Applications:

Hiross STA Oil Coolers offer a wide selection for fluid to fluid and fluid to gas applications. Standard sizes range from 3 to 8 inch diameter and 14 to 72 inch lengths. Other sizes are available for special or non-standard requirements. Performance can be easily varied by optional baffle spacing or with 1, 2 or 4 pass arrangements. The Hiross STA Oil Coolers are efficient, heavy-duty, compact, shell and tube type heat exchangers designed for long life in the most adverse installations.

Computerized design enables Hiross to construct heat exchangers to customer's specific requirements.

Computer printouts are readily available for all applications.

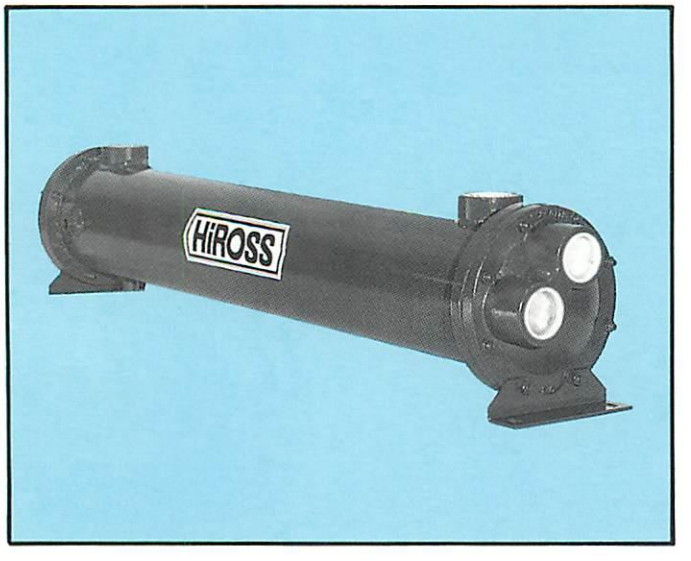
Materials of Construction:

Standard: Cast Iron Bonnets
Carbon Steel Shell
Copper Tubes

Optional: Zinc Anodes
Admirality Tubes
Stainless Steel Tubes or Shell
Cupro Nickel Tubes or Shell

Typical Applications

Air Compressors
Machine Tools
Transformer Oils
Automotive
Torque Converters
Hydraulic Power Units
Trim Coolers



Selection Procedure:

STA oil coolers are sized based on MBH (Thousand BTU/hr) to be rejected. The following formulas will assist in determining MBH;

Light Turbine Oil:

$$MBH = \frac{(GPM)X(200)X(Oil\ \Delta\ T)}{1000}$$

Water:

$$MBH = \frac{(GPM)X(500)X(WATER\ \Delta\ T)}{1000}$$

Where: 200 = BTUH per GPM of oil
500 = BTUH per GPM of water
ΔT = Difference between hot and cold temperature (oil or water)

For other liquids and gases consult factory.

The following correction factors (CF) are also needed.

CF #1) Water temperature entering STA oil cooler:

°F	70	75	80	85	90	95	100	105	110	115	120
CF	.71	.77	.83	.91	1.00	1.11	1.26	1.45	1.68	2.05	2.56

CF #2) Oil temperature leaving STA oil cooler:

°F	110	115	120	125	130	135	140
CF	2.94	2.27	1.85	1.54	1.31	1.14	1.00
°F	145	150	155	160	165	170	175
CF	.90	.81	.73	.65	.60	.56	.52

CF #3) Glycol Percentage:

%	AVERAGE SOLUTION TEMPERATURE °F							
GLY.	110°	120°	130°	140°	150°	160°	170°	180°
0%	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
20%	0.961	0.963	0.957	0.960	0.963	0.960	0.958	0.955
30%	0.935	0.936	0.939	0.935	0.938	0.938	0.936	0.937
40%	0.894	0.900	0.900	0.903	0.904	0.906	0.905	0.907
50%	0.867	0.870	0.873	0.876	0.879	0.881	0.884	0.875

Sizing and Selection Process:

Standard Oil Coolers:

1.) Determine the following information about the application:

A) Heat Rejection (MBH)
B) Oil Entering Temperature (°F to cooler)
C) Oil Leaving Temperature (°F from cooler)
D) Oil Flow Rate (GPM)
E) Cooling Water Entering Temperature (°F)

NOTE: If heat rejection value (A) is unknown, it may be calculated from the oil entering temperature (B) and oil leaving temperature (C) and oil flow rate (D) by using the "light turbine oil" formula from page 2.

