



Air Cooled Liquid Cooler Application Request:
 For AOCS Series

Email form to: sales@aihti.com or engineering@aihti.com or fax to 434-757-1810

Contact Name _____ Telephone _____ Date _____

Company Name _____ Email _____

Address: _____ Fax _____

Hot Side

Cold Side

Fluid Type _____

Ambient Air _____

Density _____ lb/ft³

Altitude _____

Viscosity _____ cP

If available:

Thermal Conductivity _____ Btu/hr.ft.°F

Specific Heat _____ Btu/lb.°F

1. Flow Rate _____

1. Operating Pressure _____

2. Temperature In _____

2. Allowable Pressure Drop _____

3. Desired Temperature Out _____

ASME Code and Certified Yes No

4. Heat Load _____

To properly size the heat exchanger we need 3 of the 4 parameters on the Hot Side.

Cabinet Material:

Tubing Material:

Motor

Standard : Steel

Standard : Copper

60Hz: 230/460 Volt, 3 Phase

Options:

Galvanized Steel

Options:

90/10 Copper Nickel

115/230 Volt, 1 Phase

Stainless Steel

Stainless Steel

575 Volt, 3 Phase

Coating

Fins

50Hz 230/400 Volt, 3 Phase

Standard Enameled

Standard Aluminum

110/220 Volt, 1 Phase

Gray Paint

Options: Copper

Options: Epoxy Paint

Optional Coating: Heresite

Hydraulic Motor

Comment: _____

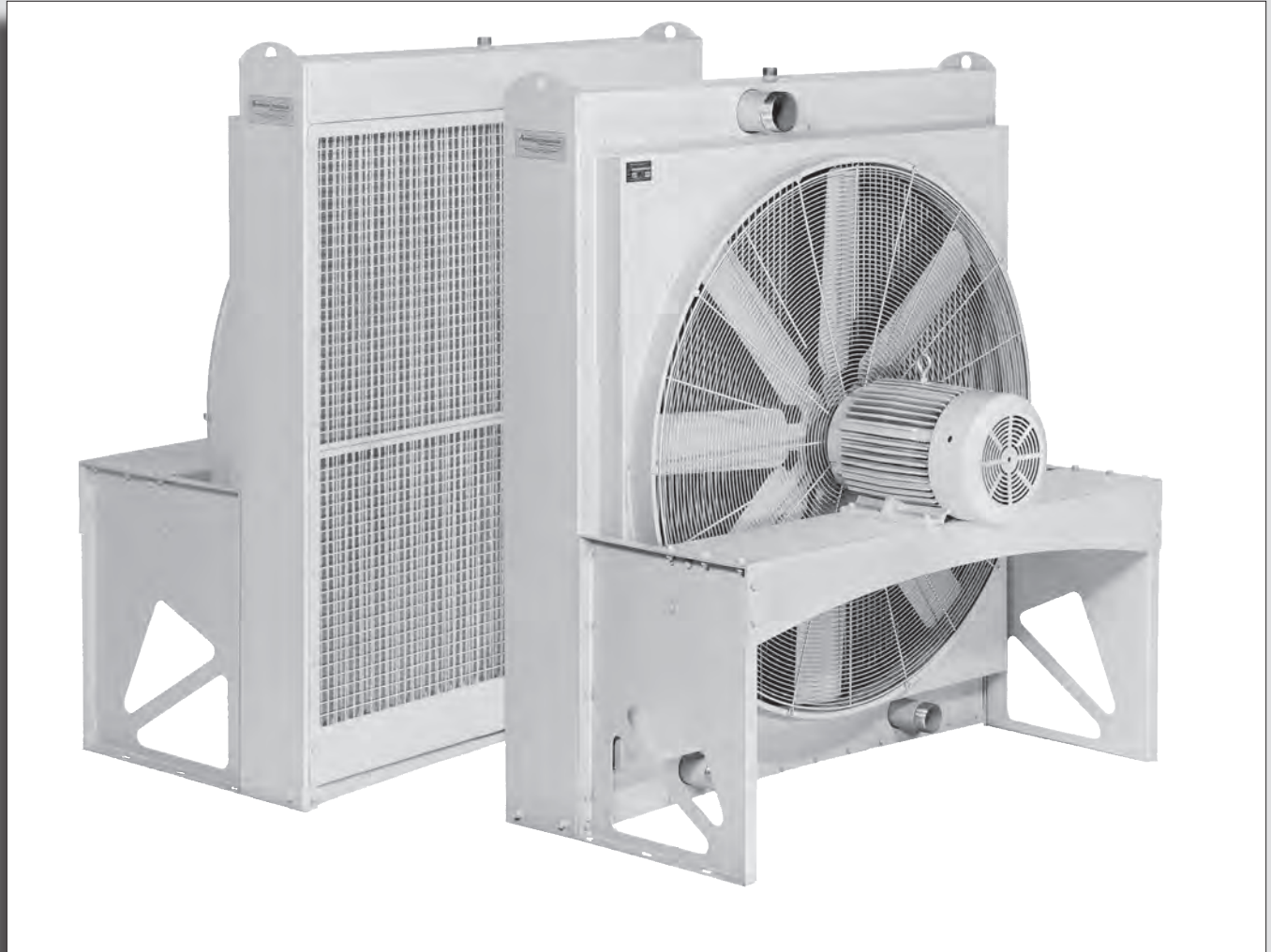
American Industrial Heat Transfer Inc.

Manufacturer of Quality Heat Exchangers



www.aihti.com

AOCS SERIES



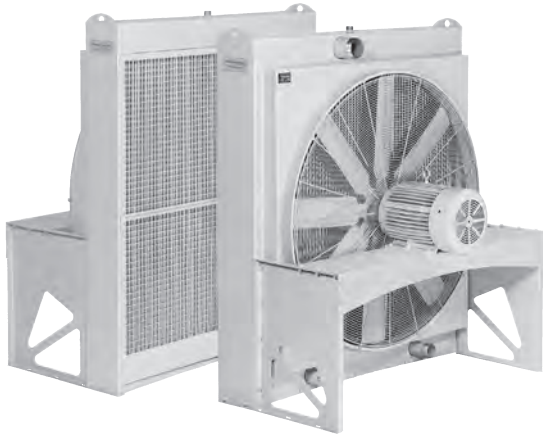
AIR COOLED

LIQUID COOLERS

- Severe duty construction with OSHA guard.
- Serviceable Core®.
- Thermal capacity to 1,400 hp (1,043 Kw).
- Operating temperature of 300°F at 200 PSI.
- Electric, hydraulic, or external drive.
- Optional: built-in bypass valve.
- Can be customized to fit any applications.
- Computer generated data sheet available for any application
- Field changeable drive from electric to hydraulic.
- Cools: Fluid power systems, rock crushers, conveyors, shredders, lubrication equipment for paper machinery, gear drives, offshore drilling equipment, etc.

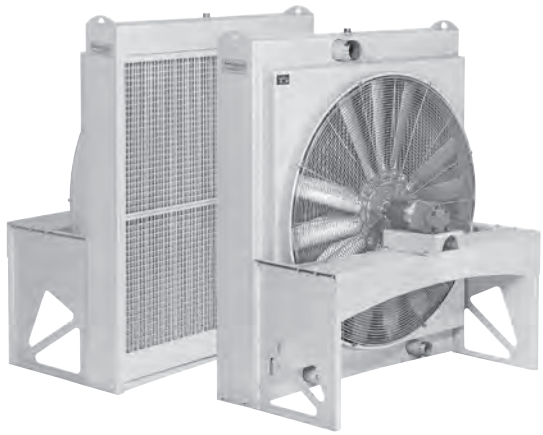
note: AIHTI reserves the right to make reasonable design changes without notice.

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AOCS Series *WITH ELECTRIC DRIVE*

Severe duty air-cooled oil coolers, super capacity, rolled tube industrial series heat exchangers with direct electric drive cooling fan, OSHA guard, and heavy duty front screen. Rated operating temperature of 300°F at 300 PSIG. Standard flow rates from 10 to 600 GPM. NPT, ANSI flange, or SAE code 61 four bolt flange port connections. Optional built-in bypass relief valve 30 PSI or 65 PSI. Can be modified to meet your requirements. Suitable for most hydraulic oils, lubrications oils, synthetic compressor oils, ethylene glycol, and many other fluids compatible with listed material.



