



**BASCO®
TYPE 500
HEAT
EXCHANGERS**

API Heat Transfer

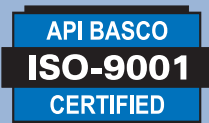
...world leaders in heat transfer technology



Quality, Value and Performance... An API Heat Transfer Tradition

Since 1953, original equipment manufacturers and aftermarket providers have looked to API Heat Transfer for a wide variety of heat transfer products.

The Basco® Type 500 remains the industry standard in ultimate value and long term reliability.



Standard Heat Exchangers Deliver Cost Effective Performance

API Heat Transfer's Basco Type 500 Shell & Tube Heat Exchanger offers the cost effectiveness and proven performance that comes with having a standard design, while easily allowing for a wide variety of options to meet specific customer requirements.

This line of pre-engineered compact heat exchangers is available in fixed tubesheet and removable bundle designs, the latter with either straight tube or U-tube arrangements. Flow configurations can be one, two, or four pass. Units are available as Commercial Standard, ASME, or ASME/TEMA-C.

The Basco Type 500 is intended to provide maximum service performance at minimum cost and lead-time.



Quality and Reliability

Reliability comes from using high quality materials in a well-conceived design that is properly applied by knowledgeable engineers and manufactured by skilled personnel. API Heat Transfer utilizes modern, high precision machining centers to convert raw materials into high value component parts. Then experienced skilled welders and assemblers transform these components into superior quality finished heat exchangers.

Over the decades, the Basco Type 500 has proven its ruggedness and reliability in tens of thousands of applications worldwide.

Rugged and versatile enough to meet your most demanding needs.

Basco Type 500 Heat Exchangers are used in these and other applications:

- Compressor Systems
- Hydraulic Systems
- Stationary Engines
- Marine Applications
- Turbines
- Paint Systems
- Air Dryers
- Vapor Recovery Systems
- Sterilizing Systems
- Lube Oil Consoles

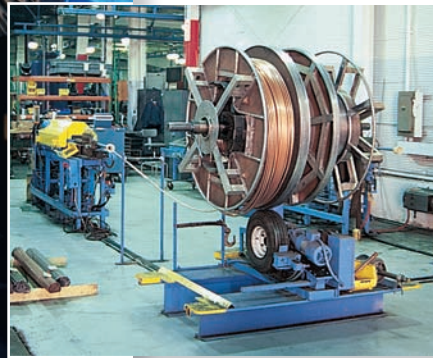


Manufacturing at a Glance

Our Basco Type 500 is manufactured in two facilities – Buffalo, NY and Suzhou, China – to support our customers on a global basis. Each facility has ISO 9001 certification assuring world-class manufacturing methods and full accountability.



Robotic CNC Machining Center assures precision drilled tubesheets, twenty-four hours a day.



Use of rolled coil tubing supports the flexibility inherent in DFT manufacturing. Special straightening equipment and unique burr-free cutting process result in superior rolled joints.

MOUNTING BRACKETS

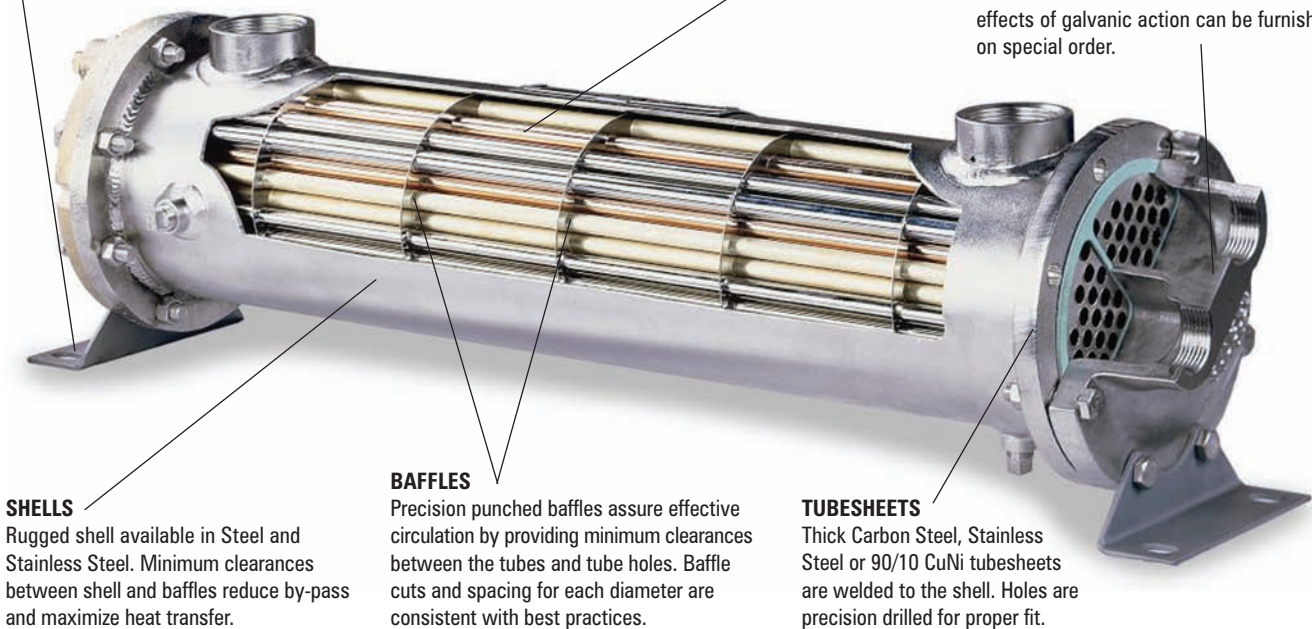
Heavy stamped steel brackets are standard and can be rotated and reversed for a variety of mounting needs. Installations other than horizontal with the brackets underneath should be checked for weight. Cradle mounting is available on all models.

TUBES

Tubes are available in Copper, 90/10 CuNi, Stainless Steel, Admiralty or Titanium. Tubes are roller expanded. Seal welding and grooving available in some cases.

