American Industrial Heat Transfer Inc.®

Manufacturer of Quality Heat Exchangers

CS - STC - CK SERIES

SINGLE PASS *TWO PASS* *FOUR PASS*

MADE IN USA

Fixed Tube Bundle / Water Cooled

Visit our Web Site at www.aihti.com

HEAT EXCHANGERS

- Operating pressure for tubes 150 PSI.
- Operating pressure for shell 300 PSI.
- Operating temperature 300 °F.
- Cools: Fluid power systems, rock crushers, presses, shears, lubrication equipment for paper machinery, gear drives, marine transmissions, etc.
- Can be customized to fit your needs.
- This brochure contains important user information such as: installation, serviceability, and terms & conditions.

CS,STC & CK-2001 supersedes CS,STC & CK-2000 and all previous printings.
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INTRODUCTION

CS SERIES

Rugged steel offers durable performance at low cost. Constructed of carbon steel & tube-sheets with copper tubing and cast iron bonnets. Unit offers a wide range of cooling at a low cost. Models are rated 300psi shell, 150psi tubes at 300°F shipped complete with mounting brackets.

STC SERIES

All 316L Stainless Steel construction provides durability and chemical resistance. Welded construction, all 316L Stainless Steel design, offered in several dimensionally interchangeable sizes. Optional Viton, Teflon, Buna-N, & Silicone seals available. Operating pressure 300psi shell and 200psi tubes at 400°F.

CK SERIES

Offered as a dimensional and thermal replacement to many extended type heat exchangers. Used for field replacements or in low budget applications. Models are rated 500psi: shell, 150psi: tube; at 300°F.

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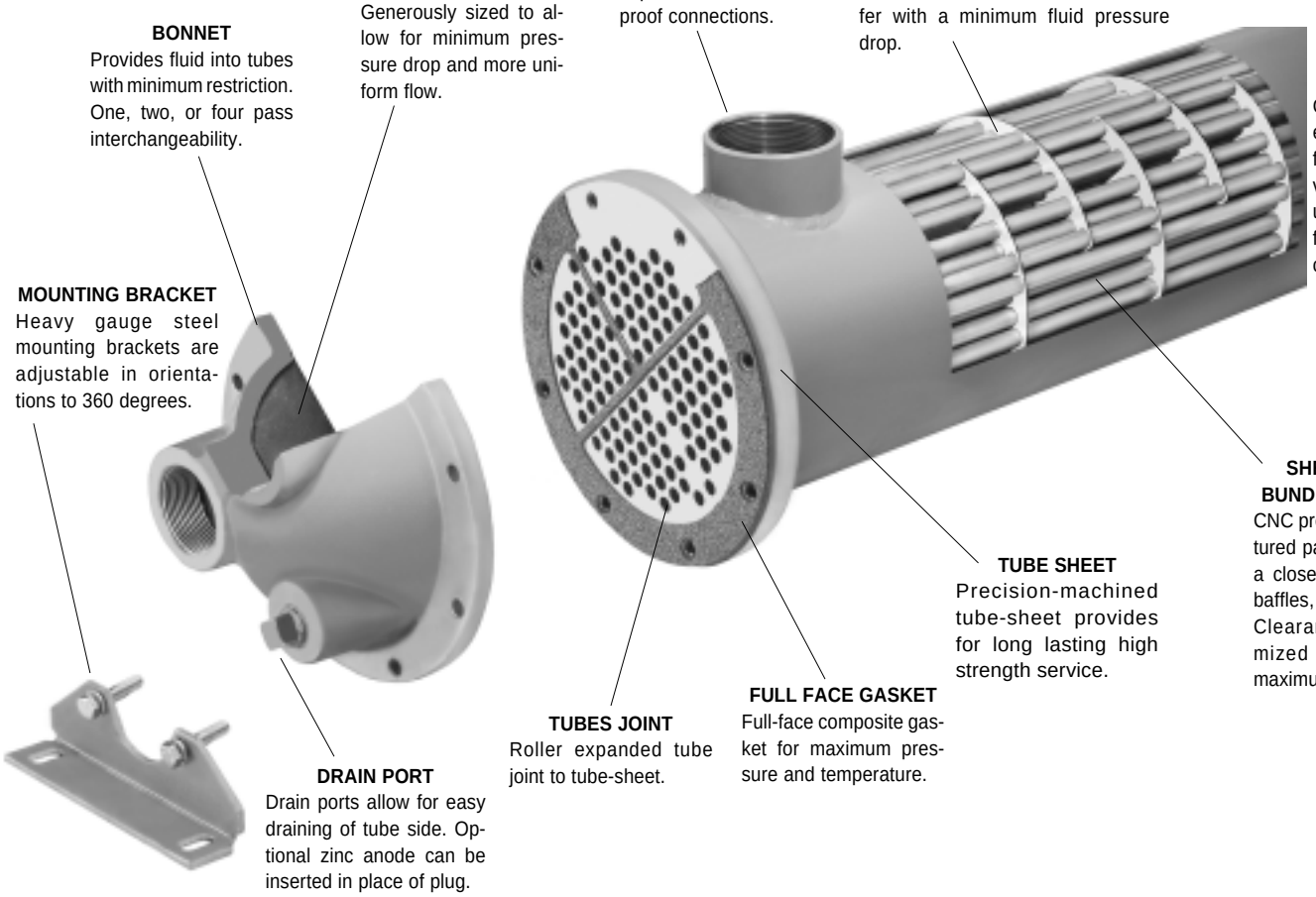
CONSTRUCTION FEATURES



BONNET
Provides fluid into tubes with minimum restriction. One, two, or four pass interchangeability.

FLOW CAVITY
Generously sized to allow for minimum pressure drop and more uniform flow.

THREAD
CNC precision threading to provide accurate leak-proof connections.

BAFFLES
CNC manufactured baffles to provide maximum turbulence and heat transfer with a minimum fluid pressure drop.

FINISH
Gray semigloss enamel suitable for outdoor service. Can be used as a base for additional coats.

MOUNTING BRACKET
Heavy gauge steel mounting brackets are adjustable in orientations to 360 degrees.

SHELL & TUBE BUNDLE ASSEMBLY
CNC precision manufactured parts to guarantee a close fit between the baffles, tubes, and shell. Clearances are minimized to provide for maximum heat transfer.

TUBE SHEET
Precision-machined tube-sheet provides for long lasting high strength service.

FULL FACE GASKET
Full-face composite gasket for maximum pressure and temperature.

TUBES JOINT
Roller expanded tube joint to tube-sheet.

DRAIN PORT
Drain ports allow for easy draining of tube side. Optional zinc anode can be inserted in place of plug.

UNIT CODING

Example Model

Options

CS - 1224 - 4 - 6 - TP - CNT - B - Z

Model
CS
STC
CK

Shell Diameter
600 = 3.25"
800 = 4.25"
1000 = 5.25"
1200 = 6.25"
1700 = 8.25"

Effective Tube Length
(9" increments)

Baffle Spacing Code
1.5"
2.0"
3.0"
4.0"
6.0"
8.0"

Cooling Tube Diamenter
4 = 1/4"
6 = 3/8"
10 = 5/8"

Tube Side Passes
SP = 1 pass
TP = 2 pass
FP = 4 pass

Tubing
Blank = Standard

Options
CNT= 90/10 Cu Ni
STS = Stainless Steel
C = Carbon Steel

End Bonnets
Blank = Standard

Options
B = Bronze

Zinc Anode

STANDARD CONSTRUCTION MATERIALS & RATINGS

Standard Model	CS Series	STC Series	CK Series	Standard Unit Ratings
Shell	Steel	316 Stainless Steel	Steel	Operating Pressure Tubes 150 psig Operating Pressure Shell 300 psig Operating Temperature 300 °F
Tubes	Copper	316 Stainless Steel	Copper	
Baffle	Steel	316 Stainless Steel	Steel	
Tube Sheet	Steel	316 Stainless Steel	Steel	
End Bonnets	Cast Iron	316 Stainless Steel	Cast Iron	
Mounting Brackets	Steel	Steel	Steel	
Gasket	Hypalon Composite	Hypalon Composite	Hypalon Composite	

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ENGINEERING SELECTION

STEP 1: Calculate the heat load

The heat load in BTU/HR or (Q) can be derived by using several methods. To simplify things, we will consider general specifications for hydraulic system oils and other fluids that are commonly used with shell & tube heat exchangers.