AOCS Series *WITH HYDRAULIC DRIVE*

Severe duty air-cooled oil coolers, super capacity, rolled tube industrial series heat exchangers with direct hydraulic drive cooling fan, OSHA guard, and heavy duty front screen. Rated operating temperature of 300°F at 300 PSIG. Standard flow rates from 10 to 600 GPM. NPT, ANSI flange, or SAE code 61 four bolt flange port connections. Optional built-in bypass relief valve 30 PSI or 65 PSI. Can be modified to meet your requirements. Suitable for most hydraulic oils, lubrications oils, synthetic compressor oils, ethylene glycol, and many other fluids compatible with listed material.



AOCS Series

Durable design offered in eleven sizes available from stock for fast delivery.



AOCS Series

**HORIZONTAL
IN ASME CODE AND
CERTIFIED
(SEE PAGE 204-205)**

HIGH PERFORMANCE TURBULATOR



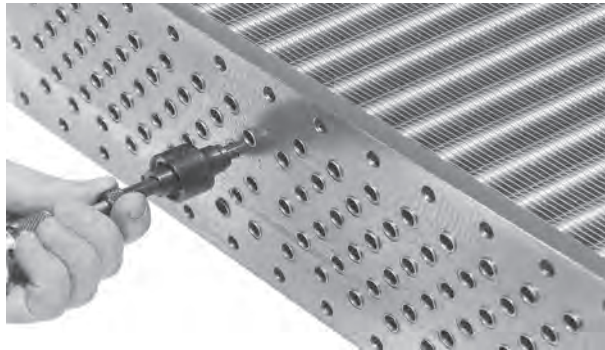
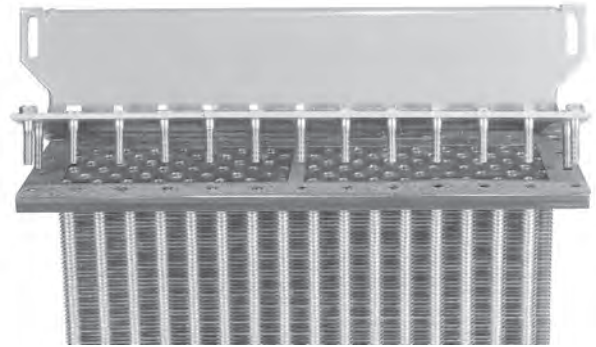
Exclusive American Industrial Turbulators installed in every flow tube, increase heat transfer by more than 100%.

American Industrial Turbulators eliminate the laminar flow condition normally associated with other smooth tube heat exchangers. High viscosity hydraulic and lubricating oils are easily cooled by this new state of the art turbulator.

SERVICEABLE CORE ®

Core covers disassemble for easy access and cleaning. Repairable design for applications that required limited down time. Roller expanded tube to tube-sheet joint.

100% mechanical bond, no braze or solder joint to fatigue fail, corrode, crack, etc.. No rubber grommets to replace. Positive gasket seal is field replaceable for field maintenance or repair.



SUPERIOR COOLING FINS

Copper tubes are mechanically bonded to highly efficient aluminum cooling fins. Die-formed fin collars provide a durable precision fit for maximum heat transfer.

Custom fin design forces air to become turbulent and carry heat away more efficiently than old flat fin designs.

CONSTRUCTION MATERIALS & RATINGS

Standard Construction Materials		Optional Construction Materials	Standard Unit Ratings	
Tubes	Copper	316L Stainless Steel, 90/10 Cu.Ni, Carbon Steel	Operating Pressure	300 psig
Fins	Aluminum	Copper		
Turbulators	Steel	Brass, Stainless Steel	Operating Temperature	300 °F
Tube sheet	Steel	316L Stainless Steel		
Manifold cover	Steel	316L Stainless Steel	Altitude	0-3200 ft.
Connection pipes	Steel	316L Stainless Steel	For higher pressure and temperature consult factory	
Cabinet & frame	Steel	Galvanized Steel, 316L Stainless Steel,		
Fan Blade	Aluminum Hub / Non-sparking, Nylon Composite Blades	-		
Fan Guard	Zinc Plated Steel	Stainless Steel		
Gasket	Hypalon Composite	Viton, Nitrile, Composites		

note: AIHTI reserves the right to make reasonable design changes without notice.

AOCS Series selection

Sizing

The performance curves provided are for petroleum oil at 63 ssu viscosity. However, fluids with characteristics other than the above mentioned may be used by applying a correction factor.

Heat Load

If the heat load is unknown, a horsepower value can be calculated by first determining the systems total potential. For a basic hydraulic system, it is helpful to know whether the system is open loop (with a large reservoir) or closed loop (normally on mobile equipment, with a very small reservoir). System potentials may be calculated quickly by using one of the two methods below.

There are some system parameters that will be required to properly accomplish the sizing calculations. Without system parameters it is difficult to determine the optimal heat exchanger size. Normally many of the system parameters can be found on hydraulic schematics or on tags located on the actual equipment. Following are some basic parameters that you should try to acquire before attempting the sizing calculations. However, it is not necessary to have every parameter listed below.

- Main system flow rate (gpm) & operating pressure (psi).
- Electric motor HP driving hydraulic pump (if more than one add up the Hp for all).
- Desired temperature (°F).
- Fluid type (SAE 10, 20, 30, etc....).
- Ambient air temperature (warmest day).
- Desired fan drive (hydraulic, electric, 12-24V DC, etc...).
- BTU's or HP to be cooled (normally given for lubrication systems).
- Maximum pressure drop allowed through the heat exchanger.
- Space available for heat exchanger (LxWxH).

Method 1

Normally used for open loop circuits. Multiply the main hydraulic systems Electric Motor Name plate Horsepower by a heat removal factor (normally 30-50%).

Example: 50 HP motor x 0.3 = 15 HP heat load

Method 2

Normally used when the HP input potential is unknown or for mobile applications where diesel engines operate the entire system. Multiply system

pressure by the flow rate of the main system divided by 1714 equals system potential (HP). Multiply the system HP by a heat removal factor (Normally 25-35%). Note: In some closed loop systems only a portion of the total system flow is directed through the heat exchanger, this may affect the cooler selection process substantially. You may contact our factory for additional technical assistance.

Example: $\frac{(2000 \text{ psi} \times 30 \text{ gpm})}{1714} = [35 \text{ HP} \times .25] = 8.75 \text{ HP heat load}$

Determining Fs value

To determine the proper size heat exchanger for your application, use the following equation to first determine the (Fs) factor.

$$F_s = \frac{\{ \text{heat load (HP)} \times 2545 \times C_v \}}{\{ \text{°F (oil leaving - air entering)} \}}$$

Example:

Heat load = 50 HP

Cv = 1.14 (SAE 20) determined from chart. [Located on page 4.]

Desired operating temperature = 120 °F

Ambient air temp. = 100 °F

$$F_s = \frac{\{ 50 \times 2545 \times 1.14 \}}{\{ 120 \text{ °F} - 100 \text{ °F} \}} = 7254$$

Selection

To select a model, locate the flow rate (GPM) at the bottom of the flow vs Fs graph. Proceed upward until the GPM flow rate intersects with the calculated Fs. The curve closest above the intersection point will meet these conditions.

Example: Fs = 7254 = Model = AOCS - 1505 - *
GPM = 40
PASSES = 2

Pressure differentials

Determine the oil pressure drop from the curves as indicated. For viscosities other than 63 ssu, multiply the actual indicated pressure drop for your GPM flow by the value shown in the pressure differential curve for your viscosity value.