END BONNETS

End Bonnets are of high quality cast Iron, Bronze or Stainless Steel in 1, 2 or 4-pass configurations. Fabricated heads are available and are standard on TEMA-C models. Zinc anodes to neutralize the effects of galvanic action can be furnished on special order.



SHELLS

Rugged shell available in Steel and Stainless Steel. Minimum clearances between shell and baffles reduce by-pass and maximize heat transfer.

BAFFLES

Precision punched baffles assure effective circulation by providing minimum clearances between the tubes and tube holes. Baffle cuts and spacing for each diameter are consistent with best practices.

TUBESHEETS

Thick Carbon Steel, Stainless Steel or 90/10 CuNi tubesheets are welded to the shell. Holes are precision drilled for proper fit.

Basco Type 500 Heat Exchangers

Type 500 Commercial Standard Models

3" – 8" Diameters, Straight and U-Tubes



Type 500 Standard Materials

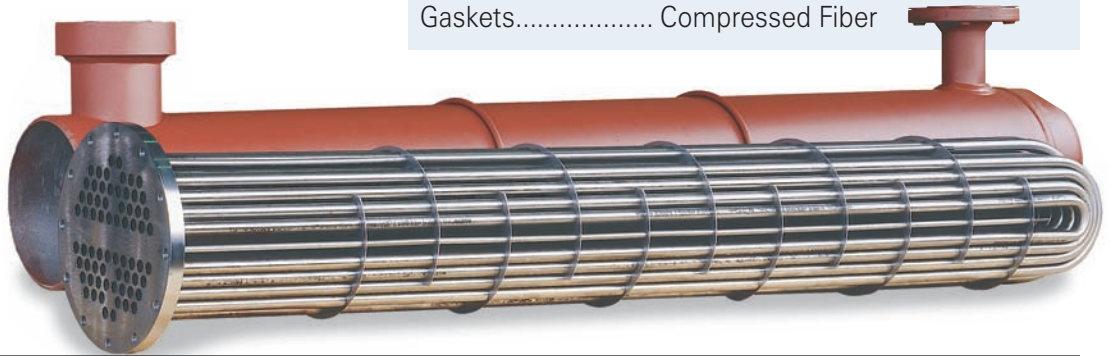
Shell.....	Steel Pipe or Tubing
Tubes	Copper, Admiralty or 90/10 CuNi
Tubesheets	Steel, Stainless or 90/10 CuNi
Bonnets	Cast Iron
Baffles	Carbon Steel
Gaskets.....	Compressed Fiber

Commercial standard model and modified model with special shellside flanges shown. Several modifications are available without adding manufacturing delays.

Type 500 Stainless Steel Models

3" – 8" Diameters, Straight and U-Tubes

Model shown is removable tubesheet U-tube with type 304 Stainless Steel tubing. Fixed bundle models also available.



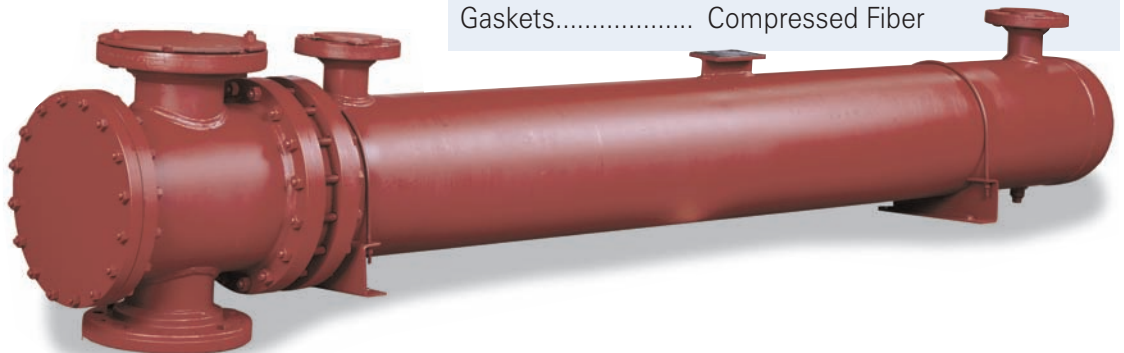
Type 500 S Materials

Shell.....	Welded 304 Stainless
Tubes	304 Stainless Steel
Tubesheets	304 Stainless Steel
Bonnets	Cast 304 Stainless
Baffles	304 Stainless Steel
Gaskets.....	Compressed Fiber

Type 500 ASME/TEMA-C Models

5" – 12" Diameters, Straight and U-Tubes

ASME Code models are available from 5" diameter and up. TEMA-C models are available in straight and U-tube designs through 12" diameter.



ASME/TEMA-C Materials

Shell.....	Carbon Steel
Tubes	Copper, Admiralty, 90/10 CuNi, SS
Tubesheets	Carbon Steel, 90/10, SS
Bonnets	Carbon Steel, Cast Ductile Iron
Baffles	Carbon Steel, SS
Gaskets.....	Compressed Fiber

Common Specifications

Standard Straight-Tube Type 500 Heat Exchangers

Model	Shell Dia.	No. Tubes			Surface			Connection Size – (Max Flow)			
		1/4"	3/8"	5/8"	1/4"	3/8"	5/8"	Shell	1-Pass	2-Pass	4-Pass
03014 03024	3-1/4"	60	24	NA	4.6 7.8	2.7 4.8	-	1	1-1/2 (47)	1 (23)	1 (12)
04014 04024 04036	4-1/2"	104	44	NA	7.9 13.6 20.4	5.0 8.6 12.2	-	1-1/2	2 (86)	1-1/4 (43)	3/4 (22)
05014 05024 05036	5-1/4"	180	80	28	13.7 23.6 35.4	9.1 15.7 24	5.3 9.1 13.6	1-1/2	2-1/2 (160)	1-1/2 (80)	1 (40)
06024 06036 06048 06060	6-1/4"	264	116	40	34.5 51.8 69.1 86.4	22.8 34.2 45.6 57	13.0 19.5 26 32.5	2	3 (230)	2 (115)	2 (57)
08024 08036 08048 08060 08072	8-5/8"	NA	232	76	- - - - -	45.6 68.3 91.1 114 136.7	24.9 37.3 49.7 62.1 74.5	3	3 (461)	2-1/2 (231)	2 (115)

