - \text{Oil } \Delta T$

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.

# Thermal Transfer Products, Ltd.

INDUSTRIAL HYDRAULICS DIVISION

Your Full Line Heat Exchanger Source.



**EK Series (Bulletin 5.03)**  
**EC Series (Bulletin 2.00)**  
Extended surface water to oil heat exchangers. Internal aluminum fins provide greatest heat transfer in smallest envelope size. Our most cost-effective water cooled heat exchanger for oil cooling applications. Oil flows to 250 GPM, heat removal to 550 HP. Options include sea water service designs and patented internal Surge-Cushion<sup>®</sup> bypass valves.



**B Series (Bulletin 6.03)**  
All brass and copper construction heat exchangers for fluid to fluid applications which require non-ferrous construction. Wide range of custom designs and materials available. Liquid flows to 200 GPM, heat removal to 525 HP. Options include 90/10 Cu-Ni and bronze materials for sea water service.



**A Series (Bulletin 7.04)**  
All brass and copper construction heat exchangers for fluid to fluid applications which require non-ferrous construction. All standard models are stocked for fast delivery. Liquid flows to 280 GPM, heat removal to 450 HP. Options include 90/10 Cu-Ni and bronze materials for sea water service.



**C/SSC Series (Bulletin 8.05)**  
C Series units are available at low cost with steel shell and copper tube construction (for application where the shellside fluid is compatible with steel). Options include type 316 stainless steel and 90/10 Cu-Ni components. SSC Series units are all type 316 stainless steel to suit a wide range of corrosive and process applications. Both series accommodate liquid flows to 250 GPM, heat removal to 450 HP.



**BPS Series (Bulletin 43.00)**  
Brazed plate oil coolers. Type 304 stainless steel plates are brazed together for very efficient, corrosion resistant applications. Provides high heat transfer at low flow rates. Internal SAE O ring oil connections, internal NPT water connections standard.



**RM Series (Bulletin 24.02)**  
Use air flow provided by the prime mover TEF motor by mounting this unit behind its motor fan. 7 models to serve case drain and full return line flows. Inner turbulators provide maximum cooling. Flows to 30 GPM, heat removal to 3.5 HP. Optional relief bypass checkvalves.



**AOC Series (Bulletin 13.02)**  
World-class design air to oil heat exchangers. Dual frequency 50/60 Hz motors standard. Metric connections and hardware available. Large units have two fans for reduced noise levels. Inner turbulators provide maximum cooling. Our most cost-effective air cooled heat exchanger for oil cooling applications. Flows to 150 GPM, heat removal of 80 HP. Options include hydraulic, 12 or 24 volt motors, built-in bypass valve.



**AO Series (Bulletin 15.02)**  
**AOVH Series (Bulletin 18.01)**  
Premium-grade, electric motor driven fan, air to oil heat exchangers. 16 models with oil flows to 200 GPM, heat removal to 80 HP. Options include special mounting brackets, a wide range of special NEMA frame motors, and built-in relief bypass valve.



**AOF Series (Bulletin 17.02)**  
Premium-grade, electric fan driven air to oil heat exchanger with air side filter. Replaceable air filter reduces maintenance. 8 models with oil flows to 100 GPM, heat removal to 35 HP. Options include mounting brackets, cleanable air filters, a wide range of special NEMA frame motors, and built-in relief bypass valve.



**AOHM Series (Bulletin 19.04)**  
**AOVHM Series**  
Premium-grade, hydraulic motor driven fan, air to oil heat exchangers. 16 models with oil flows to 200 GPM, heat removal to 80 HP. Options include special mounting brackets and built-in relief bypass valve.



**AOL Series (Bulletin 16.01)**  
Large capacity, all aluminum electric fan driven, air to oil heat exchangers. Unique all aluminum core design provides maximum cooling capacity in small envelope size. 9 sizes with oil flows to 300 GPM, heat removal to 250 HP. Options include special NEMA frame motors, and hydraulic motors.



**M Series (Bulletin 25.04)**  
**MR Series**  
Rugged design air cooled mobile oil coolers bypass protected for cold start-up on MR Series. 8 standard sizes with oil flows to 100 GPM, heat removal to 200,000 BTU/Hr. Mounting brackets included.



**MF Series (Bulletin 35.05)**  
Mobile oil cooler with 12, 24 volt, or hydraulic drive cooling fan(s). Three models, one and two fan designs. Rugged steel manifolds. Oil flows to 150 GPM, heat removal to 80,000 BTU/Hr. Mounting brackets included.



### Thermostatic Oil Bypass Valves

**Three-way Thermostatic Valves (Form 261)**  
Bypass cold oil on start-up. 5 cast iron body sizes with temperature ranges of 75° to 210°F.



**Thermal Bypass Assembly (Form 208)**  
Combination thermal/pressure bypass. One size. Aluminum body with shift temperatures from 100° to 160°F.



### Electronic Fan Temperature Controls

**AC Fan Control (Form 161)**  
Cycle electric fan motor to provide accurate temperature control. One model with 100° - 220°F range.



**DC Fan Control (Form 377)**  
Cycle 12 or 24 volt fans to maintain desired oil temperature. One size with 100° - 210°F range. Includes manual override and mounting bracket to mount to MF Series.



### Water Cooled Heat Exchanger Accessories

**Modulating Water Valves (Form 121)**  
Temperature sensitive valves for automatically controlling water flow to water cooled heat exchangers. Ten sizes. 1/2" NPT through 1-1/4" NPT. 1-1/2" & 2" valves available with ASME Flanges. Two operating temperature ranges: 75°F (24°C) to 135°F (57°C) and 115°F (46°C) to 180°F (82°C).



**Strainers (Form 143)**  
Water strainers to filter out contaminants that might otherwise cause the malfunction of the modulating water valve. Brass models 3/8" through 2" NPT.

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