Example: AOCS-1505 @ 40 gpm & 63 ssu -2 pass curve-
Indicated pressure drop 5 psi (Approx)
{ 5 psi x 2.8Cp (for SAE-20 oil) } = 14.0 corrected psi

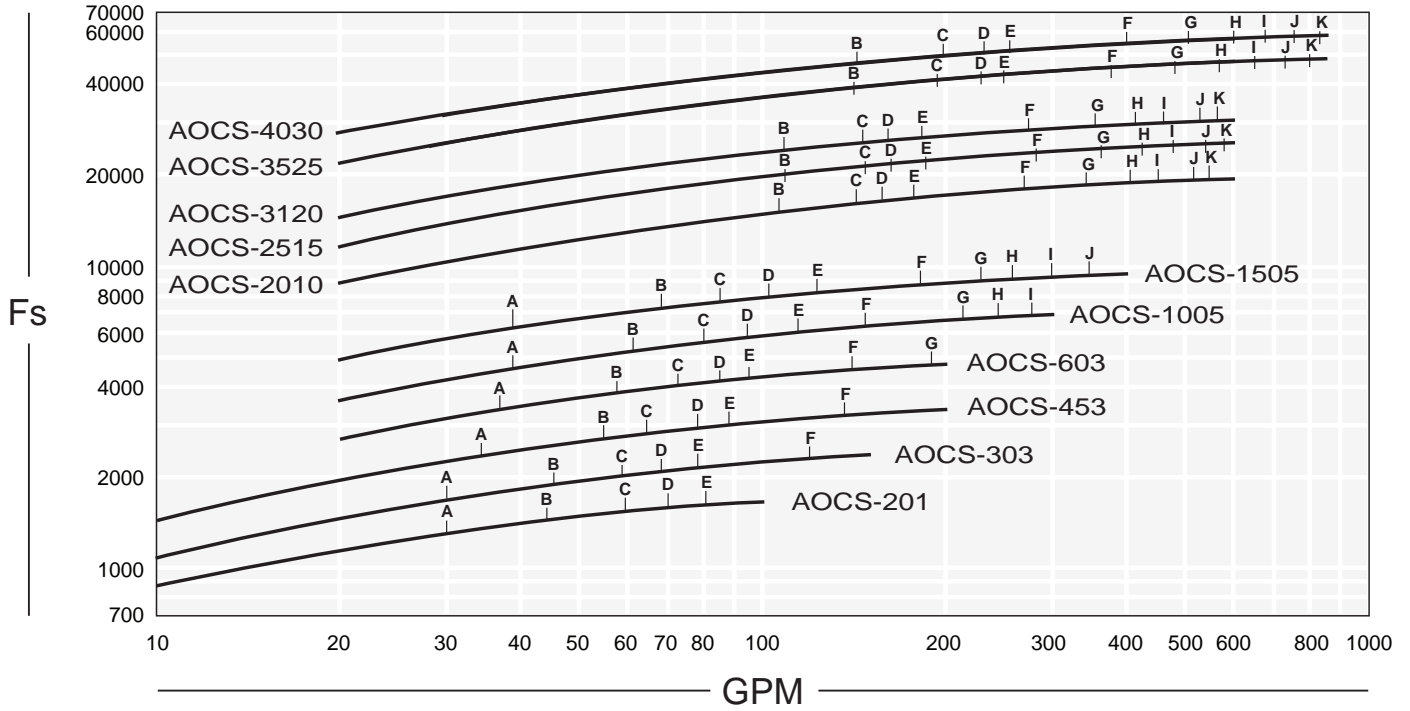
Average Liquid Temperature	Cv VISCOSITY CORRECTION FACTORS																
	SAE 5	SAE 10	SAE 20	SAE 30	SAE 40	ISO 22	ISO 32	ISO 46	ISO 68	ISO 100	ISO 150	ISO 220	ISO 320	MIL-L-7808	POLYGLYCOL	PHOSPHATE ESTER	50% ETHYLENE GLYCOL & WATER
100	1.11	1.15	1.25	1.38	1.45	1.08	1.14	1.18	1.26	1.37	1.43	1.56	1.84	1.19	0.92	0.83	0.85
110	1.09	1.12	1.20	1.32	1.40	1.06	1.13	1.16	1.25	1.31	1.39	1.48	1.67	1.14	0.89	0.80	0.84
120	1.06	1.10	1.17	1.27	1.35	1.04	1.11	1.14	1.20	1.27	1.35	1.40	1.53	1.09	0.88	0.79	0.84
130	1.04	1.08	1.13	1.24	1.29	1.03	1.09	1.13	1.17	1.24	1.30	1.34	1.44	1.05	0.85	0.77	0.83
140	1.03	1.05	1.11	1.19	1.25	1.02	1.08	1.10	1.16	1.20	1.26	1.30	1.39	1.03	0.84	0.76	0.82
150	1.01	1.04	1.09	1.16	1.22	1.02	1.06	1.09	1.13	1.17	1.22	1.27	1.33	1.01	0.83	0.74	0.82
200	0.98	0.99	1.01	1.04	1.07	0.98	0.99	1.00	1.01	1.02	1.08	1.09	1.14	0.98	0.79	0.71	0.80
250	0.95	0.96	0.97	0.98	0.99	0.95	0.96	0.96	0.96	0.97	0.99	1.01	1.02	0.97	0.76	0.69	0.79

Average Liquid Temperature	Cp PRESSURE DROP CORRECTION FACTORS																
	SAE 5	SAE 10	SAE 20	SAE 30	SAE 40	ISO 22	ISO 32	ISO 46	ISO 68	ISO 100	ISO 150	ISO 220	ISO 320	MIL-L-7808	POLYGLYCOL	PHOSPHATE ESTER	50% ETHYLENE GLYCOL & WATER
100	2.00	2.40	4.40	6.40	8.80	1.07	1.53	1.82	2.54	4.19	6.44	9.38	13.56	1.26	3.00	3.50	0.730
110	1.70	2.10	3.60	5.10	6.70	1.04	1.45	1.72	2.35	3.73	5.70	8.33	11.63	1.20	2.40	2.90	0.720
120	1.50	1.80	3.00	4.20	5.60	1.02	1.38	1.60	2.15	3.26	4.91	7.23	9.73	1.14	2.10	2.50	0.709
130	1.40	1.60	2.60	3.40	4.50	0.99	1.30	1.49	1.94	2.80	4.14	6.19	7.80	1.08	1.90	2.20	0.698
140	1.30	1.50	2.23	2.90	3.70	0.97	1.23	1.38	1.75	2.38	3.47	5.20	6.11	1.03	1.90	2.00	0.686
150	1.20	1.30	1.90	2.50	3.10	0.95	1.17	1.30	1.61	2.04	2.90	4.35	4.77	0.98	1.70	1.90	0.676
200	0.93	0.96	1.20	1.40	1.60	0.89	0.99	1.08	1.18	1.33	1.59	1.74	1.95	0.90	1.20	1.30	0.635
250	0.81	0.82	0.92	0.97	1.05	0.85	0.93	0.96	1.03	1.11	1.21	1.22	1.23	0.83	1.00	1.05	0.556

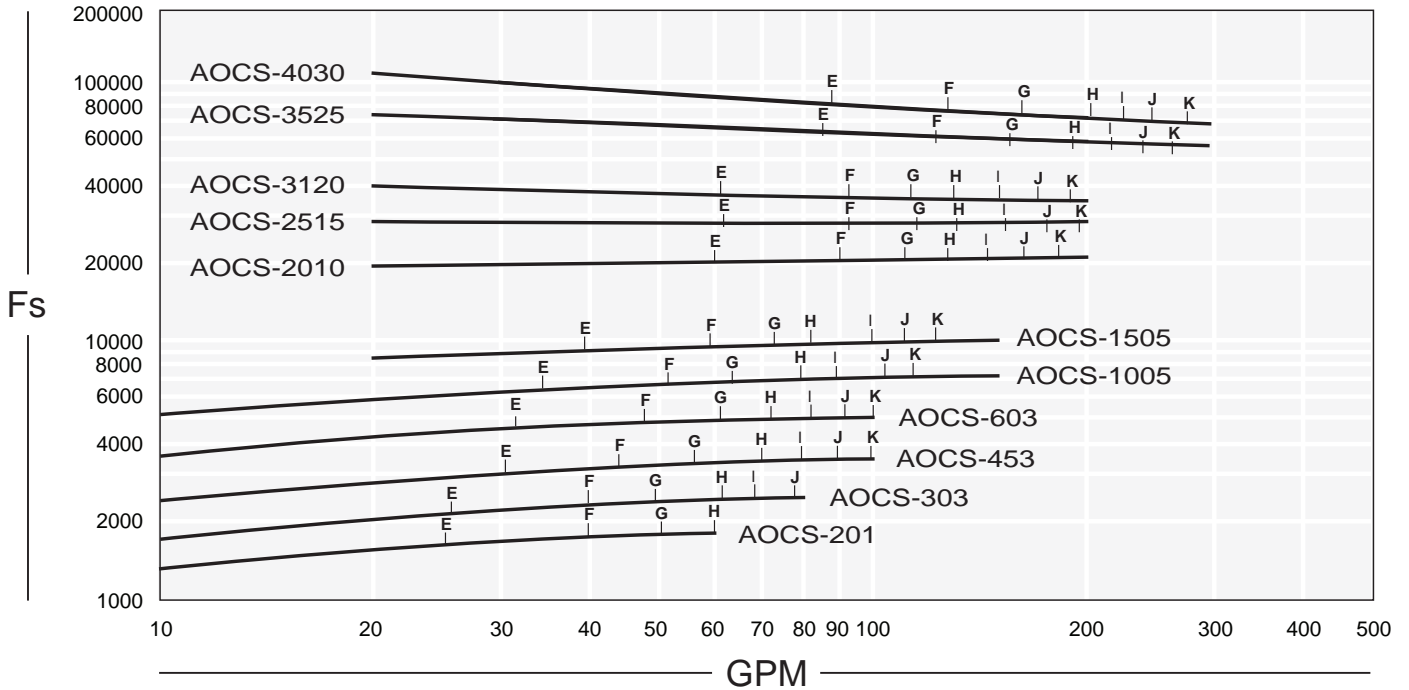
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AOCS Series performance