ASME Code Straight-Tube Type 500 Heat Exchangers

Model	Shell Dia.	No. Tubes		Surface			Connection Size – (Max Flow)			
		3/8"	5/8"	1/4"	3/8"	5/8"	Shell	1-Pass	2-Pass	4-Pass
05024 per foot	5-1/4"	80	28	-	15.7 7.8	28 4.5	1-1/2	2-1/2 (160)	1-1/2 (80)	1 (40)
06024 per foot	6-1/4"	116	40	-	22.8 11.4	13 6.5	2	3 (230)	2 (115)	1-1/2 (57)
08024 per foot	8-5/8"	232	76	-	45.6 22.8	24.9 12.4	3	3 (461)	2-1/2 (231)	2 (115)

ASME/TEMA-C Straight-Tube Heat Exchangers

Model	Shell Dia.	No. Tubes		Surface			Connection Size – (Max Flow)			
		3/8"	5/8"	1/4"	3/8"	5/8"	Shell	1-Pass	2-Pass	4-Pass
05024 per foot	5-1/4"	72	20	-	14 7.8	6.5 4.5	1-1/2	2-1/2 (160)	1-1/2 (80)	1 (40)
06024 per foot	6-1/4"	104	36	-	20.4 10.2	11 5.9	2	3 (230)	2 (115)	1-1/2 (57)
08024 per foot	8-5/8"	208	68	-	40.9 20.4	22.2 11.1	3	3 (461)	2-1/2 (231)	2 (115)
10120 per foot	10-3/4"	344	116	-	338 34	190 19	4 FL	6 FL (630)	4 FL (315)	2-1/2 (158)
12120 per foot	12-3/4"	516	172	-	507 51	281 28	6 FL	6 FL (935)	4 FL (465)	3 (234)

Standard Type 500 U-Tube Heat Exchangers

Model	Shell Dia.	No. Tubes		Surface			Connection Size – (Max Flow)			
		3/8"	5/8"	1/4"	3/8"	5/8"	Shell	1-Pass	2-Pass	4-Pass
05048 per foot	5-1/4"	34	8	-	27 6.8	11 2.7	1-1/2	-	1-1/2 (44)	1 (22)
06048 per foot	6-1/4"	52	14	-	51 10.2	18.5 4.6	2	-	2 (77)	1-1/2 (38)
08048 per foot	8-5/8"	104	34	-	82 20.5	44.5 11.2	3	-	2-1/2 (185)	2 (93)

ASME/TEMA-C U-Tube Heat Exchangers

Model	Shell Dia.	No. Tubes		Surface			Connection Size – (Max Flow)			
		3/8"	5/8"	1/4"	3/8"	5/8"	Shell	1-Pass	2-Pass	4-Pass
10120 per foot	10-3/4"	174	58	-	350 34	195 19	4 FL	-	4 FL (316)	2-1/2 (158)
12120 per foot	12-3/4"	260	88	-	527 51	297 29	6 FL	-	4 FL (480)	3 (240)

*Max tube length: 3/8" OD - 12 feet; 5/8" OD - 20 feet. Max flow based on 8 fps. Corrosion allowance: 1/16" both sides on TEMA-C models. Flanges are 150# ANSI Raised-Face

Product Nomenclature

Size (inches)	05	024
Shell Dia.	05	024
Tube Length	05	024

Overall length, shell port center distance and mounting hole locations can be adjusted by adding or subtracting the actual tube length differential.

Standard Ratings

Design Pressure	Std Units	TEMA-C/ASME
Shellside	300 psi	150 psi
Tubeside	150 psi	150 psi
Design Temp	300°F, Stainless higher	
Test Pressure	All units are either pneumatically or hydrostatically tested.	

Shells - Steel or 304 Stainless pipe to ASME specification. Shells are cleaned prior to assembly.

Tubes - Copper, roller expanded into tubesheet in 1/4", 3/8" or 5/8" OD. Also available in Admiralty, 304, 316 Stainless Steel or 90/10 CuNi.

Tubesheets - Quality steel to ASME specifications. Precision machined for excellent sealing. Stainless Steel and 90/10 CuNi also available in all sizes.

Baffles - Hot-rolled punched steel for enhanced strength and reliability. Engineered for correct fit to reduce tube wall damage from high velocity fluids. Also available in Brass and 304 Stainless Steel.

Heads - Cast or fabricated construction. Available in 1, 2, or 4-pass designs to meet ASME specifications. Designed to provide excellent gasket sealing. Options include fabricated heads from Steel, 304 Stainless, and 90/10 CuNi. Cast heads are available in Iron, cast 304 Stainless, or cast Bronze. Zinc anodes can be supplied for added protection.

Connections - Tubeside or shellside threaded or flanged in sizes 3", 4", 5", 6" and 8". Additional connections can be provided as option on all models.

Codes - ASME, ASME/TEMA-C are available and stamped accordingly. Code Version 1 has ductile iron bonnets and tubing for shell. Code Version 2 has fabricated heads and pipe for shell.

Finish - Exterior surfaces are cleaned and painted with a high quality red oxide primer.

