

# Fluid Cooling

## Shell & Tube SSC Series



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### STAINLESS STEEL CONSTRUCTION

## Performance Notes

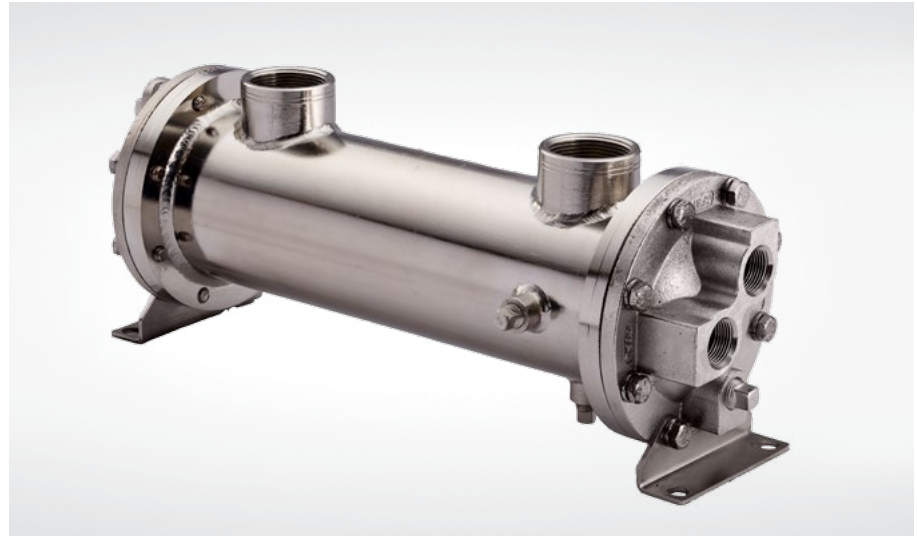
- Preferred for new oil-water applications
- Type 316 stainless steel construction
- Low cost
- Custom designs available
- Competitively priced
- NPT, SAE O-ring, SAE flange, or BSPP shell side connections available
- End bonnets removable for servicing
- Mounting feet included (may be rotated in 90° increments)
- Special TEMAC/CRN ratings available

