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CLIMATE CONTROL

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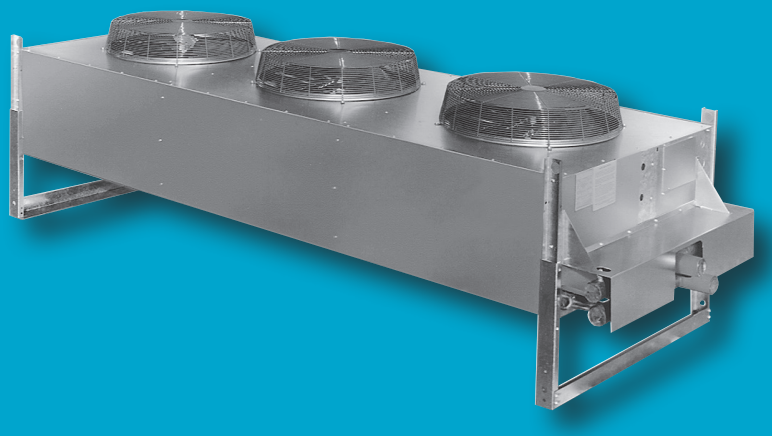
DIRECT DRIVE FLUID COOLERS

Technical Guide



Model WGS

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Overview

Our engineers have carefully selected and matched components to provide excelled performance, long service life, and a wide range of performance selections. Specifically engineered for outdoor installations, the WGS fluid cooler is constructed of aluminum and heavy gauge galvanized steel to resist corrosion in all climates.

Fluid coolers are available in a wide range of sizes. Each model is available with several circuit options to ensure the exact fluid cooler for your requirements. Our fluid coolers are designed to reduce the cost of time required for installation. Each unit is completely assembled and tested at the factory. All motor leads are wired to a junction box providing a single point for field wiring.

Direct-Drive Design Features

The Floating Tube™ Coil Design
Dramatically Reduces Tube Sheet Leaks

- Cabinets are heavy-duty construction and designed for outdoor applications; tube sheets and all structural members are fabricated from galvanized steel
- Cabinet panels are fabricated from heavy-gauge aluminum for an attractive appearance and corrosion protection
- Coils are fabricated with corrugated aluminum fins with staggered copper tubes for optimum heat transfer; all units are pressure-tested, dehydrated and pressurized prior to shipment
- Alternate coil constructions are available — copper fins, Pro-Kote™ fins and coated coils
- WGS models available in either horizontal or vertical air flow
- Fully baffled fan sections provide structural strength and prevent fan wind-milling in the off cycle
- Energy efficient fan motors with direct-drive fans available at 1140 RPM; fan motors have thermal overload protection and permanently lubricated ball bearings
- WGS models are available in 208-230 V single-phase, 208-230/460 dual-voltage, three-phase or 575 V three-phase motors.
- Statically and dynamically balanced fan blades are aluminum and riveted to painted steel spider and hubs
- Fan guards are PVC coated steel for optimum corrosion protection
- All fan motor leads are wired to a weatherproof electrical enclosure for single-point field wiring
- WGS fan cycling is ambient air
- All controls are factory mounted and wired; control circuit voltage is 230 V standard, 24 and 115 V controls are also available
- A wide selection of circuit options maximizes performance at minimal cost
- Sizes available from 10 GPM through 500 GPM
- Units are UL listed for US and Canada

Selection Procedure

Selection Formulas

Design Capacity = GPM x (Entering Fluid Temperature - Leaving Fluid Temperature) x Fluid Constant, Table 1

Average Fluid Temperature = (Entering Fluid Temperature + Leaving Fluid Temperature)/2

Initial Temperature Difference, ITD = Entering Fluid Temperature - Entering Air Temperature

Base Capacity = Design Capacity/(1,000 x ITD x Capacity Correction, Table 2 x Altitude Correction Factor, Table 3)

Pressure Drop, Fluid = Pressure Drop, Catalog x Correction Factor, Table 4

Given Conditions	
Direct Drive	120˚F Leaving Fluid Temperature
50 GPM	100˚ F Entering Air Temperature
20% Ethylene glycol solution	20 feet maximum fluid pressure drop
130˚ F Entering Fluid Temperature	1,000 feet altitude

