Heat Exchangers

Thermal Transfer Products
A ThermaSys® Company

Allison Hydraulics

Index

Heat Exchangers

Features:

- Bar and Plate Brazed Aluminium Core
- Rugged, lightweight, and compact
- Provides the best heat transfer per given envelope size while minimising pressure drop
- Air-side fin design minimises fouling and static pressure ensuring long-term, reliable performance
- Welded fittings/ports and manifolds ensure structural integrity
- Customised units are available to meet your specific performance requirements
- Additional capabilities for radiators, charge-air-coolers, condensers, and multi-circuit units
- T-BAR core optional for high viscosity oils or other highly fouling fluids
- Low noise option available

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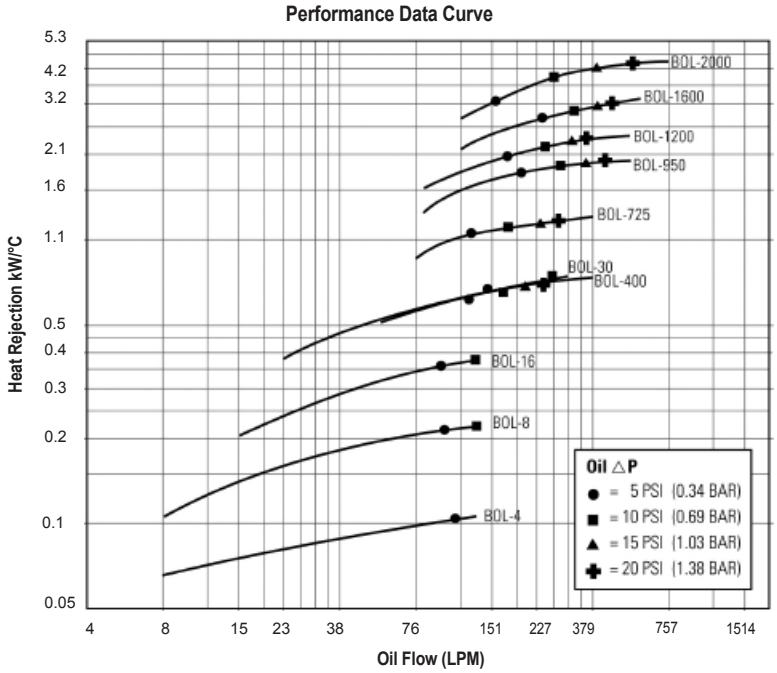
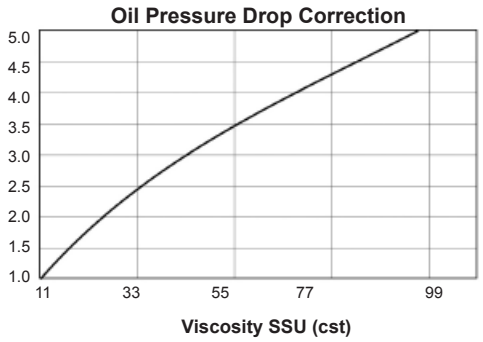
Main Characteristics:

Performance curve - BOL models with with standard P-BAR Core





Ratings:

Maximum Operating Pressure
250 psi (17 BAR)

Maximum Operating Temperature
300° F (150° C)

Materials:

Mounting Feet Steel
Standard Core Brazed Aluminium Bar and Plate
- Tanks – 5052 Aluminium
- Nose Bar & Little Bar – 3003-H Aluminium
- Air Fin, Plate, Turbulator & End Plate – 3003-0 Aluminium

Fanguard Steel
Connectors Aluminum
Fan Aluminium Hub, Plastic Blades
Shroud Steel
Motor TEFC & IEC

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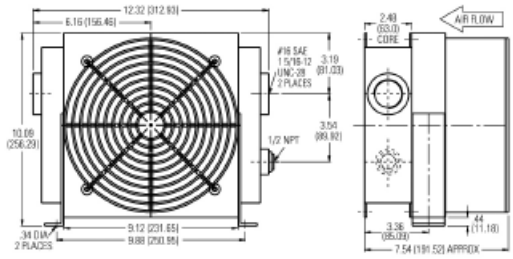
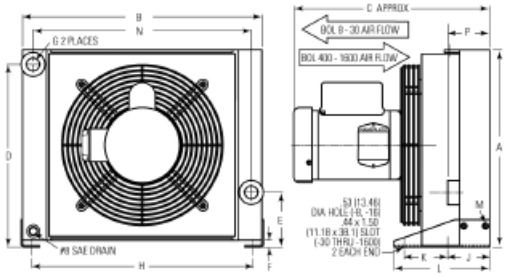
Dimensions:

Model	A	B	C	D	E	F	BSPP* (G)	H	J	K	L	N	P	Approx. Ship Wt. Kg
BOL-4	See diagram below			-	-	-	-	-	-	-	-	-	-	8
BOL-8	316	400	380	288	83	14	.75”	369	78	89	187	256	88	20
BOL-16	413	500	389	383	115	14	.75”	465	85	95	200	456	88	25
BOL-30	526	670	412	495	134	34	1.25”	628	108	127	254	618	134	57
BOL-400	504	570	440	440	165	51	1.25”	566	108	127	254	510	132	67
BOL-725	619	770	445	549	165	51	1.25”	766	108	127	254	710	132	77
BOL-950	732	941	541	624	241	51	2”	912	154	234	406	870	178	136
BOL-1200	732	1040	593	624	140	51	2”	1024	154	234	406	970	178	195
BOL-1600	937	1040	593	829	241	51	2”	1024	154	234	406	970	178	234
BOL-2000	See diagram below			-	-	-	-	-	-	-	-	-	-	264

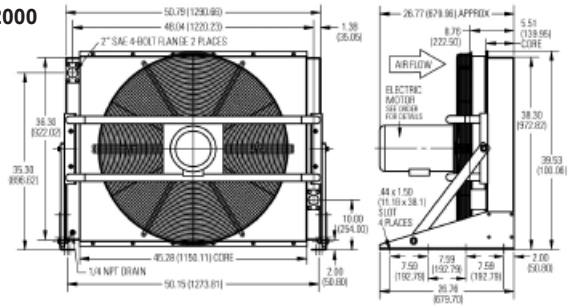
BOL-4



BOL-8 through BOL-1600



BOL-2000



Model code

BOL	4	1	2	TB	LN

Model series

Size:
4, 8, 16, 30, 400, 725, 950, 1200, 1600, 2000

Connection type*:
1 = NPT as standard
2 = SAE
3 = BSPP as standard

Motor type:
2 = single phase
9 = hydraulic
18 = IEC three phase

Core:
blank = standard bar and plate
TB = T-BAR Core*

Noise level:
blank = standard noise level
LN = low noise level

*T-BAR Core option provides a T-BAR core in BOL frame. Used for high fouling or high viscosity fluids.
Performance is typically 15-25% less than the bar and plate core.

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Selection procedure

Step 1 **Determine Heat Load.** Typical Rule of Thumb, - size cooler for 1/3 of the input kW.

Step 2 **Determine Entering Temperature Difference.** (Actual E.T.D.)

(E.T.D.= Entering oil temperature (ºC) – Entering Ambient air temperature (ºC)

- The entering oil temperature is generally the maximum desired system oil temperature.
- Entering air temperature is the highest Ambient Air temperature the application will see.

Step 3 **Determine Heat Dissipation to use the Curves**
English Version:

$$\text{Corrected Heat Rejection} = \frac{\text{kW}}{\text{ºC}} \times \frac{\text{Heatload (kW)}}{\text{Desired E.T.D (ºC)}}$$

Step 4 **Select Model From Curves** Enter the Performance Curves at the bottom with the LPM oil flow and proceed upward to the adjusted Heat Rejection from Step 3. Any Model or Curve on or above this point will meet these conditions.

Step 5 **Calculate Oil Pressure Drop** Find the oil pressure drop correction factor and multiply it by the Oil Pressure Drop found on performance curve.

Listed Performance Curves are based on:
- 32 cSt oil

If your application conditions are different, then continue with the selection procedure.

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Features:

- Bar and Plate Brazed Aluminium Core.
- Rugged, lightweight, and compact.
- Provides the best heat transfer per given envelope size while minimising pressure drop.
- Air-side fin design minimises fouling and static pressure ensuring longterm, reliable performance.
- Fan motor assembly has an IP 68 with AMP -#180908 connection.
- Welded aluminium fittings/ports and manifolds ensure structural integrity.
- Standard SAE ports – NPT and BSPP ports available.
- Customised units are available to meet your specific performance requirements.
- Additional capabilities for radiators, charge-air-coolers, condensers and multi-circuit units.