Straight-Tube Heat Exchangers

Commercial Standard – Common Dimensions

Model	Commercial Standard – Common Dimensions											Single-Pass					
	A	B	C	D	E	F	G	H	J	K-NPT	L-NPT	M	N	P	R-NPT	S-NPT	T
03014 03024	3-1/4	4-1/2	10 20	2-5/16	16-3/8 26-3/8	2-3/4	4-1/2	1-5/8	7/16	1/4	1	17-3/8 27-3/8	3-11/16	1/2	3/8	1-1/2	3/8
04014 04024 04036	4-1/4	6	9 19 31	3-1/8	16-5/8 29-5/8 38-5/8	3-1/2	4-1/4	1-3/4	7/16	1/4	1-1/2	17-7/8 27-7/8 39-7/8	4-7/16	5/8	3/8	2	-
05014 05024 05036	5-1/4	6-3/4	9 19 31	3-7/16	17-1/8 27-1/8 39-1/8	4	5-1/4	2	1/2x3/4	1/4	1-1/2	19 29 41	5	15/16	3/8	2-1/2	-
06024 06036 06048 06060	6-1/4	7-3/4	18-1/4 30-1/4 42-1/4 54-1/4	4-1/16	27-1/8 39-1/8 51-1/8 63-1/8	4-1/2	6-1/4	2-1/2	1/2x3/4	3/8	2	29-1/8 41-1/8 53-1/8 65-1/8	5-7/16	1	1/2	3	-
08024 08036 08048 08060 08072	8-5/8	10-1/2	17 29 41 53 65	5-7/16	27-1/2 39-1/2 51-1/2 63-1/2 75-1/2	5-3/4	8-1/4	3-1/2	5/8x7/8	3/8	3	31-1/8 43-1/8 55-1/8 67-1/8 79-1/8	7-1/16	1-13/16	1/2	3	-

5", 6" & 8" ASME Code – Common Dimensions

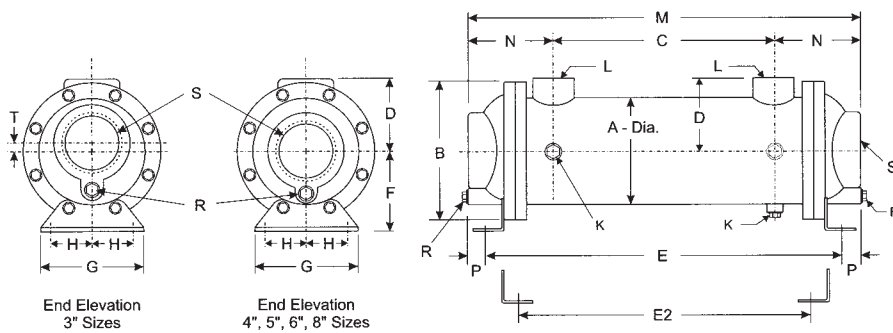
Model	ASME Code – Common Dimensions											Single-Pass					
	A	B	C	D	E	F	G	H	J	K-NPT	L-NPT	M	N	P	R-NPT	S-NPT	T
05048 06048 08048	5-1/4	6-3/4	42	3-7/8	51-5/8	4	5-1/4	2	1/2x3/4	1/4	1-1/2	53-1/2	5-3/4	15/16	3/8	2-1/2	-
	6-1/4	7-3/4	41-1/2	4-7/16	51-3/4	4-1/2	6-1/4	2-1/2	1/2x3/4	3/8	2	53-3/4	6-1/8	1	1/2	3	-
	8-5/8	10-1/2	40	5-7/8	52-3/8	5-3/4	8-1/4	3-1/2	5/8x7/8	3/8	3	56	8	1-13/16	1/2	3	-

10" & 12" ASME/TEMA-C – Common Dimensions

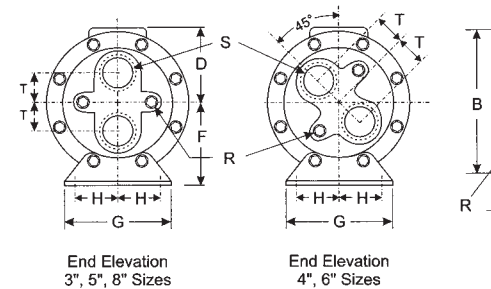
Model	ASME/TEMA-C – Common Dimensions											Single-Pass					
	A	B	C	D	E	F	G	H	J	K-NPT	L-NPT	M	N	P	R-NPT	S-NPT	T
10120 12120	10-3/4	145-3/8	109-1/2	11-1/8	11-1/8	6-13/16	10	13-3/4	96	2-1/4	12-1/2	4	1-3/8	7	4FL	6FL	-
	12-3/4	145-3/4	107-1/2	12-7/16	12-7/16	6-15/16	11	15-3/4	94	2-1/4	14-1/2	5	1-3/8	8-1/4	6FL	6FL	-

All models are available in other lengths. Apply the appropriate dimension changes to all length measurements along the centerline. Maximum tube length for 3/8" tubing is 12 feet. Maximum tube length for 5/8" tubing is 20 feet. FL indicates ANSI 150 lb. RF flange. Code design models are equipped with bottom drain only on the shell side. Bonnet vents may not be tapped unless required or if equipped with zinc anodes.

