

Job/Project:	Representative:	
ESP-Systemwize: WIZE-F72BD6A7	Created On: 07/27/2023	Phone:
Location/Tag:	Email:	
Engineer:	Submitted By:	Date:
Contractor:	Approved By:	Date:

Double Suction Split Case Pump

Series: VSX-VSC

Model: 12x14x14A



Features & Design

- Space saving footprint
- Multiple suction and discharge flange orientations
- Maintenance-free bearings
- Alignment-friendly coupling

*The Bell & Gossett Series VSX-VSC vertical suction and discharge flanges create an extremely compact space-saving design that allows up to 8,000 lbs. static loading per nozzle.

<http://bellgossett.com/pumps-circulators/double-suction-pumps/series-vsx-split-case-pump/>

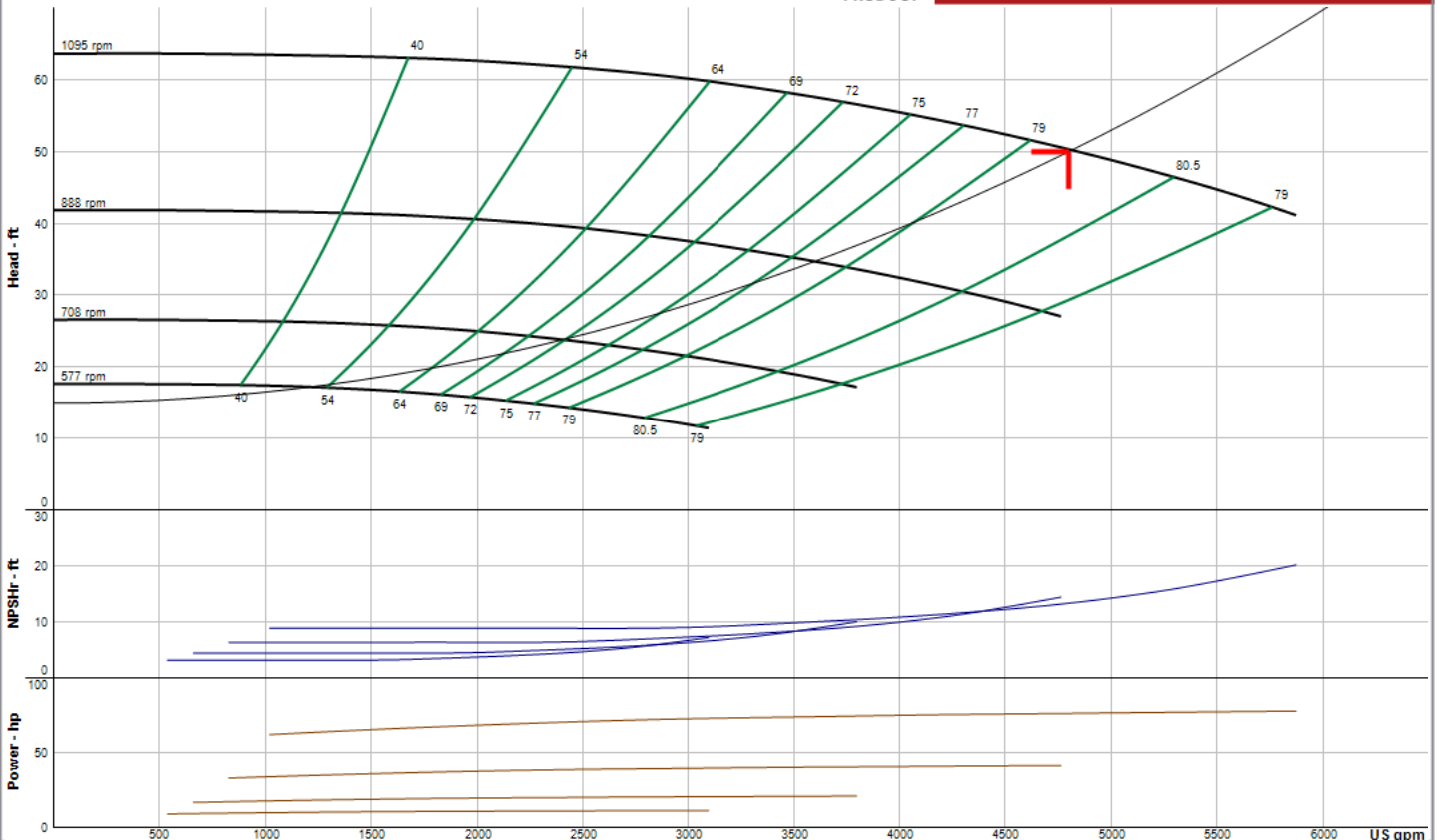
Pump Selection Summary

Duty Point Flow	4800 US gpm
Duty Point Head	50 ft
Control Head	15 ft
Duty Point Pump Efficiency	79.6 %
Part Load Efficiency Value (PLEV)	70.4 %
Impeller Diameter	13.25 in
Motor Power	100 hp
Duty Point Power	76.4 bhp
Motor Speed	1200 rpm
RPM @ Duty Point	1095 rpm
NPSHr	13.5 ft
Minimum Shutoff Head	63.6 ft
Minimum Flow at RPM	1324 US gpm
Flow @ BEP	5297 US gpm
Fluid Temperature	68 °F
Fluid Type	Water
Weight (approx. - consult rep for exact)	5182 lbs
Pump Floor Space Calculation	30.75 ft²

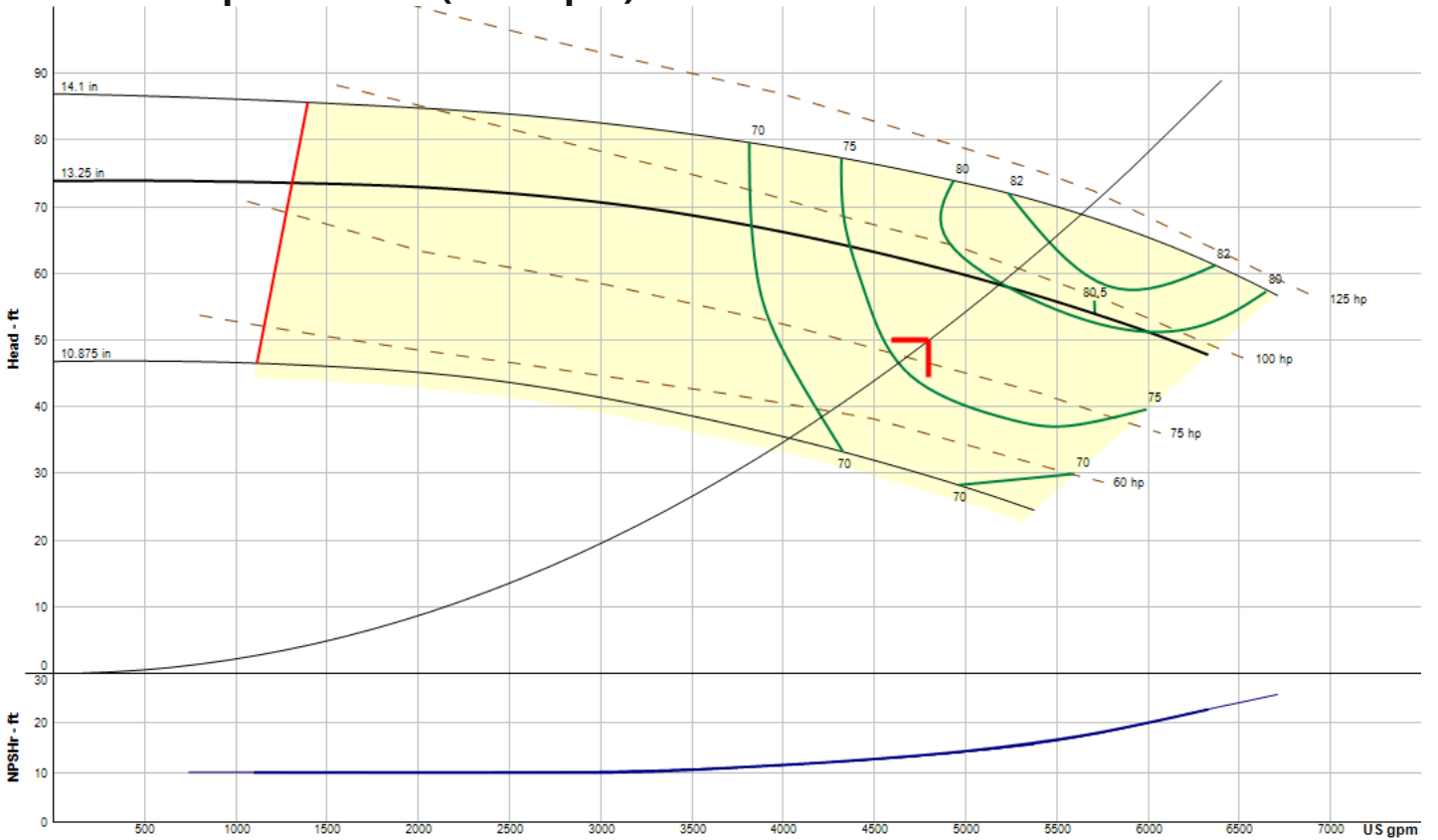
Performance Curve



VSX-VSC
12x14x14A
1095 RPM



Constant Speed Curve (1180 rpm)

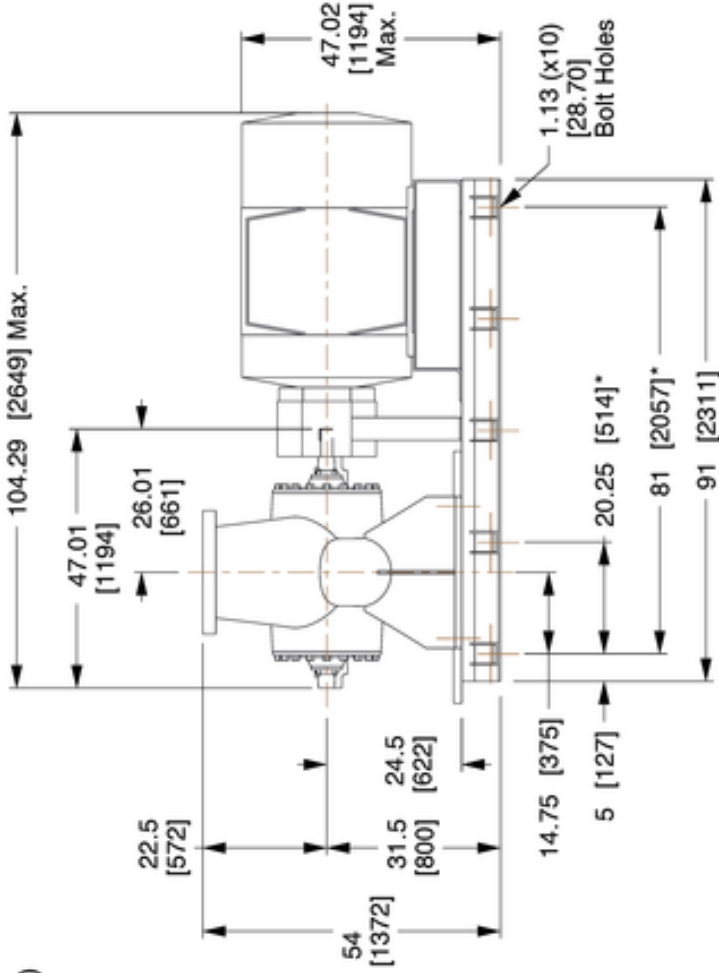
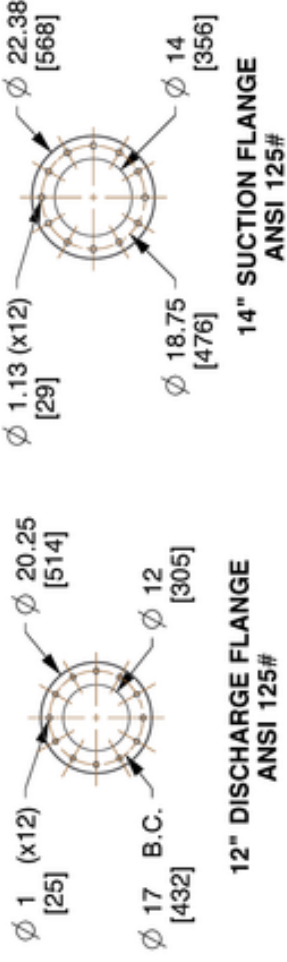
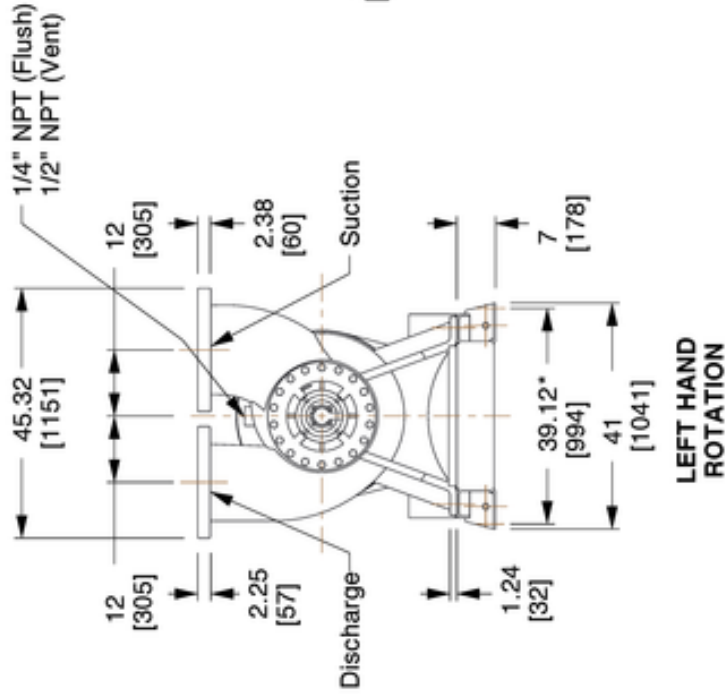
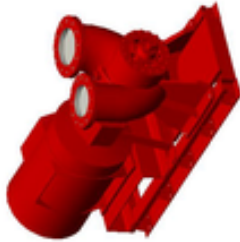


Operating Point

Flow: 4813 US gpm **Head:** 50.2 ft **Speed:** 1095 **Efficiency:** 79.6% **Point BHP:** 76.4 **End Of Curve:** 81.9%

Maximum Duty Point (at rated motor speed)

Flow: 5183 US gpm **Head:** 58.3 ft **Speed:** 1180 **Efficiency:** 79.7% **Point BHP:** 95.6 **NOL Flow:** 6329 US gpm **Runout Flow:** 6329 US gpm **NOL (BHP):** 97.5



* Dist. Between Bolt Holes

VSC-12X14X14A-444TTS-STL

Series vsc Double Suction Split Case Pump

Motor Frame: 444T/TS | Coupler: Standard Coupler | Hand of Rotation: Left Hand

Removal Clearance: 31 | Flange: ANSI 125#

Dimensions : IN (mm)

Scale : N.T.S.

Submittal # : B-872.1A

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Dimensions are subject to change

Not to be used for construction unless certified



8200 N. Austin Ave.
Morton Grove, IL 60053, USA

Standard Materials of Construction

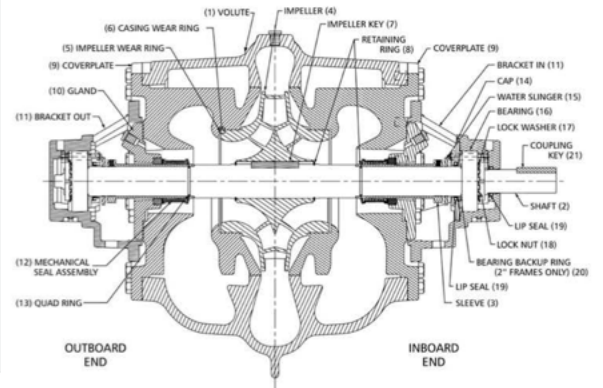
Construction:	Bronze Fitted
Volute:	Cast Iron ASTM A159 with some exceptions
Shaft:	1045 Steel
Shaft Sleeve:	304 SS
Impeller:	Low Zinc Silicon Bronze ASTM B584 Alloy C87600
Impeller Key	Stainless Steel
Retaining Ring	Stainless Steel
Coverplate	Gray Cast Iron
Gland	Gray Cast Iron
Bracket (In & Out)	Gray Cast Iron
Quad Ring	EPDM Rubber
Cap	Gray Cast iron
Water Slinger	Neoprene Rubber
Bearing	Single Row, Ball Bearing with Shield
Lock Washer	Carbon Steel
Lock Nut	Carbon Steel
Lip Seal	Steel with Nitrile Rubber Jacket
Bearing Backup Ring	Stainless Steel
Alignment Friendly Coupling	Non-Spacer, elastomeric
Coupler Guard:	ANSI/OSHA Compliant, Fully Enclosed
Baseplate:	Groutless Reinforced Structural Steel with lifting lugs

Standard Mechanical Seal Assembly

Elastomer:	EPR
Rotating Face:	Carbon
Stationary Face:	Graphite Loaded Silicon Carbon
Hardware	Stainless Steel/Brass

Maximum Working Pressure

Max Working Pressure (standard)	175 psi
Max Working Pressure (optional)	300 psi
Max Working Temperature (standard)	300
Max Working Temperature (optional)	225 - 300



Job/Project:	Representative:	
ESP-Systemwize: WIZE-DE7E5126	Created On: 07/27/2023	Phone:
Location/Tag:	Email:	
Engineer:	Submitted By:	Date:
Contractor:	Approved By:	Date:

Double Suction Split Case Pump

Series: VSX-VSC

Model: 14x16x17.5A



Features & Design

- Space saving footprint
- Multiple suction and discharge flange orientations
- Maintenance-free bearings
- Alignment-friendly coupling

*The Bell & Gossett Series VSX-VSC vertical suction and discharge flanges create an extremely compact space-saving design that allows up to 8,000 lbs. static loading per nozzle.

<http://bellgossett.com/pumps-circulators/double-suction-pumps/series-vsx-split-case-pump/>

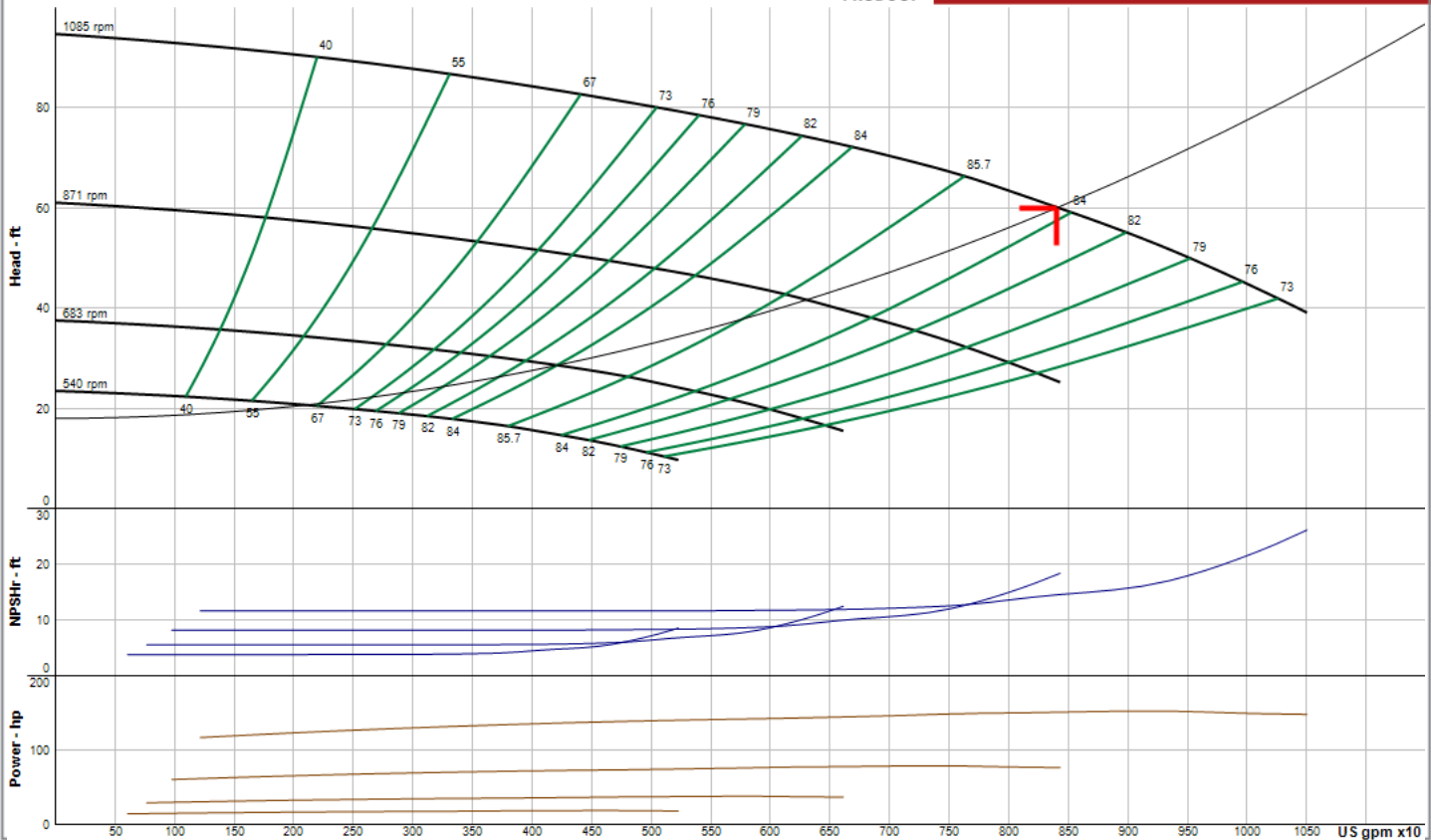
Pump Selection Summary

Duty Point Flow	8400 US gpm
Duty Point Head	60 ft
Control Head	18 ft
Duty Point Pump Efficiency	83.9 %
Part Load Efficiency Value (PLEV)	81.3 %
Impeller Diameter	15.625 in
Motor Power	200 hp
Duty Point Power	151 bhp
Motor Speed	1200 rpm
RPM @ Duty Point	1085 rpm
NPSHr	14.6 ft
Minimum Shutoff Head	94.8 ft
Minimum Flow at RPM	1907 US gpm
Flow @ BEP	7629 US gpm
Fluid Temperature	68 °F
Fluid Type	Water
Weight (approx. - consult rep for exact)	7981 lbs
Pump Floor Space Calculation	30.75 ft²