## Ratings

**Maximum Operating Pressure - Shell Side**  
300 PSI\*

**Maximum Operating Pressure - Tube Side**  
150 PSI

**Maximum Operating Temperature**  
300°F



## Ratings ASME Code

**Maximum Operating Pressure - Shell Side**  
300 PSI\*

**Maximum Operating Pressure - Tube Side**  
150 PSI

**Maximum Operating Temperature**  
300°F

## Materials

**Tubes** 316 Stainless steel

**Tubesheets** 316L Stainless steel

**Shell** 316L Stainless steel

**Shell Connections** 316L Stainless steel

**Baffles** 316 Stainless steel

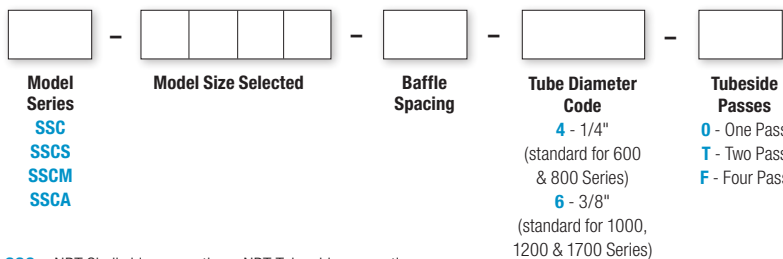
**End Bonnets** 316 Stainless steel

**Mounting Brackets** Mild steel

**Gaskets** Nitrile rubber/cellulose fiber

**Nameplate** Aluminum foil

## How to Order



**SSC** = NPT Shell side connections; NPT Tube side connections

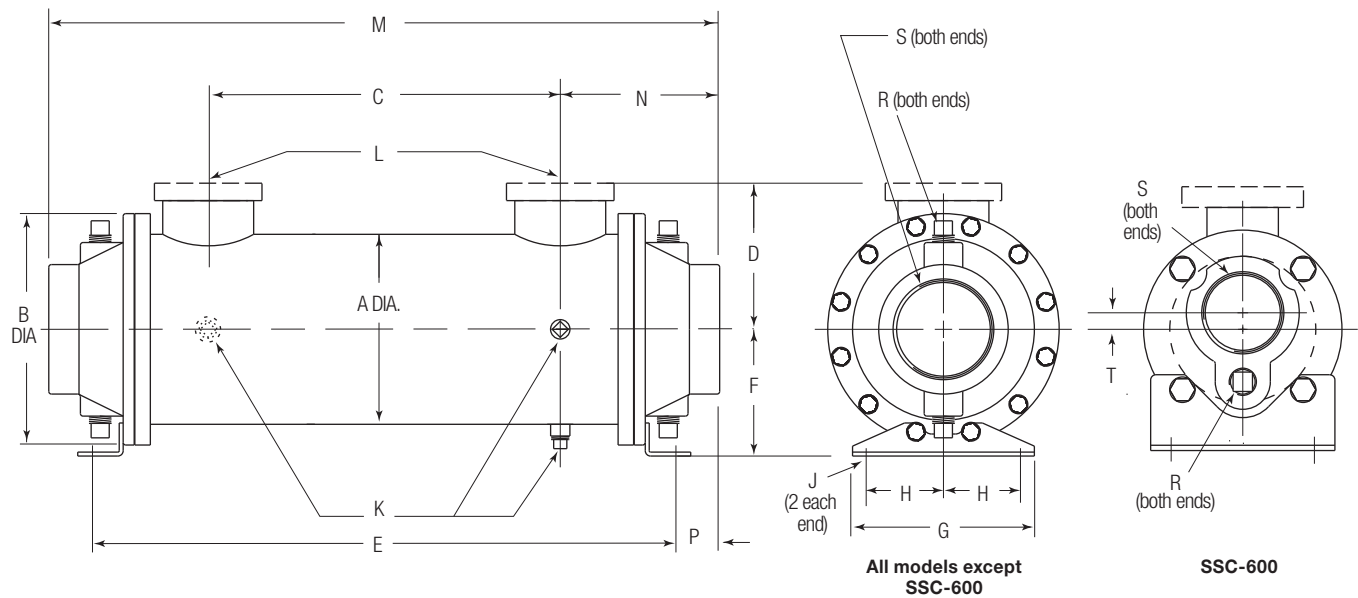
**SSCS** = SAE O-Ring Shell side connections; NPT Tube side connections