ONE PASS



TWO PASS

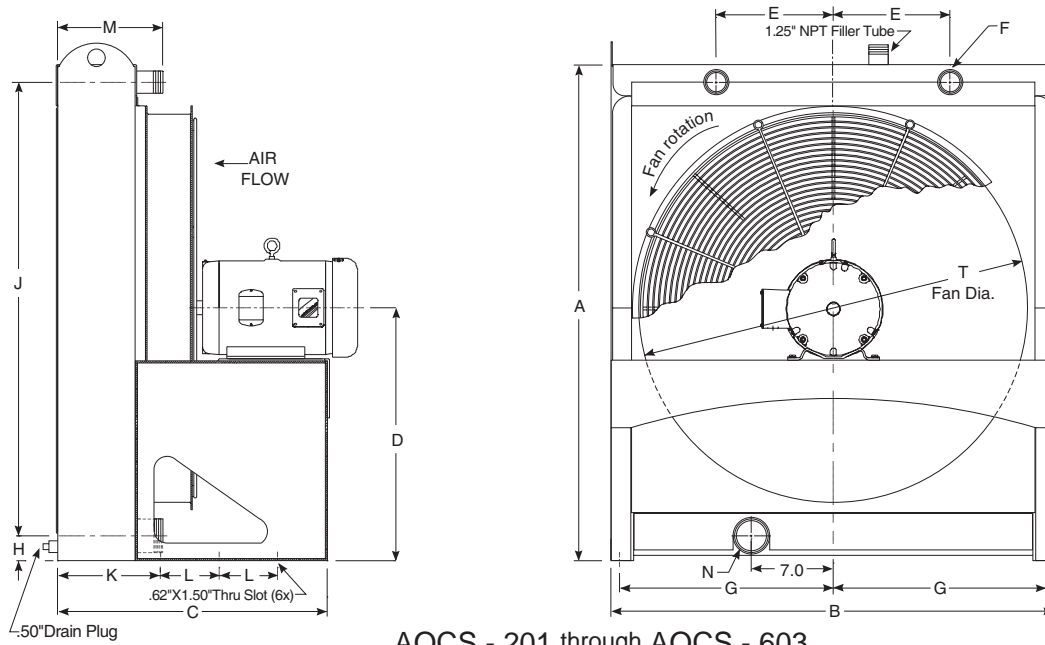


PERFORMANCE CALCULATION		OIL PRESSURE DROP (PSI) CODE			
$F_s =$	$\frac{\text{Horsepower to be removed (HP)} \times 2545 \times C_v}{\text{°F (Oil Leaving* - Ambient Air Entering)}} =$	$\frac{\text{BTU}}{\text{hr °F}}$			
		B = 2 PSI	E = 5 PSI	H = 20 PSI	K = 35 PSI
		C = 3 PSI	F = 10 PSI	I = 25 PSI	
		D = 4 PSI	G = 15 PSI	J = 30 PSI	

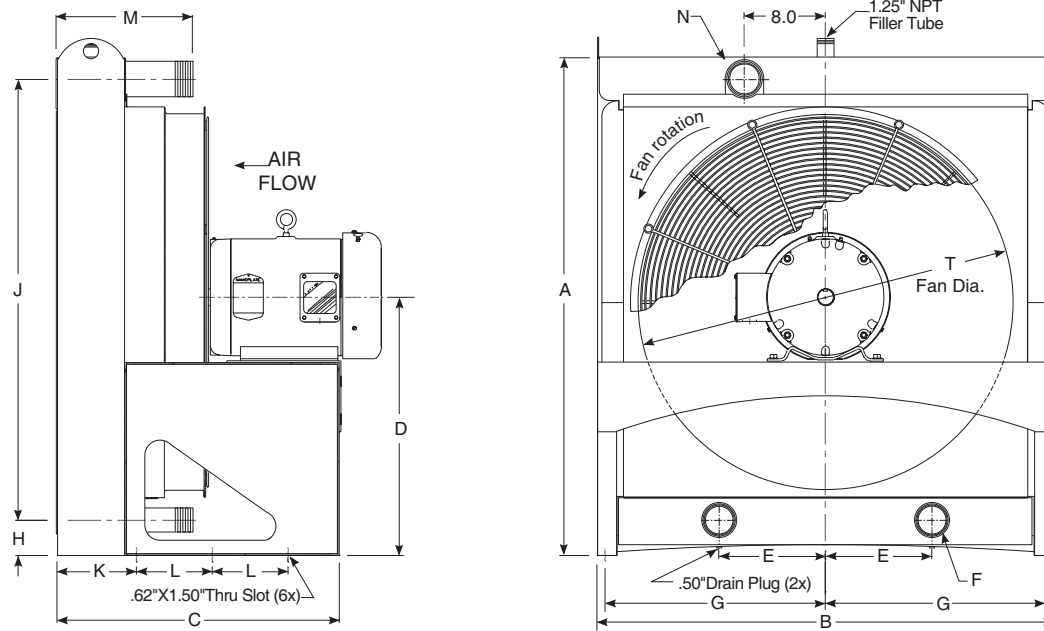
*Represents desired fluid leaving the cooler.

Note: When a model selection has been made, record whether the selection was from the one pass curve or the Two Pass curve so that the unit can be properly plumbed. Incorrect installation can seriously affect the performance.

AOCS Series *dimensions with electric drive*



AOCS - 201 through AOCS - 603



AOCS - 1005 through AOCS - 4030

(F* and N*) are SAE code 61 four bolt flanges

DIMENSIONS (inches)																
Model	A	B	C	D	E	F NPT	F* SAE	G	H	J	K	L	M	N NPT	N* SAE	T
AOCS-201 - *	27.13	23.50	20.56	13.63	6.00	1.25	1.25	11.00	1.38	24.50	7.38	5.00	9.00	1.50	1.50	18.00
AOCS-303 - *	32.38	27.50	21.94	16.38	7.00	1.25	1.25	13.00	1.88	29.00	7.38	5.00	9.00	2.00	2.00	22.00
AOCS-453 - *	36.38	33.00	23.06	18.50	8.00	1.50	1.50	15.75	1.88	33.00	8.81	5.00	9.00	2.00	2.00	28.00
AOCS-603 - *	42.38	38.00	23.06	21.62	10.00	1.50	1.50	18.25	2.13	38.75	8.81	5.00	9.00	2.50	2.50	32.00
AOCS-1005- *	49.00	45.00	24.88	25.00	10.50	2.00	2.00	21.75	3.50	43.50	7.81	7.50	13.50	3.00	3.00	36.00
AOCS-1505- *	56.00	53.00	24.88	28.50	12.50	2.00	2.00	25.75	3.50	50.50	7.69	7.00	13.50	3.00	3.00	42.00
AOCS-2010- *	65.00	59.50	32.13	33.00	15.00	3.00	3.00	29.00	4.50	58.00	11.06	7.50	15.50	4.00	4.00	48.00
AOCS-2515- *	73.25	67.25	34.78	37.00	16.00	3.00	3.00	32.87	4.50	66.00	11.06	7.50	15.50	4.00	4.00	54.00
AOCS-3120- *	79.25	69.50	34.78	40.00	17.00	3.00	3.00	34.00	4.50	72.00	11.06	7.50	15.50	4.00	4.00	60.00
AOCS-3525- *	85.50	74.00	40.00	43.00	18.00	3.00	3.00	37.00	4.50	78.00	13.00	7.50	18.00	4.00	4.00	60.00
AOCS-4030- *	91.50	80.00	40.00	46.00	20.00	3.00	3.00	40.00	4.50	84.00	13.00	7.50	18.00	4.00	4.00	60.00

*Represents the options for motor drive.