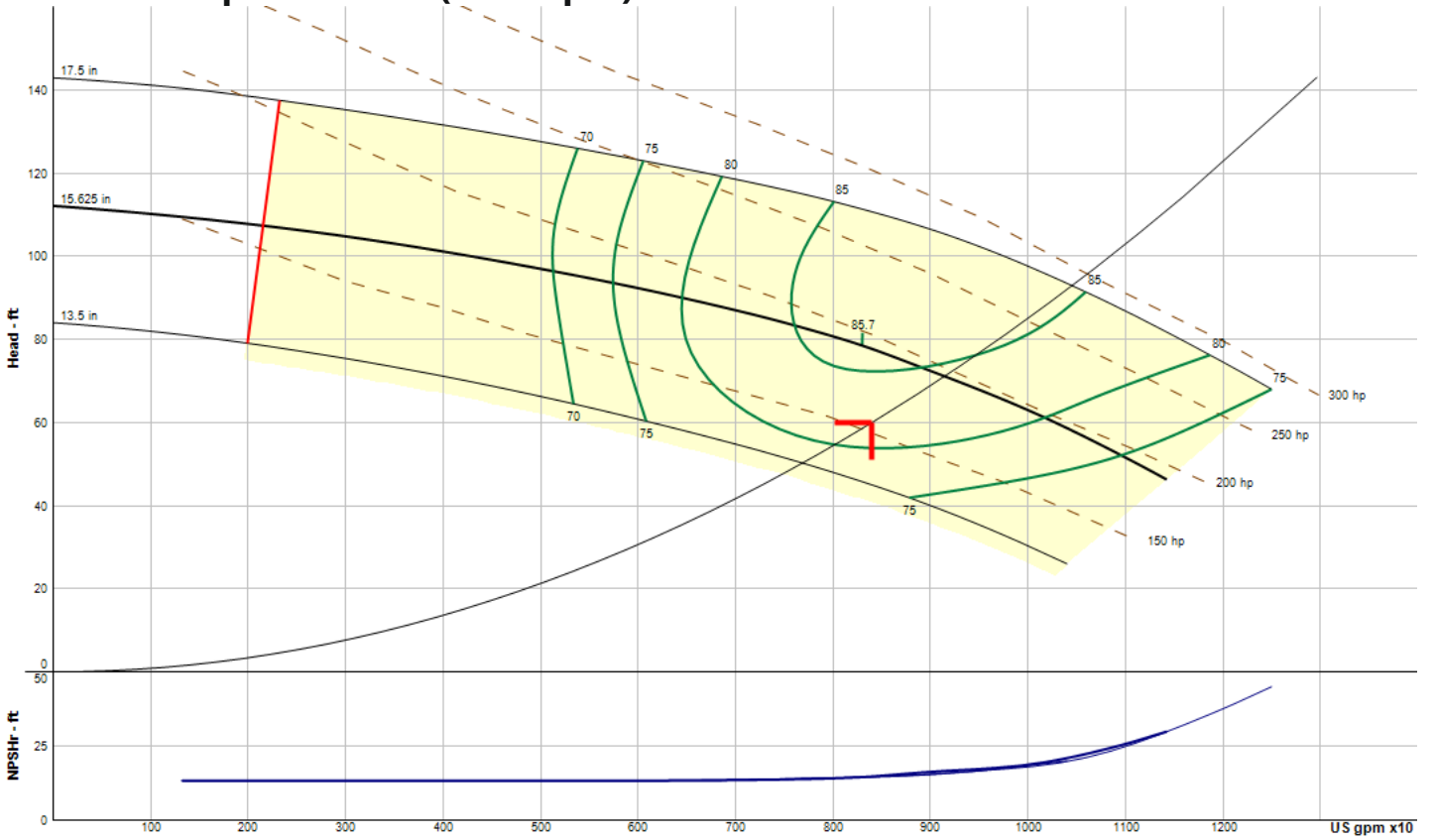
Performance Curve



VSX-VSC
14x16x17.5A
1085 RPM



Constant Speed Curve (1180 rpm)

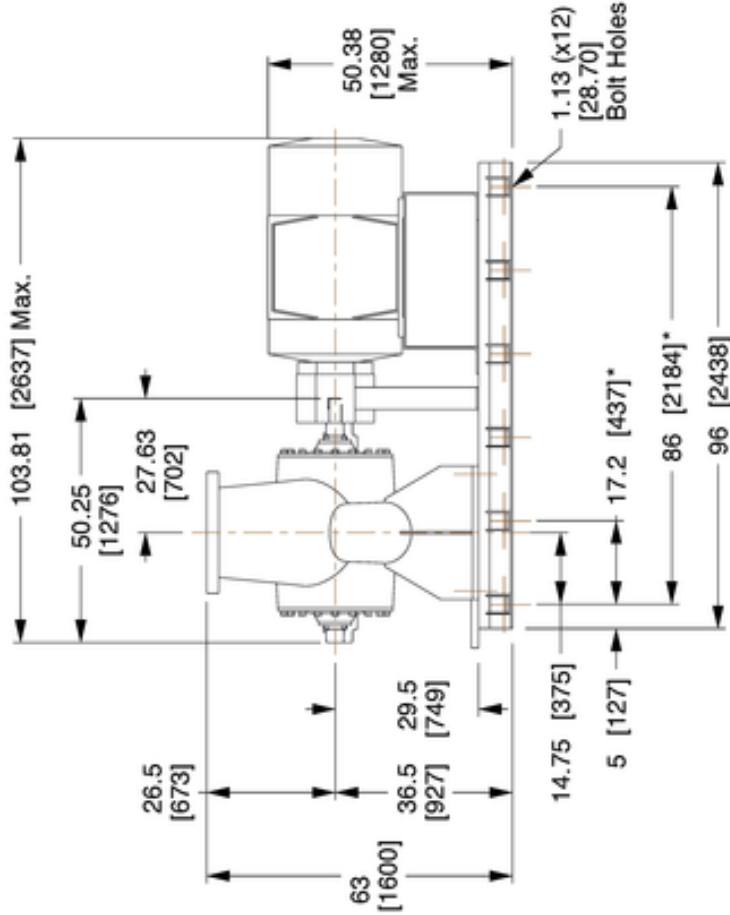
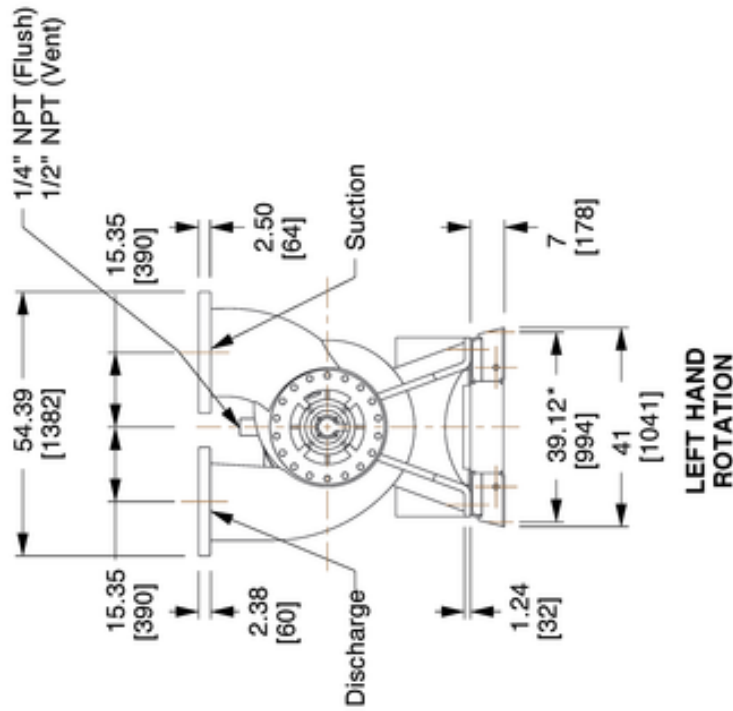


Operating Point

Flow: 8404 US gpm **Head:** 60 ft **Speed:** 1085 **Efficiency:** 83.9% **Point BHP:** 151 **End Of Curve:** 80%

Maximum Duty Point (at rated motor speed)

Flow: 9139 US gpm **Head:** 71 ft **Speed:** 1180 **Efficiency:** 84.1% **Point BHP:** 194 **NOL Flow:** 10171 US gpm **Runout Flow:** 11423 US gpm **NOL (BHP):** 196



* Dist. Between Bolt Holes

VSC-14X16X17P5A-449-STL

Series vsc Double Suction Split Case Pump

Motor Frame: 449 | Coupler: Standard Coupler | Hand of Rotation: Left Hand

Removal Clearance: 34 | Flange: ANSI 125#

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Dimensions are subject to change

Not to be used for construction unless certified



a xylem brand

8200 N. Austin Ave.
Morton Grove, IL 60053, USA

Submittal #: B-865.13C

Scale: N.T.S.

Dimensions: IN (mm)

Standard Materials of Construction

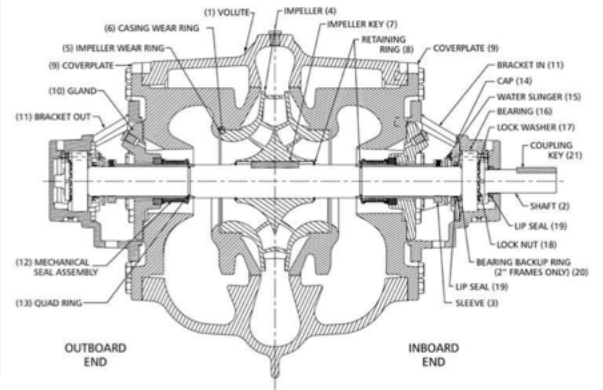
Construction:	Bronze Fitted
Volute:	Cast Iron ASTM A159 with some exceptions
Shaft:	1045 Steel
Shaft Sleeve:	304 SS
Impeller:	Low Zinc Silicon Bronze ASTM B584 Alloy C87600
Impeller Key	Stainless Steel
Retaining Ring	Stainless Steel
Coverplate	Gray Cast Iron
Gland	Gray Cast Iron
Bracket (In & Out)	Gray Cast Iron
Quad Ring	EPDM Rubber
Cap	Gray Cast iron
Water Slinger	Neoprene Rubber
Bearing	Single Row, Ball Bearing with Shield
Lock Washer	Carbon Steel
Lock Nut	Carbon Steel
Lip Seal	Steel with Nitrile Rubber Jacket
Bearing Backup Ring	Stainless Steel
Alignment Friendly Coupling	Non-Spacer, elastomeric
Coupler Guard:	ANSI/OSHA Compliant, Fully Enclosed
Baseplate:	Groutless Reinforced Structural Steel with lifting lugs

Standard Mechanical Seal Assembly

Elastomer:	EPR
Rotating Face:	Carbon
Stationary Face:	Graphite Loaded Silicon Carbon
Hardware	Stainless Steel/Brass

Maximum Working Pressure

Max Working Pressure (standard)	175 psi
Max Working Pressure (optional)	300 psi
Max Working Temperature (standard)	300
Max Working Temperature (optional)	225 - 300



Submittal to:
Michigan State University
East Lansing, MI 48824

Project:
Basso MSU Option 1 4 Cell Counter
East Lansing, MI

Engineer:
Peter Basso Associates
Troy, MI

September 5, 2023

TOWER MODEL	PERFORMANCE CONDITIONS	MOTOR DATA	TOWER DIMENSIONS	WEIGHTS
Quantity of (1) Marley MD model MD5018UAD4LCGF factory assembled 4-Cell induced draft counterflow cooling tower	Per 4-cell tower: 8,400 gpm 94.3 °F Hot Water 85.0 °F Cold Water 78.0 °F Entering WB	50 HP 1 speed / 1 wind 3 phase / 60 Hz / 230/460v 1.15sf / TEFC 1800 RPM Premium Efficiency Inverter duty nameplated <i>Site Voltage: 480</i>	Each cell: (without options) Length 18' - 1 3/4" Width 11' - 11 15/16" Height 18' - 8 1/2"	Per cell: Shipping: 12,779 lb Operating: 21,355 lb Per 4-cell tower: Shipping: 51,114 lb Operating: 85,418 lb

Quantities shown below are per tower:

Base Tower Construction/Equipment:

- Galvanized steel casing and framing with Series 300 stainless steel collection basin
- Low Sound fan with aluminum blades
- Marley designed Geareducer® with 5-year warranty
- 15 mil PVC modular film fill, 3ft (914mm) depth
- Triple-pass 17 mil PVC drift eliminators designed and manufactured by SPX
- CTI certification per STD-201
- HDG steel fan guard

Collection Basin Connections and Accessories:

- (4) 20 in (508 mm) pumped flow bottom outlet(s) with screen(s)
- (1) 3 inch (76.2mm) diameter drain with separate 3 inch (76.2mm) diameter overflow in each cell
- Flumes for equalization between cells are included
- Interconnecting flume weir plate(s) for cell isolation
- 14 in (356 mm) diameter hole and bolt circle(s) for equalization, One per Cell
- 1 in (25.4 mm) water Makeup Connection with Mechanical Float Valve in all cells with outlets
- 15 kW per cell 480/3 volt/phase electric immersion heater elements for freeze protection of the collection basin during cold weather system shutdown
- Marley ABH basin heater control system with control panel/cell and heater elements
- Heater system control package
- Heater system circuit breaker
- Heater system disconnect switch
- Heater Control per Cell

Distribution System and Accessories:

- (1) 10 in (254 mm) inlet connection on Face A per cell
- Galvanized steel header box and PVC branch arms with polypropylene spray nozzles with grommet connection for ease of removal

Maintenance & Maintenance Access Features:

- Tower is designed in accordance with OSHA safety standards
- Extended lubrication line with dipstick

Electrical System Requirements:

The following information is provided as guidance for electrical system design criteria to power each cell of the equipment in this offering based on site voltage listed in Mechanical Data above.

Description (See Mechanical Data above for sizes)	Amperage at Site Voltage (defined above)
Fan Motor 1	1 @ 65

Fan Motor 2	N/A
Spray Pump	N/A
Basin Heater	18.1
Auxiliary Load	6
Total Full Load Amps FLA	89.1
Main Circuit Breaker MCB	150
Maximum Over Current Protection MOCP	150

Full Load Amps (FLA) is the full load current at the rated voltage that the fan motor(s) and pump motor(s) will draw to produce rated output horsepower (HP). Values shown for motor full load amps are from NEC table 430.250. Included in this calculation are the amps necessary for optional basin heaters and some auxiliary load for control circuitry.

Full Load Amps per cell = Sum of Fan motor Amps + Sum of Pump motor Amps (when supplied) + Basin Heater Amps (when supplied) + Auxiliary Load (6)

The main circuit breaker (MCB) is an electrical switch designed to protect an electrical circuit from damage caused by overcurrent/overload or short circuit. The MCB value shown above is derived using appropriate overload factors, assuming the full load amps cited are being supported, based on many years of electrical control panel experience on heat rejection equipment. This will be the MCB size incorporated into the tower control panel if provided by Marley.

When provided, the Marley control panel includes an integrated overcurrent device therefore; sizing a remote MOCP type of device is not required to protect the control panel, but it may be sized considering any other installation factors required by code to protect the cable feeding the panel.

Control Systems:

None

Chemical Delivery System:

None

Tower Specials:

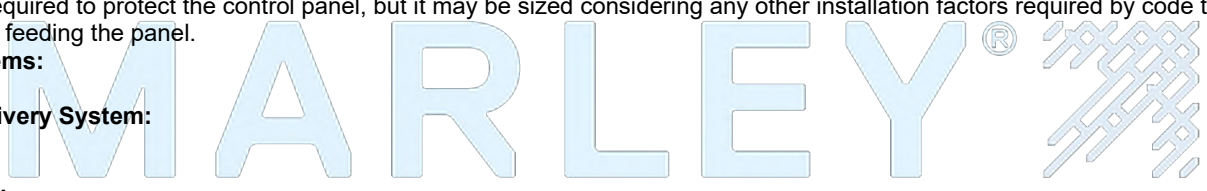
Mount motor outside.
Field Services

Field Installed Equipment:

The field installed portion of the equipment will require approximately 53.0 man-hours of installation time after the tower arrives at the jobsite (based on USA experienced crew). The price to install these components is NOT included in the total price.

Please advise if the drawing type you need has not been supplied. These are the available drawing types:

- PDF 2D documents - These documents display the tower geometry with dimensions, notes and annotations.
- Revit – A lightweight Revit part family may be downloaded from our website. Go to <http://spxcooling.com/revit>.
- DXF –Registered users of our CoolSpec Sizing and Selection tool <https://coolspec.com/> may download full scale DXF files of the basic tower. DXF is a generic 2D drawing format directly importable into AutoCad and other mechanical programs. <http://spxcooling.com/en/about/detail/revit-files/>



SUBMITTAL DOCUMENTS

Drawings & Data

<i>Transmittal Code</i>	<i>Approval Code</i>	<i>No. of Copies</i>	<i>Drawing Number /Rev/Date</i>	<i>Description</i>

Transmittal Codes:

E = Enclosed Herewith
S = Sent Separately
F = Sent via Fax
O = Other

Other Codes:

P = Print
R = Reproducible
D = Reduced Copy

Approval Codes:

SFA = Approval Document. Equipment is held for Approval and Release.
AFC = Certified Document. Equipment has been Approved for Construction.
Changes made after this point may result in price adds and/or delays.
INF = Information Document. Submitted for Information only.
RFA = Corrected Document. Re-submitted for Approval and Release
OTH = Other

Estimated Shipment Lead-Time After Drawing Approval: 160 business days

Lead times are estimates and are subject to change at time of release

September 5, 2023

For: SPX Cooling Tech, LLC

By: R B E Inc

Thank you,

Michael Chimko

**CoolSpec™ Version 7.3.25**

Product Data: 8/28/2023 (Current)

9/4/2023 8:54:34 AM

Job Information**Selected by**RBE Incorporated
4822 Joslyn Rd.
Orion Township, MI 48359 USMichael Chimko
Tel 2487653471
mchimko@rbeincorporated.com**Cooling Tower Definition**

Manufacturer	Marley	Fan Motor Speed	1800 rpm
Product	MD	Required Fan Motor Output per cell *	46.91 BHp
Model	MD5018UAD4L	Required Fan Motor Output total *	187.64 BHp
Cells	4	Fan Motor Capacity per cell	50.00 Hp
CTI Certified	Yes	Fan Motor Output per cell	50.00 BHp
Fan	11 ft, 5 Blades, Low Sound	Fan Motor Output total	200.00 BHp
Fan Speed	360 rpm, 12441 fpm	Air Flow per cell	148900 cfm
Fans per cell	1	Air Flow total	595400 cfm
Fill Type	MC120S or equivalent	Static Lift	12 ft
		Distribution Head Loss	7 ft
		ASHRAE 90.1 Performance	49.0 gpm/Hp

Model Group Inline Standard Low Sound (A)

* Required Fan Motor Output assumes VFD operation

Conditions

Tower Water Flow	8400 gpm	Air Density In	0.07094 lb/ft ³
Hot Water Temperature	94.30 °F	Air Density Out	0.07058 lb/ft ³
Range	9.30 °F	Humidity Ratio In	0.01712
Cold Water Temperature	85.00 °F	Humidity Ratio Out	0.03288
Approach	7.00 °F	Wet-Bulb Temp. Out	91.61 °F
Wet-Bulb Temperature	78.00 °F	Estimated Evaporation	77 gpm
Relative Humidity	50 %	Total Heat Rejection	38926000 Btu/h
Capacity	102.1 %		

- This selection satisfies your design conditions.

Weights & Dimensions

	Per Cell	Total
Shipping Weight	11470 lb	45880 lb
Heaviest Section	7480 lb	
Max Operating Weight	20050 lb	80180 lb
Width	11' -10"	11' -10"
Length	17' -11 ¾"	72' -6 ½"
Height	18' -8 ½"	

Minimum Enclosure Clearance

Clearance required on air inlet sides of tower without altering performance. Assumes no air from below tower.

Solid Wall	9 ft
50 % Open Wall	5 ft

Weights and dimensions do not include options; refer to sales drawings.

Cold Weather Operation**Heater Sizing** (to prevent freezing in the collection basin during periods of shutdown)

Heater kW/Cell	18.0	15.0	12.0	9.0	7.5	6.0	4.5
Ambient Temperature °F	-20.04	-9.28	1.47	12.22	17.60	22.97	28.35

Job Information

Selected by

RBE Incorporated
 4822 Joslyn Rd.
 Orion Township, MI 48359 US
 mchimko@rbeincorporated.com

Michael Chimko
 Tel 2487653471

Cooling Tower Definition

Manufacturer	Marley	Fan Speed (97.8 %)	352 rpm
Product	MD	Fan Tip Speed (97.8 %)	12170 fpm
Model	MD5018UAD4L	Fan Motor Speed (97.8 %)	1761 rpm
Cells	1	Fan Motor Capacity per cell	50.00 Hp
Fan	11.00 ft, 5 Blades, Low Sound	Fan Motor Output per cell	46.91 BHp
Fans per cell	1	Fan Motor Output total	46.91 BHp

Model Group Inline Standard Low Sound (A)

Sound » Independently Verified

1 - Cell sound data for an unobstructed environment.

Sound Pressure Level (SPL) expressed in dB (re: 20x10⁻⁶ Pa)
 Sound Power Level (PWL) expressed in dB (re: 1x10⁻¹² watts)

Distance	Location	Octave Band Center Frequency (Hz)									Overall dBA
		63	125	250	500	1000	2000	4000	8000		
5.00 ft	Air Inlet Side SPL	92	86	82	78	76	72	71	70	82	
5.00 ft	Air Inlet End SPL	92	86	82	78	76	72	71	70	82	
5.00 ft	Fan Discharge SPL	96	90	86	85	81	77	74	67	87	
50.00 ft	Air Inlet Side SPL	86	78	69	65	64	58	55	54	69	
50.00 ft	Air Inlet End SPL	86	78	69	65	64	58	55	54	69	
50.00 ft	Fan Discharge SPL	87	81	76	73	68	65	61	55	75	
	Tower PWL	120	113	108	105	101	97	93	87	107	

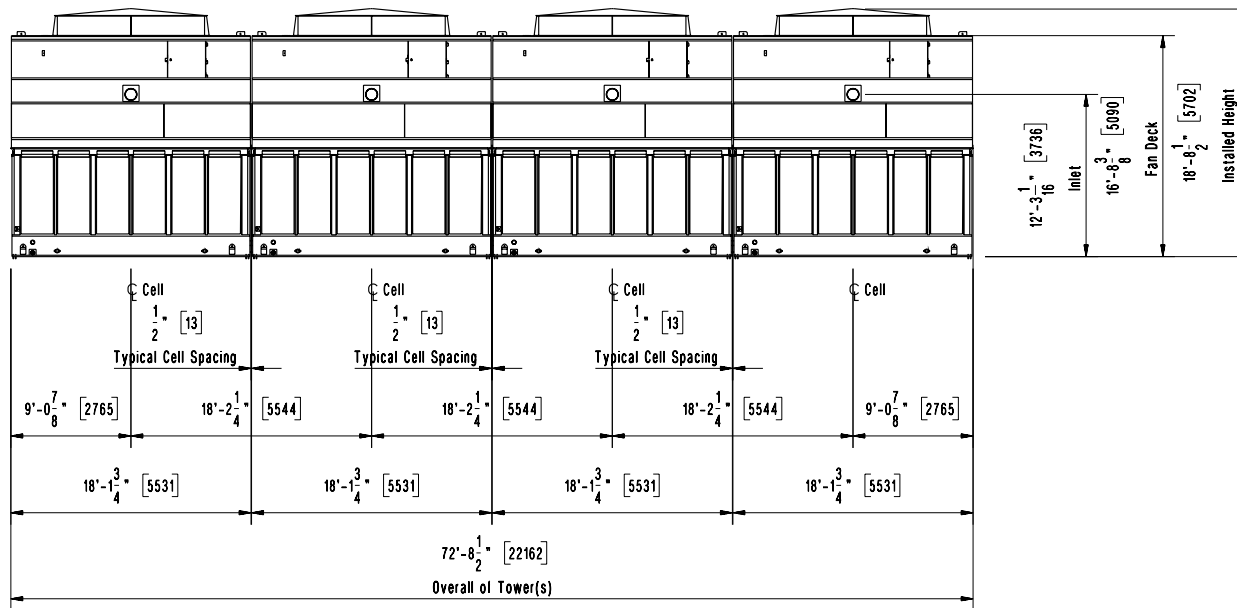
Notes

- Sound levels have been independently verified by a CTI-licensed sound test agency to ensure validity and reliability of the published values.
- Measurement and analysis of the sound levels were conducted by a certified Professional Engineer in Acoustical Engineering.
- Sound pressure levels were measured and recorded on various models in the acoustic near-field and far-field locations using ANSI S1.4 Type 1 precision instrumentation.
- Sound pressure levels were measured and recorded in full conformance with CTI ATC-128 test code November 2019 revision published by the Cooling Technology Institute (CTI).