**SSCM** = BSPP Shell side connections; BSPP Tube side connections

**SSCA** = 150# ASME RF Flanges on Shell; NPT Tube side connections

# Dimensions

## One Pass



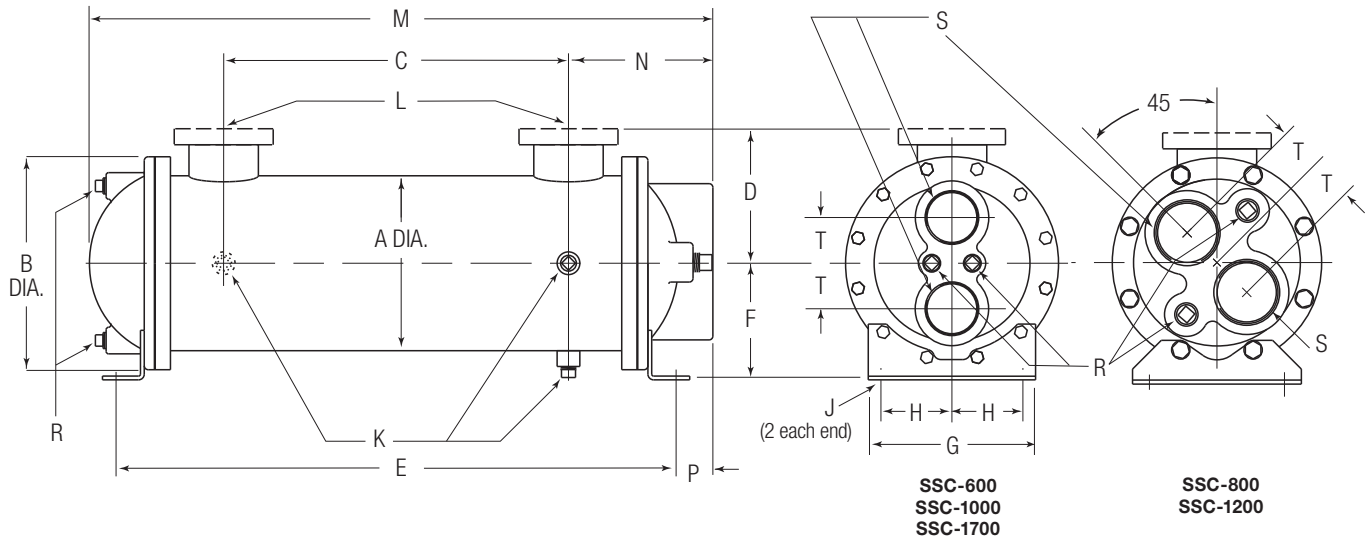
Flange Size	Z-CF	Z-CFM
1	3/8 - 16 UNC	M-10
1½	1/2 - 13 UNC	M-12
2	1/2 - 13 UNC	M-12
3	5/8 - 11 UNC	M-16

Model	A	B	C	D		E	F	G	H	J	K NPT	L		M	N	P	R NPT	S NPT/ BSPP	T
				NPT/ BSPP SAE O-Ring	SAE Flange							NPT/ BSPP Flange	SAE O-Ring						
614	3.25	4.50	10.00	2.62	2.88	16.38	2.75	4.18	1.62	0.44 Dia.	0.25 (3)	1.00	#16 1½-12 UNF-2B	17.18	3.59	0.40	0.38 (2)	1.50	0.38
624	3.25	4.50	20.00	2.62	2.88	26.38	2.75	4.18	1.62	0.44 Dia.	0.25 (3)	1.00	#16 1½-12 UNF-2B	27.18	3.59	0.40	0.38 (2)	1.50	0.38
814	4.25	6.00	9.00	3.25	3.50	16.62	3.50	4.25	1.75	0.44 Dia.	0.25 (3)	1.50	#24 1½-12 UNF-2B	17.88	4.44	0.63	0.38 (2)	2.00	—
824	4.25	6.00	19.00	3.25	3.50	26.62	3.50	4.25	1.75	0.44 Dia.	0.25 (3)	1.50		27.88	4.44	0.63	0.38 (2)	2.00	—
836	4.25	6.00	31.00	3.25	3.50	38.62	3.50	4.25	1.75	0.44 Dia.	0.25 (3)	1.50		39.88	4.44	0.63	0.38 (2)	2.00	—
1014	5.25	6.75	9.00	3.75	4.00	17.12	4.00	5.25	2.00	.50 x .75	0.25 (3)	1.50		19.09	5.05	0.92	.38 (4)	2.00	—
1024	5.25	6.75	19.00	3.75	4.00	27.12	4.00	5.25	2.00	.50 x .75	0.25 (3)	1.50	29.09	5.05	0.92	.38 (4)	2.00	—	
1036	5.25	6.75	31.00	3.75	4.00	39.12	4.00	5.25	2.00	.50 x .75	0.25 (3)	1.50	41.09	5.05	0.92	.38 (4)	2.00	—	
1224	6.25	7.75	18.25	4.25	4.88	27.13	4.50	6.25	2.50	.50 x .75	0.38 (3)	2.00	#32 2½-12 UNF-2B	30.00	5.87	1.43	.50 (4)	3.00	—
1236	6.25	7.75	30.25	4.25	4.88	39.13	4.50	6.25	2.50	.50 x .75	0.38 (3)	2.00		42.00	5.87	1.43	.50 (4)	3.00	—
1248	6.25	7.75	42.25	4.25	4.88	51.13	4.50	6.25	2.50	.50 x .75	0.38 (3)	2.00		54.00	5.87	1.43	.50 (4)	3.00	—
1260	6.25	7.75	55.25	4.25	4.88	63.13	4.50	6.25	2.50	.50 x .75	0.38 (3)	2.00		66.00	5.87	1.43	.50 (4)	3.00	—
1724	8.62	10.50	17.00	5.84	6.81	27.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	31.47	7.23	1.99	.50 (4)	4.00	—
1736	8.62	10.50	29.00	5.84	6.81	39.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	43.47	7.23	1.99	.50 (4)	4.00	—
1748	8.62	10.50	41.00	5.84	6.81	51.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	55.47	7.23	1.99	.50 (4)	4.00	—
1760	8.62	10.50	53.00	5.84	6.81	63.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	67.47	7.23	1.99	.50 (4)	4.00	—
1772	8.62	10.50	65.00	5.84	6.81	75.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	79.47	7.23	1.99	.50 (4)	4.00	—