Terms

GPM = Gallons Per Minute
CN = Constant Number for a given fluid
ΔT = Temperature differential across the potential
PSI = Pounds per Square Inch (pressure) of the operating side of the system
MHP = Horsepower of the electric motor driving the hydraulic pump
Kw = Kilowatt (watts x 1000)
T_{in} = Hot fluid entering temperature in °F
T_{out} = Hot fluid exiting temperature in °F
t_{in} = Cold fluid temperature entering in °F
t_{out} = Cold fluid temperature exiting in °F
Q = BTU / HR

For example purposes, a hydraulic system has a 125 HP (93Kw) electric motor installed coupled to a pump that produces a flow of 80 GPM @ 2500 PSIG. The temperature differential of the oil entering the pump *vs* exiting the system is about 5.3°F. Even though our return line pressure operates below 100 psi, we must calculate the system heat load potential (Q) based upon the prime movers (pump) capability. We can use one of the following equations to accomplish this:

To derive the required heat load (Q) to be removed by the heat exchanger, apply ONE of the following. Note: The calculated heat loads may differ slightly from one formula to the next. This is due to assumptions made when estimating heat removal requirements. The factor *(v)* represents the percentage of the overall input energy to be rejected by the heat exchanger. The *(v)* factor is generally about 30% for most hydraulic systems, however it can range from 20%-70% depending upon the installed system components and heat being generated (ie. servo valves, proportional valves, etc…will increase the percentage required).

Formula	Example
A) Q = GPM x CN x actual ΔT	A) Q =80 x 210 x 5.3°F = 89,040 BTU/HR
B) Q = [(PSI x GPM) / 1714] x (*v*) x 2545	B) Q =[(2500x80)/1714] x .30 x 2545 = 89,090 BTU/HR
C) Q = MHP x (*v*) x 2545	C) Q =125 x .30 x 2545 = 95,347 BTU/HR
D) Q = Kw to be removed x 3415	D) Q =28 x 3415 = 95,620 BTU/HR
E) Q = HP to be removed x 2545	E) Q =37.5 x 2545 = 95,437 BTU/HR

Constant for a given fluid (CN)

1) Oil ..... CN = 210
2) Water ..... CN = 500
3) 50% E. Glycol ..... CN = 450

STEP 2: Calculate the Mean Temperature Difference

When calculating the MTD you will be required to choose a liquid flow rate to derive the cold side ΔT. If your water flow is unknown you may need to assume a number based on what is available. As a normal rule of thumb, for oil to water cooling a 2:1 oil to water ratio is used. For applications of water to water or 50 % Ethylene Glycol to water, a 1:1 ratio is common.

Formula

HOT FLUID ΔT (Oil) $= \dfrac{Q}{CN \times GPM}$

COLD FLUID Δt (Water) $= \dfrac{BTU / hr}{CN \times GPM}$

Example

$\Delta T = \dfrac{89{,}090\ BTU/hr}{210\ CN \times 80GPM}$ (from step 1,item B) = 5.3°F = ΔT Rejected

$\Delta t = \dfrac{89{,}090\ BTU/hr}{500\ CN \times 40GPM}$ (for a 2:1 ratio) = 4.45°F = ΔT Absorbed

T_{in} = Hot Fluid entering temperature in degrees F
T_{out} = Hot Fluid exiting temperature in degrees F
t_{in} = Cold Fluid entering temperature in degrees F
t_{out} = Cold Fluid exiting temperature in degrees F

T_{in} = 125.3 °F
T_{out} = 120.0 °F
t_{in} = 70.0 °F
t_{out} = 74.5 °F

$$\frac{T_{out} - t_{in}}{T_{in} - t_{out}} = \frac{S\text{[smaller temperature difference]}}{L\text{ [larger temperature difference]}} = \left(\frac{S}{L}\right)$$

$$\frac{120.0°F - 70.0°F = 50.0°F}{125.3°F - 74.5°F = 50.8°F} = \frac{50.0°F}{50.8°F} = .984$$

STEP 3: Calculate Log Mean Temperature Difference (LMTD)

To calculate the LMTD please use the following method;

L = Larger temperature difference from step 2.
M = S/L number (LOCATED IN TABLE A).

$LMTD_i$ = L x M

$LMTD_i$ = 50.8 x .992 (FROM TABLE A) = 50.39

To correct the $LMTD_i$ for a multipass heat exchangers calculate **R** & **K** as follows:

Formula

$$R = \frac{T_{in} - T_{out}}{t_{out} - t_{in}}$$

$$K = \frac{t_{out} - t_{in}}{T_{in} - t_{in}}$$

Example

$R = \dfrac{125.3°F - 120°F}{74.5°F - 70°F} = \dfrac{5.3°F}{4.5°F} =$ **{1.17=R}**

$K = \dfrac{74.5°F - 70°F}{124.5°F - 70°F} = \dfrac{4.5°F}{55.4°F} =$ **{0.081=K}**

Locate the correction factor CF_B (FROM TABLE B)
$LMTD_c = LMTD_i \times CF_B$
$LMTD_c$ = 50.39 x 1 = **50.39**

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STEP 4: Calculate the area required

Required Area sq.ft. = $\dfrac{\text{Q (BTU / HR)}}{\text{LMTD}_c \text{ x U (FROM TABLE C)}}$ $\dfrac{89{,}090}{50.39 \text{ x } 100}$ = **17.68 sq.ft.**

STEP 5: Selection

a) From TABLE E choose the correct series size, baffle spacing, and number of passes that best fits your flow rates for both shell and tube side. Note that the tables suggest minimum and maximum information. Try to stay within the 20-80 percent range of the indicated numbers.

Example

Oil Flow Rate = 80 GPM = Series Required from Table E = **1200 Series**
Baffle Spacing from Table E = **4**
Water Flow Rate = 40 GPM = Passes required in 1200 series = **4 (FP)**

b) From TABLE D choose the heat exchanger model size based upon the sq.ft. or surface area in the series size that will accommodate your flow rate.

Example

Required Area = 17.68sq.ft Closest model required based upon sq.ft. & series = **CS - 1224 - 4 - 6 - FP**

If you require a computer generated data sheet for the application, or if the information that you are trying to apply does not match the corresponding information, please contact our engineering services department for further assistance.

TABLE A- FACTOR M/LMTD = L x M

S/L	M	S/L	M	S/L	M	S/L	M
		.25	.541	.50	.721	.75	.870
.01	.215	.26	.549	.51	.728	.76	.864
.02	.251	.27	.558	.52	.734	.77	.879
.03	.277	.28	.566	.53	.740	.78	.886
.04	.298	.29	.574	.54	.746	.79	.890
.05	.317	.30	.582	.55	.753	.80	.896
.06	.334	.31	.589	.56	.759	.81	.902
.07	.350	.32	.597	.57	.765	.82	.907
.08	.364	.33	.604	.58	.771	.83	.913
.09	.378	.34	.612	.59	.777	.84	.918
.10	.391	.35	.619	.60	.783	.85	.923
.11	.403	.36	.626	.61	.789	.86	.928
.12	.415	.37	.634	.62	.795	.87	.934
.13	.427	.38	.641	.63	.801	.88	.939
.14	.438	.39	.648	.64	.806	.89	.944
.15	.448	.40	.655	.65	.813	.90	.949
.16	.458	.41	.662	.66	.818	.91	.955
.17	.469	.42	.669	.67	.823	.92	.959
.18	.478	.43	.675	.68	.829	.93	.964
.19	.488	.44	.682	.69	.836	.94	.970
.20	.497	.45	.689	.70	.840	.95	.975
.21	.506	.46	.695	.71	.848	.96	.979
.22	.515	.47	.702	.72	.852	.97	.986
.23	.524	.48	.709	.73	.658	.98	.991
.24	.533	.49	.715	.74	.864	.99	.995

TABLE B- LMTD correction factor for Multipass Exchangers

R

	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.6	.7	.8	.9	1.0
.2	1	1	1	1	1	1	1	.999	.993	.984	.972	.942	.908	.845	.71
.4	1	1	1	1	1	1	.994	.983	.971	.959	.922	.855	.70		
.6	1	1	1	1	1	.992	.980	.965	.948	.923	.840				
.8	1	1	1	1	.995	.981	.965	.945	.916	.872					
1.0	1	1	1	1	.988	.970	.949	.918	.867	.770					
2.0	1	1	.997	.973	.940	.845	.740								
3.0	1	1	.997	.933	.835										
4.0	1	.993	.950	.850											
5.0	1	.982	.917												
6.0	1	.968	.855												
8.0	1	.930													
10.0	.996	.880													
12.0	.985	.720													
14.0	.972														
16.0	.958														
18.0	.940														
20.0	.915														