Solution

1. Calculate design capacity. From Table 1, select the fluid constant for 20% of 484.

   Design Capacity = 50 x (130-120) x 484
   Design Capacity = 242,000 BTUH

2. Calculate average fluid temperature

   = (130 +120)/2
   = 125˚ F

3. Calculate the initial temperature difference, ITD

   ITD = 130 - 100

   ITD = 30˚ F

4. Calculate Base capacity. From Table 2, for a 20% solution and an average fluid temperature of 125˚ F, interpolate to obtain a correction factor of 1.035. From Table 3, obtain an attitude correction factor at 1000 feet of 0.98.

   Base Capacity = 242,000/(1,000 x 30 x 1.035 x 0.98)

   Base Capacity = 7.95 MBH / ˚TD

Correction Factors

5. Select the model and circuiting required. From the capacity tables, locate the GPM you desire and read down until you find a base capacity equal to or greater than your calculated base capacity. Read horizontally to the left to obtain the model and circuiting (Feeds) for your application.

   The selection is a WGS 16, with 32 feeds, with a base capacity of 8.34 MBH/1˚ T.D. and a fluid loss of 15.1 feet of water.

6. Calculate the pressure drop of the fluid. From Table 4, using 20% glycol solution and a 125˚ F average fluid temperature, interpolate to get a correction factor of 0.86.

   Actual Fluid Loss = 15.1 x 0.86

   Actual Fluid Loss = 13.0 feet of water

Table 1. Fluid Constraints

Percent Glycol	Fluid Constant
0	500
10	493
20	484
30	470
40	453
50	435

Table 2. Capacity Correction Factor

Percent Glycol	Average Fluid Temperature ˚F				
	50	70	90	110	130
0	0.97	1.01	1.03	1.05	1.07
10	0.96	1.00	1.02	1.04	1.06
20	0.94	0.98	1.00	1.02	1.04
30	0.92	0.96	0.98	1.00	1.02
40	0.90	0.94	0.96	0.98	1.00
50	0.87	0.91	0.94	0.96	0.98

Note: For average fluid temperature less than 50˚F or greater than 130˚F, consult the factory

Table 3. Altitude Correction Factor

Altitude (Feet)	Correction Factor
0	1.00
1,000	0.98
2,000	0.95
3,000	0.93
4,000	0.90
5,000	0.88
6,000	0.85
7,000	0.83

Table 4. Correction Factor for Fluid Loss

Percent Ethylene Glycol	Average Fluid Temperature ˚F				
	50	70	90	110	130
0	0.88	0.82	0.78	0.75	0.71
10	0.97	0.90	0.86	0.82	0.78
20	1.05	0.98	0.94	0.89	0.85
30	1.15	1.07	1.02	0.98	0.93
40	1.24	1.15	1.10	1.05	1.00
50	1.33	1.23	1.18	1.12	1.07

Capacity Ratings

Table 5. Capacity Ratings MBH / °TD, 40% Ethylene Glycol at 130°F Average Fluid Temperature