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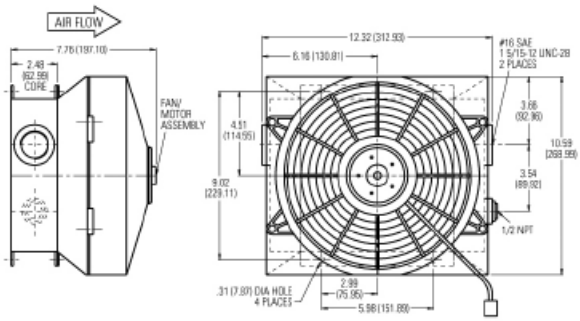
Main Characteristics:

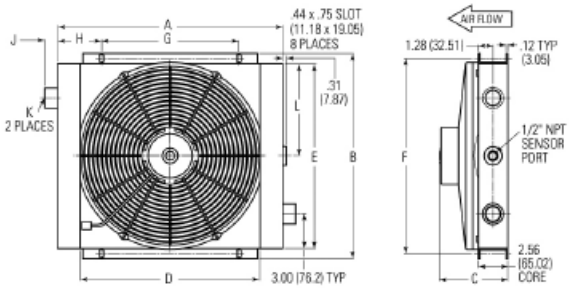
Model	A	B	C	D	E	F	G	H	J	K BSPP	L	DC Amp Draw 12V	DC Amp Draw 24V	CMM	Approx. Ship Wt. Kg
MA-4-4	See diagram below			-	-	-	-	-	-	-	-	12.5	6.3	10.28	7
MA-12-4	350	297	159	250	253	276	145	112	25	3/4”	126	12.5	6.3	14.75	9
MA-18-4	400	345	128	300	300	325	149	126	25	3/4”	150	10.6	5.3	22.17	10
MA-32-4	500	468	151	400	410	440	305	98	29	1”	205	22.2	11.1	38.74	13
MA-48-4	See diagram below			-	-	-	-	-	-	-	-	22.2	11.1	46.40	20
MA-232-4	See diagram below			-	-	-	-	-	-	-	-	19.3*	9.7*	63.26	29
MA-248-4	See diagram below			-	-	-	-	-	-	-	-	19.3*	9.7*	82.24	41

Dimensions:

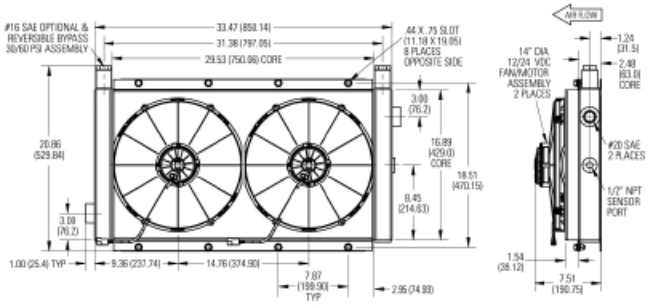
MA-4-4



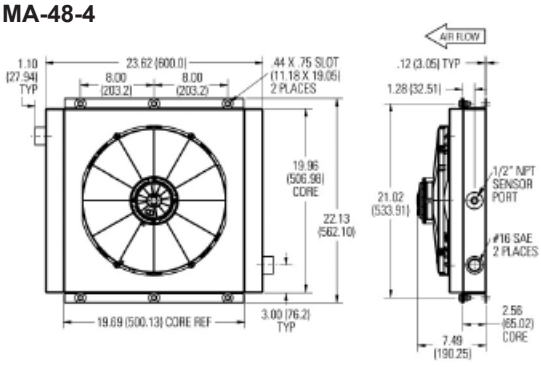
MA-12-4, MA-18-4, MA-32-4



MA-232-4



MA-48-4



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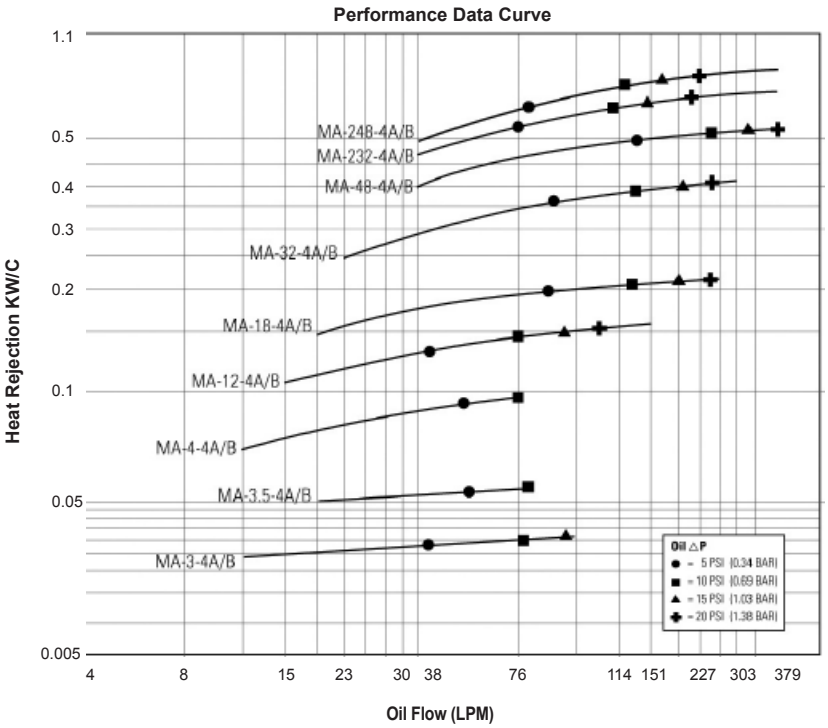
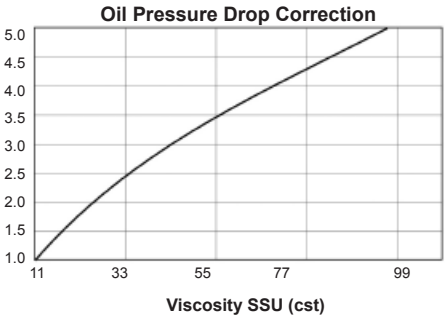
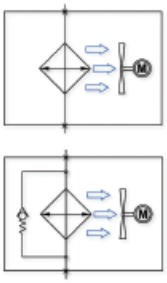
Performance curve - MA models with DC fan assemblies







Ratings:

Maximum Operating Pressure
250 psi (17 BAR)

Maximum Operating Temperature
300° F (150° C)

Materials:

Core Brazed Aluminium Bar and Plate
- Tanks – 5052 Aluminium
- Nose Bar & Little Bar – 3003-H Aluminium
- Air Fin, Plate, Turbulator & End Plate – 3003-O Aluminium

Connections: Aluminium
Core Mounting Brackets: Brazed Aluminium

Model code

MA	4	1	4A	30

Model series

Sizes:
4, 12, 18, 32, 48, 232, 248

Connection type*:
1 = NPT
2 = SAE
3 = BSPP as standard

Motor type:
4A = 12 VDC
4B = 24 VDC

Bypass*
30 = 30 PSI
60 = 60 PSI

*Bypass available on MA-12, MA-18, MA-32, MA-48, MA-232, MA-248 only. (MAR)
MA-8, MA-14, MA-20, MA-66, MA-32 do not have fan option.

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Selection procedure

Step 1 **Determine Heat Load.** Typical Rule of Thumb, - size cooler for 1/3 of the input kW.

Step 2 **Determine Entering Temperature Difference.** (Actual E.T.D.)
(E.T.D.= Entering oil temperature – Entering Ambient air temperature)
The entering oil temperature is generally the maximum desired system oil temperature.

Entering air temperature is the highest Ambient Air temperature the application will see, plus
– add any pre-heating of the air prior to its entering the cooler. Pay special attention if air is drawn from the engine compartment for cooling.

Step 3 **Find Air Velocity Correction Factor**
(Skip to Step 4 if using our DC Fan Assembly)

Calculate actual SMPM Air Velocity or SCMM (Standard Cubic Metre per Minute) for selection using the Face Area from the table.

$$\text{SMPM} = \frac{\text{SCMM Air Flow}}{\text{Square Metre Cooler Face Area}}$$

(SCMM Air flow = SMPM Air velocity x Square Feet Cooler Face Area)

*If the air velocity calculated is different than the value in Step 4, then recheck corrected oil pressure drop.