K

TABLE D- Surface Area

Model Number	Surface Area in Sq.ft. 1 / 4" O.D Tubing Code 4	3 / 8" O.D Tubing Code 6	5 / 8 O.D Tubing Code 10	Model Number	Surface Area in Sq.ft. 1 / 4" O.D Tubing Code 4	3 / 8" O.D Tubing Code 6	5 / 8 O.D Tubing Code 10
CS-614	4.6	–	–	CS-1236	–	35.3	17.7
CS-624	7.9	–	–	CS-1248	–	47.1	23.6
CS-636		–	–	CS-1260	–	58.9	29.5
				CS-1272	–	70.6	35.4
CS-814	8.3	–	–	CS-1284	–	82.3	41.3
CS-824	14.1	–	–	CS-1296	–	94.0	47.2
CS-836	21.2	–	–				
CS-848	28.3	–	–	CS-1724	–	40.1	23.6
				CS-1736	–	60.1	35.3
CS-1014	–	8.7	4.6	CS-1748	–	80.1	47.1
CS-1024	–	14.9	7.8	CS-1760	–	100.1	58.9
CS-1036	–	22.4	11.8	CS-1772	–	120.2	70.7
CS-1048	–	29.9	15.8	CS-1784	–	140.2	82.5
CS-1060	–	37.4	19.8	CS-1796	–	160.2	94.3
				CS-17108	–	180.2	106.1
CS-1224	–	23.6	11.8	CS-17120	–	200.2	117.9

TABLE E- Flow Rate for Shell & Tube

Shell dia . Code	Max. Liquid Flow - Shell Side Baffle Spacing 1.5	2	3	4	6	Liquid Flow - Tube Side SP Min.	SP Max.	TP Min.	TP Max.	FP Min.	FP Max.
600	15	20	25	30	–	7.5	48	3.5	24	2	12
800	20	34	45	60	–	10	50	4.5	38	3	21
1000	30	36	50	65	–	20	120	10	70	5.0	37
1200	45	50	70	100	125	30	220	15	112	7.5	56
1700	50	65	100	140	220	57	300	29	180	14	90

TABLE C

U	TUBE FLUID	SHELL FLUID
400	Water	Water
350	Water	50% E. Glycol
100	Water	Oil
300	50% E. Glycol	50% E. Glycol
90	50% E. Glycol	Oil

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PERFORMANCE

Instructions

The selection chart provided contains an array of popular sizes for quick sizing. It does not provide curves for all models available. Refer to page 4 & 5 for detailed calculation information.

Computer selection data sheets for standard or special models are available through the engineering department of American Industrial. To use the followings graphs correctly, refer to the instruction notes "1-5".

1) HP Curves are based upon a 40°F approach temperature; for example: oil leaving a cooler at 125°F, using 85°F cooling water (125°F – 85°F = 40°F).

2) The oil to water ratio of 1:1 or 2:1 means that for every 1 gallon of oil circulated, a minimum of 1 or 1/2 gallon (respectively) of 85°F water must be circulated to match the curve results.

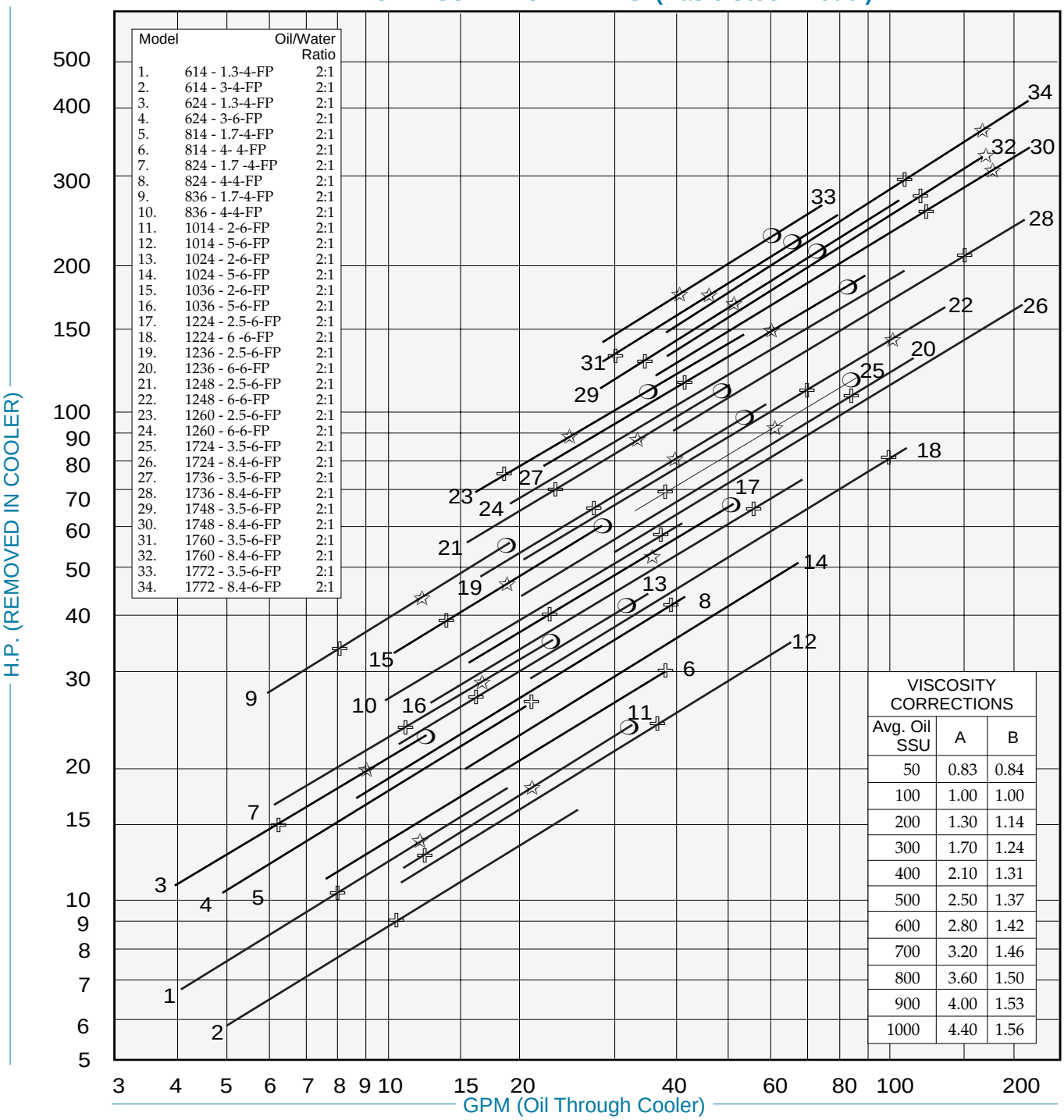
3) OIL PRESSURE DROP CODING: ✙ = 5 psi; ☆= 10 psi; ❍ = 20 psi; Δ= 50psi. Curves that have no pressure drop code symbols indicate that the oil pressure drop is less than 5 psi for the flow rate shown.

4) Pressure Drop is based upon oil with an average viscosity of 100 SSU. If the average oil viscosity is other than 100 SSU, then multiply the indicated Pressure Drop by the corresponding value from corrections table A.

5) Corrections for approach temperature and oil viscosity are as follows:

$$H.P._{(\text{Removed In Cooler})} = H.P._{(\text{Actual Heat Load})} \times \left(\frac{40}{\text{Actual Approach}}\right) \times B.$$

HEAT ENERGY DISSIPATION RATES (Basic Stock Model)



Model		Oil/Water Ratio
1.	614 - 1.3-4-FP	2:1
2.	614 - 3-4-FP	2:1
3.	624 - 1.3-4-FP	2:1
4.	624 - 3-6-FP	2:1
5.	814 - 1.7-4-FP	2:1
6.	814 - 4- 4-FP	2:1
7.	824 - 1.7 -4-FP	2:1
8.	824 - 4-4-FP	2:1
9.	836 - 1.7-4-FP	2:1
10.	836 - 4-4-FP	2:1
11.	1014 - 2-6-FP	2:1
12.	1014 - 5-6-FP	2:1
13.	1024 - 2-6-FP	2:1
14.	1024 - 5-6-FP	2:1
15.	1036 - 2-6-FP	2:1
16.	1036 - 5-6-FP	2:1
17.	1224 - 2.5-6-FP	2:1
18.	1224 - 6 -6-FP	2:1
19.	1236 - 2.5-6-FP	2:1
20.	1236 - 6-6-FP	2:1
21.	1248 - 2.5-6-FP	2:1
22.	1248 - 6-6-FP	2:1
23.	1260 - 2.5-6-FP	2:1
24.	1260 - 6-6-FP	2:1
25.	1724 - 3.5-6-FP	2:1
26.	1724 - 8.4-6-FP	2:1
27.	1736 - 3.5-6-FP	2:1
28.	1736 - 8.4-6-FP	2:1
29.	1748 - 3.5-6-FP	2:1
30.	1748 - 8.4-6-FP	2:1
31.	1760 - 3.5-6-FP	2:1
32.	1760 - 8.4-6-FP	2:1
33.	1772 - 3.5-6-FP	2:1
34.	1772 - 8.4-6-FP	2:1