ELECTRIC MOTOR DATA

Model	Horse Power	Phase	Hz	Volts	RPM	NEMA Frame	Type	Full Load Amperes	Service Factor	Thermal Overload
AOCS-201-3	1	3	60	208-230/460	1800	143T	TEFC	2.9/1.5	1.15	NO
AOCS-201-5	1	3	60	575	1800	143T	TEFC	1.13	1.25	NO
AOCS-303-3	3	3	60	208-230/460	1800	182T	TEFC	7.6/3.8	1.15	NO
AOCS-303-5	3	3	60	575	1800	182T	TEFC	3.05	1.15	NO
AOCS-453,603-3	3	3	60	208-230/460	1200	213T	TEFC	8.3/4.2	1.15	NO
AOCS-453,603-5	3	3	60	575	1200	213T	TEFC	3.34	1.15	NO
AOCS-1005,1505-3	5	3	60	208-230/460	1200	215T	TEFC	13.5/6.7	1.15	NO
AOCS-1005,1505-5	5	3	60	575	1200	215T	TEFC	5.39	1.15	NO
AOCS-2010-3	10	3	60	208-230/460	1200	256T	TEFC	27.6/13.8	1.15	NO
AOCS-2010-5	10	3	60	575	1200	256T	TEFC	11.0	1.15	NO
AOCS-2515-3	15	3	60	208-230/460	1200	284T	TEFC	35.8/17.9	1.25	NO
AOCS-2515-5	15	3	60	575	1200	284T	TEFC	14.3	1.25	NO
AOCS-3120-3	20	3	60	208-230/460	1200	286T	TEFC	48.4/24.2	1.25	NO
AOCS-3120-5	20	3	60	575	1200	286T	TEFC	19.4	1.25	NO
AOCS-3525-3	25	3	60	208-230/460	1200	324T	TEFC	60.8/30.4	1.25	NO
AOCS-3525-5	25	3	60	575	1200	324T	TEFC	24.3	1.25	NO
AOCS-4030-3	30	3	60	208-230/460	1200	326T	TEFC	71.6/35.8	1.25	NO
AOCS-4030-5	30	3	60	575	1200	326T	TEFC	28.6	1.25	NO

NOTE: All of the AOCS Series are available in 50hz upon request as a special

ELECTRIC MOTOR NOTES:

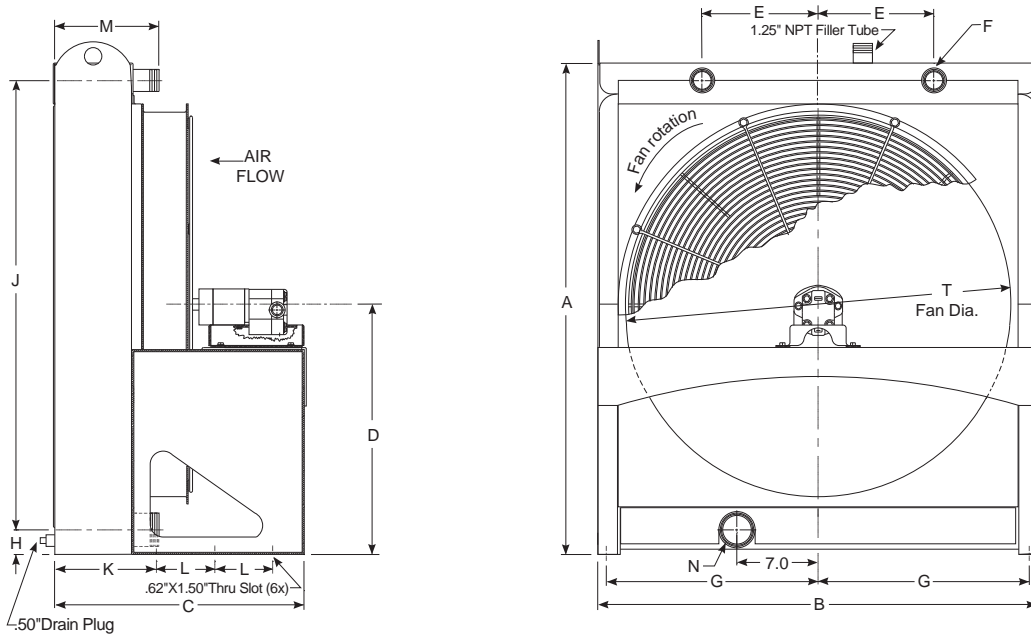
- 1) All motors are NEMA, high efficiency
- 2) All standard direct drive models are supplied with TEFC electric motor for continuous duty at 104°F (40°C).
- 3) The above motor electrical ratings are an approximate guide and may vary slightly between motor manufactures. Consult motor ratings listed directly on motor data plate prior to installation and operation
- 4) High altitude, high temperature, severe duty, crusher duty, chemical, IEC, Canadian Standards Association, and Underwriters Laboratory recognized motors are available upon request.
- 5) American industrial Heat Transfer, Inc. reserves the right to enact changes to motor brand, type, and ratings regarding horsepower, RPM, FLA, and Service factor for standard products without notice. All specified customer requirements will be honored without change or as directed.
- 6) Fan rotation is clockwise facing the motor shaft.
- 7) For lubrication information refer to manufactures maintenance instructions.
- 8) **Abbreviation Index**
 TEFC Totally Enclosed, Fan Cooled
 X-PROOF Explosion Proof

CLASS I, DIV.1, GROUP D or CLASS II, DIV.2, GROUP F & G EXPLOSION PROOF MOTOR DATA

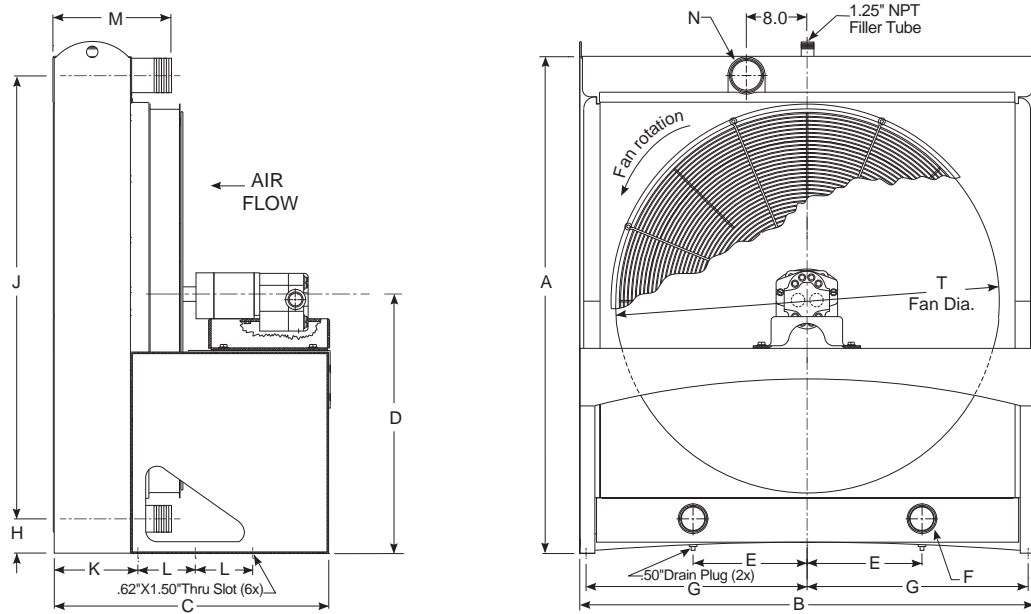
Model	Horse Power	Phase	Hz	Volts	RPM	NEMA Frame	Enclosure Type	Full Load Amperes	Service Factor	Thermal Overload
AOCS-201-3EXP	1	3	60	208-230/460	1800	143T	EPFC	2.8/1.4	1.15	YES
AOCS-303-3EXP	3	3	60	208-230/460	1800	182T	EPFC	7.8/3.9	1.15	YES
AOCS-453,603-3EXP	3	3	60	208-230/460	1200	213T	EPFC	8.8/4.4	1.15	YES
AOCS-1005,1505-3EXP	5	3	60	208-230/460	1200	215T	EPFC	13.6/6.8	1.15	YES
AOCS-2010-3EXP	10	3	60	208-230/460	1200	256T	EPFC	26.6/13.3	1.15	YES
AOCS-2515-3EXP	15	3	60	208-230/460	1200	284T	EPFC	35.0/17.5	1.15	YES
AOCS-3120-3EXP	20	3	60	208-230/460	1200	286T	EPFC	48.4/24.2	1.15	YES
AOCS-3525-3EXP	25	3	60	208-230/460	1200	324T	EPFC	60.8/30.4	1.15	YES
AOCS-4030-3EXP	30	3	60	208-230/460	1200	326T	EPFC	73.4/36.7	1.15	YES