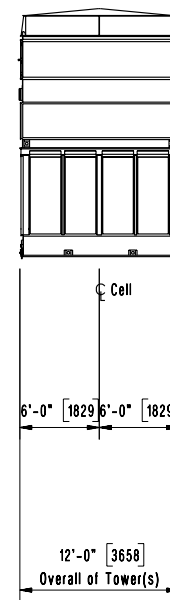
Other Resources

For additional information on sound-related topics please see:

Sound Power Impacts Per CTI Code Revision
<https://spxcooling.com/library/sound-power-impacts-per-cti-code-revision/>
 Understanding and Evaluating Cooling Tower Sound Levels Among Manufacturers
<https://spxcooling.com/library/understanding-and-evaluating-cooling-tower-sound-levels-among-manufacturers/>



Front Elevation of Tower
(Face A)

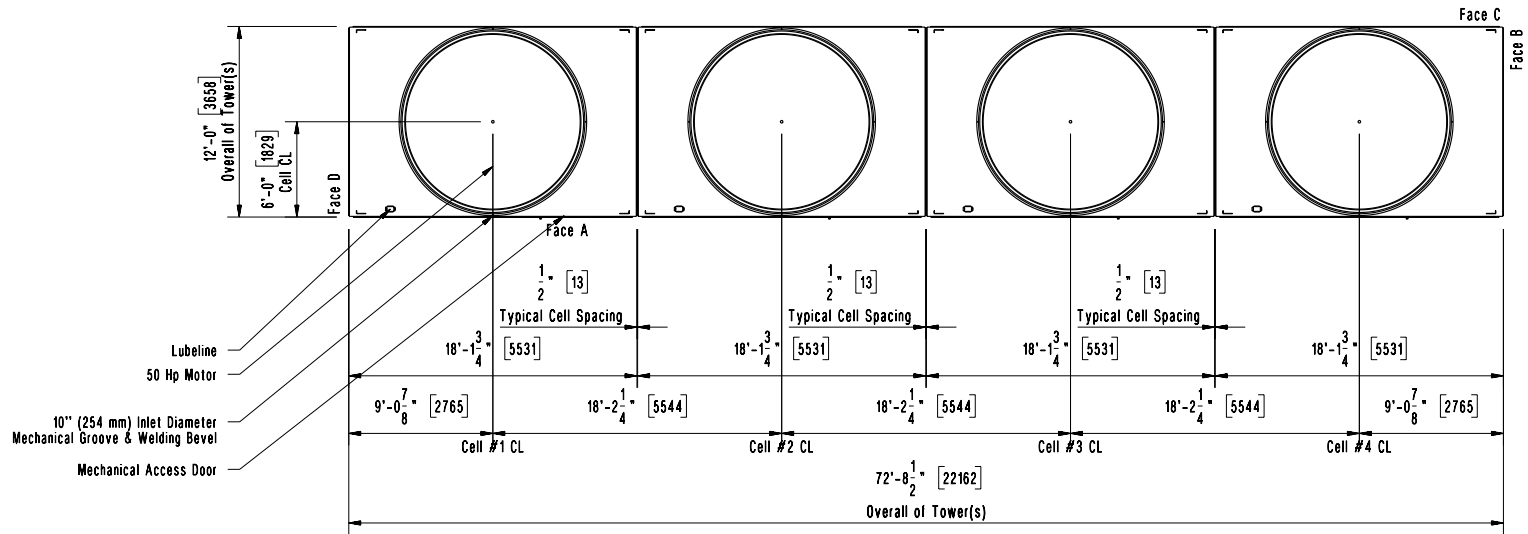


Side Elevation of Tower
(Face B, Cell 4)

NOTES

1. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
2. The units of measure are in IP (SI) units unless otherwise noted.
3. See Schematic Plan drawing for additional notes.

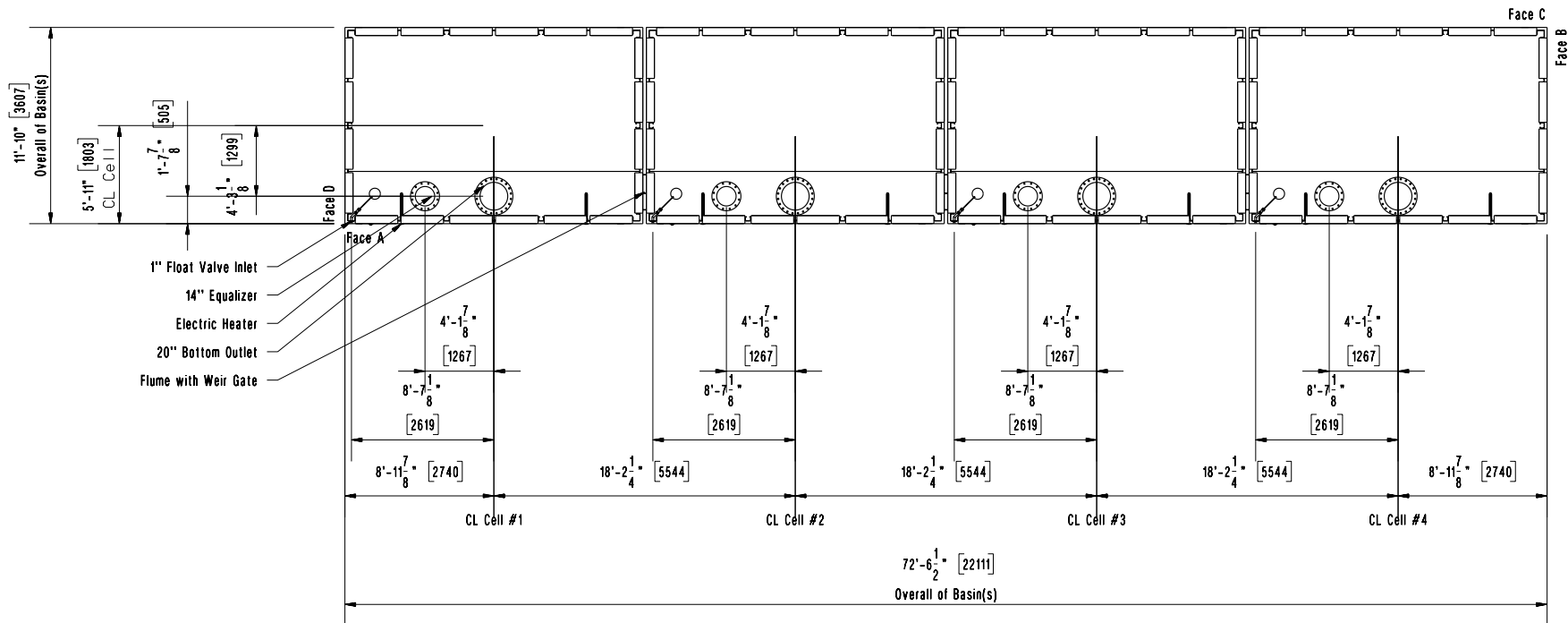
MD5018UAD4LCGF – Schematic Elevation Basso MSU Option 1 Counter 4 Cell East Lansing, MI, United States							MARLEY	
							ORDER 0	
DRAWN BY	CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV	
MICHAEL CHIMKO_230904_075236748 V1	QTC			09/05/23	SYS	MC864837S		



NOTES

1. The fan motor must be locked out and inoperable before entering the tower. This warning has been placed on the access door.
2. To insure maximum thermal performance the cooling tower must be installed level and plumb. Air inlet faces must have adequate air supply. If obstructions exist, consult your SPX CT representative.
3. Hoisting clips are provided for ease of unloading and positioning. For overhead lifts or where additional safety precautions are prudent, add slings beneath the tower. Adequate space has been provided for removal of the shackles and the 5 1/4" (133 mm) long pins from the hoist clips between the cells of a multi-cell tower. If the pin used is longer than 5 1/4" (133 mm), the cell may be slid into it's final position by using come-alongs at the base of the unit, after removal of shackle pins. See Hoisting Details drawing.
4. Flanged connections conform to ANSI125 specification. The bolt holes straddle the centerlines.
5. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
6. The units of measure are in IP (SI) units unless otherwise noted.

MD5018UAD4LCGF - Schematic Plan Basso MSU Option 1 Counter 4 Cell East Lansing, MI, United States						MARLEY	
						ORDER 0	
DRAWN BY		CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER
MICHAEL CHIMKO_230904_075236748 V1		QTC			09/05/23	SYS	MC864837M
						REV	



Plan View of Basin

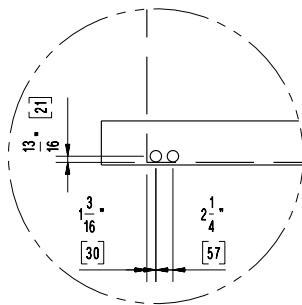
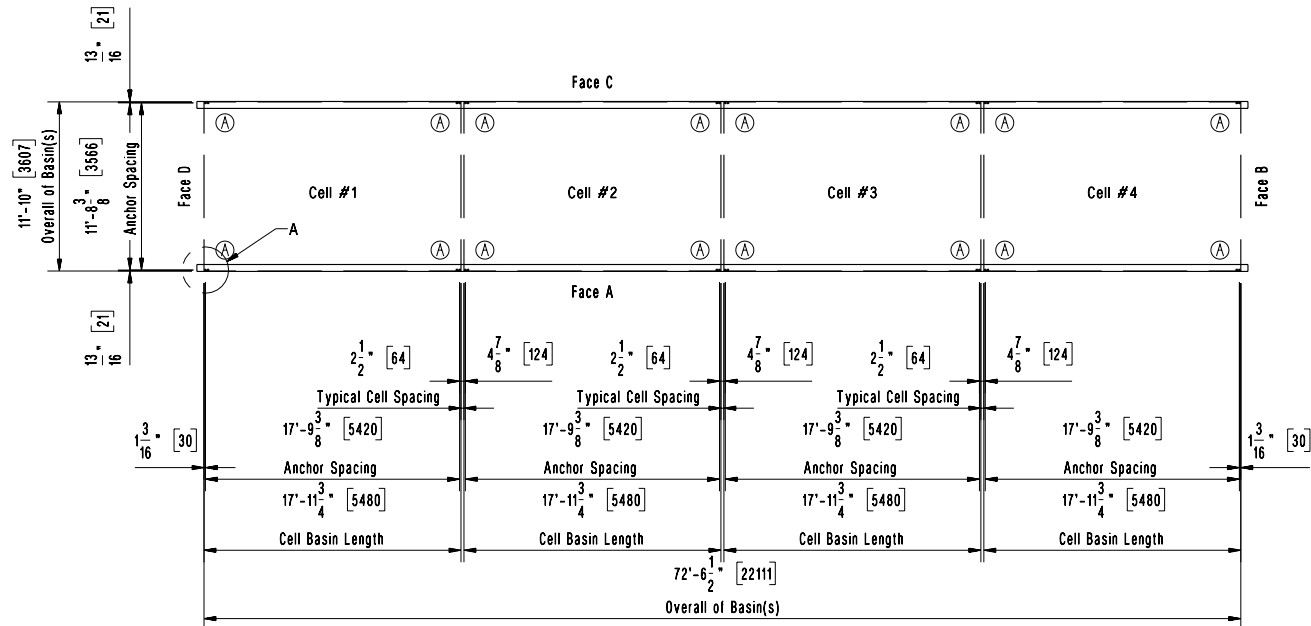
NOTES

1. Flanged connections conform to ANSI125 specification. The bolt holes straddle the centerlines.
2. All piping supports are by others. Do NOT support outlet piping from the tower.
3. The diameter of the bottom outlet equalizer option is based on a SPX CT standard using 20 percent of a tower's outlet design flow and a head differential between two adjacent towers of 1" (25 mm).
4. Basin flumes are shipped inside the tower and are to be field installed by others. The connecting collars are shop installed.
5. Refer to basin heater detail drawings for heater details.
6. The collection basin piping accessories shown on this drawing are furnished by SPX CT. This includes a full faced gasket. Flat faced flange, fasteners and seal washers attachment to the outlet and equalizer are supplied by others. The use of a flange other than a flat faced flange will damage the collection basin floor.
7. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
8. The units of measure are in IP (SI) units unless otherwise noted.

MD5018UAD4LCGF - Piping Plan Basso MSU Option 1 Counter 4 Cell East Lansing, MI, United States							MARLEY	
							ORDER 0	
DRAWN BY		CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV
MICHAEL CHIMKO_230904_075236748 V1		QTC			09/05/23	SYS	MC864837P	

Shipping Weight			Design Operating Loads				Wind Load		Seismic Load	
per Tower	per Cell	Heaviest Lift	per Tower	per Cell	Along Support Beams		Horiz. Reaction @ A	Vert. Reaction Along Beam	Horiz. Reaction @ A	Vert. Reaction Along Beam
					FACE 'A'	FACE 'C'				
5114 lbs (23185 kgf)	12779 lbs (5796 kgf)	8596 lbs (3899 kgf)	85418 lbs (38745 kgf)	21355 lbs (9686 kgf)	690 lbs/ft (1026 kgf/m)	505 lbs/ft (751 kgf/m)	95.35 x P lbs (8.86 x P kgf)	19.25 x P lbs (1.79 x P kgf)	5339 x G lbs (2422 x G kgf)	747 x G lbs (339 x G kgf)

(8) 3/4" ASTM A307 or M20 Grade 4.6 anchor bolts are required per cell. These anchor bolts are capable of resisting 53.3 psf (2552 N/m²) wind load or 0.84 G seismic load applied to the tower. Wind and Seismic capacities are un-factored loads as determined by ASCE7-10. Determination of the site specific design wind and seismic loads are by others.



DETAIL A

NOTES

- SUPPORTING STEEL:** The supporting steel is to be designed, constructed and furnished by the customer. It shall include customer supplied anchor bolts to suit the general dimensions of this drawing and of the Outlet Piping Plan drawing. The top surface of the supporting steel must be framed flush and level. The maximum beam deflection shall be limited to 1/360 of span, not to exceed 1/2" (13 mm) at the anchor bolts.
- DESIGN OPERATING LOADS:** The design operating loads shown in the above table are based upon the volume of water in the collection basin at shutdown. The shutdown water level has been sized to accommodate the maximum allowable flow rate. The design loads are shown for your use as a quick reference. The actual operating load is variable, and dependent upon the design flow rate per cell. Shutdown volume loads are determined considering the recommended operating water level. Operating levels in excess of that recommended will result in loads exceeding the values stated.
- WIND & SEISMIC LOADS:** Reactions shown are the result of the wind/seismic load being applied perpendicular to the face of the tower structure. Loads are additive to the operating loads. Wind reactions can be calculated by multiplying by P, which is the wind pressure in psf for Imperial units and kgf/m² for metric units. Seismic reactions can be calculated by design G.
- Tower support beams are provided by others.
- SHIPPING WEIGHTS AND MAXIMUM OPERATING LOADS:** Values shown in table include the optional equipment weights.
- The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
- The units of measure are in IP (SI) units unless otherwise noted.

MD5018UAD4LCGF – Supporting Steel Plan and Details
Basso MSU Option 1 Counter 4 Cell
East Lansing, MI, United States

MARLEY

ORDER 0

DRAWN BY	CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV
MICHAEL CHIMKO_230904_075236748 V1	QTC			09/05/23	SYS	MC864837G	



Issue Date: 06/14
 Project: Project
 Engineer: Sales Eng
 Customer: customer
 Software Version: YW 14.04c

Rating Program: LTC
 Rev: v1_136.idd
 Date: 10/17/14
 Page: 2 of 3

Model	YSTZRZSK7-KDG	Shaft Power (HP)	2052
Refrigerant	134A	Gear Code	ML(SPEC)
Rated Capacity (TR)	2800	Orifice	VALVE:5
Specified Capacity (TR)	2800	OptiSound Control	YES
Steam Supply Pressure (psig)	90.0	Design Point COP	1.14
Steam Supply Temperature (°F)	331.2	NPLV (As COP)	1.70
Design Steam Flow (lb/hr)	26626	Design Steam Rate (lb/hr,TR)	9.51
Percent Load (%)	100.0	NPLV (As Steam Rate) (lb/hr,TR)	6.32

	Evaporator	Condenser
Fluid	WATER*	WATER*
% By Weight	0.0*	0.0*
Tube MTI No.	272*	261*
Passes	2*	2*
Foul Factor (hr.ft ² .°F/BTU)	0.00010*	0.00025*
Fluid Entering Temperature (°F)	56.00	85.00*
Fluid Leaving Temperature (°F)	42.00*	95.00
Fluid Flow (gpm)	4784.3*	7776.0*
Fluid Pressure Drop (ft)	20.9	25.8 + 7.8 = 33.6
Fluid Size Nozzle Size ("NB)	18	20

Turbine	
Model/Frame	KD72400090
Number of Nozzles - Total	21
Number of Nozzles - Overload	1
Expansion Ratio	1.040
Number of Stages	7
Operating Speed (RPM)	4500.00
Steam Exhaust Pressure ("Hg)	3.09
Steam Rate (lbs/BHP,hr)	12.96
Steam Inlet Nozzle Size ("NB)	6
Steam Exhaust Nozzle Size ("NB)	30
Max Output (BHP)	2204

Steam Condenser	
Model #	42216A
Fluid	WATER
Tube Type	Copper, plain, 0.049" / 1.245mm
Tube Side Passes	1
Cleanliness Factor (%)	85.0
Fluid Entering Temperature (°F)	95.00
Fluid Leaving Temperature (°F)	101.22
Fluid Flow (gpm)	7776.00
Fluid Pressure Drop (ft fluid)	7.82
Fluid Size Nozzle Size ("NB)	20
Condensing Pressure ("Hg)	2.89
Condensing Temperature (°F)	113.77
Condensate Overboard Pressure (psig)	25.00
Condensate Overboard Temperature (°F)	113.77
Condensate Overboard Flow (gpm)	53.7
Condensate Nozzle Size ("NB)	1

(*) Designates Specified Input



Issue Date: 06/14
Project: Project
Engineer: Sales Eng
Customer: customer
Software Version: YW 14.04c

Rating Program: LTC
Rev: v1_136.idd
Date: 10/17/14
Page: 3 of 3

PART LOAD PERFORMANCE:

Pct Load	Capacity (TR)	Pct Steam Flow	Shaft HP (HP)	RPM	COP	Steam Flow (lb/hr)	No. Nozzle	EEFT (°F)	ELFT (°F)	CEFT (°F)	CLFT (°F)	Steam CLFT(°F)
100.0	2800.0	100.0	2052.7	4500.0	1.14	26625	20	56.00	42.00	85.00	95.00	101.20
90.0	2520.0	77.4	1594.6	4213.6	1.32	20595	17	54.60	42.00	80.00	88.80	93.70
80.0	2240.0	59.8	1205.1	3933.3	1.50	15934	17	53.20	42.00	75.00	82.70	86.50
70.0	1960.0	45.8	888.4	3629.2	1.70	12202	17	51.80	42.00	70.00	76.60	79.60
60.0	1680.0	34.0	622.1	3295.0	1.95	9054	17	50.40	42.00	65.00	70.60	72.80
50.0	1400.0	24.9	434.2	3200.0	2.21	6620	17	49.00	42.00	60.00	64.60	66.30
40.0	1120.0	18.9	308.7	3200.0	2.32	5019	17	47.60	42.00	55.00	58.70	59.90
30.0 *	840.0	13.8	214.2	3200.0	2.36	3665	17	46.20	42.00	50.00	52.70	53.70
20.0 *	560.0	10.4	161.2	3200.0	2.09	2758	17	44.80	42.00	50.00	51.80	52.50
15.0 *	421.1	8.1	126.5	3200.0	2.00	2165	17	44.10	42.00	50.00	51.40	51.90

(*) The performance is not guaranteed for any part load point. Points further identified with an * are outside the normal calculation range and are best estimates only.

Submittal to:
Michigan State University
East Lansing, MI 48824

Project:
Basso MSU Option 2 Counter 5 cell
East Lansing, MI

Engineer:
Peter Basso Associates
Troy, MI

September 6, 2023

TOWER MODEL	PERFORMANCE CONDITIONS	MOTOR DATA	TOWER DIMENSIONS	WEIGHTS
Quantity of (1) Marley MD model MD5018UAF5LCGF factory assembled 5-Cell induced draft counterflow cooling tower	Per 5-cell tower: 8,400 gpm 101.3 °F Hot Water 85.0 °F Cold Water 78.0 °F Entering WB	50 HP 1 speed / 1 wind 3 phase / 60 Hz / 230/460v 1.15sf / TEFC 1800 RPM Premium Efficiency Inverter duty nameplated <i>Site Voltage: 480</i>	Each cell: (without options) Length 18' - 1 3/4" Width 11' - 11 15/16" Height 19' - 8 1/2"	Per cell: Shipping: 13,570 lb Operating: 22,146 lb Per 5-cell tower: Shipping: 67,850 lb Operating: 110,730 lb

Quantities shown below are per tower:

Base Tower Construction/Equipment:

- Galvanized steel casing and framing with Series 300 stainless steel collection basin
- Low Sound fan with aluminum blades
- Marley designed Geareducer® with 5-year warranty
- 15 mil PVC modular film fill, 4ft (1219mm) depth
- Triple-pass 17 mil PVC drift eliminators designed and manufactured by SPX
- CTI certification per STD-201
- HDG steel fan guard

Collection Basin Connections and Accessories:

- (5) 20 in (508 mm) pumped flow bottom outlet(s) with screen(s)
- (1) 3 inch (76.2mm) diameter drain with separate 3 inch (76.2mm) diameter overflow in each cell
- Flumes for equalization between cells are included
- Interconnecting flume weir plate(s) for cell isolation
- 12 in (305 mm) diameter hole and bolt circle(s) for equalization, One per Cell
- 1 in (25.4 mm) water Makeup Connection with Mechanical Float Valve in all cells with outlets
- 15 kW per cell 480/3 volt/phase electric immersion heater elements for freeze protection of the collection basin during cold weather system shutdown
- Marley ABH basin heater control system with control panel/cell and heater elements
- Heater system control package
- Heater system circuit breaker
- Heater system disconnect switch
- Heater Control per Cell

Distribution System and Accessories:

- (1) 10 in (254 mm) inlet connection on Face A per cell
- Galvanized steel header box and PVC branch arms with polypropylene spray nozzles with grommet connection for ease of removal

Maintenance & Maintenance Access Features:

- Tower is designed in accordance with OSHA safety standards
- Extended lubrication line with dipstick
- Removable panel on fill casing to facilitate periodic fill removal

Electrical System Requirements:

The following information is provided as guidance for electrical system design criteria to power each cell of the equipment in this offering based on site voltage listed in Mechanical Data above.

Description (See Mechanical Data above for sizes)	Amperage at Site Voltage (defined above)
Fan Motor 1	1 @ 65

Fan Motor 2	N/A
Spray Pump	N/A
Basin Heater	18.1
Auxiliary Load	6
Total Full Load Amps FLA	89.1
Main Circuit Breaker MCB	150
Maximum Over Current Protection MOCP	150

Full Load Amps (FLA) is the full load current at the rated voltage that the fan motor(s) and pump motor(s) will draw to produce rated output horsepower (HP). Values shown for motor full load amps are from NEC table 430.250. Included in this calculation are the amps necessary for optional basin heaters and some auxiliary load for control circuitry.