VISCOSITY CORRECTIONS		
Avg. Oil SSU	A	B
50	0.83	0.84
100	1.00	1.00
200	1.30	1.14
300	1.70	1.24
400	2.10	1.31
500	2.50	1.37
600	2.80	1.42
700	3.20	1.46
800	3.60	1.50
900	4.00	1.53
1000	4.40	1.56

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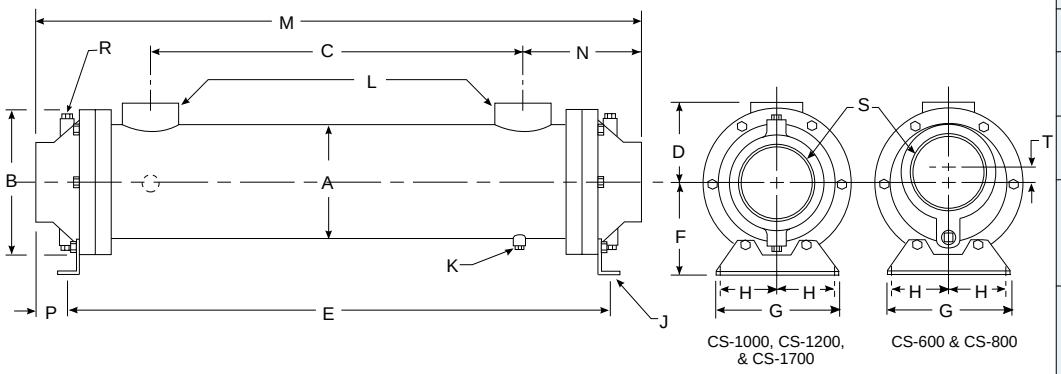
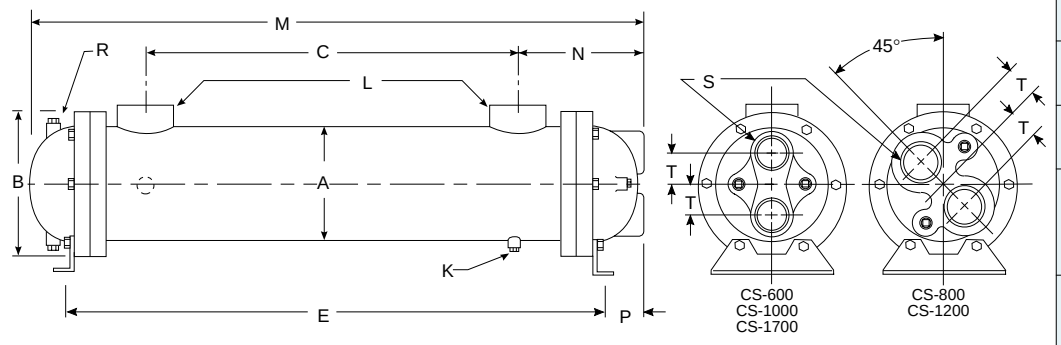


CS-1000, CS-1200, & CS-1700

CS-600 & CS-800

SINGLE PASS (SP)

Model	M	N	P	R NPT	S NPT	T
614	17.18	3.59	.40	(2) .38	1.50	.38
624	27.18					
814	17.88	4.44	.63	(2) .38	2.00	.50
824	27.88					
836	39.88					
1014	19.09	5.05	.92	(4) .38	2.00	-
1024	29.09					
1036	41.09					
1224	30.00	5.88	1.43	(4) .50	3.00	-
1236	42.00					
1248	54.00					
1260	66.00					
1272	78.00					
1724	31.47	7.23	1.99	(4) .50	4.00	-
1736	43.47					
1748	55.47					
1760	67.47					
1772	79.47					
1784	91.47					

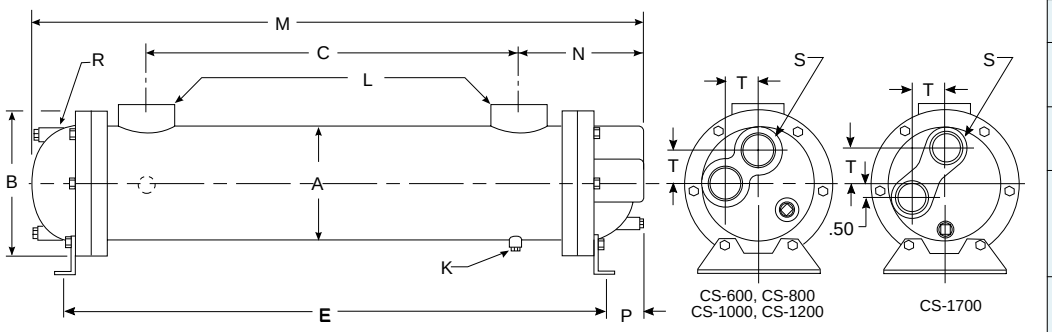


CS-600
CS-1000
CS-1700

CS-800
CS-1200

TWO PASS (TP)

Model	M	N	P	R NPT	S NPT	T
614	17.12	3.56	.38	(2) .38	1.00	1.00
624	27.12					
814	17.88	4.44	.63	(2) .38	1.25	1.06
824	27.88					
836	39.88					
1014	18.62	5.00	.94	(2) .38	1.50	1.19
1024	28.62					
1036	40.62					
1224	29.03	5.44	1.00	(2) .50	2.00	1.44
1236	41.03					
1248	53.03					
1260	65.03					
1272	77.03					
1724	30.62	7.06	1.81	(2) .50	2.50	1.88
1736	42.62					
1748	54.62					
1760	66.62					
1772	78.62					
1784	90.62					



CS-600, CS-800
CS-1000, CS-1200

CS-1700

FOUR PASS (FP)

Model	M	N	P	R NPT	S NPT	T
614	17.12	3.56	.38	(2) .38	.75	1.00
624	27.12					
814	17.88	4.44	.63	(3) .38	.75	1.25
824	27.88					
836	39.88					
1014	18.81	4.81	.75	(3) .38	1.00	1.69
1024	28.81					
1036	40.81					
1224	29.13	5.44	1.00	(3) .38	1.50	2.00
1236	41.13					
1248	53.13					
1260	65.13					
1272	77.13					
1724	29.86	7.06	1.81	(3) .50	2.00	2.50
1736	41.86					
1748	53.86					
1760	65.86					
1772	77.86					
1784	89.86					

COMMON DIMENSIONS & WEIGHTS

Model	A	B	C	D	E	F	G	H	J	K NPT	L NPT	L SAE	WEIGHT	Model
614	3.25	4.50	10.00	2.31	16.38	2.75	4.18	1.62	.38ϕ x 0.88	(2) .25	1.00	#16 1 5/16 -12	17	614
624			20.00		26.38								24	624
814	4.25	6.00	9.00	3.12	16.62	3.50	4.25	1.75	.44ϕ x 1.00	(2) .25	1.50	#24 1 7/8 -12	32	814
824			19.00		26.62								41	824
836			31.00		38.62								53	836
1014	5.25	6.75	9.00	3.62	17.12	4.00	5.25	2.00	.44ϕ x 1.00	(2) .25	1.50	#24 1 7/8 -12	43	1014
1024			19.00		27.12								57	1024
1036			31.00		39.12								72	1036
1224	6.25	7.75	18.25	4.16	27.13	4.50	6.25	2.50	.44ϕ x 1.00	(2) .38	2.00	#32 2 1/2 -12	85	1224
1236			30.25		39.13								110	1236
1248			42.25		51.13								135	1248
1260			54.25		63.13								160	1260
1272			66.25		75.13								185	1272
1724	8.25	10.12	17.00	5.62	27.50	5.75	8.25	3.50	.44ϕ x 1.00	(2) .38	3.00	3.0" Four bolt Flange	140	1724
1736			29.00		39.50								180	1736
1748			41.00		51.50								220	1748
1760			53.00		63.50								260	1760
1772			65.00		75.50								300	1772
1784			77.00		87.50								340	1784

NOTES: We reserve the right to make reasonable design changes without notice.