Model	Feeds	GPM															
		10		15		20		25		30		40		50		60	
		MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
WGS 049	8 12 16	2.36 2.23	14.0 4.7	2.71 2.58 2.47	28.7 9.7 4.5	2.80 2.70	16.1 7.5	2.95 2.85	24.0 11.2	2.97	15.5						
WGS 080	12 16 21 32	3.07	7.4	3.67 3.55	15.1 7.0	4.04 3.92 3.79	25.2 11.6 5.6	4.17 4.05	17.3 8.4	4.35 4.24 4.02	23.8 11.5 3.8	4.49 4.30	19.2 6.4	4.66 4.49	28.5 9.4	4.62	13.0
WGS 107	12 16 24	3.46	7.5	4.32 4.16	15.5 7.1	4.88 4.73 4.46	25.7 11.9 4.0	5.13 4.86	17.6 6.0	5.42 5.17	24.3 8.3	5.60	13.8	5.89	20.4	6.10	28.2
WGS 123	12 16 24	3.62	7.5	4.62 4.45	15.5 7.1	5.30 5.12 4.81	25.7 11.9 4.0	5.61 5.30	17.6 6.0	5.99 5.68	24.3 8.3	6.23	13.8	6.60	20.4	6.88	28.2
WGS 147	12 16 24	3.92	9.4	5.12 4.96	19.3 8.9	5.78 5.49	14.7 5.0	6.39 6.08	21.9 7.4	6.53	10.2	7.19	16.9	7.64	25.2		
WGS 165	12 21 32	4.17	12.4	5.57	25.4	7.27	9.2	8.44 6.57	13.7 4.4	9.43 7.09	18.9 6.1	7.84	10.2	8.34	15.1	8.70	20.9
WGS 211	16 24 48			5.93	12.3	7.22 6.93	20.5 6.8	7.90	10.2	8.68	14.0	9.83 8.97	23.3 3.7	9.78	5.5	10.41	7.5
WGS 225	24 48					6.99	6.8	7.98	10.2	8.78	14.0	9.96 9.25	23.3 3.7	10.14	5.5	10.82	7.5
WGS 248	21 32 64					7.65	12.9	8.81 8.44	19.1 6.1	9.73 9.33	26.3 8.4	10.66	14.0	11.58 10.63	20.8 3.3	12.25 11.33	28.7 4.5

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Table 6. Capacity Ratings MBH / ˚TD, 40% Ethylene Glycol at 130˚F Average Fluid Temperature

Model	Feeds	GPM																	
		70		80		90		100		110		120		130		140		150		160	
		MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
WGS 211	48	10.89	9.9	11.29	12.6	11.61	15.5	11.88	18.6	12.12	22.1	12.31	25.7								
WGS 225	48	11.36	9.9	11.80	12.6	12.16	15.5	12.46	18.6	12.72	22.1	12.94	25.7								
WGS 248	64	11.88	6.0	12.33	7.5	12.69	9.3	12.98	11.2	13.24	13.3	13.46	15.5	13.64	17.8	13.81	20.3	13.95	23.0	14.08	25.7

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Table 7. Model WGS Connection Sizes, based on number of feeds

Feeds	Inlet/Outlet
8	1-1/8”
12	1-3/8”
16	1-3/8”
21	1-5/8”

Feeds	Inlet/Outlet
24	2-1/8”
32	2-1/8”
48	2-5/8”
64	2-5/8”