Full Load Amps per cell = Sum of Fan motor Amps + Sum of Pump motor Amps (when supplied) + Basin Heater Amps (when supplied) + Auxiliary Load (6)

The main circuit breaker (MCB) is an electrical switch designed to protect an electrical circuit from damage caused by overcurrent/overload or short circuit. The MCB value shown above is derived using appropriate overload factors, assuming the full load amps cited are being supported, based on many years of electrical control panel experience on heat rejection equipment. This will be the MCB size incorporated into the tower control panel if provided by Marley.

When provided, the Marley control panel includes an integrated overcurrent device therefore; sizing a remote MOCP type of device is not required to protect the control panel, but it may be sized considering any other installation factors required by code to protect the cable feeding the panel.

Control Systems:

None

Chemical Delivery System:

None

Tower Specials:

Mount motor outside the airstream
Field Services

Field Installed Equipment:

The field installed portion of the equipment will require approximately 66.5 man-hours of installation time after the tower arrives at the jobsite (based on USA experienced crew). The price to install these components is NOT included in the total price.

Please advise if the drawing type you need has not been supplied. These are the available drawing types:

- PDF 2D documents - These documents display the tower geometry with dimensions, notes and annotations.
- Revit – A lightweight Revit part family may be downloaded from our website. Go to <http://spxcooling.com/revit>.
- DXF –Registered users of our CoolSpec Sizing and Selection tool <https://coolspec.com/> may download full scale DXF files of the basic tower. DXF is a generic 2D drawing format directly importable into AutoCad and other mechanical programs. <http://spxcooling.com/en/about/detail/revit-files/>

SUBMITTAL DOCUMENTS

Drawings & Data

<i>Transmittal Code</i>	<i>Approval Code</i>	<i>No. of Copies</i>	<i>Drawing Number /Rev/Date</i>	<i>Description</i>

Transmittal Codes:

E = Enclosed Herewith

S = Sent Separately

F = Sent via Fax

O = Other

Other Codes:

P = Print

R = Reproducible

D = Reduced Copy

Approval Codes:

SFA = Approval Document. Equipment is held for Approval and Release.

AFC = Certified Document. Equipment has been Approved for Construction.
Changes made after this point may result in price adds and/or delays.

INF = Information Document. Submitted for Information only.

RFA = Corrected Document. Re-submitted for Approval and Release

OTH = Other

Estimated Shipment Lead-Time After Drawing Approval: 160 business days

Lead times are estimates and are subject to change at time of release

September 6, 2023

For: SPX Cooling Tech, LLC

By: R B E Inc

Thank you,

Michael Chimko

**CoolSpec™ Version 7.3.25**

Product Data: 8/28/2023 (Current)

9/6/2023 11:53:56 AM

Job Information**Selected by**RBE Incorporated
4822 Joslyn Rd.
Orion Township, MI 48359 USMichael Chimko
Tel 2487653471
mchimko@rbeincorporated.com**Cooling Tower Definition**

Manufacturer	Marley	Fan Motor Speed	1800 rpm
Product	MD	Required Fan Motor Output per cell *	41.59 BHp
Model	MD5018UAF5L	Required Fan Motor Output total *	207.96 BHp
Cells	5	Fan Motor Capacity per cell	50.00 Hp
CTI Certified	Yes	Fan Motor Output per cell	50.00 BHp
Fan	11 ft, 5 Blades, Low Sound	Fan Motor Output total	250.00 BHp
Fan Speed	360 rpm, 12441 fpm	Air Flow per cell	143300 cfm
Fans per cell	1	Air Flow total	716400 cfm
Fill Type	MC120S or equivalent	Static Lift	13 ft
		Distribution Head Loss	5 ft
		ASHRAE 90.1 Performance	50.9 gpm/Hp

Model Group Inline Standard Low Sound (A)

* Required Fan Motor Output assumes VFD operation

Conditions

Tower Water Flow	8400 gpm	Air Density In	0.07094 lb/ft ³
Hot Water Temperature	101.25 °F	Air Density Out	0.06969 lb/ft ³
Range	16.25 °F	Humidity Ratio In	0.01712
Cold Water Temperature	85.00 °F	Humidity Ratio Out	0.03893
Approach	7.00 °F	Wet-Bulb Temp. Out	96.79 °F
Wet-Bulb Temperature	78.00 °F	Estimated Evaporation	126 gpm
Relative Humidity	50 %	Total Heat Rejection	67972000 Btu/h
Capacity	106.3 %		

- This selection satisfies your design conditions.

Weights & Dimensions

	Per Cell	Total
Shipping Weight	12200 lb	61200 lb
Heaviest Section	8300 lb	
Max Operating Weight	20800 lb	104100 lb
Width	11' -10"	11' -10"
Length	17' -11 ¾"	90' -8 ¾"
Height	19' -8 ½"	

Minimum Enclosure Clearance

Clearance required on air inlet sides of tower without altering performance. Assumes no air from below tower.

Solid Wall	8 ft
50 % Open Wall	5 ft

Weights and dimensions do not include options; refer to sales drawings.

Cold Weather Operation**Heater Sizing** (to prevent freezing in the collection basin during periods of shutdown)

Heater kW/Cell	18.0	15.0	12.0	9.0	7.5	6.0	4.5
Ambient Temperature °F	-20.04	-9.28	1.47	12.22	17.60	22.97	28.35

Job Information

Selected by

RBE Incorporated
 4822 Joslyn Rd.
 Orion Township, MI 48359 US
 mchimko@rbeincorporated.com

Michael Chimko
 Tel 2487653471

Cooling Tower Definition

Manufacturer	Marley	Fan Speed (93.8 %)	338 rpm
Product	MD	Fan Tip Speed (93.8 %)	11675 fpm
Model	MD5018UAF5L	Fan Motor Speed (93.8 %)	1689 rpm
Cells	1	Fan Motor Capacity per cell	50.00 Hp
Fan	11.00 ft, 5 Blades, Low Sound	Fan Motor Output per cell	41.59 BHp
Fans per cell	1	Fan Motor Output total	41.59 BHp

Model Group Inline Standard Low Sound (A)

Sound » Independently Verified

1 - Cell sound data for an unobstructed environment.

Sound Pressure Level (SPL) expressed in dB (re: 20x10⁻⁶ Pa)
 Sound Power Level (PWL) expressed in dB (re: 1x10⁻¹² watts)

Distance	Location	Octave Band Center Frequency (Hz)								Overall dBA
		63	125	250	500	1000	2000	4000	8000	
5.00 ft	Air Inlet Side SPL	91	85	81	77	75	72	71	70	81
5.00 ft	Air Inlet End SPL	91	85	81	77	75	72	71	70	81
5.00 ft	Fan Discharge SPL	95	89	85	84	80	76	73	66	86
50.00 ft	Air Inlet Side SPL	85	77	68	64	63	58	55	54	69
50.00 ft	Air Inlet End SPL	85	77	68	64	63	58	55	54	69
50.00 ft	Fan Discharge SPL	86	80	75	72	67	64	61	54	74
	Tower PWL	119	112	107	104	100	96	93	87	106

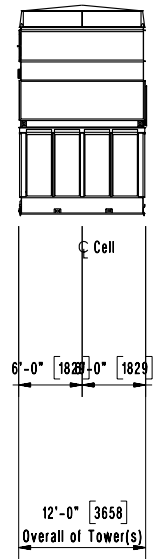
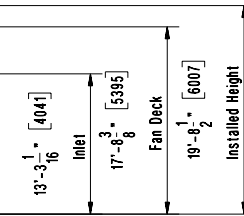
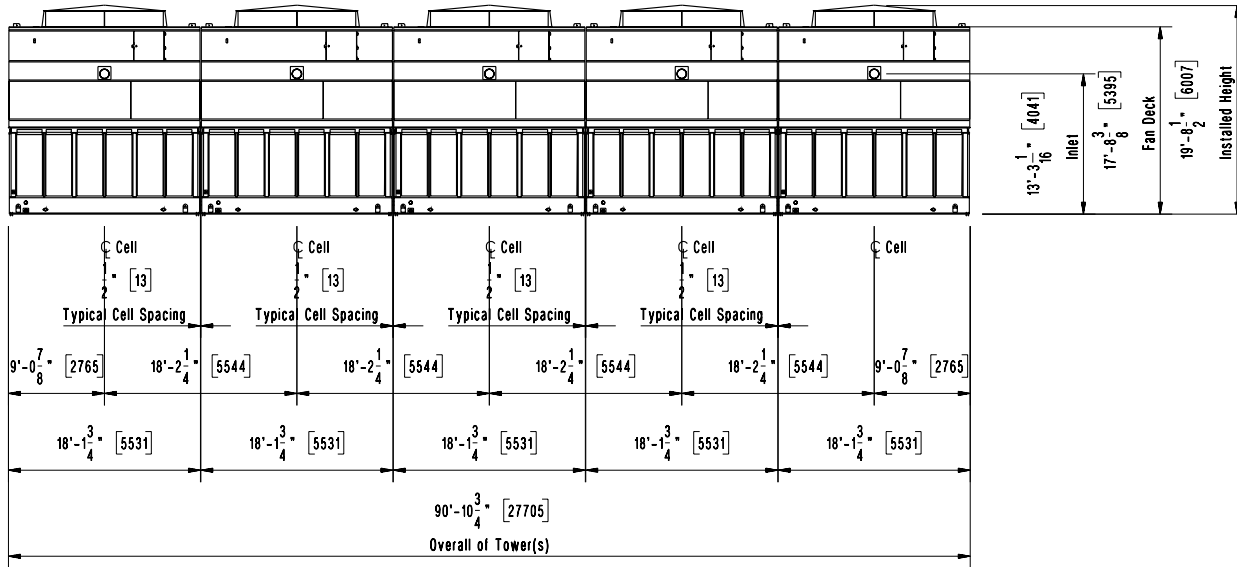
Notes

- Sound levels have been independently verified by a CTI-licensed sound test agency to ensure validity and reliability of the published values.
- Measurement and analysis of the sound levels were conducted by a certified Professional Engineer in Acoustical Engineering.
- Sound pressure levels were measured and recorded on various models in the acoustic near-field and far-field locations using ANSI S1.4 Type 1 precision instrumentation.
- Sound pressure levels were measured and recorded in full conformance with CTI ATC-128 test code November 2019 revision published by the Cooling Technology Institute (CTI).

Other Resources

For additional information on sound-related topics please see:

Sound Power Impacts Per CTI Code Revision
<https://spxcooling.com/library/sound-power-impacts-per-cti-code-revision/>
 Understanding and Evaluating Cooling Tower Sound Levels Among Manufacturers
<https://spxcooling.com/library/understanding-and-evaluating-cooling-tower-sound-levels-among-manufacturers/>

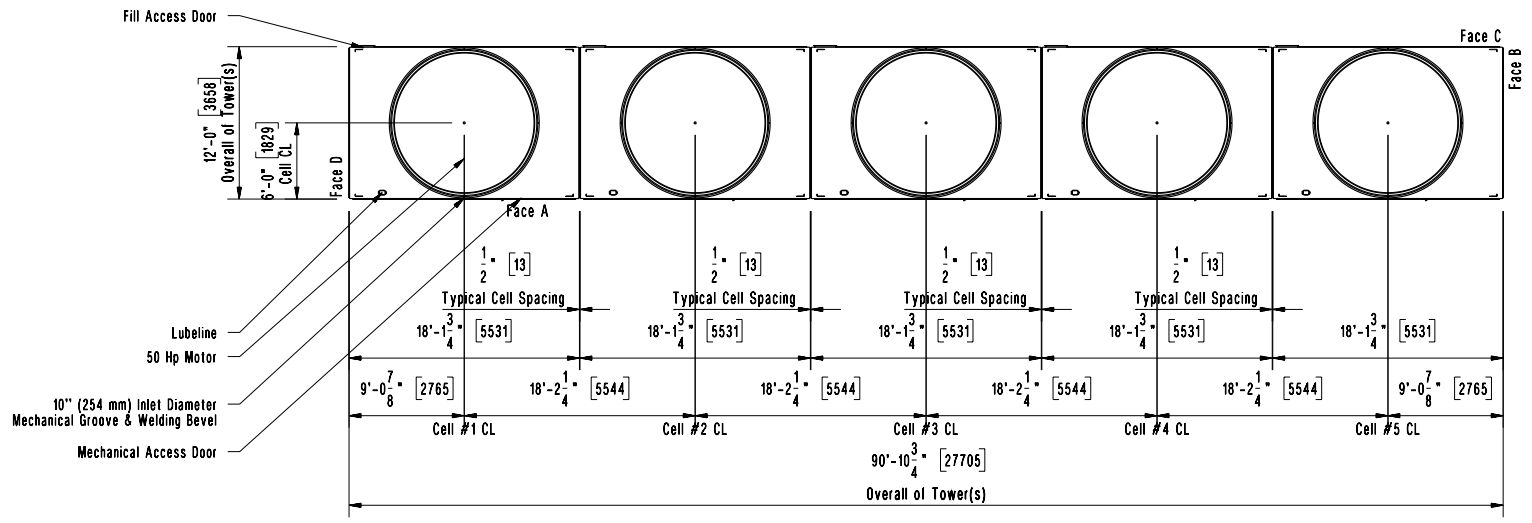


Front Elevation of Tower
(Face A)

Side Elevation of Tower
(Face B, Cell 5)

- NOTES
1. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
 2. The units of measure are in IP (SI) units unless otherwise noted.
 3. See Schematic Plan drawing for additional notes.

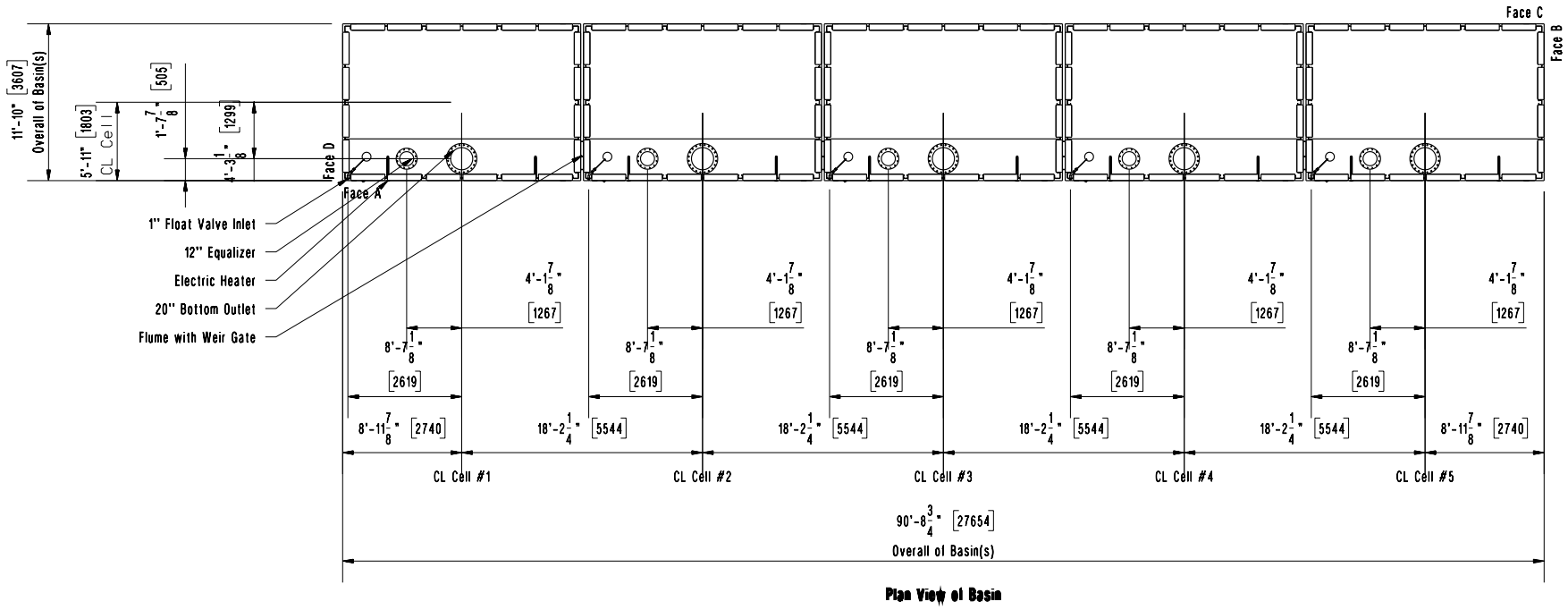
MD5018UAF5LCGF – Schematic Elevation							MARLEY	
Basso MSU Option 2 counter 4 cell							ORDER 0	
East Lansing, MI, United States								
DRAWN BY	CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV	
MICHAEL CHIMKO_230906_092643618 V1	QTC			09/06/23	SYS	MC864949S		



NOTES

1. The fan motor must be locked out and inoperable before entering the tower. This warning has been placed on the access door.
2. To insure maximum thermal performance the cooling tower must be installed level and plumb. Air inlet faces must have adequate air supply. If obstructions exist, consult your SPX CT representative.
3. Hoisting clips are provided for ease of unloading and positioning. For overhead lifts or where additional safety precautions are prudent, add slings beneath the tower. Adequate space has been provided for removal of the shackles and the 5 1/4" (133 mm) long pins from the hoist clips between the cells of a multi-cell tower. If the pin used is longer than 5 1/4" (133 mm), the cell may be slid into it's final position by using come-alongs at the base of the unit, after removal of shackle pins. See Hoisting Details drawing.
4. Flanged connections conform to ANSI125 specification. The bolt holes straddle the centerlines.
5. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
6. The units of measure are in IP (SI) units unless otherwise noted.

<p>MD5018UAF5LCGF – Schematic Plan Basso MSU Option 2 counter 4 cell East Lansing, MI, United States</p>							<p>MARLEY</p>	
							<p>ORDER 0</p>	
DRAWN BY		CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV
MICHAEL CHIMKO_230906_092643618 V1		QTC			09/06/23	SYS	MC864949M	

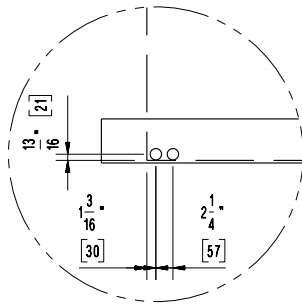
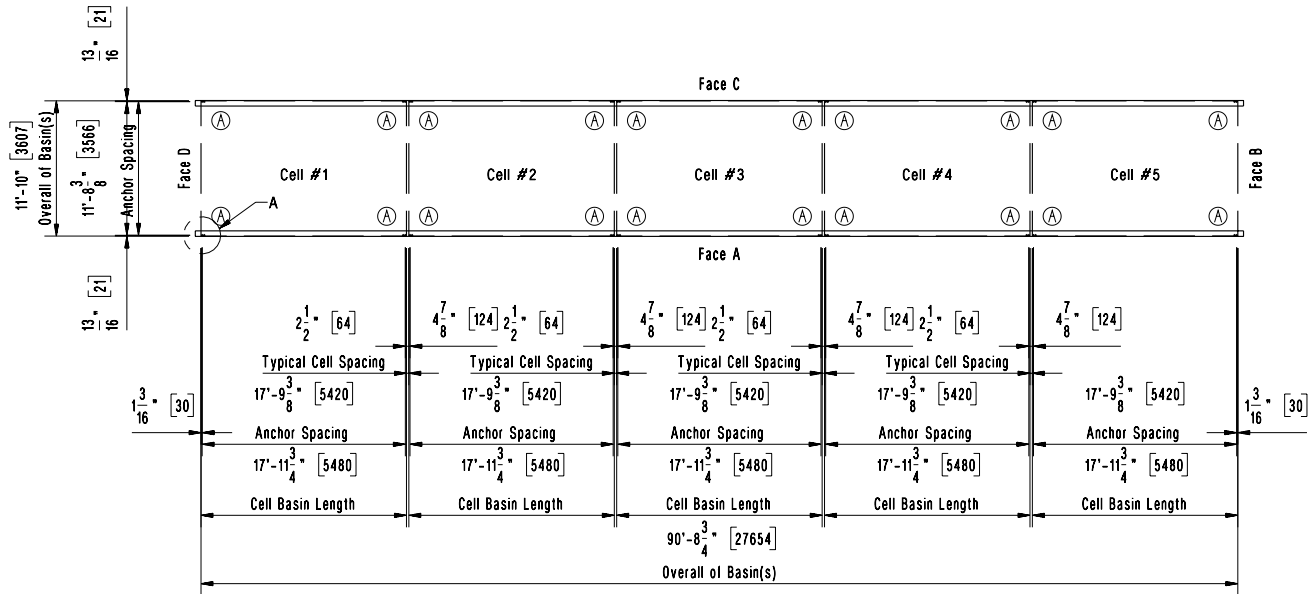


- NOTES**
1. Flanged connections conform to ANSI125 specification. The bolt holes straddle the centerlines.
 2. All piping supports are by others. Do NOT support outlet piping from the tower.
 3. The diameter of the bottom outlet equalizer option is based on a SPX CT standard using 20 percent of a tower's outlet design flow and a head differential between two adjacent towers of 1" (25 mm).
 4. Basin flumes are shipped inside the tower and are to be field installed by others. The connecting collars are shop installed.
 5. Refer to basin heater detail drawings for heater details.
 6. The collection basin piping accessories shown on this drawing are furnished by SPX CT. This includes a full faced gasket. Flat faced flange, fasteners and seal washers attachment to the outlet and equalizer are supplied by others. The use of a flange other than a flat faced flange will damage the collection basin floor.
 7. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
 8. The units of measure are in IP (SI) units unless otherwise noted.

MD5018UAF5LCGF - Piping Plan Basso MSU Option 2 counter 4 cell East Lansing, MI, United States							MARLEY	
							ORDER 0	
DRAWN BY		CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV
MICHAEL CHIMKO_230906_092643618 V1		QTC			09/06/23	SYS	MC864949P	

Shipping Weight			Design Operating Loads				Wind Load		Seismic Load	
per Tower	per Cell	Heaviest Lift	per Tower	per Cell	Along Support Beams		Horiz. Reaction @ A	Vert. Reaction Along Beam	Horiz. Reaction @ A	Vert. Reaction Along Beam
					FACE 'A'	FACE 'C'				
67850 lbs (30776 kgf)	13570 lbs (6155 kgf)	9384 lbs (4256 kgf)	110730 lbs (50226 kgf)	22146 lbs (10045 kgf)	715 lbs/ft (1064 kgf/m)	523 lbs/ft (779 kgf/m)	99.84 x P lbs (9.28 x P kgf)	21.1 x P lbs (1.96 x P kgf)	5536 x G lbs (2511 x G kgf)	864 x G lbs (392 x G kgf)

(8) 3/4" ASTM A307 or M20 Grade 4.6 anchor bolts are required per cell. These anchor bolts are capable of resisting 53.3 psf (2552 N/m²) wind load or 0.84 G seismic load applied to the tower. Wind and Seismic capacities are un-factored loads as determined by ASCE7-10. Determination of the site specific design wind and seismic loads are by others.