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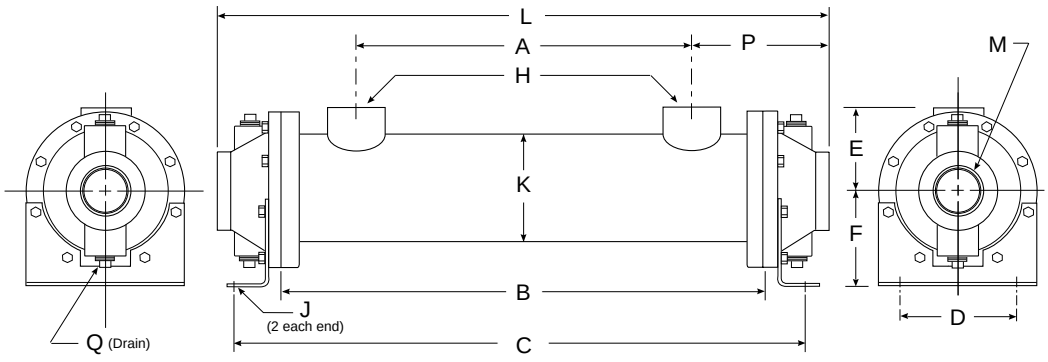
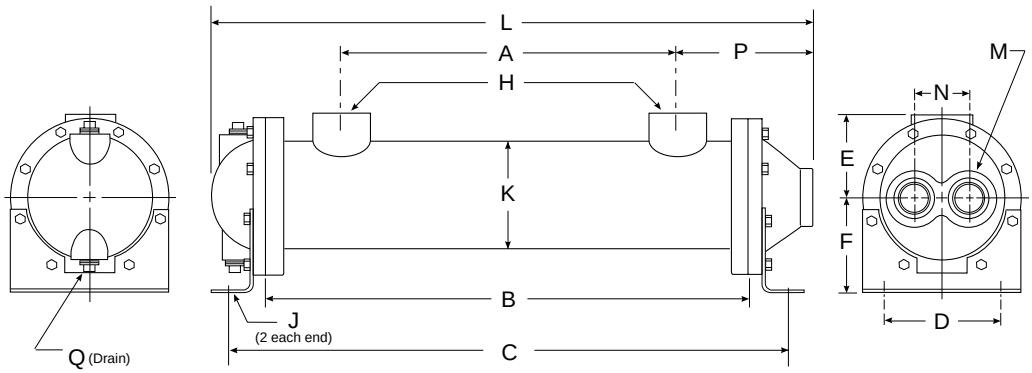


Model	L	M NPT	P	S NPT
CK-505	7.44	.75	3.35	---
CK-508	10.44			
CK-510	12.44			
CK-512	14.44			
CK-514	16.44			
CK-518	20.44			
CK-524	26.44			
CK-536	38.56			
CK-708	12.57	1.25	4.78	(2) .38
CK-712	16.57			
CK-714	18.57			
CK-718	22.57			
CK-724	28.57			
CK-736	40.57			
CK-1012	17.02	2.00	5.17	(2) .38
CK-1014	19.02			
CK-1018	23.02			
CK-1024	29.03			
CK-1036	41.02			
CK-1048	53.02			

SINGLE PASS (SP)



Model	L	M NPT	N	P	Q NPT
CK-708	12.44	1.00	1.76	4.85	(2) .38
CK-714	16.44				
CK-718	18.44				
CK-724	22.44				
CK-736	40.44				
CK-1012	16.71	1.50	2.38	5.17	(2) .38
CK-1014	18.71				
CK-1018	22.71				
CK-1024	28.71				
CK-1036	40.71				
CK-1048	52.71				

TWO PASS (TP)

COMMON DIMENSIONS & WEIGHTS

Model	A	B	C	D	E	F	H NPT	H SAE	J	K	WEIGHT	Model
CK-505	2.19	5.19	7.44	2.50	2.28	1.62	.75	#12 1 1/16 -12	.34ϕ x .62	2.55	7.00	CK-505
CK-508	3.85	8.19	10.44								7.50	CK-508
CK-510	5.85	10.19	12.44								8.00	CK-510
CK-512	7.85	12.19	14.44								8.50	CK-512
CK-514	9.85	14.19	16.44								9.00	CK-514
CK-518	13.85	18.19	20.44								9.50	CK-518
CK-524	19.85	24.19	26.44								10.50	CK-524
CK-536	31.85	36.19	38.44								11.50	CK-536
CK-708	3.00	8.19	10.71	3.00	2.84	2.69	1.50	#24 1 7/8 -12	.44ϕ x .75	3.75	15.00	CK-708
CK-712	7.00	12.19	14.71								17.50	CK-712
CK-714	9.00	14.19	16.71								18.50	CK-714
CK-718	13.00	18.19	20.71								20.00	CK-718
CK-724	19.00	24.19	26.71								22.00	CK-724
CK-736	31.00	36.19	38.71								24.50	CK-736
CK-1012	6.18	12.02	15.45	4.00	3.62	4.00	2.00	#32 2 1/2 -12	.44ϕ x 1.00	5.25	38.00	CK-1012
CK-1014	8.18	14.02	17.45								40.00	CK-1014
CK-1018	12.18	18.02	21.45								44.50	CK-1018
CK-1024	18.18	24.02	27.45								51.00	CK-1024
CK-1036	30.18	36.02	39.45								57.00	CK-1036
CK-1048	42.18	48.02	51.45								64.00	CK-1048

NOTE: We reserve the right to make reasonable design changes without notice.

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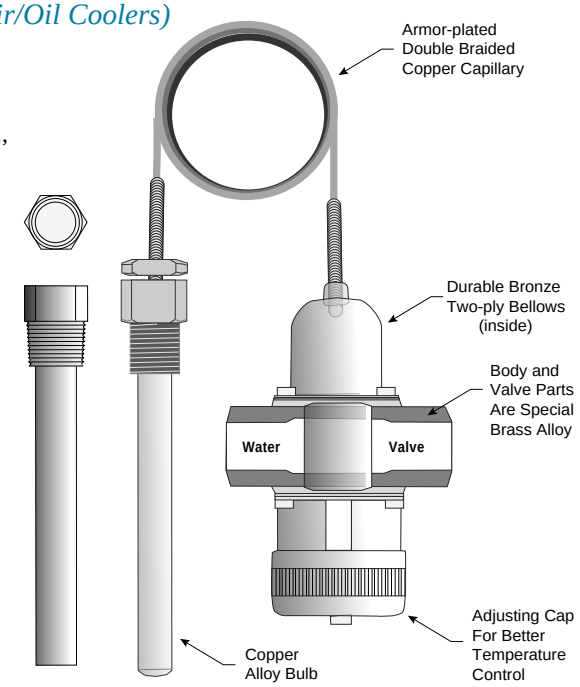
56T THERMOSTATIC MODULATING WATER VALVE WITH BULB WELL ASSEMBLY

(for Shell & Tube Heat Exchangers And Air/Oil Coolers)

SPECIFICATIONS

Sizes	0.375", 0.50", 0.75", 1.00", 1.25" FPT
Fluid Pressure	125psi (max.)
Standard Temperature	40° - 100° F., 60° - 140° F., 100° - 175° F., 125° - 200° F., 140° - 240° F., 200° - 275°F.
Body	Brass alloy casting
Valve Parts	Brass alloy
Standard Capillary Length	6' & 20' foot
Standard Bulbs	For 3/8" & 1/2" valve sizes: 5/8" x 6 with 3/4" union connections. For 3/4" & 1" valve sizes: 5/8" x 8-1/4" with 3/4" union connections. Stainless steel construction available.
Standard Bulb Mounting	3/4" NPT
Seat Disk	Buna-N-replaceable
Seat Bead	Stainless Steel - replaceable



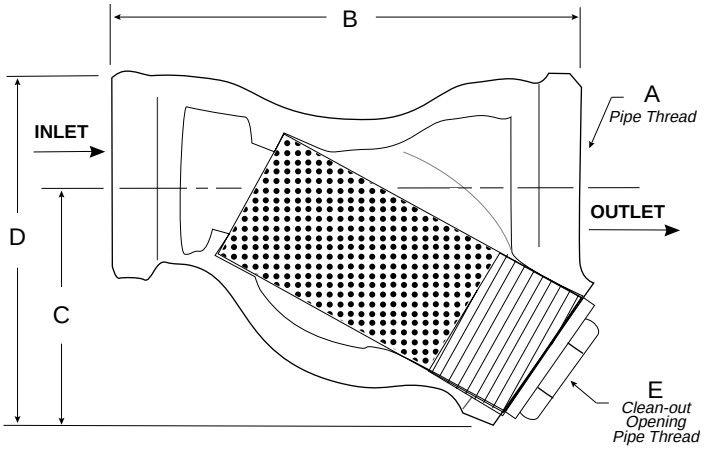
APPLICATION INFORMATION

- Built for rugged machine tool and hydraulic applications.
- Adjustable temperature range to meet your requirements.
- Quick response to temperature changes.
- Extra heavy-duty direct acting bellows for longer service.

Note: Please consult factory if a non-cataloged temperature is required.

The type 56-T valve gives smooth regulation of water and other fluids. It's designed for the most rugged application. For example: hydraulic power packaging equipment, hydraulic presses, plastic molding equipment, and anywhere reliability in temperature control is demanded. The type 56-t valve is a better designed product that won't leak or chatter. To insure dependability, every valve is factory tested three times in different temperature baths. Extra performance can be expected of the bellows also. They are direct acting with sturdy walls, and the inner spring is zinc coated. The seat beads are stainless steel to resist the erosive effects of *wire drawing* and provide longer life for your needs. Additional features include mounting in any position, Buna-N seat disc, and manual flushing.