2.) Using the correction factor tables from the previous page for entering water temperature, leaving oil temperature and glycol percentage in your specific application, correct the MBH.

3.) Finally, enter the "four pass or two pass" performance charts at the proper oil flow rate and read down the column to find the MBH value that is equal to or greater than your calculated MBH. If the oil pressure drop is acceptable, read cooler model number at left.

NOTE: If your oil flow rate is between columns, interpolate accordingly.

Example: I

1.) A) unavailable
B) 180°F entering oil temperature
C) 150° leaving oil temperature
D) 15 GPM
E) 85°F entering water temperature (0% glycol)

THEREFORE:

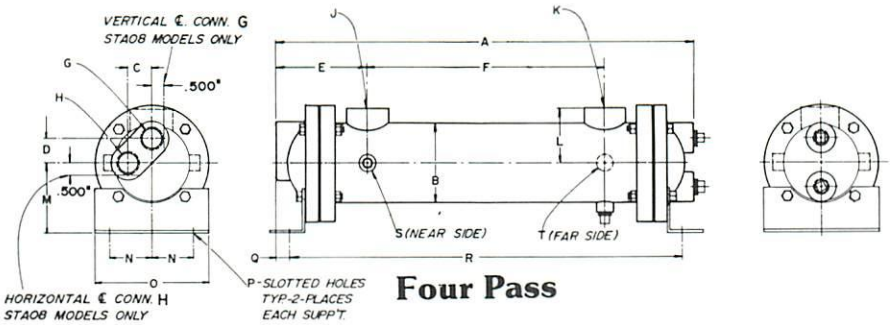
$$MBH = \frac{(GPM)X(200)X(Oil\ \Delta\ T)X(CF\#1)X(CF\#2)X(CF\#3)}{1000}$$

2.) $$MBH = \frac{(15)X(200)X(30)X(.91)X(.81)X(1)}{1000} = 66.34$$

3.) Enter performance charts and read the following values for 2 and 4 pass models.

A.) Model STA 04024L - 4 pass with oil pressure drop of less than 1 psi. Water consumption would be 15 GPM (1:1 ratio).
ΔP_{water}= 5.8 psi, ΔT_{water}= 8.8°F

B.) Model STA 04024L - 2 pass with oil pressure drop of less than 1 psi. Water consumption would be 30 GPM (1:2 ratio)
ΔP_{water}= 2.9 psi, ΔT_{water}= 4.4°F



Four Pass

DIMENSIONS IN INCHES																			
MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T
STA03014	17.187	3.250	1.000	1.000	3.567	10.000	3/4" F.P.T.	3/4" F.P.T.	1" F.P.T.	1" F.P.T.	2.312	2.750	1.625	4.500	7/16 x 3/4	.375	16.375	1/4" F.P.T.	1/4" F.P.T.
STA03024	27.187	3.250	1.000	1.000	3.562	20.000											26.375		
STA04014	17.567					9.000											16.625		
STA04024	27.562	4.250	1.250	1.250	4.437	19.000	3/4" F.P.T.	3/4" F.P.T.	1-1/2" F.P.T	1-1/2" F.P.T	3.125	3.500	1.750	4.250	7/16 x 3/4	.625	26.625	1/4" F.P.T.	1/4" F.P.T.
STA04036	39.562					31.000											38.625		
STA05014	18.437					9.000											17.125		
STA05024	28.437	5.250	1.688	1.688	4.812	19.000	1" F.P.T.	1" F.P.T.	1-1/2" F.P.T	1-1/2" F.P.T	3.437	4.000	2.000	5.250	1/2 x 3/4	.750	27.125	1/4" F.P.T.	1/4" F.P.T.
STA05036	40.437					31.000											39.125		
STA06024	28.567					18.250											27.125		
STA06036	40.567	6.250	2.000	2.000	5.437	30.250	1-1/2" F.P.T	1-1/2" F.P.T	2" F.P.T.	2" F.P.T.	4.062	4.500	2.500	6.250	1/2 x 3/4	1.000	39.125	3/8" F.P.T.	3/8" F.P.T.
STA06048	52.567					42.250											51.125		
STA06060	64.562					54.250											63.125		
STA08024	30.437					17.000											27.500		
STA08036	42.437					29.000											39.500		
STA08048	54.437	8.625	2.500	2.500	7.062	41.000	2" F.P.T.	2" F.P.T.	3" F.P.T.	3" F.P.T.	5.437	5.750	3.500	8.250	5/8 x 7/8	1.812	51.500	2/8" F.P.T.	3/8" F.P.T.
STA08060	66.437					53.000											63.500		
STA08072	78.437					65.000											75.500		