DETAIL A

NOTES

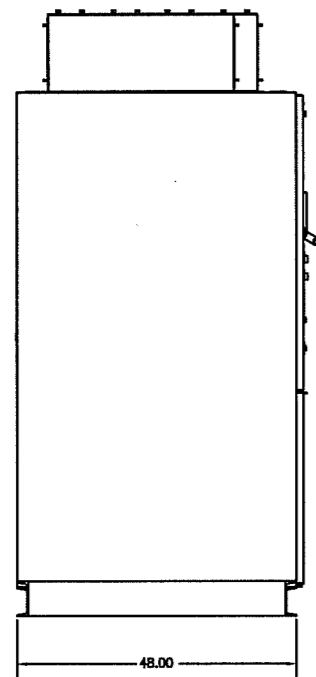
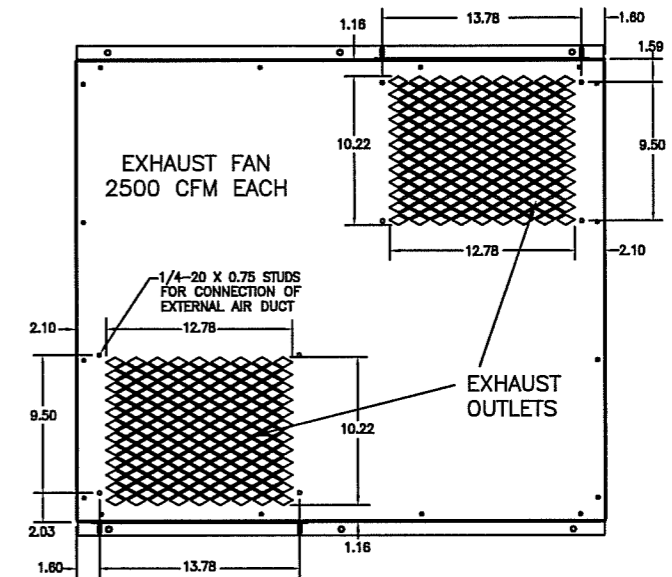
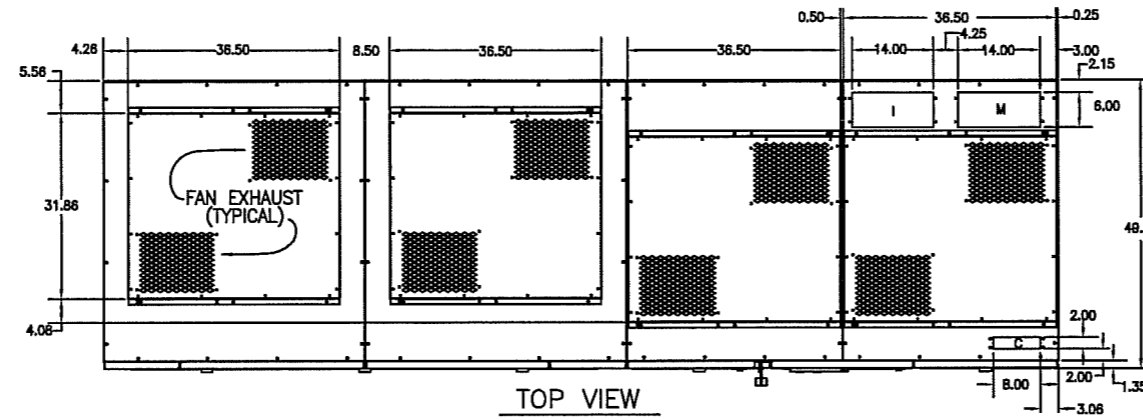
- SUPPORTING STEEL:** The supporting steel is to be designed, constructed and furnished by the customer. It shall include customer supplied anchor bolts to suit the general dimensions of this drawing and of the Outlet Piping Plan drawing. The top surface of the supporting steel must be framed flush and level. The maximum beam deflection shall be limited to 1/360 of span, not to exceed 1/2" (13 mm) at the anchor bolts.
- DESIGN OPERATING LOADS:** The design operating loads shown in the above table are based upon the volume of water in the collection basin at shutdown. The shutdown water level has been sized to accommodate the maximum allowable flow rate. The design loads are shown for your use as a quick reference. The actual operating load is variable, and dependent upon the design flow rate per cell. Shutdown volume loads are determined considering the recommended operating water level. Operating levels in excess of that recommended will result in loads exceeding the values stated.
- WIND & SEISMIC LOADS:** Reactions shown are the result of the wind/seismic load being applied perpendicular to the face of the tower structure. Loads are additive to the operating loads. Wind reactions can be calculated by multiplying by P, which is the wind pressure in psf for Imperial units and kgf/m² for metric units. Seismic reactions can be calculated by design G.
- Tower support beams are provided by others.
- SHIPPING WEIGHTS AND MAXIMUM OPERATING LOADS:** Values shown in table include the optional equipment weights.
- The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
- The units of measure are in IP (SI) units unless otherwise noted.

MD5018UAF5LCGF – Supporting Steel Plan and Details								MARLEY	
Basso MSU Option 2 counter 4 cell								ORDER 0	
East Lansing, MI, United States									
DRAWN BY		CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV	
MICHAEL CHIMKO_230906_092643618 V1		QTC			09/06/23	SYS	MC864949G		

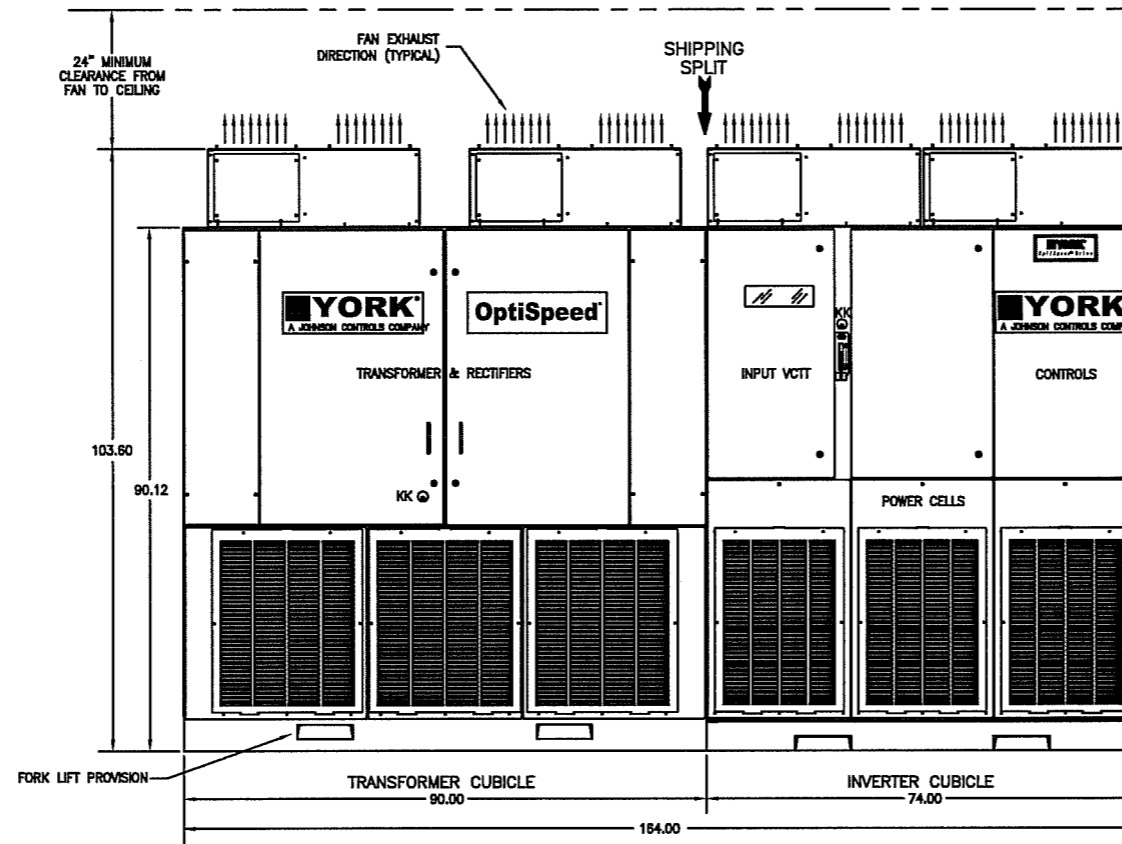
4000V F2
4160V F2

CABLE TERMINATIONS			
ENTRY	INCOMING CABLES	MOTOR LEADS	CONTROL WIRE
TOP	I	M	C
BOTTOM	I	M	C

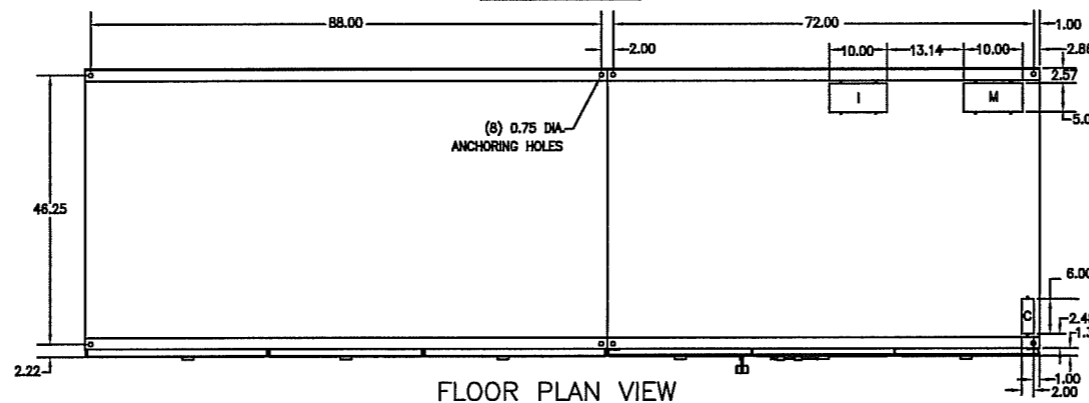
INCOMING TERMINATIONS USE NEMA 4-HOLE PATTERN
MOTOR TERMINATIONS USE NEMA 4-HOLE PATTERN



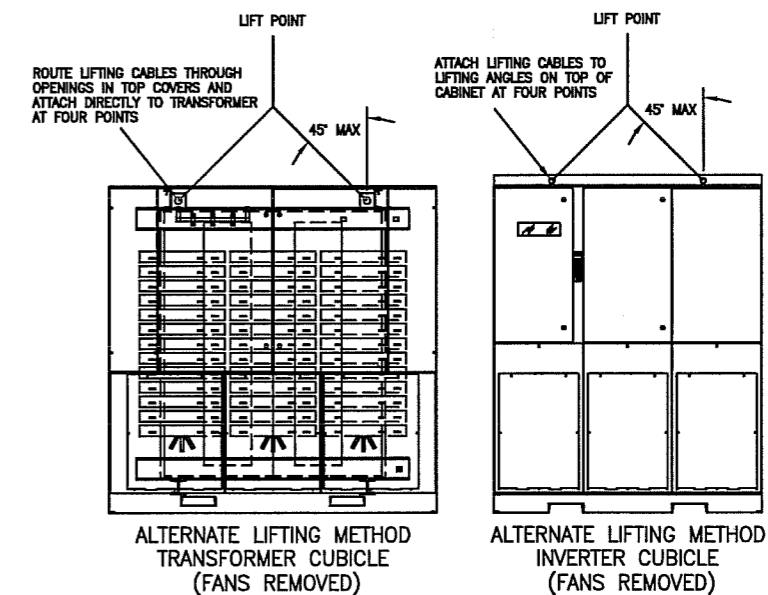
LH VIEW



FRONT VIEW



FLOOR PLAN VIEW



- NOTES**
- ENCLOSURE TYPE: NEMA 1 W/GASKETED DOORS
 - ALL WEIGHTS ARE APPROXIMATE IN LBS
 - ALL DIMS ARE IN INCHES
 - POWER CELLS NEED TO BE REMOVED FOR ACCESS

	DK	DL
TRANSFORMER CUBICLE	11,200 lbs	12,000 lbs
INVERTER CUBICLE	4,500 lbs	4,500 lbs

PRODUCT DRAWING

Medium Voltage OptiSpeed VSD

NOT FOR CONSTRUCTION



- Robust cylindrical steel receiver with dished heads for structural integrity with minimum 3/16" thickness.
- Minimum receiver elevation for simplified shipping and installation and lowest possible inlet height.
- Wide range of receiver sizes for most efficient operation of your system.
- "Package" construction yields total responsibility. Factory assembled and tested as a complete package.
- B35 2ft. NPSH pumps or Centriflo® centrifugal condensate pumps. Vertical mount design puts motors above dirt and water, and saves floor space. All pumps feature enclosed bronze impellers and renewable wearing rings.
- Handles condensate up to 210°F at sea level, up to 550 gpm and 75 psig discharge pressures with floor level horizontal steel receivers.
- Handles condensate up to 212°F at sea level, up to 550 gpm and 175 psig discharge pressures with elevated horizontal steel receivers.



SERIES CED



SERIES CHD

Domestic® Pump Series CHD™ and CED™ Condensate Units

DUPLEX 30,000 THRU 555,000 SQ. FT. EDR
7417 THRU 136,517 LB./HR.



DOMESTIC® SERIES CHD & CED CONDENSATE UNITS

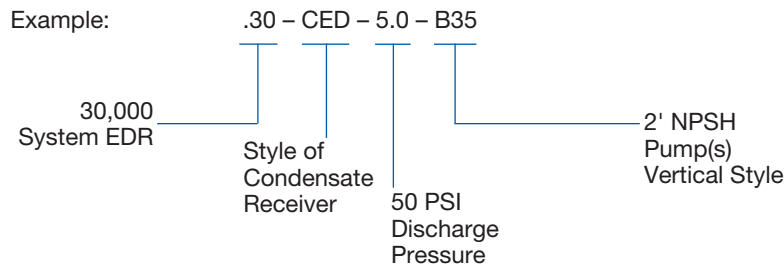
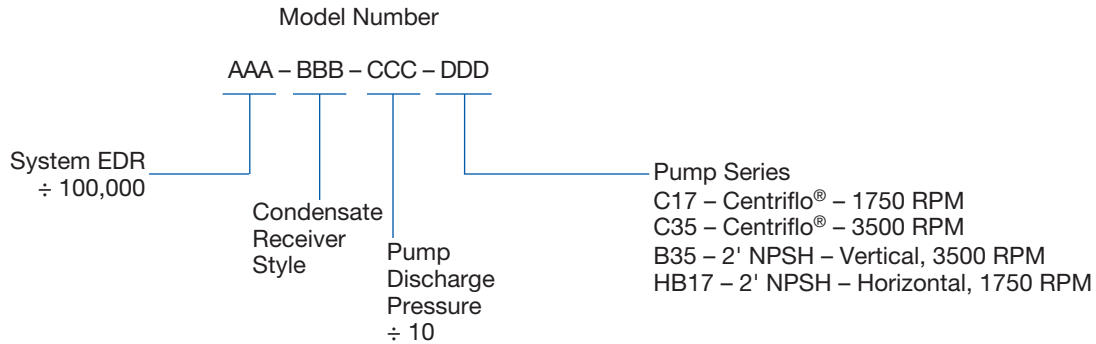
Series CED units offer flexible and economical solutions for condensate handling requirements in schools, hospitals and many other applications.

The receiver is fabricated of black steel and is available with hot dipped galvanizing or epoxy lining. A wide range of receiver sizes guarantees an efficient match of unit to system, and depending on receiver size, as many as eight condensate pumps can be mounted on the receiver.

Series B35 2' NPSH pumps are standard equipment. These 2 ft. NPSH centrifugal pumps are rugged and reliable and ensure operation at boiling temperatures when used with elevated units.

For those situations where initial cost is an overriding factor, CED units can be furnished with economical Centriflo® single stage pumps.

MODEL DESIGNATION



DOMESTIC® SERIES CHD & CED CONDENSATE UNITS

STANDARD UNIT FEATURES:

- Steel receiver, minimum 3/16" thickness with dished heads and inlet cascade baffle. Receiver sized for 5 minute net storage.
- Units are elevated 30 inches on a fabricated steel base with suction piping and isolation valves.
- Gauge glass with shut-off valve
- Dial thermometer
- Float switch(es)
- Centrifugal 2' NPSH B35 pumps with open drip proof motors. Pump capacity sized for two times the system return rate.

OPTIONAL EQUIPMENT AS SPECIFIED:

- Centriflo® centrifugal pumps; Series C17-1750 RPM or Series C35-3500 RPM
- Inlet basket strainer
- Manhole
- NEMA 2 – U.L. Listed Control Panel
- Mechanical or electrical alternation
- TEFC motors and controls
- Hot dip galvanizing or epoxy lining
- Discharge pressure gauges
- High or low water alarms and required controls

DOMESTIC® PUMP SERIES CHD & CED SELECTION DATA

Total Sq. Ft. EDR	** Pump Cap. GPM	Pump Disch. Press. PSIG	Centriflo Pump Motor HP	Condensate to 200 °F	Condensate to 205 °F	Series B Pump Motor HP	Condensate to 210 °F	Condensate to 212 °F	Rec. Size & Net Storage Cap.	Opening Sizes, (Inches)
				Series CHD Model Number	Series CED Model Number		Series CHD Model Number	Series CED Model Number		
30,000	30	20	¾	.30-CHD-2.0-C35	.30-CED-2.0-C35	¾	.30-CHD-2.0-B35	.30-CED-2.0-B35	24" x 36" 65 GAL	INLET 2½ OVERFLOW 2 VENT 2
		25	¾	.30-CHD-2.5-C35	.30-CED-2.5-C35	¾	.30-CHD-2.5-B35	.30-CED-2.5-B35		
		30	1	.30-CHD-3.0-C35	.30-CED-3.0-C35	1	.30-CHD-3.0-B35	.30-CED-3.0-B35		
		40	1½	.30-CHD-4.0-C35	.30-CED-4.0-C35	2	.30-CHD-4.0-B35	.30-CED-4.0-B35		
		50	2	.30-CHD-5.0-C35	.30-CED-5.0-C35	3	.30-CHD-5.0-B35	.30-CED-5.0-B35		
		60	3	.30-CHD-6.0-C35	.30-CED-6.0-C35	3	.30-CHD-6.0-B35	.30-CED-6.0-B35		
		75	5	.30-CHD-7.5-C35	.30-CED-7.5-C35	5	.30-CHD-7.5-B35	.30-CED-7.5-B35		
		85	-	-	-	5	.30-CHD-8.5-B35	.30-CED-8.5-B35		
		90	5	.30-CHD-9.0-C35	.30-CED-9.0-C35	-	-	-		
		100	-	-	-	7½	.30-CHD-10.0-B35	.30-CED-10.0-B35		
60,000	60	20	1½	.60-CHD-2.0-C35	.60-CED-2.0-C35	1½	.60-CHD-2.0-B35	.60-CED-2.0-B35	24" x 60" 104 GAL	INLET 3 OVERFLOW 2½ VENT 2
		25	1½	.60-CHD-2.5-C35	.60-CED-2.5-C35	2	.60-CHD-2.5-B35	.60-CED-2.5-B35		
		30	2	.60-CHD-3.0-C35	.60-CED-3.0-C35	2	.60-CHD-3.0-B35	.60-CED-3.0-B35		
		40	3	.60-CHD-4.0-C35	.60-CED-4.0-C35	3	.60-CHD-4.0-B35	.60-CED-4.0-B35		
		50	3	.60-CHD-5.0-C35	.60-CED-5.0-C35	5	.60-CHD-5.0-B35	.60-CED-5.0-B35		
		60	5	.60-CHD-6.0-C35	.60-CED-6.0-C35	5	.60-CHD-6.0-B35	.60-CED-6.0-B35		
		75	5	.60-CHD-7.5-C35	.60-CED-7.5-C35	7½	.60-CHD-7.5-B35	.60-CED-7.5-B35		
		85	-	-	-	7½	.60-CHD-8.5-B35	.60-CED-8.5-B35		
		90	7½	.60-CHD-9.0-C35	.60-CED-9.0-C35	-	-	-		
		100	-	-	-	7½	.60-CHD-10.0-B35	.60-CED-10.0-B35		
75,000	75	20	1½	.75-CHD-2.0-C35	.75-CED-2.0-C35	2	.75-CHD-2.0-B35	.75-CED-2.0-B35	30" x 48" 141 GAL	INLET 4 OVERFLOW 3 VENT 2½
		25	2	.75-CHD-2.5-C35	.75-CED-2.5-C35	2	.75-CHD-2.5-B35	.75-CED-2.5-B35		
		30	2	.75-CHD-3.0-C35	.75-CED-3.0-C35	3	.75-CHD-3.0-B35	.75-CED-3.0-B35		
		40	3	.75-CHD-4.0-C35	.75-CED-4.0-C35	5	.75-CHD-4.0-B35	.75-CED-4.0-B35		
		50	5	.75-CHD-5.0-C35	.75-CED-5.0-C35	5	.75-CHD-5.0-B35	.75-CED-5.0-B35		
		60	5	.75-CHD-6.0-C35	.75-CED-6.0-C35	7½	-	.75-CED-6.0-B35		
		75	7½	.75-CHD-7.5-C35	.75-CED-7.5-C35	10	-	.75-CED-7.5-B35		
		85	-	-	-	10	-	.75-CED-8.5-B35		
		90	7½	.75-CHD-9.0-C35	.75-CED-9.0-C35	-	-	-		
		100	-	-	-	15	-	.75-CED-10.0-B35		
112,000	112	25	3	1.12-CHD-2.5-C35	1.12-CED-2.5-C35	5	NOT AVAILABLE	1.12-CED-2.5-B35	30" x 72" 204 GAL	INLET 4 OVERFLOW 3 VENT 2½
		30	3	1.12-CHD-3.0-C35	1.12-CED-3.0-C35	5		1.12-CED-3.0-B35		
		40	5	1.12-CHD-4.0-C35	1.12-CED-4.0-C35	7½		1.12-CED-4.0-B35		
		50	5	1.12-CHD-5.0-C35	1.12-CED-5.0-C35	7½		1.12-CED-5.0-B35		
		60	7½	1.12-CHD-6.0-C35	1.12-CED-6.0-C35	10		1.12-CED-6.0-B35		
		75	10	1.12-CHD-7.5-C35	1.12-CED-7.5-C35	10		1.12-CED-7.5-B35		
		85	-	-	-	15		1.12-CED-8.5-B35		
150,000	150 (140 MAX WITH B35 PUMPS)	25	5	1.50-CHD-2.5-C35	1.50-CED-2.5-C35	-	NOT AVAILABLE	-	36" x 72" 302 GAL	INLET 4 OVERFLOW 3 VENT 2½
		30	5	1.50-CHD-3.0-C35	1.50-CED-3.0-C35	-		-		
		40	7½	1.50-CHD-4.0-C35	1.50-CED-4.0-C35	7½		1.40-CED-4.0-B35		
		50	7½	1.50-CHD-5.0-C35	1.50-CED-5.0-C35	7½		1.40-CED-5.0-B35		
		60	10	1.50-CHD-6.0-C35	1.50-CED-6.0-C35	10		1.40-CED-6.0-B35		
		75	15	1.50-CHD-7.5-C35	1.50-CED-7.5-C35	15		1.40-CED-7.5-B35		
		85	-	-	-	15		1.40-CED-8.5-B35		
260,000	260	25	7½*	2.60-CHD-2.5-C17	2.60-CED-2.5-C17	7½*	NOT AVAILABLE	2.60-CED-2.5-HB17	42" x 84" 492 GAL	INLET 6 OVERFLOW 4 VENT 4
		30	7½*	2.60-CHD-3.0-C17	2.60-CED-3.0-C17	7½*		2.60-CED-3.0-HB17		
		40	10*	2.60-CHD-4.0-C17	2.60-CED-4.0-C17	10*		2.60-CED-4.0-HB17		
		50	-	-	-	15*		2.60-CED-5.0-HB17		
340,000	340	25	7½*	3.40-CHD-2.5-C17	3.40-CED-2.5-C17	7½*	NOT AVAILABLE	3.40-CED-2.5-HB17	48" x 96" 712 GAL	INLET 6 OVERFLOW 4 VENT 4
		30	10*	3.40-CHD-3.0-C17	3.40-CED-3.0-C17	10*		3.40-CED-3.0-HB17		
		40	15*	3.40-CHD-4.0-C17	3.40-CED-4.0-C17	15*		3.40-CED-4.0-HB17		
425,000	425	25	10*	4.25-CHD-2.5-C17	4.25-CED-2.5-C17		NOT AVAILABLE	NOT	48" x 120" 879 GAL	INLET 8 OVERFLOW 4 VENT 6
		30	15*	4.25-CHD-3.0-C17	4.25-CED-3.0-C17			AVAILABLE		
		40	15*	4.25-CHD-4.0-C17	4.25-CED-4.0-C17			AVAILABLE		
550,000	550	25	10*	5.50-CHD-2.5-C17	5.50-CED-2.5-C17		NOT AVAILABLE	NOT	60" x 108" 1306 GAL	INLET 8 OVERFLOW 4 VENT 6
		30	15*	5.50-CHD-3.0-C17	5.50-CED-3.0-C17			AVAILABLE		

* 1750 RPM pumps. All others are 3500 RPM.
 ** Pump GPM based upon 2 times the return rate
 Consult factory for units other than shown

OPTIONAL ELECTRIC CONTROLS

Description of Optional Panel Components:

- Magnetic Starters must be used on all 3 phase motors and single phase motors over 2 HP.
- Disconnect Switches and Circuit Breakers. Either a circuit breaker or fuses are required ahead of the starters to protect against short circuits. A disconnect switch or circuit breaker also provides a means of shutting off power for service.
- Selector Switches – “Auto-Off-Hand” selector switches provide a means of shutting off pumps and a means of testing in the “Hand” position. “Off-Hand-Lead-Lag” selector switches may be furnished on duplex units with 2 float switches to provide manual alternation.
- Electric Alternator may be furnished on duplex units to provide automatic sequencing of lead pump. Use only when magnetic starters are provided and only with 2 float switches.
- A Transformer is required by the National Electrical Code to reduce control voltage when power supply exceeds 250 volts. A transformer is recommended when voltage exceeds 130 volts. Refer to local codes for requirements.
- Pilot Lights – Pump running pilots are available to indicate pump operation.
- Audible Alarm – An alarm to indicate low or high water level may be furnished. A separate tank mounted level switch should be provided with an alarm.