Specifications and Dimensions

Diagram 1. Model WGS Dimensions, 5 through 26 Tons with Vertical Air Flow

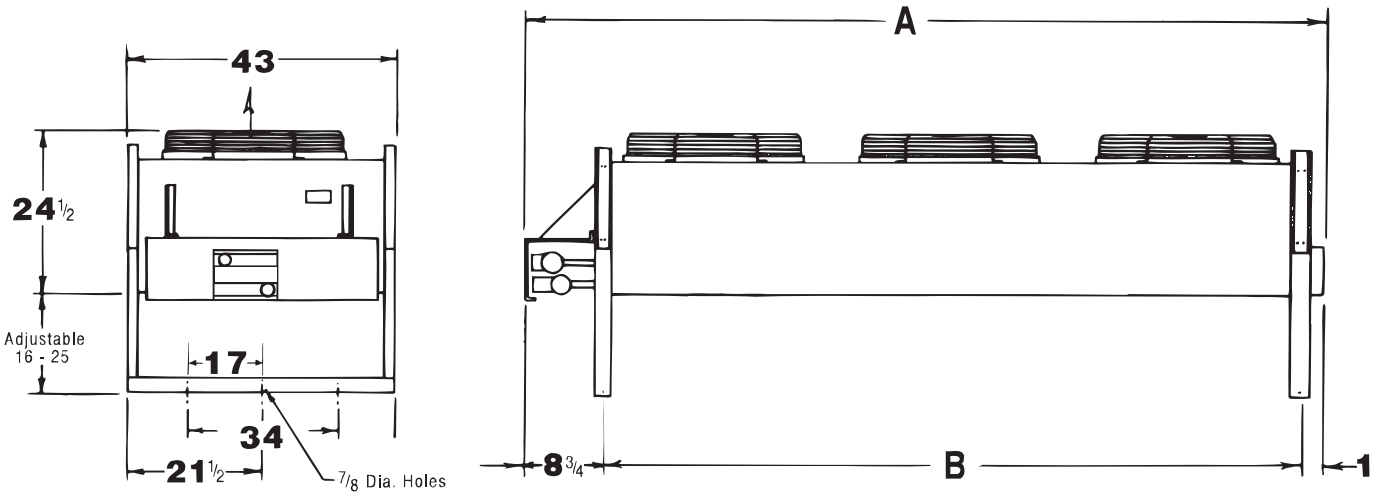

Diagram 2. Model WGS Dimensions, 5 through 26 Tons with Horizontal Air Flow

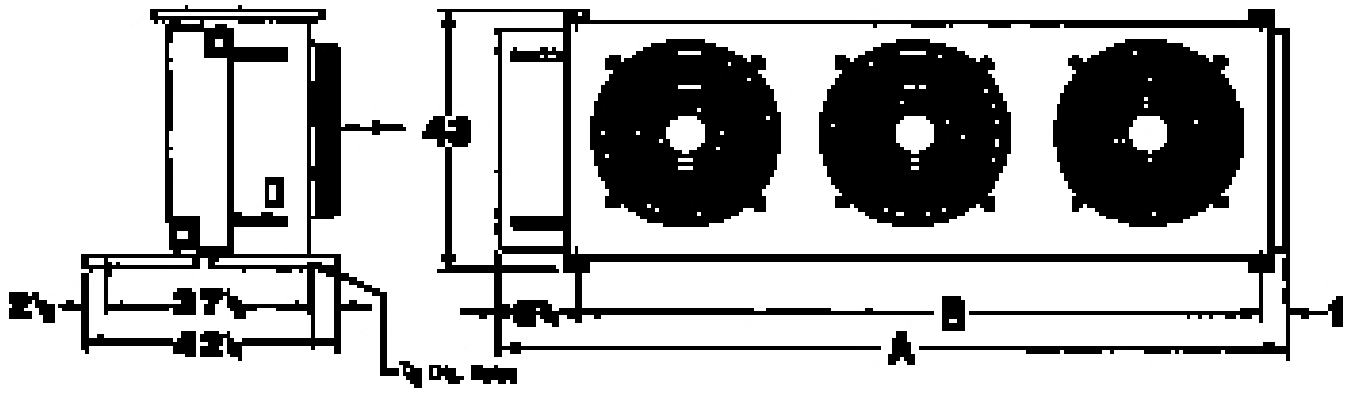

Table 8. Model WGS Specifications

Model	Dimensions (in.)		CFM	Fan		Motor Data				Approx. Net Wt. (lbs.)
	A	B		No.	Dia.	HP[1]	FLA[1]	HP[2]	FLA[2]	
WGS005	39-3/4	30	5,050	1	24	1/3	3.4	1/3	2.6/1.3	180
WGS008	49-3/4	40	6,450	1	26	1/2	3.9	1/3	2.6/1.3	260
WGS010	69-3/4	60	10,100	2	24	1/3	6.8	1/3	5.2/2.6	450
WGS012	69-3/4	60	12,400	2	26	1/2	7.8	1/3	5.2/2.6	470
WGS014	89-3/4	80	13,700	2	26	1/2	7.8	1/3	5.2/2.6	510
WGS016	89-3/4	80	12,900	2	26	1/2	7.8	1/3	5.2/2.6	530
WGS021	129-3/4	120	20,500	3	26	1/2	11.7	1/3	7.8/3.9	550
WGS023	129-3/4	120	19,900	3	26	1/2	11.7	1/3	7.8/3.9	580
WGS026	129-3/4	120	19,400	3	26	1/2	11.7	1/3	7.8/3.9	625

[1] Motor voltage 208-230/1/60; 1075 RPM
[2] Motor voltage 208-230-460/3/60; 1140 RPM

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