Consult factory for dimensional information on two pass units. Standard Manufacturing tolerances apply.

Selection Chart

Four Pass Units
MBH/Oil Pressure Drop (PSI)

MODEL ▼ / OIL GPM ▶	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
STA03014-S	25.8 0.8	34.4 1.8													
STA03014-L	20.8 0.3	28.7 0.6													
STA03024-S	43.7 0.8	58.2 1.8	← MBH ← ΔP												
STA03024-L	39.2 0.4	52.6 0.8													
STA04014-S	37.8 0.8	51.3 1.7	61.0 2.6												
STA04014-L	30.7 0.3	42.5 0.5	51.0 0.8												
STA04024-S	66.1 0.7	88.6 1.6	104.3 2.6												
STA04024-L	54.5 0.3	73.9 0.5	87.8 0.8												
STA04036-S	106.7 0.9	145.5 2.2	170.0 3.7												
STA04036-L	89.7 0.3	120.9 0.6	142.4 1.0												
STA05014-S	31.6 0.6	44.3 1.2	53.7 2.2	61.1 3.8	67.7 5.9										
STA05014-L	25.8 0.2	36.6 0.4	44.7 0.6	51.3 0.8	56.8 1.0										
STA05024-S	55.0 0.5	75.7 1.2	90.9 2.0	103.1 3.1	113.5 4.8										
STA05024-L	45.3 0.2	63.0 0.4	76.3 0.6	87.1 0.8	96.4 1.1										
STA05036-S	90.5 0.7	124.2 1.7	147.6 2.8	166.2 5.0	181.6 7.6										
STA05036-L	74.7 0.2	102.8 0.4	123.1 0.7	139.4 1.0	153.1 1.3										
STA06024-S		92.3 0.7	111.0 1.2	126.5 1.6	139.4 2.2	151.0 3.0	161.3 4.0								
STA06024-L		83.4 0.4	100.7 0.6	115.1 0.9	127.2 1.1	138.2 1.4	147.7 1.6								
STA06036-S		152.0 0.9	181.9 1.5	205.6 2.2	225.8 3.1	243.3 4.5	258.4 6.0								
STA06036-L		125.4 0.2	150.6 0.4	171.1 0.5	188.7 0.7	203.9 0.9	217.7 1.1								
STA06048-S		203.2 0.8	247.1 1.3	279.1 1.9	305.8 2.6	328.7 3.6	349.1 4.9								
STA06048-L		169.8 0.2	203.7 0.4	231.1 0.5	254.1 0.7	274.5 0.9	292.6 1.1								
STA06060-S		245.5 0.7	304.4 1.1	348.9 1.6	383.0 2.1	411.6 2.9	437.0 3.9								
STA06060-L		218.2 0.3	268.0 0.4	304.5 0.6	334.4 0.8	360.2 1.1	383.2 1.3								
STA08024-S			178.1 0.6	203.3 0.9	225.2 1.2	244.3 1.4	276.7 1.7	261.3 2.1	291.1 2.6	304.4 3.2	316.8 3.9	328.8 4.6	340.0 5.4	350.1 6.2	360.1 7.1
STA08024-L			155.2 0.3	177.5 0.4	196.8 0.5	214.2 0.6	229.7 0.7	243.8 0.8	257.2 0.9	269.4 1.1	281.0 1.2	291.6 1.3	302.3 1.4	311.6 1.6	321.2 1.8
STA08036-S			271.4 0.5	310.9 0.7	343.2 1.0	371.6 1.2	396.8 1.5	419.7 1.8	440.9 2.1	460.1 2.5	478.6 3.0	495.5 3.5	511.4 4.1	526.0 4.7	540.2 5.4
STA08036-L			243.7 0.3	278.0 0.4	307.5 0.5	333.4 0.6	256.7 0.8	378.0 0.9	397.2 1.0	415.3 1.2	432.0 1.3	447.7 1.5	462.8 1.6	477.4 1.8	490.3 1.9
STA08048-S			369.4 0.6	432.7 0.8	484.8 1.0	528.6 1.3	565.3 1.6	597.3 2.0	626.5 2.5	653.2 3.1	678.2 3.7	701.4 4.4	722.9 5.1	743.7 5.9	762.6 6.7
STA08048-L			325.1 0.2	377.7 0.3	421.0 0.4	455.9 0.5	487.4 0.6	515.5 0.7	541.6 0.8	565.8 0.9	587.9 1.0	609.2 1.2	629.1 1.3	647.8 1.4	665.3 1.5
STA08060-S				526.5 0.2	598.4 1.0	658.2 1.3	710.5 1.6	756.6 1.9	797.5 2.4	833.9 2.9	865.7 3.5	895.0 4.2	922.2 4.9	947.9 5.6	972.6 6.4
STA08060-L				479.8 0.3	541.2 0.4	593.3 0.6	639.0 0.7	679.0 0.8	712.9 0.9	743.8 1.1	773.2 1.2	799.8 1.4	825.3 1.6	848.8 1.7	872.0 1.9
STA08072-S						787.2 1.4	859.1 1.7	920.6 2.2	975.4 2.8	1025.1 3.4	1070.0 4.1	1111.6 4.8	1149.4 5.6	1184.1 6.5	1214.3 7.5
STA08072-L						689.4 0.4	756.4 0.5	807.5 0.6	854.1 0.7	896.0 0.9	933.7 1.0	966.5 1.1	996.5 1.2	1025.9 1.4	1052.9 1.5