Specified Panel Components to be furnished with unit at extra cost.

Standard panels are supplied with NEMA 2 enclosures and are U.L. listed unless otherwise specified.



**U.L. Listed
Control Panel**

ROUGHING-IN DIMENSIONS Not to be used for installation. Certified Dimensions on Request.
CHD and CED Receiver sizes other than those shown are available. Consult factory.

SERIES CHD AND CED

RECEIVER SIZE**	NET STORAGE CAPACITY (U.S. GALLONS)	TOTAL RECEIVER CAPACITY	SYSTEM RATING		APPROXIMATE OVERALL DIMENSIONS				HEAD & SHELL THICKNESS
			EDR X 1000	LBS/HR STEAM	LENGTH (INCHES)	WIDTH*** (INCHES)	HEIGHT (INCHES)		
							CHD	CED	
24x36	65	77	30	7500	60	38	26 ¹ / ₂	56 ¹ / ₂	3/16
24x60	104	124	60	15000	84	38	26 ¹ / ₂	56 ¹ / ₂	
30x48	141	161	75	18750	74	44	32	62	
30x72	204	234	112	28000	100	44	32 ¹ / ₂	62 ¹ / ₂	
36x72	302	342	150	37500	102	50	38 ¹ / ₂	68	
42x84	492	542	200	65000	122	56 ¹ / ₂	44 ¹ / ₂	74	
48x96	712	805	340	85000	135 ¹ / ₂	62 ¹ / ₂	50 ¹ / ₂	80	
48x120	879	995	425	106250	159 ¹ / ₂	62 ¹ / ₂	50 ¹ / ₂	80	1/4
60x108	1306	1424	550	137500	152	74 ¹ / ₂	62 ¹ / ₂	92	

* Pump GPM based upon 2 times system rate.

** For storage other than 5 minutes, adjust receiver size accordingly.

*** Varies according to pump size; maximum dimension shown.

We value your feedback. Please take our 3 question survey at bellgossett.com/survey to let us know how we are doing.



Xylem Inc.
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Morton Grove, Illinois 60053
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www.bellgossett.com

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YMC² CHILLER PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model No.		Net Capacity (tons)	Power	Refrigerant
CH-1000	1	YMC2-S3517A B		1000	460/3/60.0	R-134a

Unit Data	Evaporator	Condenser
Compressor Model: M6C-331FAC	Model: ED3914-481-BS1-2GTL	Model: CB3314-471-ES1-2GTL
EWT (°F):	56.00	85.00
LWT (°F):	42.00	94.30
Flow Rate (gpm):	1709	3036
Pressure Drop (ft H2O):	24.9	27.5
Fluid Type (%):	WATER	WATER
Circuit No. of Passes:	2	2
Fouling Factor (ft ² °F hr / Btu):	0.000100	0.000250
Tube No. / Description:	481 - 0.025" CSL Enhanced Copper (3/4")	471 - 0.025" Enhanced Copper (3/4")
Design Working Pressure (psig):	150	150
Entering Water Nozzle @ Location:	L	L
Leaving Water Nozzle @ Location:	L	L
Water Box Weight, ea (lb)(1):	709	440
Cover Plate Weight, ea (lb):	825	411
Return Head Weight (lb):	211	176
Water Weight (lb):	2707	2471
Water Volume(gal):	325	297
Min Flow Rate (gpm):	825.5	1407
Max Flow Rate (gpm):	2333	3857

Performance Data		Electrical Data		Other	
Heat Rejection Capacity(mbtu/hr):	14.04	Job FLA:	766	Operating Wt. (lb):	33448
Job KW:	584.6	Min Circuit Ampacity(Amps):	958	Per Isolator (lb):	8362
KW/Ton.R:	0.5846	Max Fuse/Breaker:	1600	Refrigerant Wt. (lb):	1510
NPLV.IP(KW/Ton.R):	0.3242			Compressor Wt. (lb):	4400
				Ship Wt (lb):	28304
Isolation Valves:	YES				
		Type Starter: VSD w/ filter			
		VSD Model: HYP1278XHC30B-46B			

Notes:

(1) Not including cover plate on marine water boxes.

AHRI Message:

Auxiliary components included in total kW: Chiller Controls.

Certified in accordance with the AHRI Water-Cooled Water Chilling and Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Certified units may be found in the AHRI Directory at www.ahridirectory.org.



Job/Project:	Representative:	
ESP-Systemwize: WIZE-446BC41C	Created On: 07/27/2023	Phone:
Location/Tag:	Email:	
Engineer:	Submitted By:	Date:
Contractor:	Approved By:	Date:

Double Suction Split Case Pump

Series: VSX-VSC

Model: 8x10x17.5A



Features & Design

- Space saving footprint
- Multiple suction and discharge flange orientations
- Maintenance-free bearings
- Alignment-friendly coupling

*The Bell & Gossett Series VSX-VSC vertical suction and discharge flanges create an extremely compact space-saving design that allows up to 8,000 lbs. static loading per nozzle.

<http://bellgossett.com/pumps-circulators/double-suction-pumps/series-vsx-split-case-pump/>

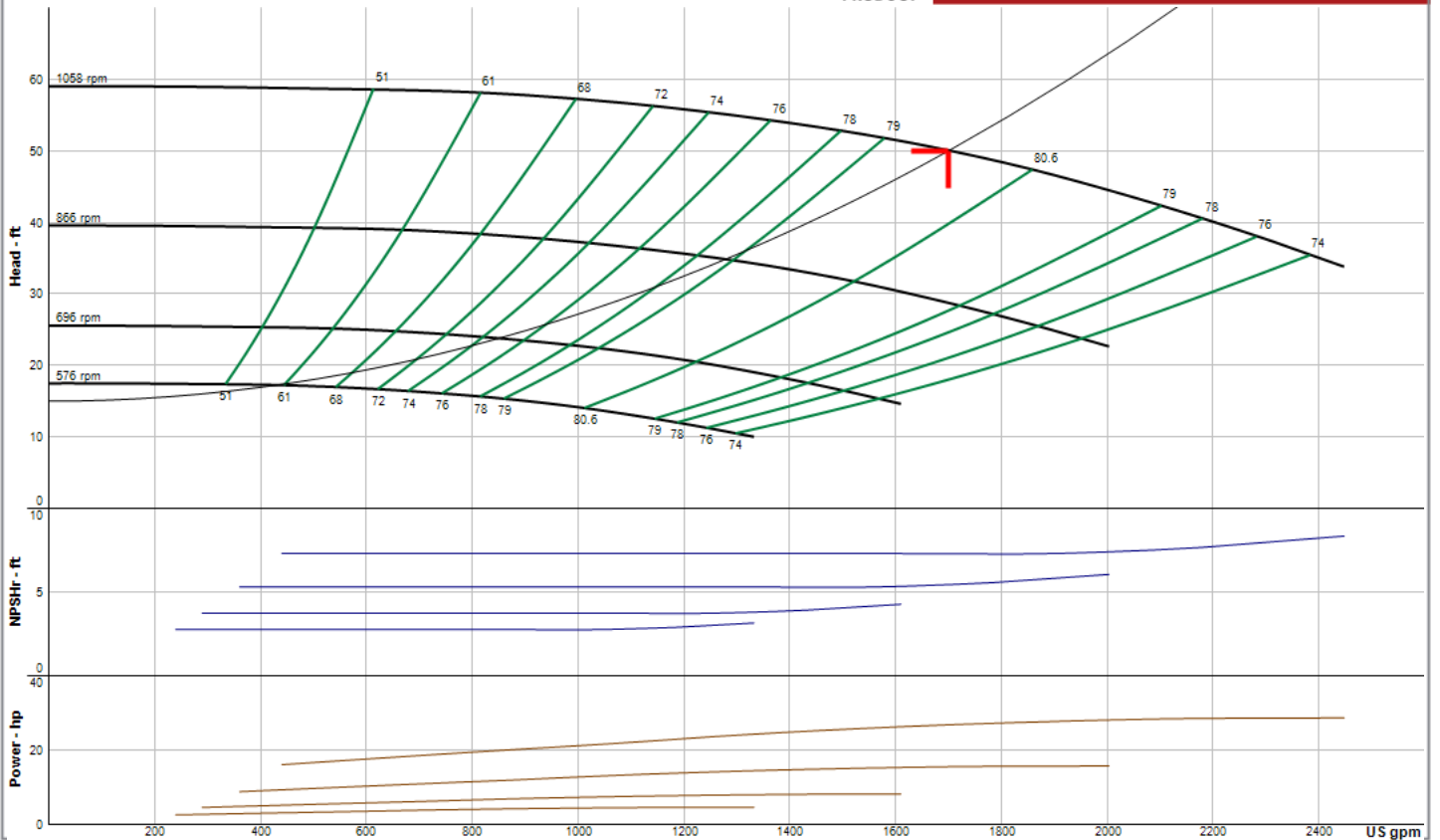
Pump Selection Summary

Duty Point Flow	1700 US gpm
Duty Point Head	50 ft
Control Head	15 ft
Duty Point Pump Efficiency	79.8 %
Part Load Efficiency Value (PLEV)	73.7 %
Impeller Diameter	12.875 in
Motor Power	40 hp
Duty Point Power	26.8 bhp
Motor Speed	1200 rpm
RPM @ Duty Point	1058 rpm
NPSHr	7.3 ft
Minimum Shutoff Head	59 ft
Minimum Flow at RPM	427 US gpm
Flow @ BEP	1858 US gpm
Fluid Temperature	68 °F
Fluid Type	Water
Weight (approx. - consult rep for exact)	4256 lbs
Pump Floor Space Calculation	27.33 ft²

Performance Curve



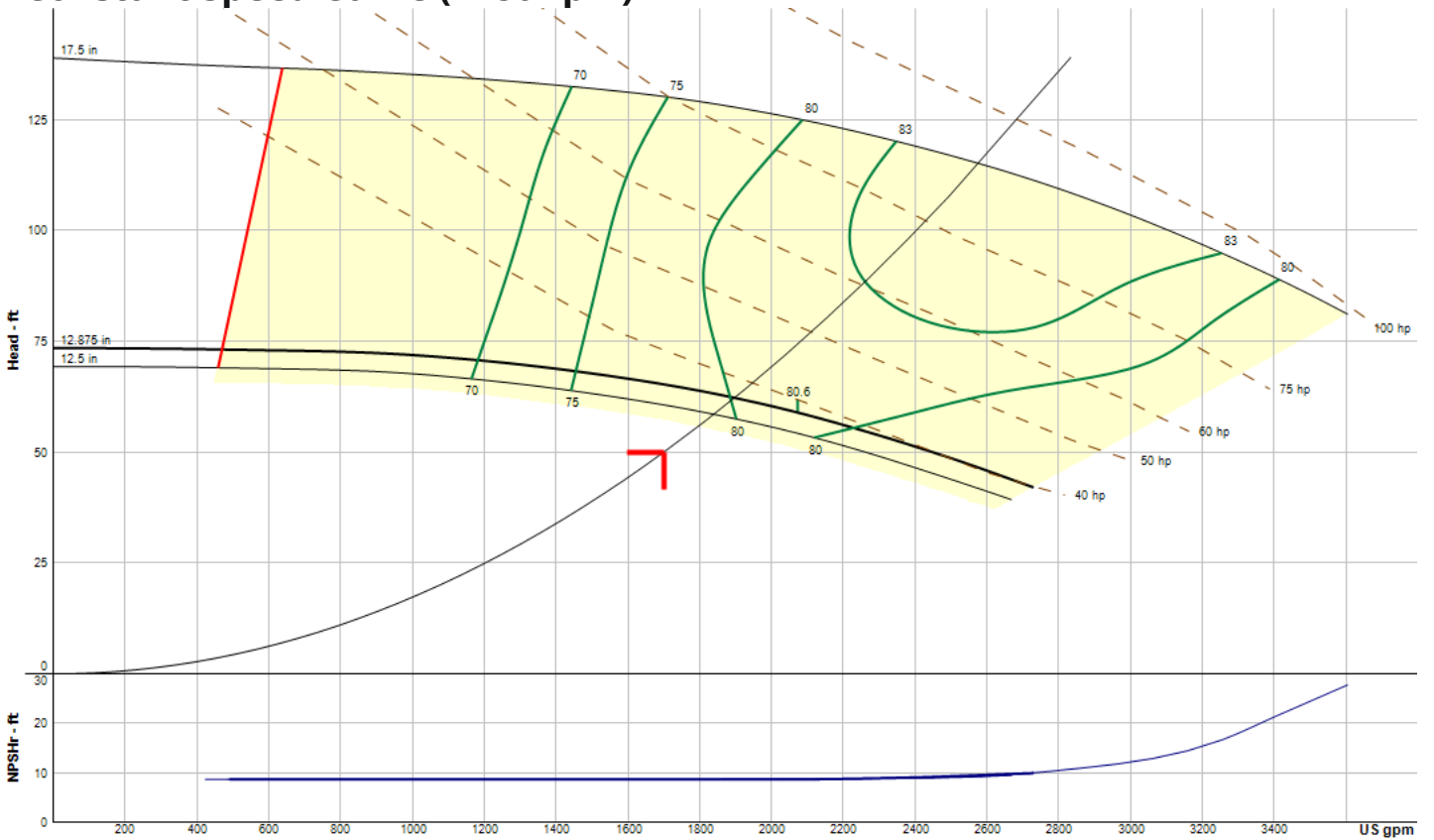
VSX-VSC
8x10x17.5A
1058 RPM



Performance curve meets 14.6 / ISO 9906 acceptance criteria | Available Phase: 3, Available Voltage(s) [V]: 200, 575, 230/460

WIZE-446BC41C

Constant Speed Curve (1180 rpm)

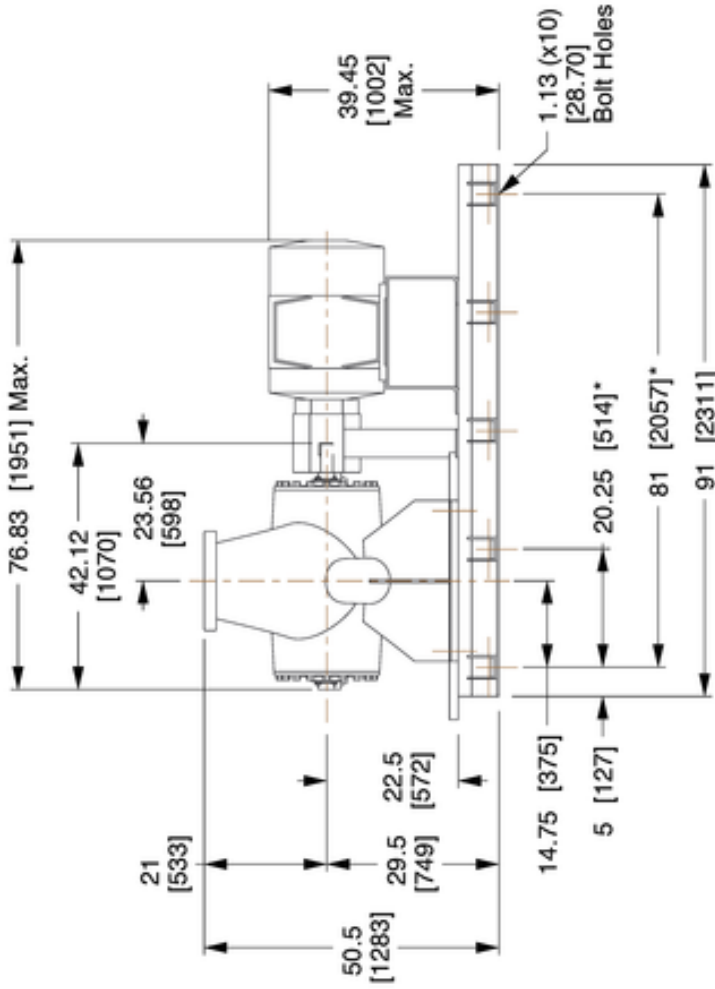
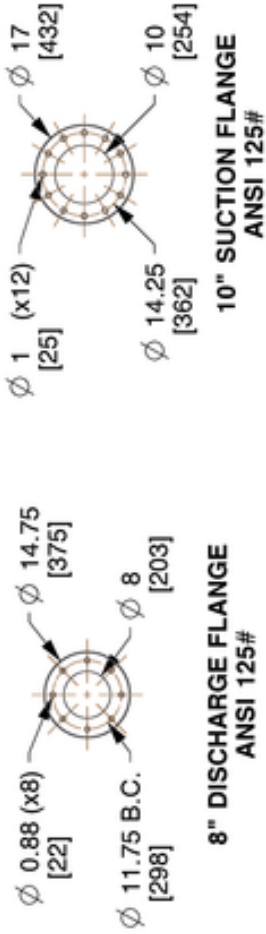
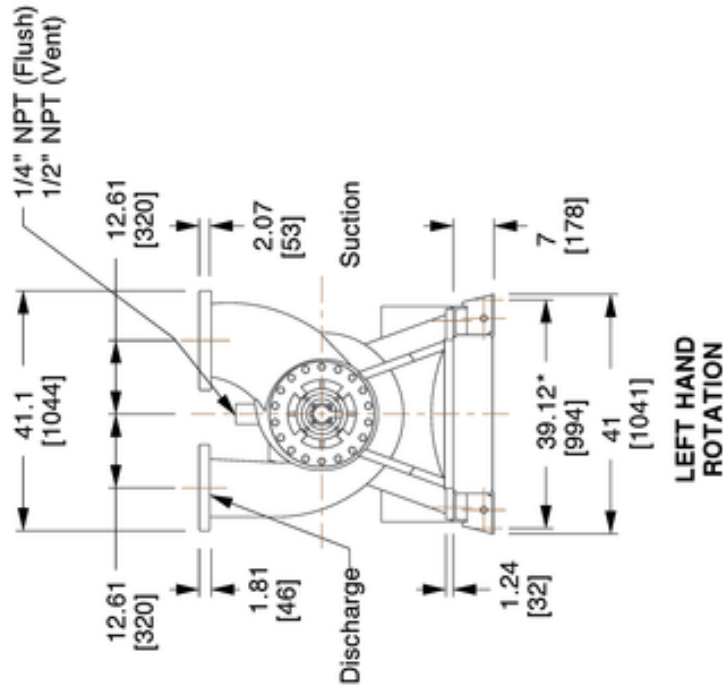


Operating Point

Flow: 1701 US gpm Head: 50 ft Speed: 1058 Efficiency: 79.8% Point BHP: 26.8 End Of Curve: 69.5%

Maximum Duty Point (at rated motor speed)

Flow: 1897 US gpm Head: 62.2 ft Speed: 1180 Efficiency: 80% Point BHP: 37.2 NOL Flow: 2730 US gpm Runout Flow: 2730 US gpm NOL (BHP): 39.8



* Dist. Between Bolt Holes

VSC-8X10X17P5A-364TTS-STL

Series vsc Double Suction Split Case Pump

Motor Frame: 364T/T/S | Coupler: Standard Coupler | Hand of Rotation: Left Hand

Removal Clearance: 26 | Flange: ANSI 125#

Dimensions : IN (mm)

Scale : N.T.S.

Submittal # : B-857.4C

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Dimensions are subject to change

Not to be used for construction unless certified



a xylem brand

8200 N. Austin Ave.
Morton Grove, IL 60053, USA

Standard Materials of Construction

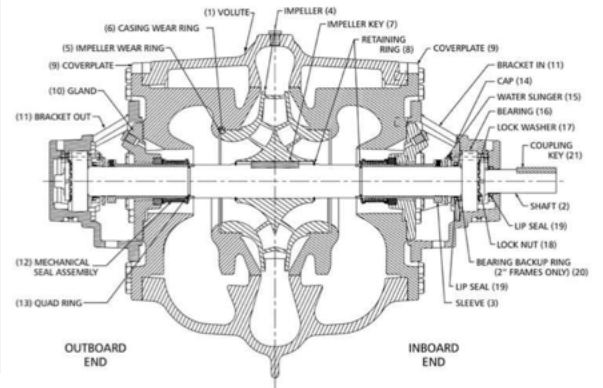
Construction:	Bronze Fitted
Volute:	Cast Iron ASTM A159 with some exceptions
Shaft:	1045 Steel
Shaft Sleeve:	304 SS
Impeller:	Low Zinc Silicon Bronze ASTM B584 Alloy C87600
Impeller Key	Stainless Steel
Retaining Ring	Stainless Steel
Coverplate	Gray Cast Iron
Gland	Gray Cast Iron
Bracket (In & Out)	Gray Cast Iron
Quad Ring	EPDM Rubber
Cap	Gray Cast iron
Water Slinger	Neoprene Rubber
Bearing	Single Row, Ball Bearing with Shield
Lock Washer	Carbon Steel
Lock Nut	Carbon Steel
Lip Seal	Steel with Nitrile Rubber Jacket
Bearing Backup Ring	Stainless Steel
Alignment Friendly Coupling	Non-Spacer, elastomeric
Coupler Guard:	ANSI/OSHA Compliant, Fully Enclosed
Baseplate:	Groutless Reinforced Structural Steel with lifting lugs

Standard Mechanical Seal Assembly

Elastomer:	EPR
Rotating Face:	Carbon
Stationary Face:	Graphite Loaded Silicon Carbon
Hardware	Stainless Steel/Brass

Maximum Working Pressure

Max Working Pressure (standard)	175 psi
Max Working Pressure (optional)	300 psi
Max Working Temperature (standard)	300
Max Working Temperature (optional)	225 - 300



Job/Project:	Representative:	
ESP-Systemwize: WIZE-F36B069C	Created On: 07/27/2023	Phone:
Location/Tag:	Email:	
Engineer:	Submitted By:	Date:
Contractor:	Approved By:	Date:

Double Suction Split Case Pump

Series: VSX-VSC

Model: 8x10x10.5A



Features & Design

- Space saving footprint
- Multiple suction and discharge flange orientations
- Maintenance-free bearings
- Alignment-friendly coupling

*The Bell & Gossett Series VSX-VSC vertical suction and discharge flanges create an extremely compact space-saving design that allows up to 8,000 lbs. static loading per nozzle.