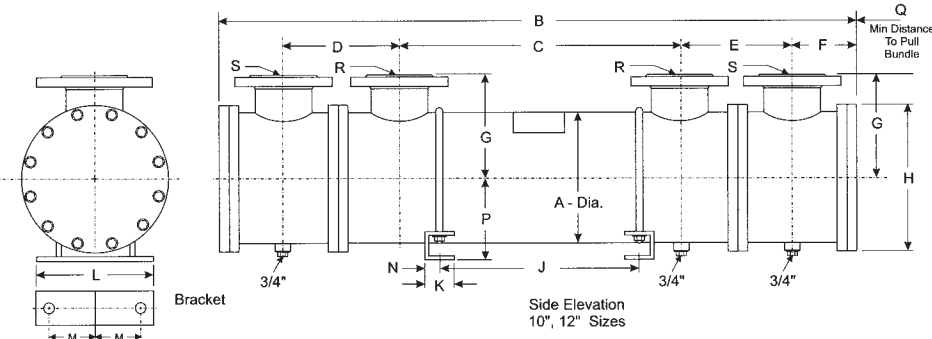
SINGLE-PASS STANDARD and CODE



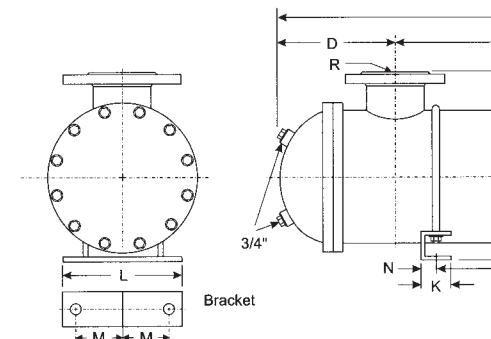
TWO-PASS STANDARD and CODE



SINGLE-PASS ASME/TEMA-C



TWO-PASS ASME/TEMA-C



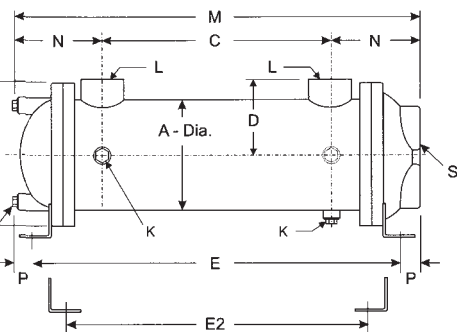
Two-Pass							Four-Pass						Weight	E2	Model
Model	M	N	P	R-NPT	S-NPT	T	M	N	P	R-NPT	S-NPT	T			
03014	17-1/8	3-9/16	3/8	3/8	1	1	17-1/8	3-9/16	3/8	3/8	3/4	1	18	13-5/8	03014
03024	27-1/8						27-1/8						23	23-5/8	03024
04014	17-7/8	4-7/16	5/8	3/8	1-1/4	1-1/16	17-7/8	4-7/16	5/8	3/8	3/4	1-1/4	32	13-7/8	04014
04024	27-7/8						27-7/8						41	23-7/8	04024
04036	39-7/8						39-7/8						52	35-7/8	04036
05014	19	5	15/16	3/8	1-1/2	1-1/2	18-13/16	4-13/16	3/4	3/8	1	1-11/16	45	13-3/8	05014
05024	29						28-13/16						55	23-3/8	05024
05036	41						40-13/16						75	35-3/8	05036
06024	29-1/8	5-7/16	1	1/2	2	1-9/16	29-1/8	5-7/16	1	1/2	1-1/2	2	75	23-1/2	06024
06036	41-1/8						41-1/8						100	35-1/2	06036
06048	53-1/8			See Note			53-1/8			See Note			125	47-1/2	06048
06060	65-1/8			Note			65-1/8			Note			150	59-1/2	06060
08024	30-5/8	7-1/16	1-13/16	1/2	2-1/2	2-1/4	30-5/8	7-1/16	1-13/16	1/2	2	2-1/2	165	23-5/8	08024
08036	42-5/8						42-5/8						215	35-5/8	08036
08048	54-5/8			See Note			54-5/8			See Note			285	47-5/8	08048
08060	66-5/8			Note			66-5/8			Note			325	59-5/8	08060
08072	78-5/8			Note			78-5/8			Note			390	71-5/8	08072

Two-Pass							Four-Pass						Weight	E2	Model
Model	M	N	P	R-NPT	S-NPT	T	M	N	P	R-NPT	S-NPT	T			
05048	53-1/2	5-3/4	15/16	3/8	1-1/2	1-1/2	53-5/16	5-9/16	3/4	3/8	1	1-11/16		47-7/8	05048
06048	53-3/4	6-1/8	1	1/2	2	1-9/16	53-3/4	6-1/8	1	1/2	1-1/2	2		48-1/8	06048
08048	56	8	1-13/16	1/2	2-1/2	2-1/4	55-1/2	8	1-13/16	1/2	2	2-1/2		48-1/4	08048

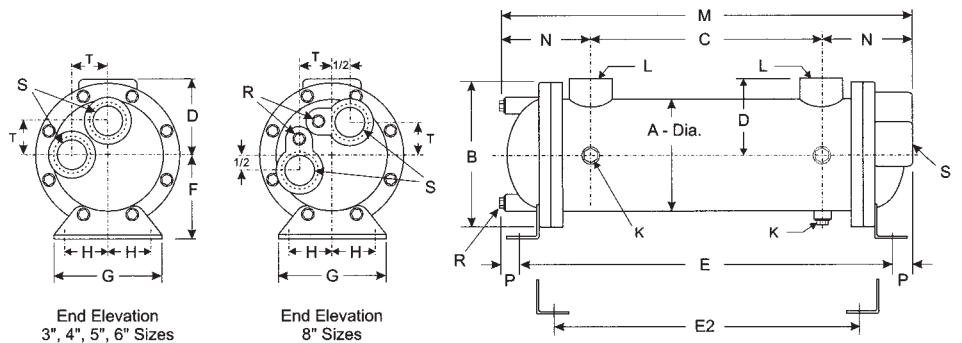
Two-Pass							Four-Pass						Weight	E2	Model
Model	M	N	P	R-NPT	S-NPT	T	M	N	P	R-NPT	S-NPT	T			
10120	4	1-3/8	7	4FL	4FL	-	4	1-3/8	7	4FL	2-1/2	-		-	10120
12120	5	1-3/8	8-1/4	6FL	4FL	-	5	1-3/8	8-1/4	6FL	3	-		-	12120

All models are available in other lengths. Apply the appropriate dimension changes to all length measurements along the centerline. Maximum tube length for 3/8" tubing is 12 feet. Maximum tube length for 5/8" tubing is 20 feet. FL indicates ANSI 150 lb. RF flange. Code design models are equipped with bottom drain only on the shell side. Bonnet vents may not be tapped unless required or if equipped with zinc anodes.