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

# Dimensions

## Two Pass



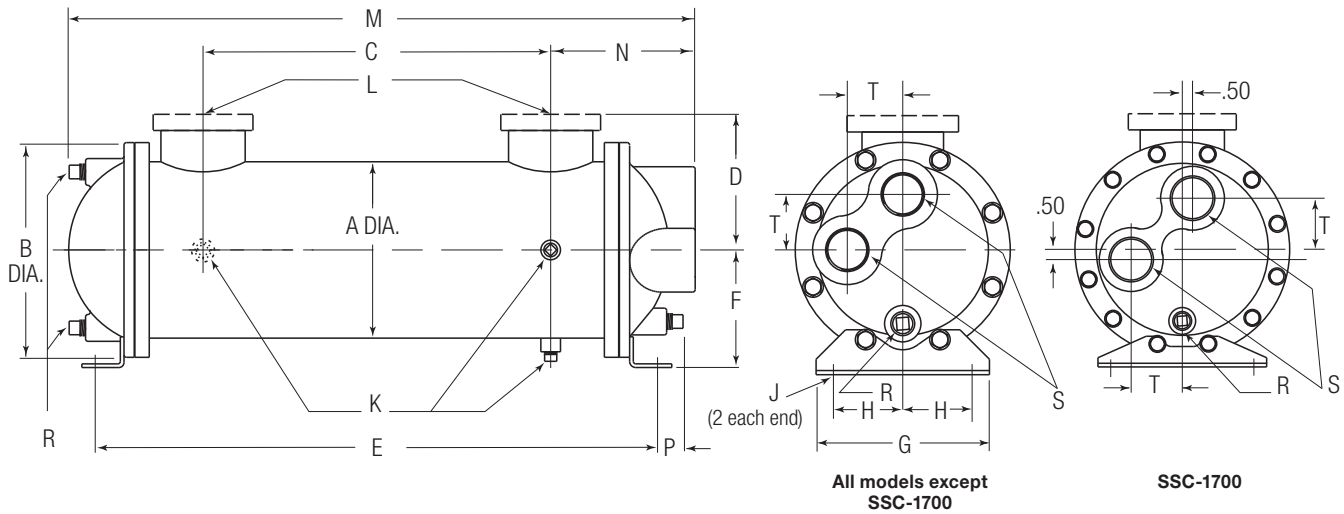
Flange Size	Z-CF	Z-CFM
1	3/8 - 16 UNC	M-10
1½	1/2 - 13 UNC	M-12
2	1/2 - 13 UNC	M-12
3	5/8 - 11 UNC	M-16