<http://bellgossett.com/pumps-circulators/double-suction-pumps/series-vsx-split-case-pump/>

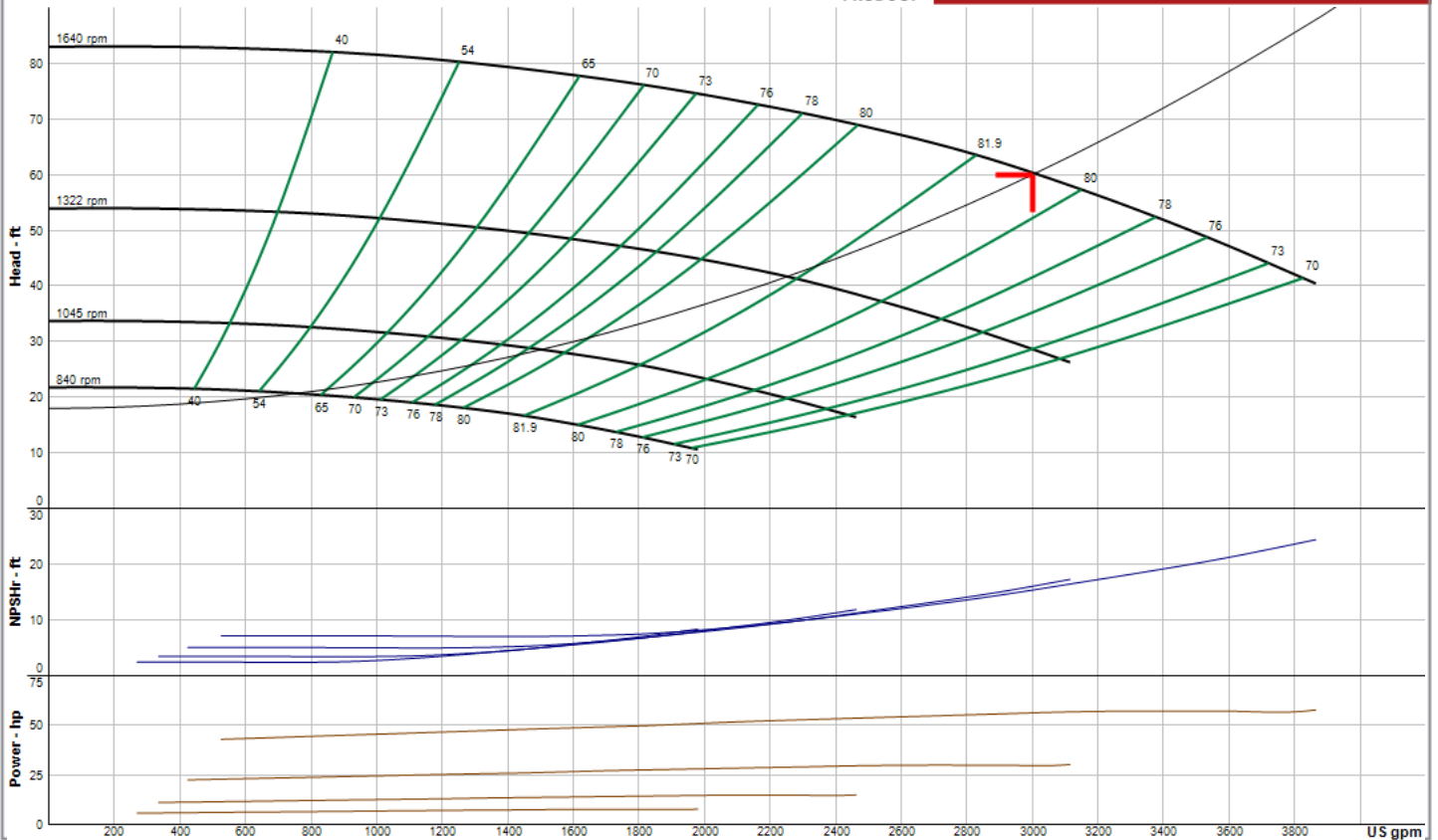
Pump Selection Summary

Duty Point Flow	3000 US gpm
Duty Point Head	60 ft
Control Head	18 ft
Duty Point Pump Efficiency	80.4 %
Part Load Efficiency Value (PLEV)	76.9 %
Impeller Diameter	9.875 in
Motor Power	75 hp
Duty Point Power	56.3 bhp
Motor Speed	1800 rpm
RPM @ Duty Point	1640 rpm
NPSHr	15.5 ft
Minimum Shutoff Head	83 ft
Minimum Flow at RPM	707 US gpm
Flow @ BEP	2829 US gpm
Fluid Temperature	68 °F
Fluid Type	Water
Weight (approx. - consult rep for exact)	2384 lbs
Pump Floor Space Calculation	14.11 ft²

Performance Curve



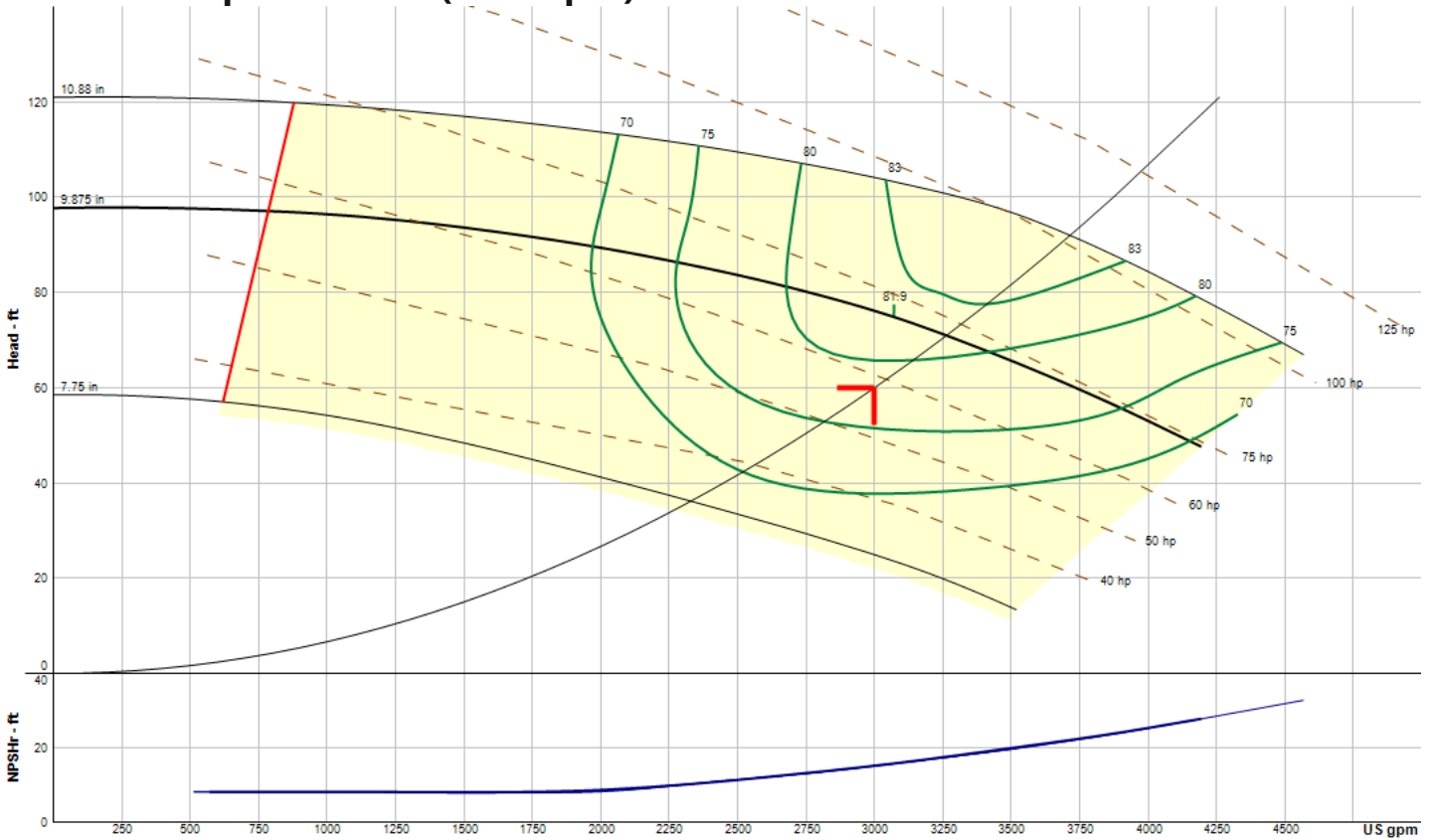
VSX-VSC
8x10x10.5A
1640 RPM



Performance curve meets 14.6 / ISO 9906 acceptance criteria | Available Phase: 3, Available Voltage(s) [V]: 575, 200, 230/460

WIZE-F36B069C

Constant Speed Curve (1780 rpm)

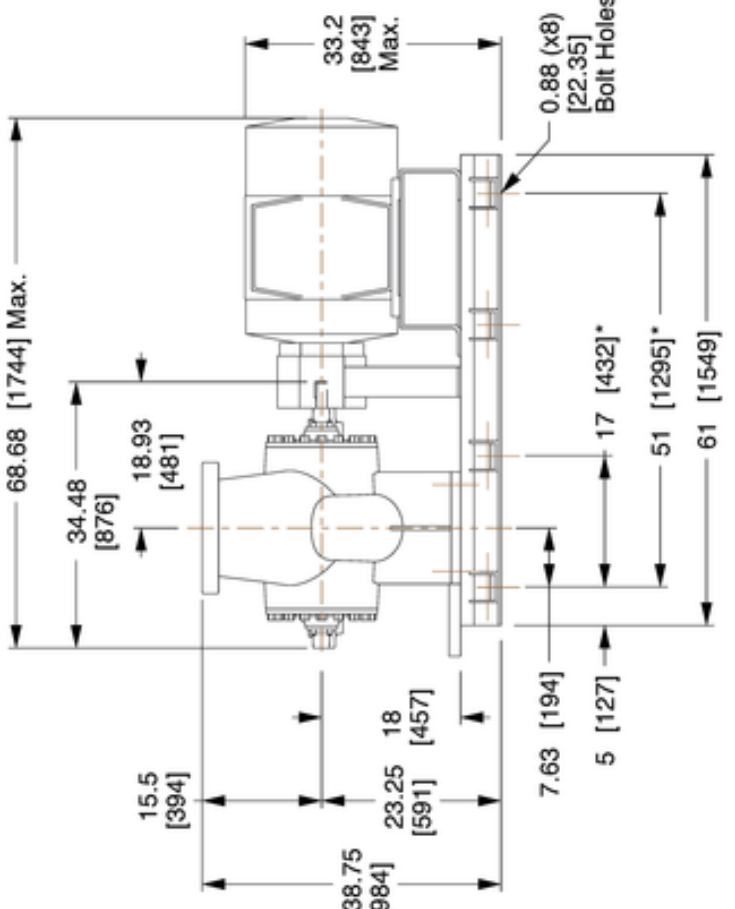
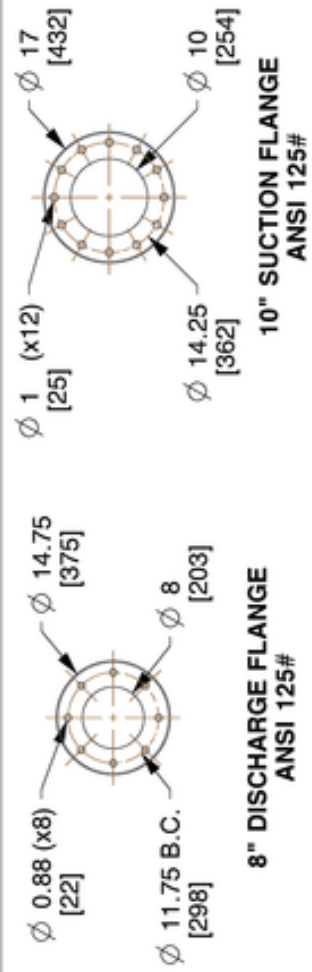
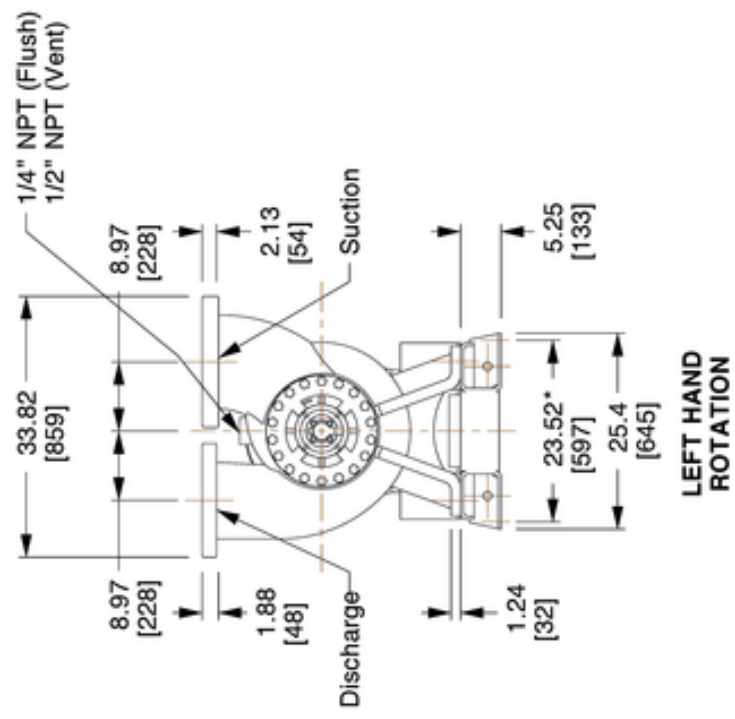
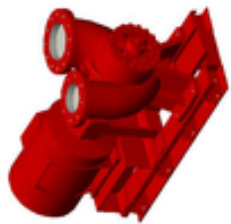


Operating Point

Flow: 3005 US gpm **Head:** 60.1 ft **Speed:** 1640 **Efficiency:** 80.4% **Point BHP:** 56.3 **End Of Curve:** 77.8%

Maximum Duty Point (at rated motor speed)

Flow: 3260 US gpm **Head:** 70.9 ft **Speed:** 1780 **Efficiency:** 80.8% **Point BHP:** 71.9 **NOL Flow:** 4195 US gpm **Runout Flow:** 4195 US gpm **NOL (BHP):** 73.9



* Dist. Between Bolt Holes



Bell & Gossett
a xylem brand

8200 N. Austin Ave.
Morton Grove, IL 60053, USA

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Dimensions are subject to change
Not to be used for construction unless certified

VSC-8X10X10P5A-365TTS-STL

Series vsc Double Suction Split Case Pump

Motor Frame: 365T/TS | Coupler: Standard Coupler | Hand of Rotation: Left Hand

Removal Clearance: 24 | Flange: ANSI 125#

Dimensions : IN (mm) Scale : N.T.S.

Submittal # : B-855.1D

Standard Materials of Construction

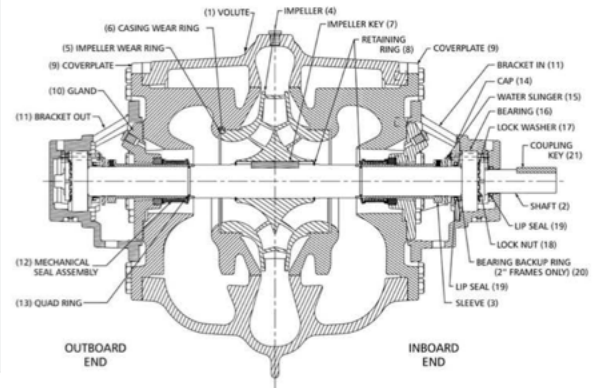
Construction:	Bronze Fitted
Volute:	Cast Iron ASTM A159 with some exceptions
Shaft:	1045 Steel
Shaft Sleeve:	304 SS
Impeller:	Low Zinc Silicon Bronze ASTM B584 Alloy C87600
Impeller Key	Stainless Steel
Retaining Ring	Stainless Steel
Coverplate	Gray Cast Iron
Gland	Gray Cast Iron
Bracket (In & Out)	Gray Cast Iron
Quad Ring	EPDM Rubber
Cap	Gray Cast iron
Water Slinger	Neoprene Rubber
Bearing	Single Row, Ball Bearing with Shield
Lock Washer	Carbon Steel
Lock Nut	Carbon Steel
Lip Seal	Steel with Nitrile Rubber Jacket
Bearing Backup Ring	Stainless Steel
Alignment Friendly Coupling	Non-Spacer, elastomeric
Coupler Guard:	ANSI/OSHA Compliant, Fully Enclosed
Baseplate:	Groutless Reinforced Structural Steel with lifting lugs

Standard Mechanical Seal Assembly

Elastomer:	EPR
Rotating Face:	Carbon
Stationary Face:	Graphite Loaded Silicon Carbon
Hardware	Stainless Steel/Brass

Maximum Working Pressure

Max Working Pressure (standard)	175 psi
Max Working Pressure (optional)	300 psi
Max Working Temperature (standard)	300
Max Working Temperature (optional)	225 - 300



Submittal to:
Michigan State University
East Lansing, MI 48824

Project:
Basso MSU Option 3
East Lansing, MI

August 14, 2023

TOWER MODEL	PERFORMANCE CONDITIONS	MOTOR DATA	TOWER DIMENSIONS	WEIGHTS
Quantity of (1) Marley MD model MD5016TAF2LCGF factory assembled 2-Cell induced draft counterflow cooling tower	Per 2-cell tower: 3,000 gpm 94.3 °F Hot Water 85.0 °F Cold Water 78.0 °F Entering WB	40 HP 1 speed / 1 wind 3 phase / 60 Hz / 230/460v 1.15sf / TEFC 1800 RPM Premium Efficiency Inverter duty nameplated <i>Site Voltage: 480</i>	Each cell: (without options) Length 11' - 11 3/4" Width 11' - 10" Height 17' - 5"	Per cell: Shipping: 7,915 lb Operating: 13,604 lb Per 2-cell tower: Shipping: 15,829 lb Operating: 27,207 lb

Quantities shown below are per tower:

Base Tower Construction/Equipment:

- Galvanized steel casing and framing with Series 300 stainless steel collection basin
- Low Sound fan with aluminum blades
- Marley designed Geareducer® with 5-year warranty
- 15 mil PVC modular film fill, 4ft (1219mm) depth
- Triple-pass 17 mil PVC drift eliminators designed and manufactured by SPX
- CTI certification per STD-201
- HDG steel fan guard

Collection Basin Connections and Accessories:

- (2) 16 in (406 mm) pumped flow bottom outlet(s) with screen(s)
- (1) 3 inch (76.2mm) diameter drain with separate 3 inch (76.2mm) diameter overflow in each cell
- Flumes for equalization between cells are included
- Interconnecting flume weir plate(s) for cell isolation
- 12 in (305 mm) diameter hole and bolt circle(s) for equalization, One per Cell
- 1 in (25.4 mm) water Makeup Connection with Mechanical Float Valve in all cells with outlets
- 18 kW per cell 480/3 volt/phase electric immersion heater elements for freeze protection of the collection basin during cold weather system shutdown
- Marley ABH basin heater control system with control panel/cell and heater elements
- Heater system control package
- Heater system circuit breaker
- Heater system disconnect switch
- Heater Control per Cell

Distribution System and Accessories:

- (1) 8 in (203 mm) inlet connection on Face A per cell
- Galvanized steel header box and PVC branch arms with polypropylene spray nozzles with grommet connection for ease of removal

Maintenance & Maintenance Access Features:

- Tower is designed in accordance with OSHA safety standards
- Extended lubrication line with dipstick

Electrical System Requirements:

The following information is provided as guidance for electrical system design criteria to power each cell of the equipment in this offering based on site voltage listed in Mechanical Data above.

Description (See Mechanical Data above for sizes)	Amperage at Site Voltage (defined above)
Fan Motor 1	1 @ 52

Fan Motor 2	N/A
Spray Pump	N/A
Basin Heater	21.7
Auxiliary Load	6
Total Full Load Amps FLA	79.7
Main Circuit Breaker MCB	125
Maximum Over Current Protection MOCP	125

Full Load Amps (FLA) is the full load current at the rated voltage that the fan motor(s) and pump motor(s) will draw to produce rated output horsepower (HP). Values shown for motor full load amps are from NEC table 430.250. Included in this calculation are the amps necessary for optional basin heaters and some auxiliary load for control circuitry.

Full Load Amps per cell = Sum of Fan motor Amps + Sum of Pump motor Amps (when supplied) + Basin Heater Amps (when supplied) + Auxiliary Load (6)

The main circuit breaker (MCB) is an electrical switch designed to protect an electrical circuit from damage caused by overcurrent/overload or short circuit. The MCB value shown above is derived using appropriate overload factors, assuming the full load amps cited are being supported, based on many years of electrical control panel experience on heat rejection equipment. This will be the MCB size incorporated into the tower control panel if provided by Marley.

When provided, the Marley control panel includes an integrated overcurrent device therefore; sizing a remote MOCP type of device is not required to protect the control panel, but it may be sized considering any other installation factors required by code to protect the cable feeding the panel.

Control Systems:

None

Chemical Delivery System:

None

Tower Specials:

Field Services

Field Installed Equipment:

The field installed portion of the equipment will require approximately 26.0 man-hours of installation time after the tower arrives at the jobsite (based on USA experienced crew). The price to install these components is NOT included in the total price.