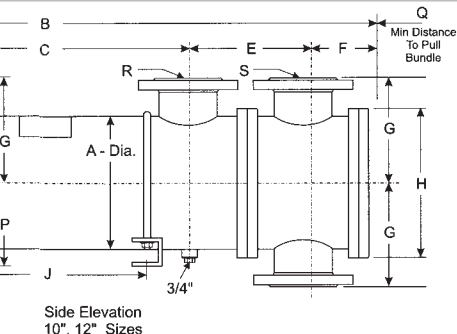
STANDARD and CODE



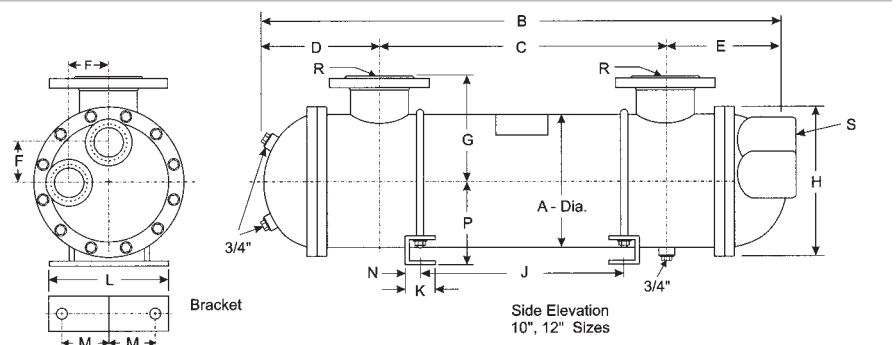
FOUR-PASS STANDARD and CODE



SME/TEMA-C



FOUR-PASS ASME/TEMA-C



U-Tube Heat Exchangers

Commercial Standard U-Tube – Common Dimensions

Model	A	B	C	D	E	F	G	H	J	K-NPT	L-NPT
05048	5-1/4	6-3/4	48-1/2	3-7/16	57-5/16	4	4-1/2	2	1/2x3/4	1/4	1-1/2
06048	6-1/4	7-3/4	49	4-1/16	58-3/8	4-1/2	6-1/4	2-1/2	1/2x3/4	3/8	2
08048	8-5/8	10-1/2	50-1/2	5-7/16	61-13/16	5-3/4	8-1/4	3-1/2	5/8x7/8	3/8	3

5", 6" & 8" ASME Code Models

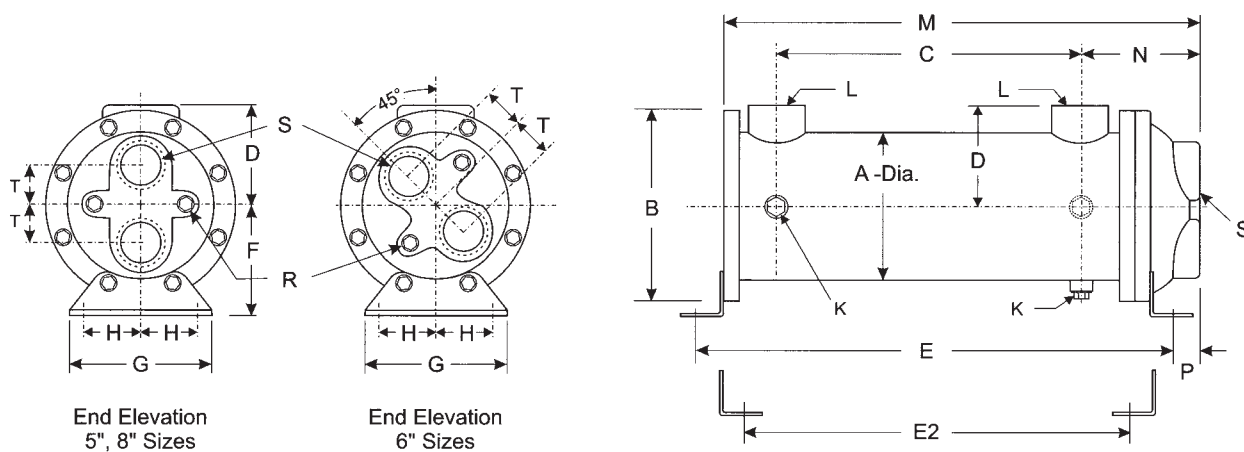
Model	A	B	C	D	E	F	G	H	J	K-NPT	L-NPT
05048	5-1/4	6-3/4	48-1/2	3-7/8	57-5/16	4	5-1/4	2	1/2x3/4	1/4	1-1/2
06048	6-1/4	7-3/4	49	4-7/16	58-3/8	4-1/2	6-1/4	2-1/2	1/2x3/4	3/8	2
08048	8-5/8	10-1/2	50-1/2	5-7/8	61-13/16	5-3/4	8-1/4	3-1/2	5/8x7/8	3/8	3-

10" & 12" ASME/TEMA-C Models

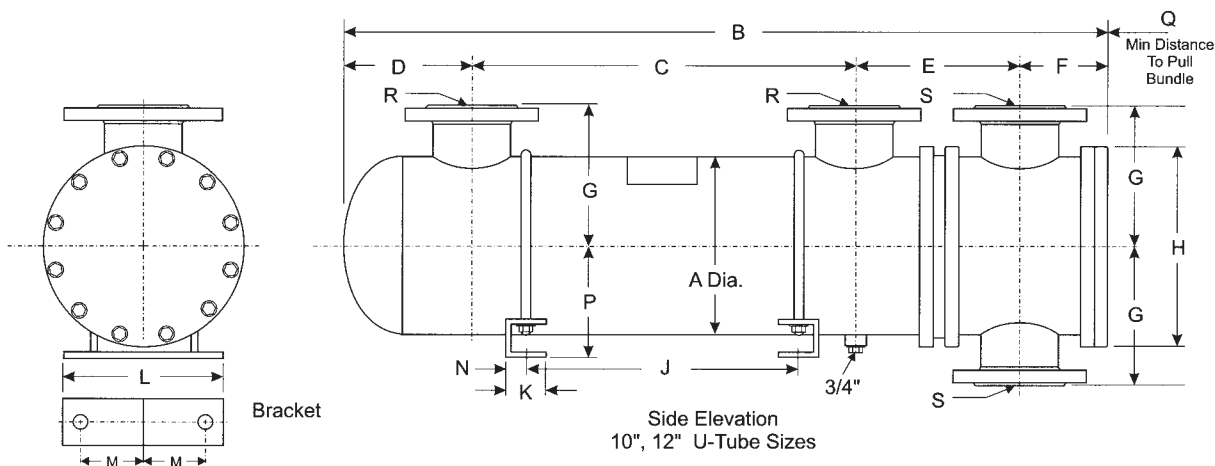
Model	A	B	C	D	E	F	G	H	J	K	L
10120	10-3/4	148-3/4	121	8-15/16	12	6-13/16	10	13-3/4	105	2-1/4	12-1/2
12120	12-3/4	153-1/2	122-1/2	10-9/16	13-1/2	6-15/16	11	15-3/4	109	2-1/4	14-1/2