NOTE: All of the AOCS Series explosion proof motors are available in 50hz upon request as a special

AOCS Series *dimensions with hydraulic drive*



AOCS - 201 through AOCS - 603



AOCS - 1005 through AOCS - 4030

(F* and N*) are SAE code 61 four bolt flanges

DIMENSIONS (inches)																
Model	A	B	C	D	E	F NPT	F* SAE	G	H	J	K	L	M	N NPT	N* SAE	T
AOCS-201 - 9	27.13	23.50	20.56	13.63	6.00	1.25	1.25	11.00	1.38	24.50	7.38	5.00	9.00	1.50	1.50	18.00
AOCS-303 - 9	32.38	27.50	21.94	16.38	7.00	1.25	1.25	13.00	1.88	29.00	7.38	5.00	9.00	2.00	2.00	22.00
AOCS-453 - 9	36.38	33.00	23.06	18.50	8.00	1.50	1.50	15.75	1.88	33.00	8.81	5.00	9.00	2.00	2.00	28.00
AOCS-603 - 9	42.38	38.00	23.06	21.62	10.00	1.50	1.50	18.25	2.13	38.75	8.81	5.00	9.00	2.50	2.50	32.00
AOCS-1005- 9	49.00	45.00	24.88	25.00	10.50	2.00	2.00	21.75	3.50	43.50	7.81	7.50	13.50	3.00	3.00	36.00
AOCS-1505- 9	56.00	53.00	24.88	28.50	12.50	2.00	2.00	25.75	3.50	50.50	7.69	7.00	13.50	3.00	3.00	42.00
AOCS-2010- 9	65.00	59.50	32.13	33.00	15.00	3.00	3.00	29.00	4.50	58.00	11.06	7.50	15.50	4.00	4.00	48.00
AOCS-2515- 9	73.25	67.25	34.78	37.00	16.00	3.00	3.00	32.87	4.50	66.00	11.06	7.50	15.50	4.00	4.00	54.00
AOCS-3120- 9	79.25	69.50	34.78	40.00	17.00	3.00	3.00	33.25	4.50	72.00	11.06	9.00	15.50	4.00	4.00	60.00
AOCS-3525- 9	85.50	74.00	40.00	43.00	18.00	3.00	3.00	37.00	4.50	78.00	13.00	9.00	18.00	4.00	4.00	60.00
AOCS-4030- 9	91.50	80.00	40.00	46.00	20.00	3.00	3.00	40.00	4.50	84.00	13.00	9.00	18.00	4.00	4.00	60.00

HYDRAULIC MOTOR DATA

Model	Motor RPM	Displacement in ³ /Rev	Required Flow		Oper. pressure start / run PSIG	Case Drain	SAE Size	Side Port SAE O-Ring	Max. Continuous Pressure PSIG
			GPM	LPM					
AOCS-201- 9	1725	0.68	6.0	22.7	400 / 290	Ext.	A	#12; 1-1/16-12	3000
AOCS-303- 9	1725	0.68	6.0	22.7	1400 / 860	Ext.	A	#12; 1-1/16-12	3000
AOCS-453- 9	1160	1.00	5.9	22.3	1300 / 870	Ext.	A	#12; 1-1/16-12	3000
AOCS-603- 9	1160	1.00	5.9	22.3	1300 / 870	Ext.	A	#12; 1-1/16-12	3000
AOCS-1005- 9	1160	1.45	8.5	32.2	1500 / 1000	Ext.	A	#12; 1-1/16-12	3000
AOCS-1505- 9	1160	1.45	8.5	32.2	1500 / 1000	Ext.	A	#12; 1-1/16-12	3000
AOCS-2010- 9	1160	2.32	13.7	51.9	1750 / 1250	Ext.	B	#16; 1-5/16-12	3000
AOCS-2515- 9	1160	3.30	19.5	73.8	2000 / 1350	Ext.	B	#16; 1-5/16-12	3000
AOCS-3120- 9	1160	3.30	19.5	73.8	2500 / 1800	Ext.	B	#16; 1-5/16-12	3000
AOCS-3525- 9	1160	3.80	22.5	85.0	2500 / 1900	Ext.	B	#16; 1-5/16-12	3000
AOCS-4030- 9	1160	5.30	26.6	100.7	3000 / 2200	Ext.	B	#16; 1-5/16-12	3000

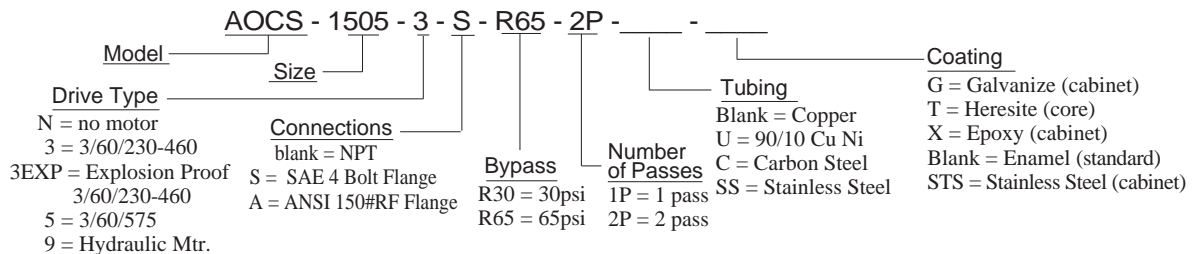
Note:

Maximum degree of fluid contamination; Class 18/15 according to ISO 4406. Therefore, we recommend a filter with a retention rate of B 20 >. For longer life, we recommend class 17/14, achievable with a filter B10 > -100.

HYDRAULIC MOTOR NOTES:

- Standard units are supplied with a bi-directional hydraulic gear motor for the fan drive. The gear motor requires an external case drain be used during operation. The external case drain should be connected directly to hydraulic reservoir or a return line with not greater than 10PSIG back pressure. (NOTE: *Failure to properly connect and use the external case drain during motor operation could result in motor failure and external leakage of hydraulic fluid.*)
- Hydraulic motor flow requirements are provided with an efficiency rating of approximately 85%. Pressure requirements are calculated theoretical minimum operating requirements.
- Hydraulic motor load adapters are provided to bridge and align the space between the hydraulic motor and the fan. Load adapters require periodic maintenance lubrication (see accompanying information).
- Maximum degree of fluid contamination, class 18/15 according to ISO 4406. Therefore, it is recommended to use a filter with retention rating of B20>. For longer life, it is recommended to use class 17/14 achievable with filter B10>-100.
- A shaft coupling bushing is used on some models to join the fan drive shaft to the fan. All fans, either hub style or bushing connection, should be checked and retightened after the first 100 hours of operation.
- Fan rotation is clockwise when facing the motor shaft.
- Optional displacement motors available upon request.
- American industrial reserves the right to enact changes to hydraulic motor, brand, type, ratings, port sizes, or any additional non-specified attribute for standard products without notice. All specific requirements will be honored without change pending availability.