Performance based on 140°F oil leaving temperature, 90°F cooling water temperature and a 1:1 oil to water flow ratio. Calculations made with light turbine oil. Consult factory for other conditions.

Note: ① Average ΔP_{Water} = 4 PSI

② $\Delta T_{Water} = \frac{2 \times (\text{MBH Calculated})}{GPM_{Water}}$

Selection Chart

Two Pass Units
MBH/Oil Pressure Drop (PSI)

MODEL ▼ / OIL GPM ▶	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
STA03014-S	26.8 0.8	35.6 1.7													
STA03014-L	21.7 0.2	29.5 0.5													
STA03024-S	48.2 0.8	61.9 1.8	← MBH ← ΔP												
STA03024-L	42.7 0.3	55.6 0.7													
STA04014-S	41.0 0.7	54.2 1.6	63.6 2.6												
STA04014-L	32.8 0.2	44.3 0.5	52.8 0.8												
STA04024-S	78.0 0.7	97.9 1.5	112.5 2.6												
STA04024-L	61.8 0.2	80.1 0.5	93.5 0.8												
STA04036-S	144.3 0.8	175.7 1.9	194.4 3.5												
STA04036-L	113.9 0.2	140.2 0.5	158.8 0.9												
STA05014-S	33.7 0.5	46.3 1.2	55.6 2.2	63.0 3.9	69.3 5.9										
STA05014-L	27.2 0.2	37.9 0.4	46.0 0.6	52.5 0.8	58.0 1.0										
STA05024-S	62.5 0.5	82.3 1.2	96.9 1.9	108.9 3.1	119.0 4.8										
STA05024-L	50.1 0.2	67.4 0.4	80.4 0.6	91.1 0.8	100.3 1.0										
STA05036-S	114.9 0.6	144.6 1.6	165.2 2.9	182.1 5.0	196.5 7.7										
STA05036-L	90.7 0.2	115.7 0.4	134.9 0.7	150.4 1.0	163.5 1.3										
STA06024-S				135.5 1.7	147.9 2.1	159.2 3.0	169.3 4.0	178.4 5.2							
STA06024-L				122.4 0.9	134.4 1.1	144.9 1.4	154.6 1.6	163.2 1.9							
STA06036-S				231.8 2.2	249.8 3.2	265.9 4.5	280.2 6.01	293.4 7.8							
STA06036-L				188.7 0.5	205.1 0.7	219.5 0.9	233.0 1.1	245.0 1.3							
STA06048-S				333.4 1.8	354.8 2.6	374.0 3.7	391.7 5.0	407.6 6.4							
STA06048-L				265.9 0.5	286.0 0.7	304.3 0.9	320.9 1.1	336.5 1.3							