All models are available in other lengths. Apply the appropriate dimension changes to all length measurements along the centerline. Maximum tube length for 3/8" tubing is 12 feet. Maximum tube length for 5/8" tubing is 20 feet. FL indicates ANSI 150 lb. RF flange.

TWO-PASS U-TUBE MODELS



TWO-PASS U-TUBE ASME/TEMA-C



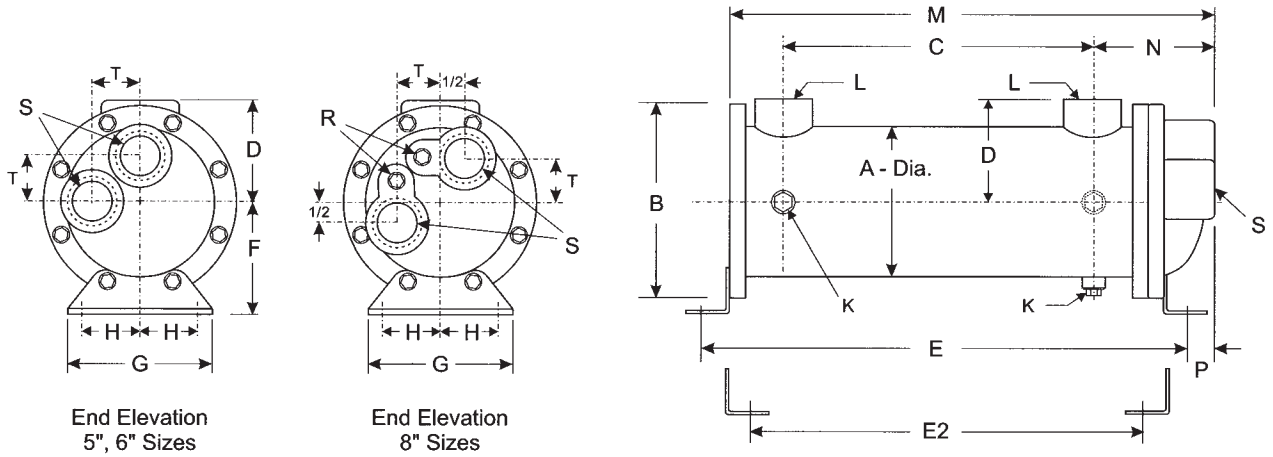
Two-Pass							Four-Pass						Weight	E2	Model
Model	M	N	P	R-NPT	S-NPT	T	M	N	P	R-NPT	S-NPT	T			
05048	57-1/16	5-3/4	15/16	3/8	1-1/2	1-1/2	57-1/16	5-9/16	3/4	-	1	1-11/16	80	53-9/16	05048
06048	58-3/8	6-1/8	1	1/2	2	1-9/16	58-3/8	6-1/8	1	-	1-1/2	2	135	54-3/4	06048
08048	62-1/2	8	1-13/16	1/2	2-1/2	2-1/4	60-1/2	8	1-13/16	1/2	2	2-1/2	300	57-5/8	08048

Two-Pass							Four-Pass						Weight	E2	Model
Model	M	N	P	R-NPT	S-NPT	T	M	N	P	R-NPT	S-NPT	T			
05048	57-1/4	5-3/4	15/16	3/8	1-1/2	1-1/2	57-1/16	5-9/16	3/4	-	1	1-11/16	90	53-9/16	05048
06048	58-3/8	6-1/8	1	1/2	2	1-9/16	58-3/8	6-1/8	1	-	1-1/2	2	145	54-3/4	06048
08048	62-1/2	8	1-13/16	1/2	2-1/2	2-1/4	62-1/2	8	1-13/16	1/2	2	2-1/2	310	57-11/16	08048

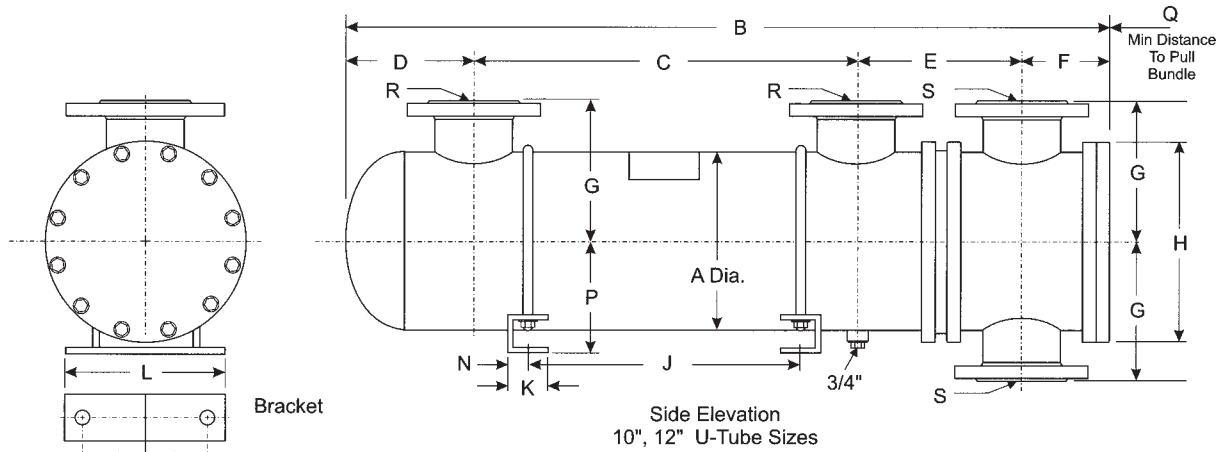
Two-Pass							Four-Pass						Weight	E2	Model
Model	M	N	P	Q	R	S	M	N	P	Q	R	S			
10120	4	1-3/8	7	116	4FL	4FL	4	1-3/8	7	122	4FL	2-1/2	1085	-	10120
12120	5	1-3/8	8-1/4	117	6FL	4FL	5	1-3/8	8-1/4	123	6FL	3	1580	-	12120