"Y" STRAINER *(for Shell & Tube Heat Exchangers And Air/Oil Coolers)*



MODEL	SIZE A (NPT)	DIMENSIONS (Inches) B	C	D	E (NPT)	WT. (lbs.)
18 - Y	0.38"	2.50"	2.63"	2.00"	0.25"	0.75
	0.50"	2.50"	2.63"	2.00"	0.25"	0.75
	0.75"	3.50"	3.75"	2.75"	0.50"	1.75
	1.00"	3.50"	3.75"	2.75"	0.50"	1.75
20 - Y	0.50"	4.00"	3.25"	2.50"	0.38"	1.75
	0.75"	4.00"	3.25"	2.50"	0.38"	1.75
	1.00"	4.75"	4.38"	3.38"	0.75"	4.00
	1.25"	6.00"	5.13"	3.88"	0.75"	4.75
	1.50"	6.00"	5.13"	3.88"	0.75"	4.75
	2.00"	8.13"	6.38"	4.63"	0.75"	13.00
PRESSURE RATINGS, ALL MODELS: 125lbs. per Sq.In.						

APPLICATIONS & SPECS. ("Y" Strainers)

These strainers are engineered for water or steam, and are adaptable for many other uses. Cleaning is accomplished by simply removing a pipe plug without disconnecting any piping. Or, if it is desirable to clean without interrupting service, a blow-off valve can be connected to the clean-out opening. ***Note:*** Pumps, control valves, traps, or other equipment controlling the flow of liquids or gases require proper protection with strainers for trouble free operation.

18 - Y BRASS STRAINERS

The 18 - Y strainer body is a sturdy red brass casting. Standard units have 50 mesh brass wire screens. Brazing connections are available on special order instead of pipe threads.

20 - Y STRAINERS

The 20 - Y strainer has a heavy cast iron body with accurately machined pipe thread inlet and outlet (National Pipe Thread N.P.T.). It contains a strainer screen of 0.02" thick brass with 100, 1/16" perforations per inch.

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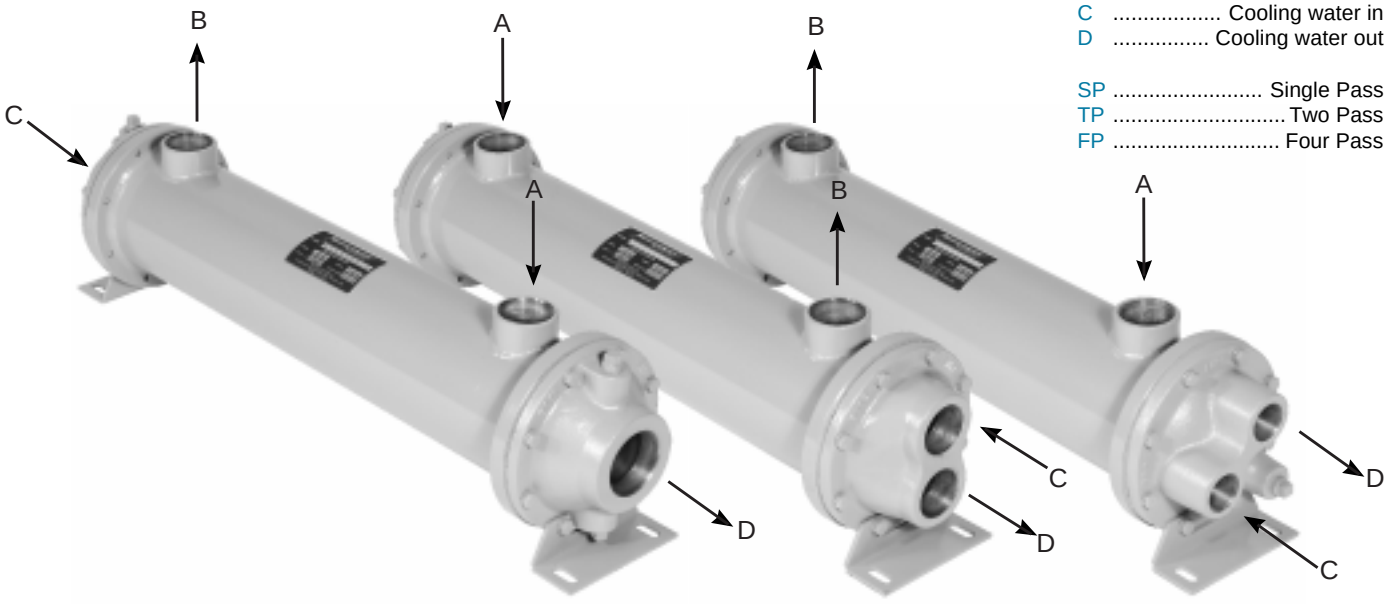
INSTALLATION & MAINTENANCE

PIPING HOOK-UP

A ..... Hot fluid to be cooled
B ..... Cooled fluid
C ..... Cooling water in
D ..... Cooling water out

SP ..... Single Pass
TP ..... Two Pass
FP ..... Four Pass



ONE PASS TWO PASS FOUR PASS

Receiving / Installation

a) Inspect unit for any shipping damage before uncrating. Indicate all damages to the trucking firms' delivery person, and mark it on the receiving bill before accepting the freight. Make sure that there is no visible damage to the outside surface of the heat exchanger. *Since the warranty is based upon the unit date code located on the model identification tags, removal or manipulation of the identification tags will void the manufacturers warranty.*

b) When handling the shell & tube heat exchanger, special care should be taken to avoid dropping the unit since mishandling could cause the heat exchanger to crack and leak externally. Mishandling of the unit is not covered under the manufacturers warranty. All units are shipped with partial wood/corrugated cardboard containers for safe handling.

c) Standard Enamel Coating: American Industrial provides its standard products with a normal base coat of oil base air cure enamel paint. The enamel paint is applied as a temporary protective and esthetic coating prior to shipment. While the standard enamel coating is durable, American Industrial does not warranty it as a long-term finish coating. It is strongly suggested that a more durable final coating be applied after installation or prior to long-term storage in a corrosive environment to cover any accidental scratches, enhance esthetics, and further prevent corrosion. It is the responsibility of the customer to provide regular maintenance against chips, scratches, etc... and regular touch up maintenance must be provided for long-term benefits and corrosion prevention.

d) Special Coatings: American Industrial offers as customer options, Air-Dry Epoxy, and Heresite (Air-Dry Phenolic) coatings at additional cost. American Industrial offers special coatings upon request, however American Industrial does not warrantee coatings to be a permanent solution for any equipment against corrosion. It is the responsibility of the customer to provide regular maintenance against chips, scratches, etc... and regular touch up maintenance must be provided for long-term benefits and corrosion prevention.

e) American Industrial recommends that the equipment supplied should be installed by qualified personnel who have solid understanding of system design, pressure and temperature ratings, and piping assembly. Verify the service conditions of the system prior to applying any shell & tube heat exchanger. If the system pressure or temperature does not fall within the parameters on model rating tag located on the heat exchanger, contact our factory prior to installation or operation.

f) Plan the installation to meet the requirements indicated on the piping installation diagram as illustrated (page 10). It is recommended to put the hot fluid to be cooled through the shell side and the cold fluid through the tube side. The indicated port assembly sequence in the diagram maximizes the performance, and minimizes the possibility of thermal shock. In instances where the fluids are required to be reversed, *hot fluid in the tubes and cold fluid in the shell* the heat exchanger will work with reduced performance.

g) When installing a series EAB heat exchanger (expansion bellow), it is recommended to use a shoulder bolt to allow the heat exchanger to move freely while expanding and contracting due to high differential temperatures.

h) It is recommended to use flexible hose wherever possible to reduce vibration and allow slight movement. However, hoses are not required. Hydraulic carrying lines should be sized to handle the appropriate flow and to meet system pressure drop requirements based upon the systems parameters, and not based upon the

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units supply and return connection size. We recommend that a low cracking pressure direct acting relief valve be installed at the heat exchanger inlet to protect it from pressure spikes by bypassing oil in the event the system experiences a high flow surge. If preventative filtration is used it should be located ahead of the cooler on both shell and tube side to catch any scale or sludge from the system before it enters the cooler. Failure to install filters ahead of the heat exchanger could lead to possible heat exchanger failure due to high pressure if the system filters plug.

i) Standard shell & tube coolers are built with a rolled tube-sheet construction. However, the differential operating temperature between the entering shell side fluid and the entering tube side fluid should not exceed 150°F. If this condition exists, a severe thermal shock could occur leading to product failure and mixing of the fluids. For applications with a differential temperatures of 150°F or more, we recommend using a series with a floating tube-sheet, u-tube, or expansion joint to reduce the potential for the effects of thermal shock.

j) Water requirements vary from location to location. If the source of cooling water is from other than a municipal water supply, it is recommended that a water strainer be installed ahead of the heat exchanger to prevent dirt and debris from entering and clogging the flow passages. If a water modulating valve is used it is recommended to be installed at the inlet to the cooler to regulate the water flow.

k) For steam service, or other related applications, please consult our engineering department for additional information.