Model	A	B	C	D		E	F	G	H	J	K NPT	L		M	N	P	R NPT	S NPT/ BSPP	T
				NPT/ BSPP SAE O-Ring	SAE Flange							NPT/ BSPP Flange	SAE O-Ring						
614	3.25	4.50	10.00	2.62	2.88	16.38	2.75	4.18	1.62	0.44 Dia.	0.25 (3)	1.00	#16 1½-12 UNF-2B	17.12	3.56	0.38	0.38 (2)	1.50	1.00
624	3.25	4.50	20.00	2.62	2.88	26.38	2.75	4.18	1.62	0.44 Dia.	0.25 (3)	1.00	UNF-2B	27.12	3.56	0.38	0.38 (2)	1.50	1.00
814	4.25	6.00	9.00	3.25	3.50	16.62	3.50	4.25	1.75	0.44 Dia.	0.25 (3)	1.50	#24 1½-12 UNF-2B	17.88	4.44	0.63	0.38 (2)	1.25	1.06
824	4.25	6.00	19.00	3.25	3.50	26.62	3.50	4.25	1.75	0.44 Dia.	0.25 (3)	1.50		27.88	4.44	0.63	0.38 (2)	1.25	1.06
836	4.25	6.00	31.00	3.25	3.50	38.62	3.50	4.25	1.75	0.44 Dia.	0.25 (3)	1.50		39.88	4.44	0.63	0.38 (2)	1.25	1.06
1014	5.25	6.75	9.00	3.75	4.00	17.12	4.00	5.25	2.00	.50 x .75	0.25 (3)	1.50		18.62	5.00	0.94	.38 (4)	1.50	1.50
1024	5.25	6.75	19.00	3.75	4.00	27.12	4.00	5.25	2.00	.50 x .75	0.25 (3)	1.50		28.62	5.00	0.94	.38 (4)	1.50	1.50
1036	5.25	6.75	31.00	3.75	4.00	39.12	4.00	5.25	2.00	.50 x .75	0.25 (3)	1.50	40.62	5.00	0.94	.38 (4)	1.50	1.50	
1224	6.25	7.75	18.25	4.25	4.88	27.13	4.50	6.25	2.50	.50 x .75	0.38 (3)	2.00	#32 2½-12 UNF-2B	29.02	5.43	1.00	.50 (4)	2.00	1.56
1236	6.25	7.75	30.25	4.25	4.88	39.13	4.50	6.25	2.50	.50 x .75	0.38 (3)	2.00		41.03	5.43	1.00	.50 (4)	2.00	1.56
1248	6.25	7.75	42.25	4.25	4.88	51.13	4.50	6.25	2.50	.50 x .75	0.38 (3)	2.00		53.03	5.43	1.00	.50 (4)	2.00	1.56
1260	6.25	7.75	55.25	4.25	4.88	63.13	4.50	6.25	2.50	.50 x .75	0.38 (3)	2.00		65.03	5.43	1.00	.50 (4)	2.00	1.56
1724	8.62	10.50	17.00	5.84	6.81	27.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	30.62	7.06	1.81	.50 (4)	2.50	2.25
1736	8.62	10.50	29.00	5.84	6.81	39.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	42.62	7.06	1.81	.50 (4)	2.50	2.25
1748	8.62	10.50	41.00	5.84	6.81	51.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	54.62	7.06	1.81	.50 (4)	2.50	2.25
1760	8.62	10.50	53.00	5.84	6.81	63.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	66.62	7.06	1.81	.50 (4)	2.50	2.25
1772	8.62	10.50	65.00	5.84	6.81	75.50	5.75	8.25	3.50	.62 x .88	0.38 (3)	3.00	—	78.62	7.06	1.81	.50 (4)	2.50	2.25