Step 4 **Determine the Corrected Heat Dissipation to use the Curves**

$$\frac{\text{Corrected Heat Rejection (kW)}}{^{\circ}\text{C}} = \frac{\text{Heatload (kW)}}{(\text{E.T.D } (^{\circ}\text{C}) \times \text{Air Velocity Correction Factor})}$$

Step 5 **Select Model From Curves** Enter the Performance Curves at the bottom with the LPM oil flow and proceed upward to the adjusted Heat Rejection from Step 4. Any Model or Curve on or above this point will meet these conditions.

Step 6 **Calculate Oil Pressure Drop** Find the oil pressure drop correction factor and multiply it by the Oil Pressure Drop found on performance curve.

Listed Performance Curves are based on:

- 32 cSt oil
- 304.8 Standard Metres per Minute (SMPM) Air Velocity

If your application conditions are different, then continue with the selection procedure.

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Features:

- Copper & Steel Construction
- Compact Size
- High Efficiency Finned Bundle Design
- Low Cost
- Optional Patented Built-in Surge-Cushion® Relief Bypass
- 3/16" Tube Size
- Heat Removal up to 300 kW
- Oil Flow rates up to 300 Litres/min.
- Large Oil Connections for Minimum Entering and Exiting Flow Restriction
- Removable End Bonnets for easy tube cleaning
- Mounting Brackets Designed so that Cooler can be Rotated in 90° increments
- High Pressure Ratings
- Complete Line of Accessories Available

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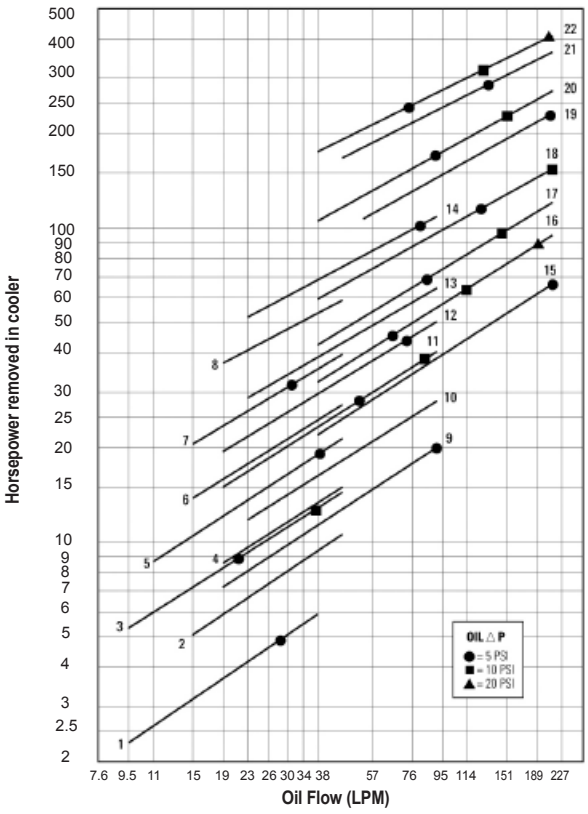
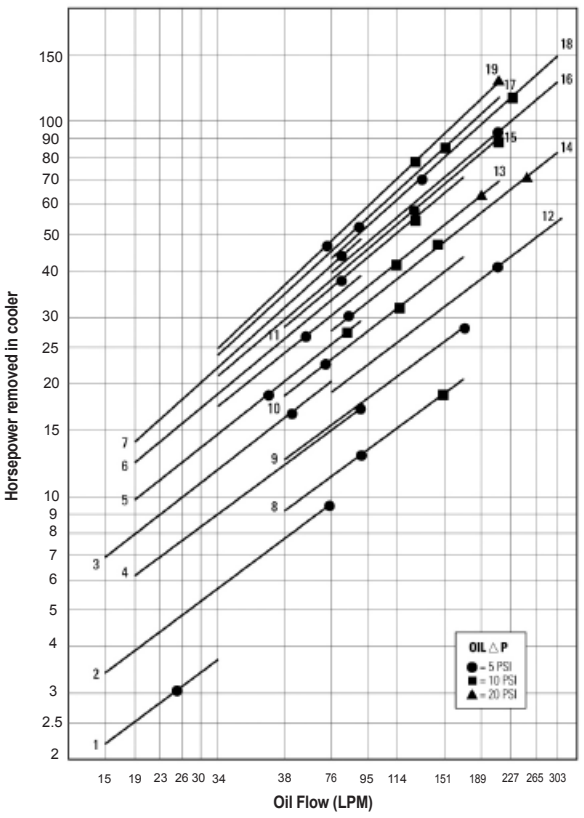
Main Characteristics:

Performance curves

1:1 oil to water ratio - high water usage



4:1 oil to water ratio - low water usage



Ratings:

Operating Pressure/Shell side 500 psi
Operating Pressure/Tubeshell side 150 psi
Operating Temperature 250° F

Materials:

Shell Steel
Tube Sheets Steel
Baffles Steel
Mounting Brackets Steel
Gaskets Nitrile Rubber/Cellulose Fibre
Nameplate Aluminium Foil
Tubes Copper
Fins Aluminium
End Caps Grey Iron

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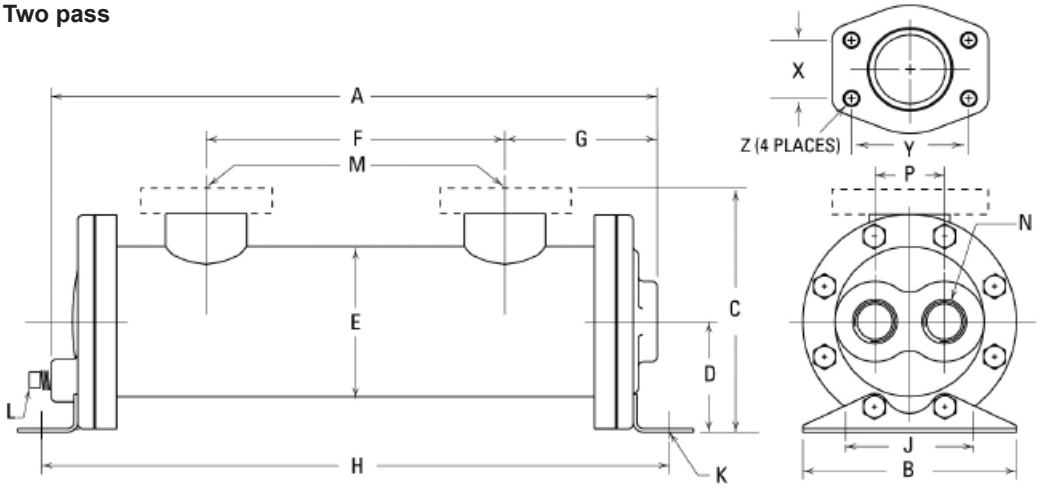
Dimensions:

Model	A	B	BSPP SAE O-RING	BSPP SAE FLANGE	D	E	F	G	H	J	K	L BSPP	M BSPP	N BSPP
EKM-505	187	89	95	N/A	41	65 DIA.	56	66	189	64	9 x 16 SLOT	N/A	3/4”	3/4”
EKM-508	264		99				98	83	265					
EKM-510	314						149		316					
EKM-512	365						199		367					
EKM-514	416						250		418					
EKM-518	518						352		519					
EKM-524	670						504		672					
EKM-536	975						809		976					
EKM-708	282	127	139	145	66	89 DIA.	76	103	272	76	11 x 19 SLOT	1/4”	1 1/2”	1 1/4”
EKM-712	384						178		374					
EKM-714	434						229		424					
EKM-718	536						330		526					
EKM-724	689						483		678					
EKM-736	994						787		983					
EKM-1012	389	165	195	210	102	128 DIA	157	16	392	102	11 x 25 SLOT		2”	1 1/2”
EKM-1014	440						208		443					
EKM-1018	542						309		545					
EKM-1024	695						462		697					
EKM-1036	999						767		1002					
EKM-1048	1304						1071		1307					

Two pass



Model code

EKM	****	*	O	R	CN	NP

Model series

Size

Baffle spacing:
EK-1036 and EK-1048 models only

Tubeside passes:
O = one pass
T = two pass
F = four pass

Surge cushion:
blank = no relief bypass
R = relief bypass

Cooling tube material:
blank = copper
CN = CuNi

End bonnet material:
blank = cast iron
NP = Electroless nickel plate (as standard)

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Selection procedure

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:

$$\text{HP heat load} \times \frac{40}{\text{Actual Approach}} \times \frac{\text{Viscosity}}{\text{Correction A}} = \frac{\text{Curve}}{\text{Horsepower}}$$

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.

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