STA06060-S				438.8 1.5	467.1 2.0	490.2 2.9	509.2 3.9	527.3 5.1							
STA06060-L				371.4 0.6	396.1 0.8	416.9 1.0	436.3 1.2	454.2 1.5							
STA08024-S				228.8 0.9	248.8 1.1	267.0 1.4	283.5 1.7	298.2 2.1	311.9 2.6	324.6 3.2	336.6 3.9	348.4 4.6	358.7 5.4	369.0 6.2	378.9 7.1
STA08024-L				196.3 0.4	214.8 0.5	231.4 0.6	246.5 0.7	260.1 0.8	273.0 0.9	285.3 1.1	296.5 1.2	306.9 1.3	317.0 1.4	326.7 1.6	335.8 1.8
STA08036-S				379.9 0.7	408.5 0.9	432.2 1.2	453.9 1.5	474.2 1.7	492.9 2.0	510.3 2.5	527.1 3.0	542.8 3.5	557.5 4.1	571.6 4.8	585.1 5.4
STA08036-L				332.2 0.4	357.2 0.5	380.2 0.6	401.2 0.7	420.3 0.9	438.5 1.0	455.2 1.2	471.4 1.3	486.1 1.5	500.5 1.6	513.3 1.8	526.3 1.9
STA08048-S				587.7 0.7	632.0 0.9	667.3 1.2	697.4 1.5	724.2 2.0	748.3 2.5	768.4 3.1	787.9 3.7	806.9 4.4	824.1 5.2	841.3 6.0	857.8 6.8
STA08048-L				487.5 0.2	524.9 0.3	555.5 0.4	582.6 0.5	605.3 0.7	626.9 0.8	647.2 0.9	666.7 1.0	684.9 1.1	702.4 1.2	719.3 1.4	735.2 1.5
STA08060-S				796.3 0.6	845.3 0.9	905.5 1.1	943.5 1.5	977.6 1.9	1008.6 2.4	1036.7 2.9	1061.2 3.5	1084.8 4.2	1106.5 4.9	1124.7 5.7	1142.3 6.5
STA08060-L				688.1 0.3	741.1 0.4	780.9 0.5	816.3 0.6	848.6 0.7	876.3 0.9	901.8 1.0	926.1 1.2	946.0 1.3	965.6 1.5	984.3 1.6	1002.6 1.8
STA08072-S				1024.7 054	1063.8 1.2	1192.1 1.2	1223.8 2.0	1295.9 2.2	1333.1 2.8	1366.4 3.4	1396.7 4.1	1425.4 4.9	1452.0 5.7	1476.7 6.6	1498.1 7.5
STA08072-L				866.6 0.2	908.0 0.3	992.1 0.4	1034.8 0.5	1072.0 0.6	1105.8 0.7	1137.7 0.8	1166.9 0.9	1192.2 1.0	1216.8 1.1	1239.7 1.3	1260.8 1.4

Performance based on 140°F oil leaving temperature, 90°F cooling water temperature and a 1:2 oil to water flow ratio. Calculations made with light turbine oil. Consult factory for other conditions.

Note: ① Average ΔP_{Water} = 2 PSI

② $\Delta T_{Water} = \frac{2 \times (\text{MBH Calculated})}{GPM_{Water}}$