Example of a model:



COMMON DATA

Model	Air Flow		Sound Level dB(A) @ 13ft	Liquid Volume		Weight Electric		Weight Hydraulic		Serviceable Core™
	CFM	m ³ /s		gal.	cm ³	lb	kg	lb	kg	
AOCS-201 - *	3000	1.41	77	1.7	6435	200	91	185	84	Yes
AOCS-303 - *	4380	2.07	82	3.8	14383	310	141	260	118	Yes
AOCS-453 - *	5920	2.79	78	4.8	18168	490	222	410	186	Yes
AOCS-603 - *	8750	4.13	80	6.1	23089	580	263	490	222	Yes
AOCS-1005- *	12650	5.97	84	7.7	29145	690	313	575	261	Yes
AOCS-1505- *	16150	7.65	87	10.4	39364	910	413	1025	465	Yes
AOCS-2010- *	23350	11.73	92	22.8	86298	1280	580	1062	482	Yes
AOCS-2515- *	32000	15.00	95	27.5	104088	1610	730	1320	598	Yes
AOCS-3120- *	39000	18.40	99	31.9	120742	1810	821	1483	673	Yes
AOCS-3525- *	46000	21.71	99	47.0	177895	1980	898	1622	736	Yes
AOCS-4030- *	54000	25.48	99	47.0	185466	2150	975	1762	799	Yes

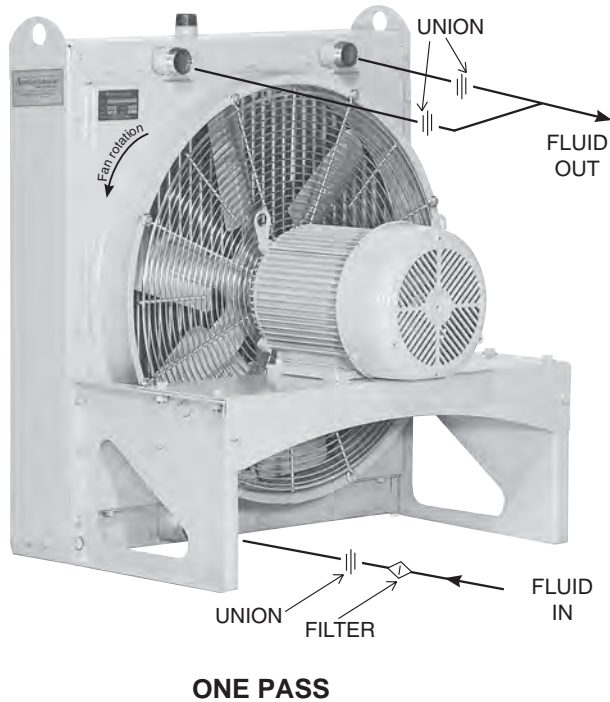
NOTES: a) * Represents the options for motor drive.

b) To estimate the sound level at distances other than 13 feet (4 meters) from the cooler, add 6 db for each halving of distance, or subtract 6 db for each doubling of the distance.

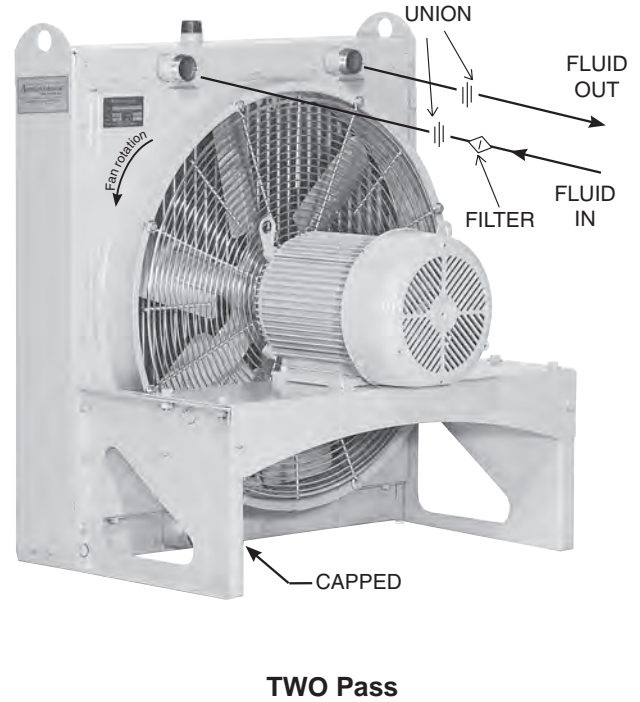
note: AIHTI reserves the right to make reasonable design changes without notice.

AOCS Series *installation and maintenance*

AOCS - 201 through AOCS - 603



ONE PASS



TWO 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 the core and fan are not damaged. Rotate the fan blade to make sure that it moves freely. The published weight information located in this brochure is approximate. True shipment weights are determined at the time of shipping and may vary. Approximate weight information published herein is for engineering approximation purposes and should not be used for exact shipping weight. *Since the warranty is based upon the unit date code located on the model identification tag, removal or manipulation of the identification tag will void the manufacturers warranty.*

b) When handling the heat exchanger, special care should be taken to avoid damage to the core and fan. All units are shipped with wood skids for easy forklift 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.

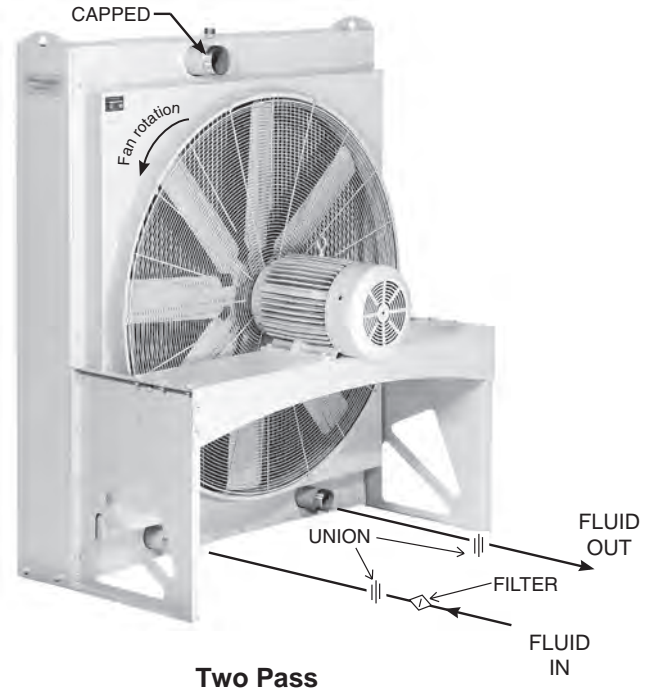
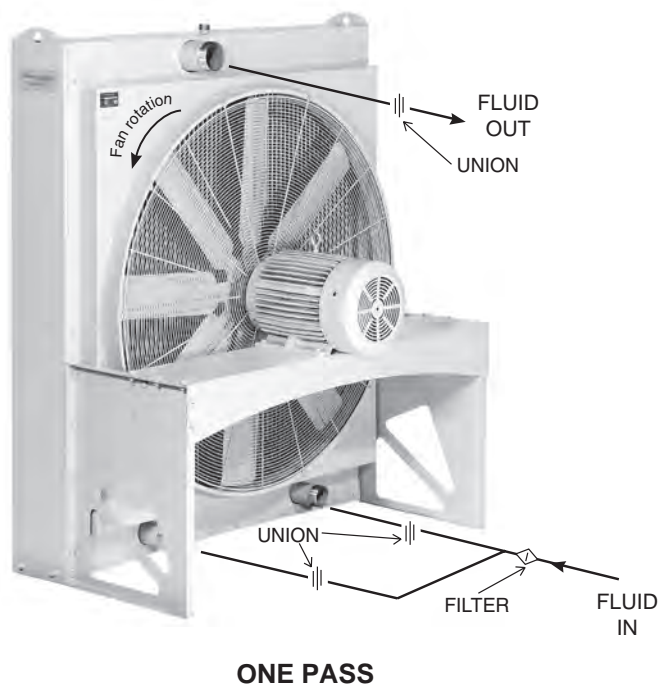
e) American Industrial recommends that the equipment supplied should be installed by qualified personnel who have solid understanding of system design, pressure and temperature ratings, and piping assembly. Verify the service conditions of the system prior to applying any air cooled heat exchanger series cooler. 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.

g) Heat exchanger should be securely fastened using the mounting foot brackets (included). All mounting holes should be used to secure unit into place. Optional horizontal mounting with vertical air flow is possible with specially designed mounting legs available through American Industrial. The special mounting legs incorporate motor mount and are recommended for horizontal operation. Customer modifications are not recommended to convert vertical mount units into horizontal units.

h) Connections should be made in "one pass" or "Two Pass" configurations exactly as indicated in the "piping hook up" illustration above and page opposite. The process flow entering the "Fluid IN" port and exiting the "Fluid OUT" port eliminates air pockets and assures that the unit will stay completely flooded. Flexible hose can be applied to reduce the risk of core failure due to thermal expansion or system vibration. Piping alignment and support is required for hoses longer than four feet in length and for piping exerting more than 20 lbs of dynamic force. It is recommended that filtration be located ahead of the heat exchanger to prevent excessive backpressure and clogging.