Maintenance

a) Inspect the heat exchanger for loosened bolts, connections, rust spots, corrosion, and for internal or external fluid leakage. Any corroded surfaces should be cleaned and recoated with paint.

b) *Shell side:* In many cases with clean hydraulic system oils it will not be necessary to flush the interior of the shell side of the cooler. In circumstances where the quality of hydraulic fluid is in question, the shell side should be disconnected and flushed on a yearly basis with a clean flushing oil/solvent to remove any sludge that has been deposited. For severe cases where the unit is plugged and cannot be flushed clean with solvent, the heat exchanger should be replaced to maintain the proper cooling performance.

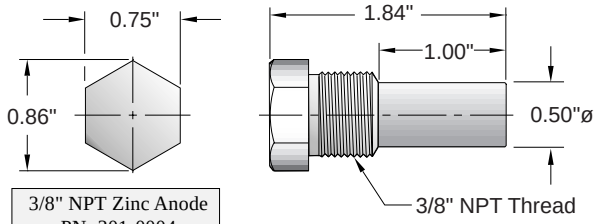
c) *Tube side:* In many cases it will be necessary to clean the tube side of the heat exchanger due to poor fluid quality, debris, calcium deposits, corrosion, mud, sludge, seaweed, etc.... To clean the tube side, flush with clean water or any good quality commercial cleaner that does not attack the particular material of construction. With straight tube heat exchangers you can use a rod to carefully push any debris out of the tubes.

d) Zinc anodes are normally used to reduce the risk of failure due to electrolysis. Zinc anodes are a sacrificial component designed to wear and dissolve through normal use. Normally, zinc anodes are applied to the water supply side of the heat exchanger. Depending upon the amount of corrosive action, one, two, three, or more anodes can be applied to help further reduce the risk of failure. American Industrial Heat Transfer, Inc. offers zinc anodes as an option, to be specified and installed at the request our customers. It is the responsibility of the customer to periodically check and verify the condition of the zinc anode and replace it as needed.

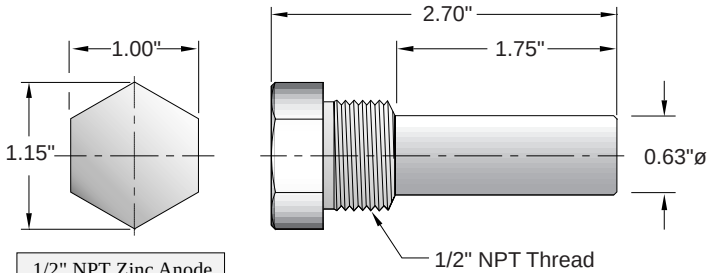
Applications vary due to water chemical makeup and quality, material differences, temperature, flow rate, piping arrangements, and machine grounding. For those reasons, zinc anodes do not follow any scheduled factory predetermined maintenance plan moreover they must be checked routinely by the customer, and a maintenance plan developed based upon the actual wear rate.

If substantial wear occurs or zinc dissolves without replacement, premature failure or permanent damage may occur to the heat exchanger. American Industrial does not warranty customer applications. It is the responsibility of the customer to verify and apply the proper system materials of construction and overall system requirements. Failures resulting from properly applied or misapplied use of zinc anode(s) into non-specified or specified applications will be the sole responsibility of the customer.

e) A routine maintenance schedule should be developed and adjusted to meet your systems requirements based upon water quality, etc….Failure to regularly maintain and clean your heat exchanger can result in a reduction in operational performance and life expectancy.



3/8" NPT Zinc Anode PN: 301-0004
AB-400 thru AB-1000 AA-400 thru AA-1000 CS-600 thru CS-1000



1/2" NPT Zinc Anode PN: 301-0003
AB-1200 thru AB-2000 AA-1200 thru AA-1600 CS-1200 thru CS-1700

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COMPANY PROFILE

American Industrial's state-of-the-art manufacturing facility.

Mission Statement

To manufacture Heat Transfer products by applying state-of-the-art technologies, with the ability to serve a wide variety of industries through professional distribution affiliations throughout North America and abroad.

Since 1985, American Industrial Heat Transfer, Inc. is pleased to offer more than thirty fully manufactured product lines to meet the requirements of most heat transfer needs. American Industrial manufactures all of the heat exchangers as advertised, so that your company is never compromised. Modern state-of-the-art CNC manufacturing machinery, top quality raw materials, and professional engineering services are all offered by American Industrial for the convenience of our customers.

Many innovative liquid and air-cooled heat exchanger designs are offered for a wide variety of mobile and industrial applications. The latest technology data processing, manufacturing, and engineering systems are employed throughout our company.

American Industrial is proud to offer one of the strongest authorized distribution networks in the industry with worldwide coverage. Direct access to professional engineering services, no service charge 24 hour expedite delivery, custom modifications, competitive pricing, etc... are just a few benefits of being an American Industrial customer.

We know that our future relies on the future of our customers. For that reason we have invested in high-technology automation and professional personnel to give us the competitive edge far into the future.

If you would like to know more about our products, please contact your local American Industrial distributor or contact our company. You can see us on the web at www.aihti.com. We appreciate your business and we hope to share with you in your successes.

Our courteous and professional staff is available to provide quality customer service assistance.

A full line of engineering services is available to assist with technical support as well as detailed Auto Cad drawings.

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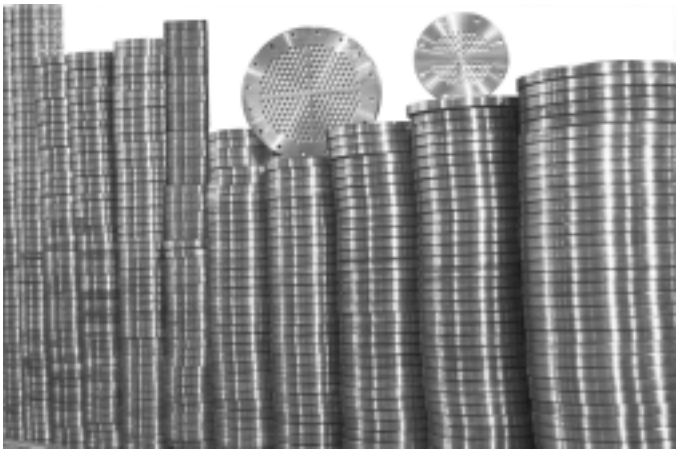
RAW MATERIALS

Standard 3/4" Carbon Steel tube-sheets precision machined to provide for a superior tube-joint with a high corrosion allowance. Tube-sheets are robotically welded to the shell to provide for a leak-free union and consistent joint. Parts are readily available for immediate assembly to ensure 24 hour shipment.



MANUFACTURING

Historically, American Industrial has embraced high technology machinery to manufacture a consistent, reliable, and quality product. Our Computer Numeric Controlled rapid parts production facility is instrumental in reducing cost of components, giving you true quality at a low cost. Special designs or modifications are quickly manufactured in our computerized state-of-the-art manufacturing complex.

STOCK

American Industrial is committed to carrying a variety of standard heat exchangers. Hundreds of shell & tube and air/oil heat exchangers are available from stock ready for immediate shipment. Standard units that are not in stock can be manufactured and shipped within 24 or 48 hours.

SHIPPING

American Industrial has consulted with top freight carriers to determine the best packaging methods to ensure safe undamaged shipments. To further ensure the safe arrival of our products to its destination, we package our products with additional wood crating, skids, and fiberboard. We then apply a final layer of plastic wrap to protect from water and other external problems.

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PARTIAL TERMS & CONDITIONS

Limited Warranty

Seller makes no warranties expressed or implied, including but not by way of limitation, any implied warranty of merchantability and any implied warranty of fitness for a particular purpose, on any order except that seller warrants title to all goods furnished by seller and except that seller warrants for a period of one year from the date mark located on the seller's identification tag that all goods described on seller's acknowledgment of purchaser's purchase order will be manufactured in accordance with the specifications, if any, set forth in said purchase order and expressly accepted in seller's acknowledgment subject to seller's standard manufacturing variations and practices. In the case of components or accessories furnished by suppliers to seller, purchaser's warranty from seller shall be limited to the warranty of the component or accessory supplier. The foregoing warranties are the sole and exclusive warranties applicable to the goods delivered under this order, and all other warranties, express or implied, including without limitation any warranty of merchantability, are hereby expressly disclaimed and negated. Without limiting the generality of the foregoing, purchaser acknowledges that seller's products are not packaged or protected for long periods of storage and thus may corrode or rust over time.