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

# Dimensions

## Four Pass

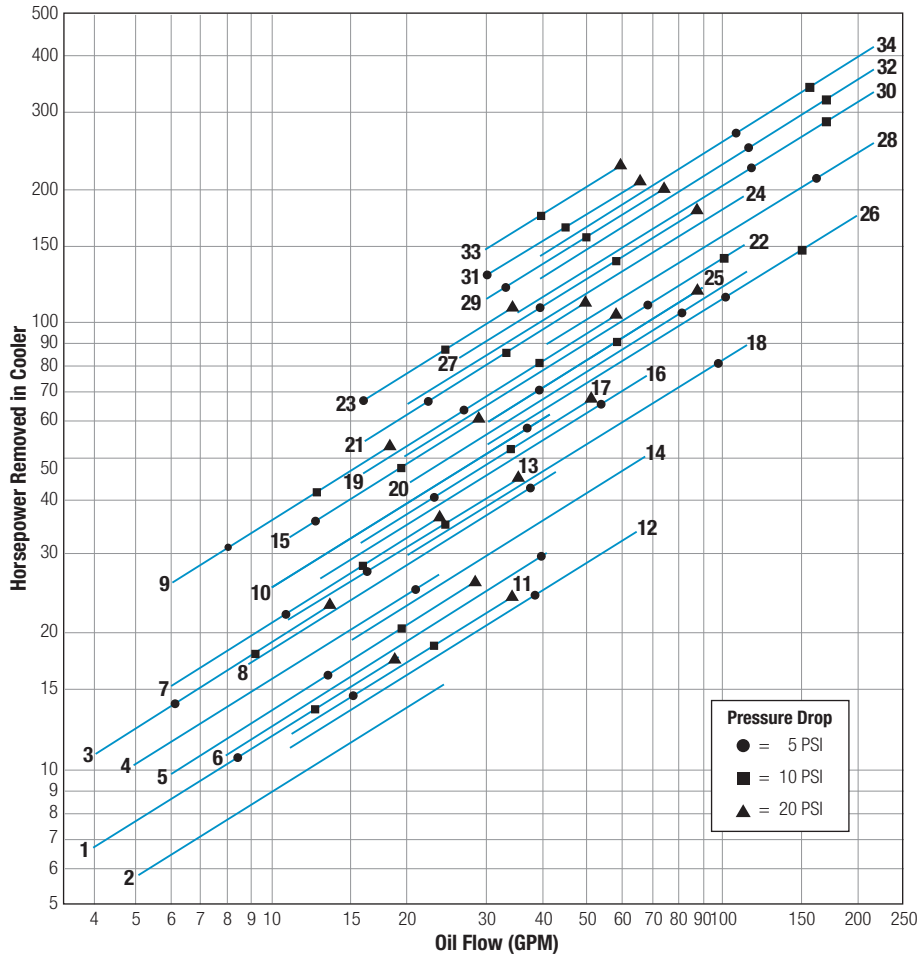


Flange Size	Z-CF	Z-CFM
1	3/8 - 16 UNC	M-10
1½	1/2 - 13 UNC	M-12
2	1/2 - 13 UNC	M-12
3	5/8 - 11 UNC	M-16