AOCS Series *installation and maintenance*

AOCS - 1005 through AOCS - 4030



i) With respect to the heat exchangers nozzle size, flow line sizes should be sized to handle the appropriate flow rate and system pressure drop requirements, normally flow line rates of about 8-12 feet per second and inlet pressure less than 100psig are experienced. If the flow line size is larger than the heat exchanger nozzle size, additional pressure loss beyond the published pressure loss data may occur.

j) Electric motors should be connected only to supply source of the same characteristics as indicated on the electric motor information plate. Prior to starting, verify that the motor and fan spin freely without obstruction. Check carefully that the fan turns in the correct rotation direction (normally counter clockwise) from the motor side (fan direction arrow). Failure to operate the fan in the proper direction could reduce performance or cause serious damage to the heat exchanger or other components. Fan blades should be rechecked for tightness after the first 100 hours of operation.

k) It is important to apply the catalog recommended flow rate for the hydraulic motor that corresponds with the specific model being used. A case drain is required for hydraulic motor installation. Failure to connect case drain can result in motor failure. The proper flow rate and direction to the hydraulic motor are critical to ensure fan direction and RPM. Exceeding the recommended RPM could result in fan failure and cause severe damage to the heat exchanger. See fan rotation on installation diagram.

Maintenance

Regular maintenance intervals based upon the surrounding and operational conditions should be maintained to verify equipment performance and to prevent premature component failure. Since some of the components such as, motors, fans, load adapters, etc... are not manufactured by American Industrial, maintenance requirements provided by the manufacture must be followed.

a) Inspect the entire heat exchanger and motor/fan assembly for loosened bolts, loose connections, broken components, rust spots, corrosion, fin/coil clogging, or external leakage. Make immediate repairs to all affected areas prior to restarting and operating the heat exchanger or its components.

b) Heat exchangers operating in oily or dusty environments will often need to have the coil cooling fins cleaned. Oily or clogged fins should be cleaned by carefully brushing the fins and tubes with water or a non-aggressive degreasing agent mixture (*Note: Cleaning agents that are not compatible with copper, brass, aluminum, steel or stainless steel should not be used*). A compressed air or a water stream can be used to dislodge dirt and clean the coil further. Any external dirt or oil on the electric motor and fan assembly should be removed. *Caution: Be sure to disconnect the electric motor from its power source prior to doing any maintenance.*

c) In most cases it is not necessary to internally flush the coil. In circumstances where the coil has become plugged or has a substantial buildup of material, flushing the coil with water or a solvent may be done. Flushing solvents should be non-aggressive suitable for the materials of construction. Serviceable Core® models can be disassembled and inspected or cleaned if required.

d) Most low horsepower electric motors do not require any additional lubrication. However, larger motors must be lubricated with good quality grease as specified by the manufacture at least once every 6-9 months or as directed by the manufacture. T.E.F.C. air ventilation slots should be inspected and cleaned regularly to prevent clogging and starving the motor of cooling air. To maintain the electric motor properly see the manufactures requirements and specifications. The hydraulic motor uses an over hung load adapter for motor alignment and to extend the shaft to accept the fan.

AOCS Series *installation and maintenance*

Grease ports located on the adapter should be greased regularly with a high quality bearing grease.

e) Initial inspection, check the fan blade bolts for loosening after the first 100 hours of operation. Re-tighten the fan blade bolts to the proper torque if required. Note: Failure to check and maintain the fan blade could result in damage or failure of the equipment. Fan blades should be cleaned and inspected for tightness during the regular maintenance schedule when handling a fan blade care must be given to avoid bending or striking any of the blades. Fan blades are factory balanced and will not operate properly if damaged or unbalanced. Damaged fan blades can cause excessive vibration and severe damage to the heat exchanger or drive motor. Replace any damaged fan with an American industrial suggested replacement.

f) Air cooled exchanger cabinets are constructed using 7ga. through 18ga. steel that may be bent back into position if damaged. Parts that are not repairable can be purchased through American Industrial.

g) Coil fins that become flattened can be combed back into position. This process may require removal of the coil from the cabinet.

i) Solely at the request of customers, American Industrial provides direct acting internal inlet port to outlet port bypass relief valves as an additional safe guard against surge flow and over pressurization of the heat exchanger. However, American Industrial does not specify, recommend, suggest, guarantee, or warrantee the internal relief valve or its performance to safe guard the heat exchanger from damage or prevent failure due to excessive flow or over pressurization. It is the ultimately the sole responsibility of the customer/user to verify with the original equipment manufacture all conditions associated with applying an additional system relief valve prior to application.

Serviceable Core[®] Maintenance

Units containing a Serviceable Core[®] have bolted manifold covers that can be removed for cleaning or repair purposes. Most AOCH or AOCS cores manufactured after January 1, 1998 are Serviceable Cores[®].

Servicing Sequence

American Industrial has gone to great lengths to provide components that are repairable. If the heat exchanger core requires internal cleaning or attention the following steps will explain what must be done to access the internal tubes. Be sure to order gasket kits or repair parts prior to removal and disassembly to minimize down time.

a) To clean the internal tubes first remove all connection plumbing from the unit.

b) Be sure the unit is drained of all water etc...

c) Place the heat exchanger in an area that it can be accessed from all sides. Remove the core from the cabinet if required (AOCH, AOCS).

d) Mark the cover ① and tube-sheet ③ for both covers so that they can be replaced into the same position when finished. Remove the manifold cover bolts ② and hardware and place them into a secure place.

e) The manifold covers are tightly compressed and may need some prying to separate them from the gasket ⑥, physically remove the cover assemblies ① from both sides.

f) The tubes ④ and turbulators ⑤ are now accessible for cleaning. Note: turbulators are installed on AOCH & AOCS cores only. If you need to remove the turbulator that runs through the tubing, it will be necessary to first squeeze the flattened end of the protruding turbulator ⑤, so that on end will fit through the tube. From the opposite end pull the turbulator ⑤ out. You may need to use pliers to grip and pull the turbulators ⑤ out, especially if there is debris lodged inside. As the turbulators ⑤ come out, most of the dirt will too, so be prepared. *It is suggested that gloves be worn when handling the turbulators ⑤ as they may be sharp.*

We suggest a mild water-soluble degreaser be used with a brush. Tubing I.D. is approximately .325 a plastic bristle brush on a rod will work best for cleaning the tubes ④. Steel brushes should be avoided since the steel is harder than the copper tubing and may heavily score the tubes ④ if used.

g) If there are any leaking tubes ④ you may plug them by carefully forcing a soft metal plug into the hole and tapping it tight. You may in some cases weld the leaking tube shut however, care should be taken since excessive heat may cause surrounding tube joints to loosen and leak.

h) When finished cleaning or repairing, be sure to replace ALL of the turbulators ⑤ back into any open tubes ④. When the turbulators ⑤ protrude from the opposite end flatten them again so they are tight and cannot be removed.

i) When finished reattach the manifold covers ① in the same position they were removed, using new gaskets ⑥, bolts ②, and hardware. We suggest using a torque wrench to final tighten the bolts ②.

j) Torque Specifications: For 5/16" bolts 22-23 ft-lbs, for 3/8" bolts to 38-42 ft-lbs. Since bolts and hardware can physically fatigue during application we suggest new bolt kits be used when reassembling.