Limitation of Purchaser's Remedies; Exclusive of Damages

Purchaser's remedies with respect to any claim arising out of any order, any goods delivered pursuant to any order and expressly accepted in seller's acknowledgment, or seller's performance in connection with any order, including, without limitation, any claim arising out of any recall, defect or alleged defect in any goods or services furnished by seller, shall be limited exclusively to the right of repair or replacement of such goods or services, at seller's option. Without in any way limiting the generality of the foregoing, in no event shall seller be liable for any consequential or incidental damages, including, without limitation, any loss of anticipated profits incurred by purchaser with respect to any goods or services furnished by seller, or any damages arising from injuries to persons as a result of purchaser's or a third party's negligence. Seller's warranty does not cover failures resulting from the improper installation, mounting design or application or from corrosion. The provisions of this paragraph are a material term of this transaction.

Disputes

Seller and purchaser agree to submit any disputes regarding any order, any goods delivered pursuant to any order and expressly accepted in seller's acknowledgment, or seller's performance in connection with any order, including without limitation seller's limited warranty obligation, to mediation by an independent mediator to be mutually agreed upon by seller and purchaser. The cost of such mediation shall be borne equally by seller and purchaser. In the event such mediation does not resolve their dispute, seller and purchaser agree to submit such dispute to an independent arbitrator, to be mutually agreed upon by seller and purchaser or, otherwise, chosen by the mediator. Seller and purchaser agree that all mediation and arbitration shall be conducted in Zion, Illinois. The non-prevailing party at the arbitration shall pay the prevailing party's attorneys' fees and costs incurred in participating in the arbitration.

Governing Law

Seller and Purchaser's agreement shall be governed by and interpreted in accordance with the laws of the State of Illinois of the United States of America. Manufacture, shipment and delivery are subject to any prohibition, restriction, priority, allocation, regulation or condition imposed by or on behalf of the United States of America or any other governmental body with appropriate jurisdiction which may prevent or interfere with fulfillment of any order.

Permissible Variations

Goods shipped by Seller shall be within the limits and sizes published by Seller, subject, however, to Seller's right to ship overages or underages in accordance with Seller's standard practices and goods shipped by Seller will be subject to standard variations provided such variations are non-functional or are not material in nature.

Technical Assistance and Advice

Seller's warranty shall not be enlarged and no obligation or liability shall arise out of Seller's rendering of technical assistance, technical advice facilities, service or recommendations made by Seller in connection with Purchaser's purchases of the goods hereunder. Said technical services, advice, assistance or recommendations made by Seller or any representative of Seller concerning any use or application of any goods furnished hereunder is believed to be reliable, but SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, AND THE SAME ARE HEREBY EXPRESSLY DISCLAIMED as to the same and the results to be obtained. Purchaser assumes all responsibility for loss or damage resulting from the use of any such goods.

For standard dimensional information please refer to our corresponding product brochure. For information regarding a special engineered product please contact our company. All specially engineered products specifying a 5-digit suffix will be supplied with a drawing for customer approval at the time of purchase. Additional costs may be added if requirements should change from the original specifications, or have been initially overlooked. Please be aware that "normal shipping" lead-times are estimated based upon components in stock at the time of quotation, extended shipping time up to as much as two weeks or more may be required if changes to inventory availability occur. Cancellation charges will be incurred for special order equipment.

American Industrial Heat Transfer, Inc. provides a complete installation manual included with each unit sold containing a complete copy of our 3 page*"Terms and Conditions of Sale"*. If an installation manual was not received or misplaced for your equipment additional copies may be acquired. To receive a copy of American Industrial Heat Transfer, Inc. Installation Manual including *"Standard Terms and Conditions of Sale"* please refer to the following sources. 1) The American Industrial product catalog. 2) Our Internet site *www.aihti.com*, 3) Contact American Industrial directly at 1-847-731-1000.

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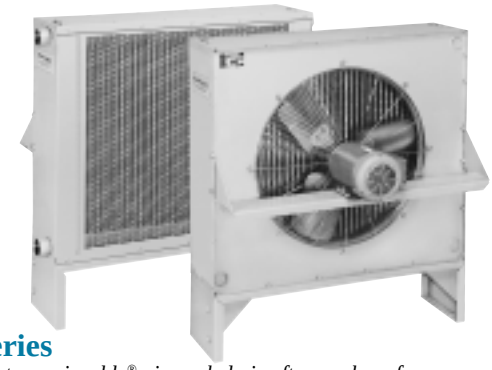
AOMF Series

• Low profile air-cooled heat exchangers with 12 & 24 volt fan drive for mobil applications.

AC,ACHM & ACF Series

• Industrial air/oil heat exchanger available in 8 standard sizes with electric or hydraulic drive.

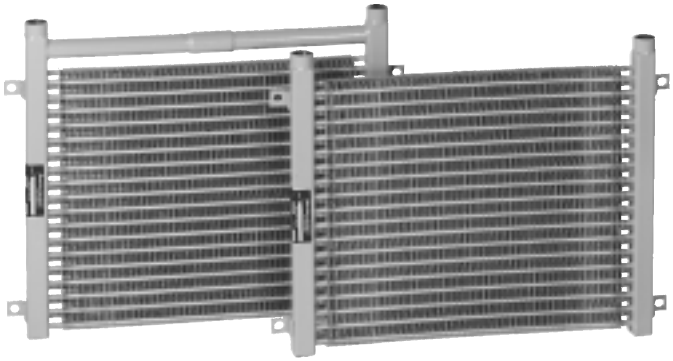


ACA Series

• Heavy-duty serviceable® air cooled air after-coolers for compressor sizes up to 500 HP.

BM Series

• Mounted directly to the vent side of TEFC electric motors.



AOM & AOMR Series

• Mobil oil coolers for applications not requiring a fan motor.

URCS Series

• U-tube heat exchangers for steam services with removable tubes bundle in copper, 316L SS, or 90/10 Cu Ni.

AB 2000-6000 Series

• High capacity shell & tube heat exchangers available in sizes from 10"-32" diameters.

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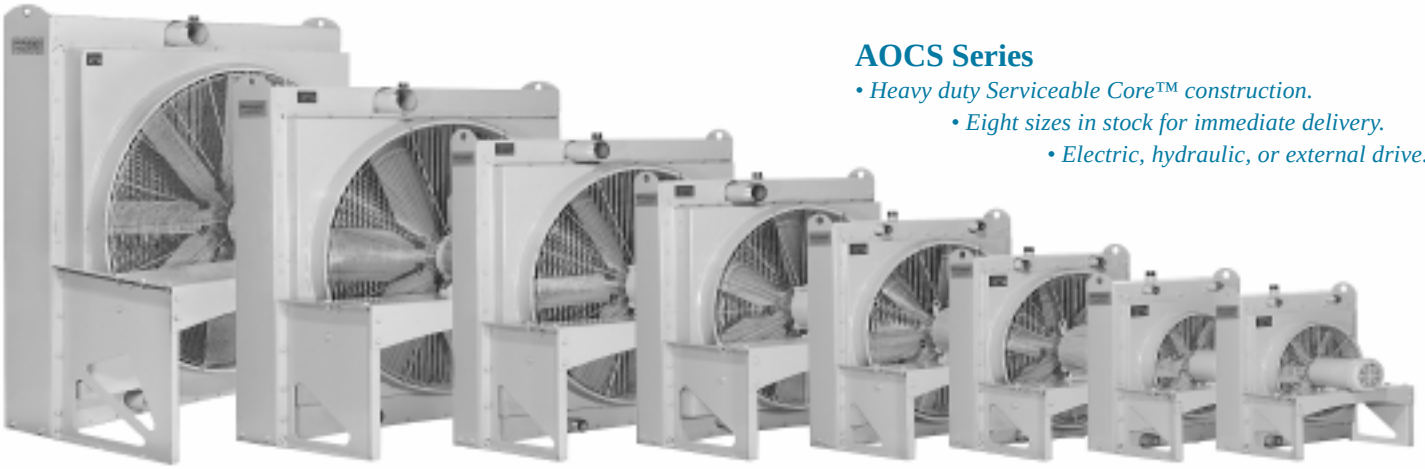
AVAILABLE PRODUCTS



AOCS Series

• Heavy duty Serviceable Core™ construction.
• Eight sizes in stock for immediate delivery.
• Electric, hydraulic, or external drive.

AOCH Series

• Heavy duty Serviceable Core™ construction.
• Eight sizes in stock for immediate delivery.
• Electric & hydraulic drive.

AC Series

• Industrial duty construction.
• Eight sizes in stock for immediate delivery.
• Electric & hydraulic drive.

AA Series

• Variety of sizes from 2"-8" diameters, available in a wide range of materials.

AB Series

• Variety of sizes from 2"-8" diameters available in brass or 316L Stainless Steel.

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