All models are available in other lengths. Apply the appropriate dimension changes to all length measurements along the centerline. Maximum tube length for 3/8" tubing is 12 feet. Maximum tube length for 5/8" tubing is 20 feet. FL indicates ANSI 150 lb. RF flange.

FOUR-PASS U-TUBE MODELS



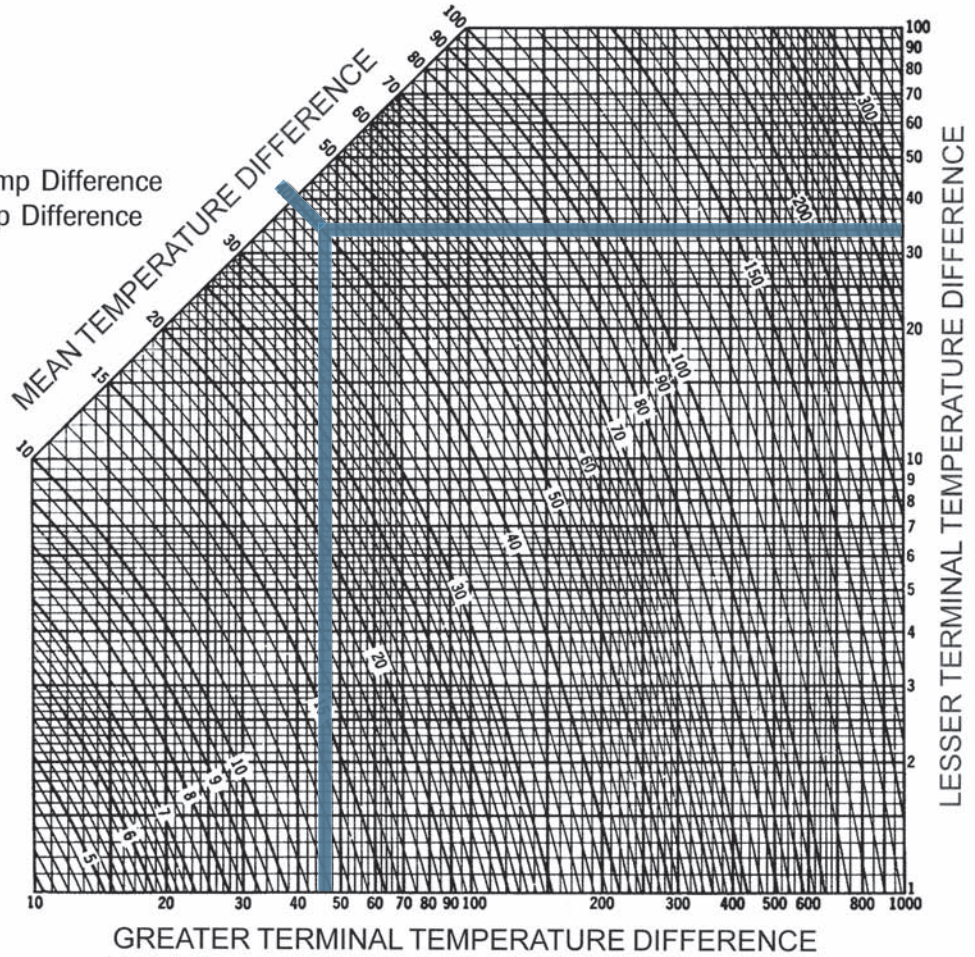
FOUR-PASS U-TUBE ASME/TEMA-C



Selection Sizing

$$LMTD = \frac{(GTTD - LTTD)}{\text{LogN} \left(\frac{GTTD}{LTTD} \right)}$$

GTTD = Greater Terminal Temp Difference
 LTTD = Lesser Terminal Temp Difference



P

	0.5	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.6	0.7	0.8	0.9	1.0
0.2								.99	.99	.98	.97	.94	.90	.84	.71
0.4							.99	.98	.97	.95	.92	.85	.70		
0.6						.99	.98	.96	.94	.92	.84				
0.8				.99	.98	.96	.94	.91	.87						
1.0				.98	.97	.94	.91	.86	.77						
2.0		.99	.97	.94	.84	.74									

R

3.0		.97	.93	.83											
4.0	.99	.95	.85												
5.0	.98	.91													
6.0	.96	.85													
8.0		.93													
10.0	.99	.88													
12.0	.98	.72													
14.0	.97														
16.0	.95														
18.0	.94														
20.0	.91														

$$R = \frac{T_1 - T_2}{t_2 - t_1}$$

$$P = \frac{t_2 - t_1}{T_1 - t_1}$$

Locate Correction Factor at Intersection of "R" and "P"

Correction for LMTD when Using Multi-Pass Heat Exchangers.

Multi-pass heat exchangers cannot take full advantage of counter-current flow, which changes the LMTD for the application.

To correct the LMTD, multiply the value obtained from the above graph by the correction factor obtained from this correction graph. If the P and R values intersect outside the graph, consult the factory to discuss your specific application.

T₁ Hot Fluid Inlet Temp, °F

T₂ Hot Fluid Outlet Temp, °F

t₁ Cold Fluid Inlet Temp, °F

t₂ Cold Fluid Outlet Temp, °F