Model	A	B	C	D		E	F	G	H	J	K NPT	L		M	N	P	R NPT	S NPT/ BSPP	T
				NPT/ BSPP SAE O-Ring	SAE Flange							NPT/ BSPP Flange	SAE O-Ring						
614	3.25	4.50	10.00	2.62	2.88	16.38	2.75	4.18	1.62	0.44 Dia.	.25 (3)	1.00	#16 1½-12 UNF-2B	17.12	3.56	0.38	.38 (2)	.75	1.00
624	3.25	4.50	20.00	2.62	2.88	26.38	2.75	4.18	1.62	0.44 Dia.	.25 (3)	1.00	#16 1½-12 UNF-2B	27.12	3.56	0.38	.38 (2)	.75	1.00
814	4.25	6.00	9.00	3.25	3.50	16.62	3.50	4.25	1.75	0.44 Dia.	.25 (3)	1.50	#24 1½-12 UNF-2B	17.88	4.44	0.63	.38 (3)	.75	1.06
824	4.25	6.00	19.00	3.25	3.50	26.62	3.50	4.25	1.75	0.44 Dia.	.25 (3)	1.50		27.88	4.44	0.63	.38 (3)	.75	1.06
836	4.25	6.00	31.00	3.25	3.50	38.62	3.50	4.25	1.75	0.44 Dia.	.25 (3)	1.50		39.88	4.44	0.63	.38 (3)	.75	1.06
1014	5.25	6.75	9.00	3.75	4.00	17.12	4.00	5.25	2.00	.50 x .75	.25 (3)	1.50		18.81	4.81	0.75	.38 (3)	1.00	1.50
1024	5.25	6.75	19.00	3.75	4.00	27.12	4.00	5.25	2.00	.50 x .75	.25 (3)	1.50	#32 2½-12 UNF-2B	28.81	4.81	0.75	.38 (3)	1.00	1.50
1036	5.25	6.75	31.00	3.75	4.00	39.12	4.00	5.25	2.00	.50 x .75	.25 (3)	1.50		40.81	4.81	0.75	.38 (3)	1.00	1.50
1224	6.25	7.75	18.25	4.25	4.88	27.13	4.50	6.25	2.50	.50 x .75	.38 (3)	2.00		29.13	5.44	1.00	.38 (3)	1.50	1.56
1236	6.25	7.75	30.25	4.25	4.88	39.13	4.50	6.25	2.50	.50 x .75	.38 (3)	2.00	#32 2½-12 UNF-2B	41.13	5.44	1.00	.38 (3)	1.50	1.56
1248	6.25	7.75	42.25	4.25	4.88	51.13	4.50	6.25	2.50	.50 x .75	.38 (3)	2.00		53.13	5.44	1.00	.38 (3)	1.50	1.56
1260	6.25	7.75	55.25	4.25	4.88	63.13	4.50	6.25	2.50	.50 x .75	.38 (3)	2.00		65.13	5.44	1.00	.38 (3)	1.50	1.56
1724	8.62	10.50	17.00	5.84	6.81	27.50	5.75	8.25	3.50	.62 x .88	.38 (3)	3.00	—	29.86	7.06	1.81	.38 (3)	2.00	2.50
1736	8.62	10.50	29.00	5.84	6.81	39.50	5.75	8.25	3.50	.62 x .88	.38 (3)	3.00	—	41.86	7.06	1.81	.38 (3)	2.00	2.50
1748	8.62	10.50	41.00	5.84	6.81	51.50	5.75	8.25	3.50	.62 x .88	.38 (3)	3.00	—	53.86	7.06	1.81	.38 (3)	2.00	2.50
1760	8.62	10.50	53.00	5.84	6.81	63.50	5.75	8.25	3.50	.62 x .88	.38 (3)	3.00	—	65.86	7.06	1.81	.38 (3)	2.00	2.50
1772	8.62	10.50	65.00	5.84	6.81	75.50	5.75	8.25	3.50	.62 x .88	.38 (3)	3.00	—	77.86	7.06	1.81	.38 (3)	2.00	2.50

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

# Performance Curves



Curve Number	Model	Shipping Weight (LBS)
1	SSC-614-1.3-4-F	17
2	SSC-614-3-4-F	17
3	SSC-624-1.3-4-F	24
4	SSC-624-3-4-F	24
5	SSC-814-1.7-4-F	32
6	SSC-814-4-4-F	32
7	SSC-824-1.7-4-F	41
8	SSC-824-4-4-F	41
9	SSC-836-1.7-4-F	53
10	SSC-836-4-4-F	53
11	SSC-1014-2-6-F	43
12	SSC-1014-5-6-F	43
13	SSC-1024-2-6-F	57
14	SSC-1024-5-6-F	57
15	SSC-1036-2-6-F	72
16	SSC-1036-5-6-F	72
17	SSC-1224-2.5-6-F	85
18	SSC-1224-6-6-F	85
19	SSC-1236-2.5-6-F	110
20	SSC-1236-6-6-F	110
21	SSC-1248-2.5-6-F	135
22	SSC-1248-6-6-F	135
23	SSC-1260-2.5-6-F	160
24	SSC-1260-6-6-F	160
25	SSC-1724-3.5-6-F	140
26	SSC-1724-8.4-6-F	140
27	SSC-1736-3.5-6-F	180
28	SSC-1736-8.4-6-F	180
29	SSC-1748-3.5-6-F	220
30	SSC-1748-8.4-6-F	220
31	SSC-1760-3.5-6-F	260
32	SSC-1760-8.4-6-F	260
33	SSC-1772-3.5-6-F	300
34	SSC-1772-8.4-6-F	300

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 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

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

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

**STEP 5 Determine Oil Pressure Drop from Curves.** Multiply pressure drop from curve by correction factor B found on oil viscosity correction curve.  
● = 5 PSI   ■ = 10 PSI   ▲ = 20 PSI

## Oil Temperature

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

Typical operating temperature ranges are:

Hydraulic Motor Oil	110°F - 130°F
Hydrostatic Drive Oil	130°F - 180°F
Lube Oil Circuits	110°F - 130°F
Automatic Transmission Fluid	200°F - 300°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 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 ΔT) with this formula:

$$\text{Oil } \Delta T = (\text{BTUs/HR}) / (\text{GPM Oil Flow} \times 210)$$

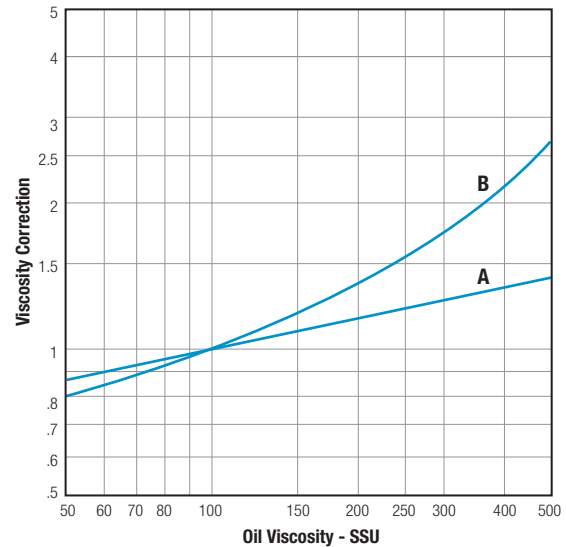
To calculate the oil leaving temperature from the cooler, use this formula:

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

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.

## Viscosity Correction



## Maximum Flow Rates

Example Model No.  
**SSC - 1024 - 2 - 6 - F**

Unit Size	Baffle Spacing	Shell Side (GPM)	Tube Side (GPM)		
			O	T	F
600	1.3, 3	19, 29	48	24	12
800	1.7, 4	32, 69	84	42	21
1000	2, 5	41, 69	146	73	37
1200	2.5, 6	60, 115	224	112	56
1700	3.5, 8.4	125, 253	465	232	116

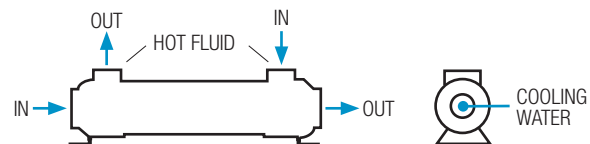
### Exceptions to Maximum Shell Side Flows

SSC-814-4-4-*	63 GPM Max.
SSC-1014-2-6-*	33 GPM Max.
SSC-1014-5-6-*	66 GPM Max.
SSC-1724-3.5-6-*	105 GPM Max.
SSC-1724-8.4-6-*	200 GPM Max.

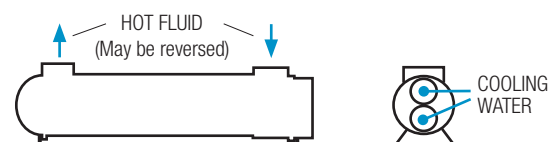
**Caution:** Incorrect installation can cause this product to fail prematurely, causing the shell side and tube side fluids to intermix.

## Piping Diagram

### One Pass



### Two and Four Pass



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