Please advise if the drawing type you need has not been supplied. These are the available drawing types:

- PDF 2D documents - These documents display the tower geometry with dimensions, notes and annotations.
- Revit – A lightweight Revit part family may be downloaded from our website. Go to <http://spxcooling.com/revit>.
- DXF –Registered users of our CoolSpec Sizing and Selection tool <https://coolspec.com/> may download full scale DXF files of the basic tower. DXF is a generic 2D drawing format directly importable into AutoCad and other mechanical programs. <http://spxcooling.com/en/about/detail/revit-files/>

SUBMITTAL DOCUMENTS

Drawings & Data

<i>Transmittal Code</i>	<i>Approval Code</i>	<i>No. of Copies</i>	<i>Drawing Number /Rev/Date</i>	<i>Description</i>

Transmittal Codes:

E = Enclosed Herewith
S = Sent Separately
F = Sent via Fax
O = Other

Other Codes:

P = Print
R = Reproducible
D = Reduced Copy

Approval Codes:

SFA = Approval Document. Equipment is held for Approval and Release.
AFC = Certified Document. Equipment has been Approved for Construction.
Changes made after this point may result in price adds and/or delays.
INF = Information Document. Submitted for Information only.
RFA = Corrected Document. Re-submitted for Approval and Release
OTH = Other

Estimated Shipment Lead-Time After Drawing Approval: 160 business days

Lead times are estimates and are subject to change at time of release

August 14, 2023

For: SPX Cooling Tech, LLC

By: R B E Inc

Thank you,

Michael Chimko

**CoolSpec™ Version 7.3.24**

Product Data: 6/17/2023 (Current)

8/11/2023 10:35:52 AM

Job Information**Selected by**RBE Incorporated
4822 Joslyn Rd.
Orion Township, MI 48359 USMichael Chimko
Tel 2487653471
mchimko@rbeincorporated.com**Cooling Tower Definition**

Manufacturer	Marley	Fan Motor Speed	1800 rpm
Product	MD	Required Fan Motor Output per cell *	36.32 BHp
Model	MD5016TAF2L	Required Fan Motor Output total *	72.63 BHp
Cells	2	Fan Motor Capacity per cell	40.00 Hp
CTI Certified	Yes	Fan Motor Output per cell	40.00 BHp
Fan	9.0 ft, 5 Blades, Low Sound	Fan Motor Output total	80.00 BHp
Fan Speed	433 rpm, 12243 fpm	Air Flow per cell	102600 cfm
Fans per cell	1	Air Flow total	205200 cfm
Fill Type	MC120S or equivalent	Static Lift	11.6 ft
		Distribution Head Loss	5.4 ft
		ASHRAE 90.1 Performance	43.8 gpm/Hp

Model Group Inline Standard Low Sound (A)

* Required Fan Motor Output assumes VFD operation

Conditions

Tower Water Flow	3000 gpm	Air Density In	0.07094 lb/ft ³
Hot Water Temperature	94.30 °F	Air Density Out	0.07051 lb/ft ³
Range	9.30 °F	Humidity Ratio In	0.01712
Cold Water Temperature	85.00 °F	Humidity Ratio Out	0.03335
Approach	7.00 °F	Wet-Bulb Temp. Out	92.05 °F
Wet-Bulb Temperature	78.00 °F	Estimated Evaporation	27 gpm
Relative Humidity	50 %	Total Heat Rejection	13902000 Btu/h
Capacity	103.2 %		

- This selection satisfies your design conditions.

Weights & Dimensions

	Per Cell	Total
Shipping Weight	8240 lb	16490 lb
Heaviest Section	4360 lb	
Max Operating Weight	13930 lb	27870 lb
Width	11' -10"	11' -10"
Length	11' -11 3/4"	24' -2"
Height	17' -5"	

Minimum Enclosure Clearance

Clearance required on air inlet sides of tower without altering performance. Assumes no air from below tower.

Solid Wall	6.9 ft
50 % Open Wall	3.9 ft

Weights and dimensions do not include options; refer to sales drawings.

Cold Weather Operation**Heater Sizing** (to prevent freezing in the collection basin during periods of shutdown)

Heater kW/Cell	12.0	9.0	7.5	6.0	4.5	3.0
Ambient Temperature °F	-19.69	-3.66	4.35	12.37	20.38	28.40

Job Information

Selected by

RBE Incorporated
 4822 Joslyn Rd.
 Orion Township, MI 48359 US
 mchimko@rbeincorporated.com

Michael Chimko
 Tel 2487653471

Cooling Tower Definition

Manufacturer	Marley	Fan Speed (96.7 %)	419 rpm
Product	MD	Fan Tip Speed (96.7 %)	11842 fpm
Model	MD5016TAF2L	Fan Motor Speed (96.7 %)	1741 rpm
Cells	1	Fan Motor Capacity per cell	40.00 Hp
Fan	9.00 ft, 5 Blades, Low Sound	Fan Motor Output per cell	36.32 BHp
Fans per cell	1	Fan Motor Output total	36.32 BHp

Model Group Inline Standard Low Sound (A)

Sound » Independently Verified

1 - Cell sound data for an unobstructed environment.

Sound Pressure Level (SPL) expressed in dB (re: 20x10⁻⁶ Pa)
 Sound Power Level (PWL) expressed in dB (re: 1x10⁻¹² watts)

Distance	Location	Octave Band Center Frequency (Hz)								Overall dBA
		63	125	250	500	1000	2000	4000	8000	
5.00 ft	Air Inlet Side SPL	91	85	80	76	75	71	70	69	80
5.00 ft	Air Inlet End SPL	91	85	80	76	75	71	70	69	80
5.00 ft	Fan Discharge SPL	96	90	86	84	81	77	74	66	86
50.00 ft	Air Inlet Side SPL	84	76	68	63	63	57	54	53	68
50.00 ft	Air Inlet End SPL	84	76	68	63	63	57	54	53	68
50.00 ft	Fan Discharge SPL	86	79	75	72	67	64	60	53	74
	Tower PWL	118	112	107	104	99	95	92	86	106

Notes

- Sound levels have been independently verified by a CTI-licensed sound test agency to ensure validity and reliability of the published values.
- Measurement and analysis of the sound levels were conducted by a certified Professional Engineer in Acoustical Engineering.
- Sound pressure levels were measured and recorded on various models in the acoustic near-field and far-field locations using ANSI S1.4 Type 1 precision instrumentation.
- Sound pressure levels were measured and recorded in full conformance with CTI ATC-128 test code November 2019 revision published by the Cooling Technology Institute (CTI).

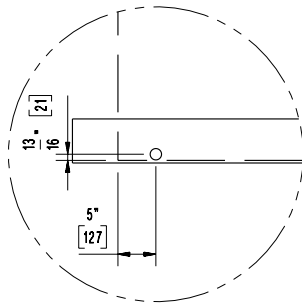
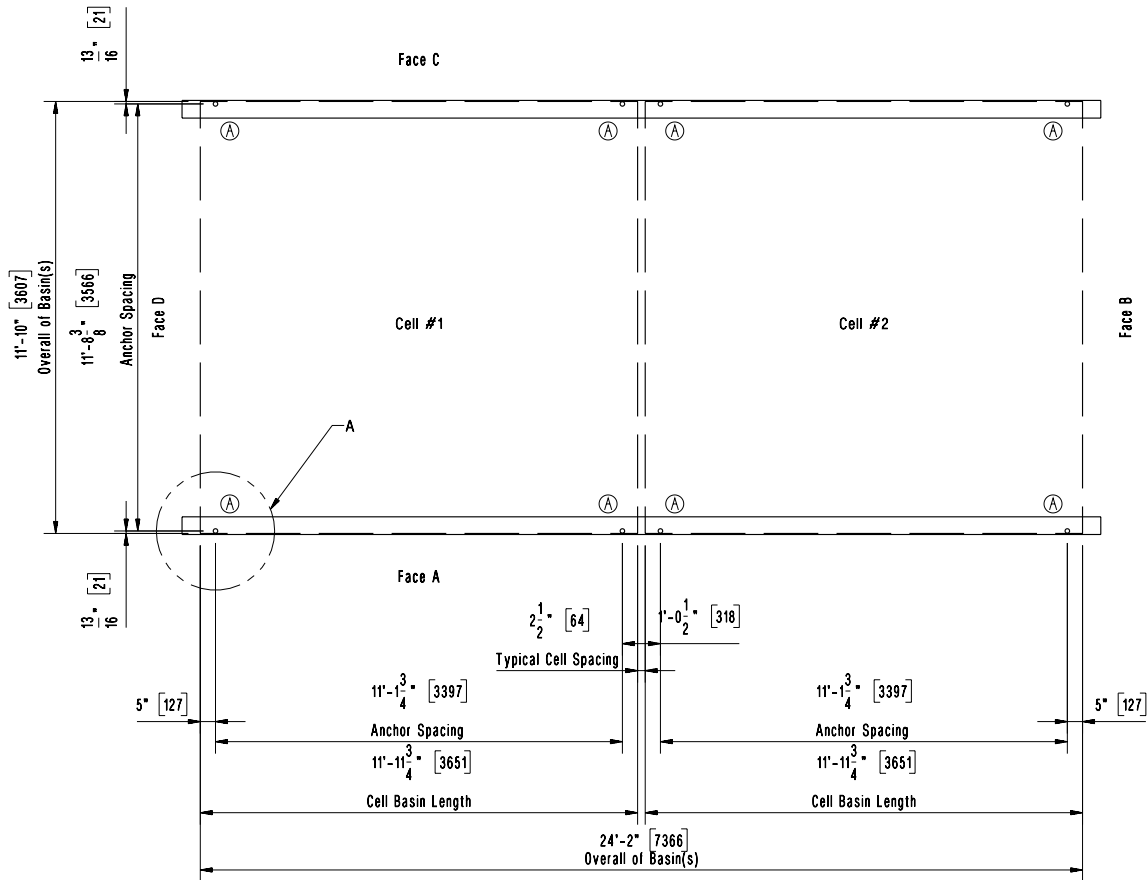
Other Resources

For additional information on sound-related topics please see:

Sound Power Impacts Per CTI Code Revision
<https://spxcooling.com/library/sound-power-impacts-per-cti-code-revision/>
 Understanding and Evaluating Cooling Tower Sound Levels Among Manufacturers
<https://spxcooling.com/library/understanding-and-evaluating-cooling-tower-sound-levels-among-manufacturers/>

Shipping Weight			Design Operating Loads				Wind Load		Seismic Load	
per Tower	per Cell	Heaviest Lift	per Tower	per Cell	Along Support Beams		Horiz. Reaction @ A	Vert. Reaction Along Beam	Horiz. Reaction @ A	Vert. Reaction Along Beam
					FACE 'A'	FACE 'C'				
15829 lbs (7180 kg)	7915 lbs (3590 kg)	4421 lbs (2005 kg)	27207 lbs (12341 kg)	13604 lbs (6170 kg)	643 lbs/ft (956 kg/m)	497 lbs/ft (740 kg/m)	54.5 x P lbs (5.06 x P kgf)	14.17 x P lbs (1.32 x P kgf)	3401 x G lbs (1543 x G kgf)	694 x G lbs (315 x G kgf)

(4) 5/8" ASTM A307 or M16 Grade 4.6 anchor bolts are required per cell. These anchor bolts are capable of resisting 65 psf (3112 N/m²) wind load or 0.77 G seismic load applied to the tower. Wind and Seismic capacities are un-factored loads as determined by ASCE7-10. Determination of the site specific design wind and seismic loads are by others.



DETAIL A

NOTES

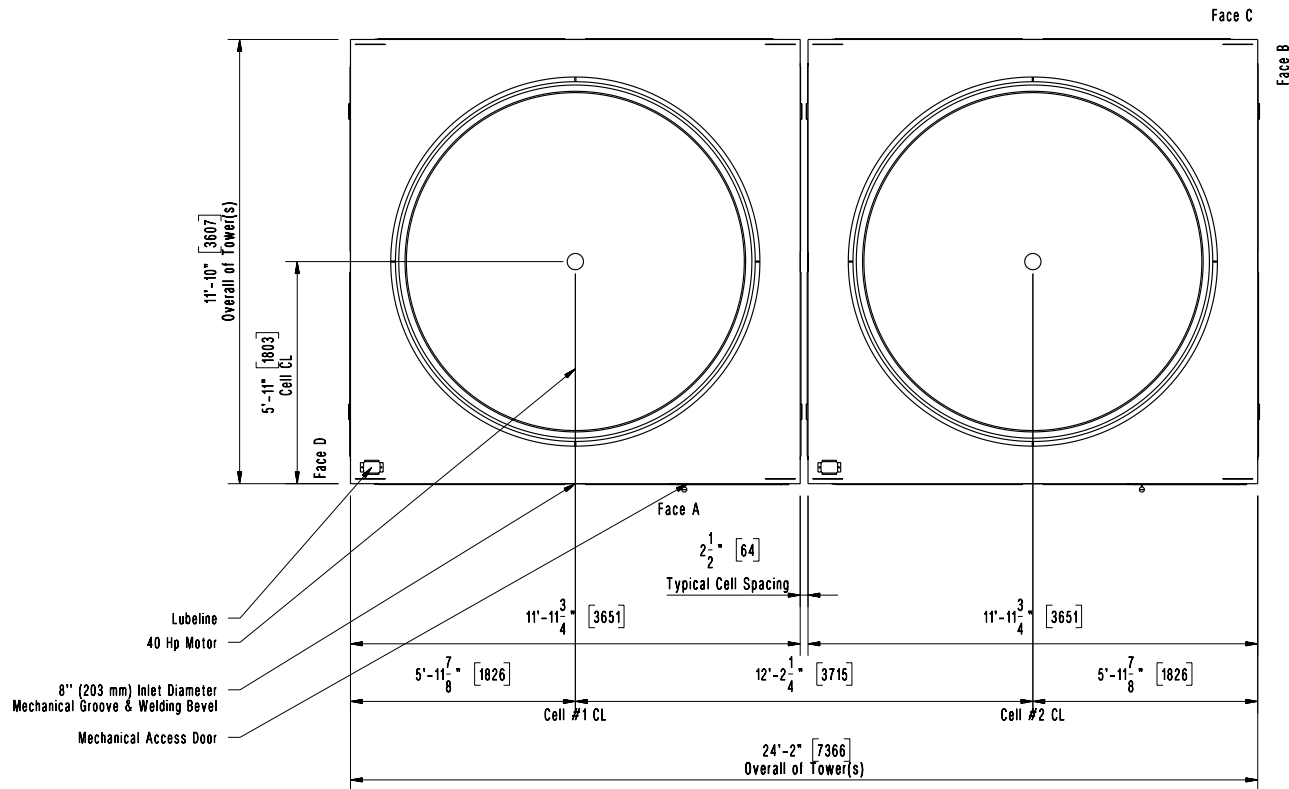
- SUPPORTING STEEL:** The supporting steel is to be designed, constructed and furnished by the customer. It shall include customer supplied anchor bolts to suit the general dimensions of this drawing and of the Outlet Piping Plan drawing. The top surface of the supporting steel must be framed flush and level. The maximum beam deflection shall be limited to 1/360 of span, not to exceed 1/2" (13 mm) at the anchor bolts.
- DESIGN OPERATING LOADS:** The design operating loads shown in the above table are based upon the volume of water in the collection basin at shutdown. The shutdown water level has been sized to accommodate the maximum allowable flow rate. The design loads are shown for your use as a quick reference. The actual operating load is variable, and dependent upon the design flow rate per cell. Shutdown volume loads are determined considering the recommended operating water level. Operating levels in excess of that recommended will result in loads exceeding the values stated.
- WIND & SEISMIC LOADS:** Reactions shown are the result of the wind/seismic load being applied perpendicular to the face of the tower structure. Loads are additive to the operating loads. Wind reactions can be calculated by multiplying by P, which is the wind pressure in psf for Imperial units and kg/m² for metric units. Seismic reactions can be calculated by design G.
- Tower support beams are provided by others.
- SHIPPING WEIGHTS AND MAXIMUM OPERATING LOADS:** Values shown in table include the optional equipment weights.
- The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
- The units of measure are in IP (SI) units unless otherwise noted.

MD5016TAF2LCGF – Supporting Steel Plan and Details
Basso MSU Option 3 Counter
East Lansing, MI, United States

MARLEY

ORDER 0

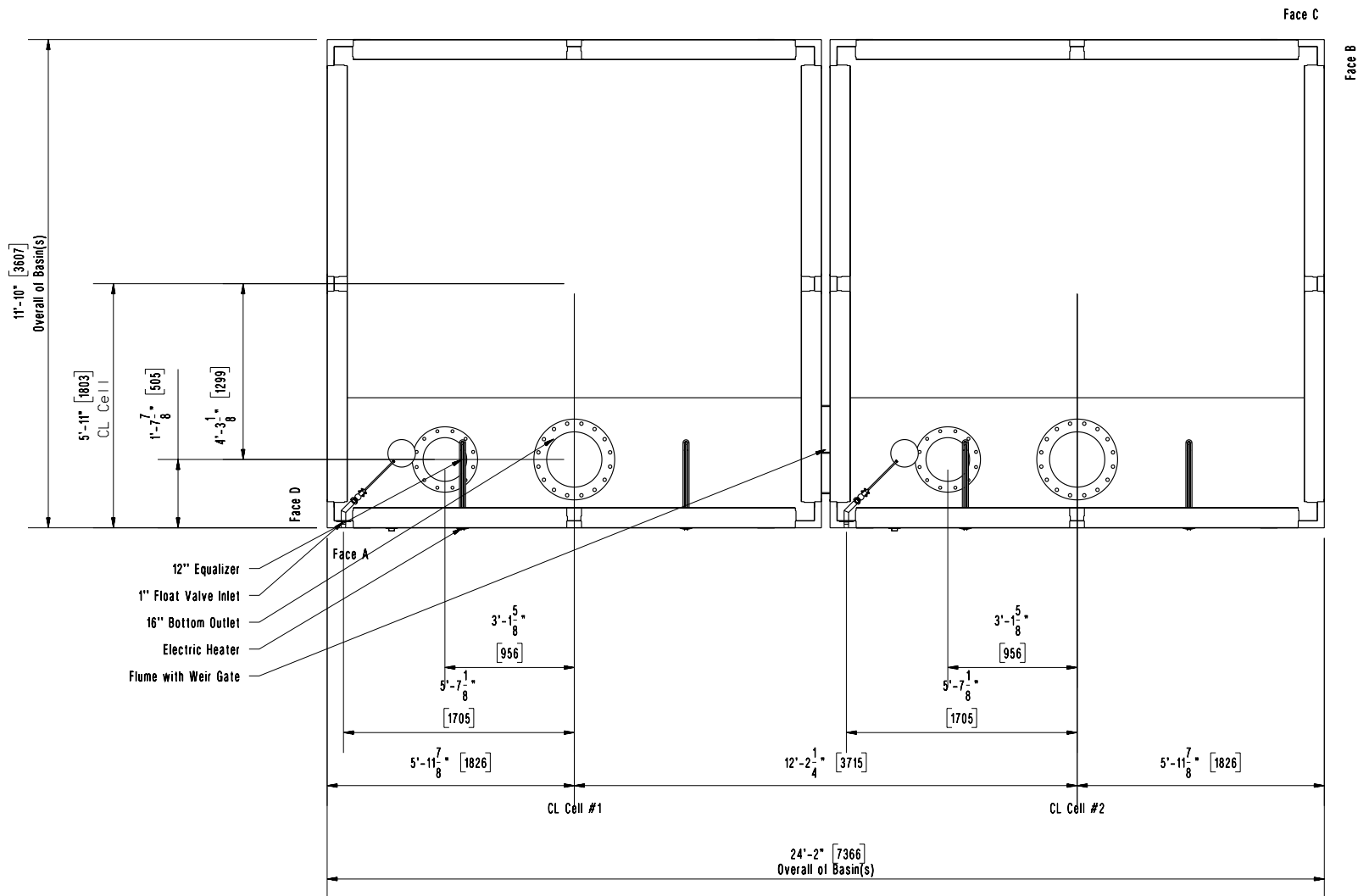
DRAWN BY	CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV
MICHAEL CHIMKO_230811_093358748 V1	QTC			08/14/23	SYS	MC862633G	



NOTES

1. The fan motor must be locked out and inoperable before entering the tower. This warning has been placed on the access door.
2. To insure maximum thermal performance the cooling tower must be installed level and plumb. Air inlet faces must have adequate air supply. If obstructions exist, consult your SPX CT representative.
3. Hoisting clips are provided for ease of unloading and positioning. For overhead lifts or where additional safety precautions are prudent, add slings beneath the tower. Adequate space has been provided for removal of the shackles and the 5 1/4" (133 mm) long pins from the hoist clips between the cells of a multi-cell tower. If the pin used is longer than 5 1/4" (133 mm), the cell may be slid into it's final position by using come-alongs at the base of the unit, after removal of shackle pins. See Hoisting Details drawing.
4. Flanged connections conform to ANSI125 specification. The bolt holes straddle the centerlines.
5. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
6. The units of measure are in IP (SI) units unless otherwise noted.

MD5016TAF2LCGF – Schematic Plan Basso MSU Option 3 Counter East Lansing, MI, United States								
							ORDER 0	
DRAWN BY	CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV	
MICHAEL CHIMKO_230811_093358748 V1	QTC			08/14/23	SYS	MC862633M		

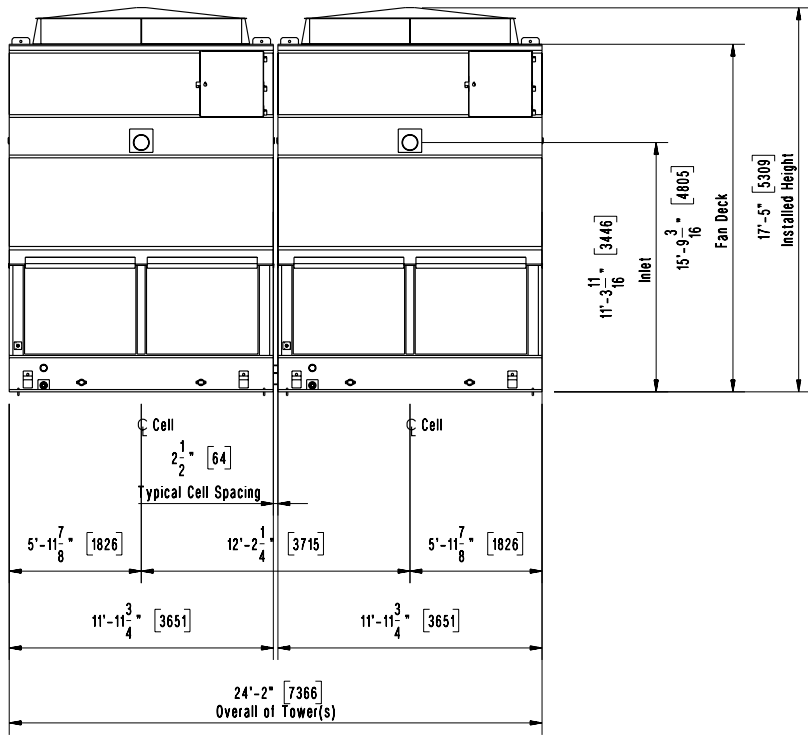


Plan View of Basin

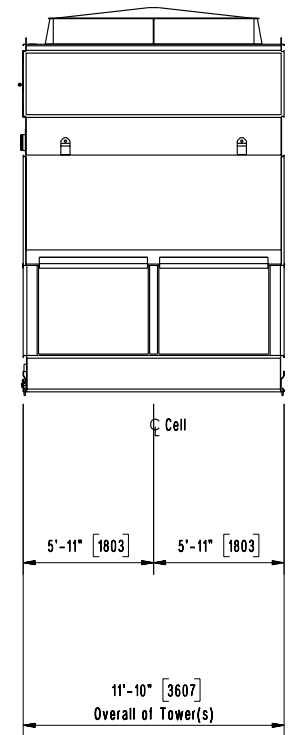
NOTES

1. Flanged connections conform to ANSI125 specification. The bolt holes straddle the centerlines.
2. All piping supports are by others. Do NOT support outlet piping from the tower.
3. The diameter of the bottom outlet equalizer option is based on a SPX CT standard using 20 percent of a tower's outlet design flow and a head differential between two adjacent towers of 1" (25 mm).
4. Basin flumes are shipped inside the tower and are to be field installed by others. The connecting collars are shop installed.
5. Refer to basin heater detail drawings for heater details.
6. The collection basin piping accessories shown on this drawing are furnished by SPX CT. This includes a full faced gasket. Flat faced flange, fasteners and seal washers attachment to the outlet and equalizer are supplied by others. The use of a flange other than a flat faced flange will damage the collection basin floor.
7. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
8. The units of measure are in IP (SI) units unless otherwise noted.

MD5016TAF2LCGF - Piping Plan Basso MSU Option 3 Counter East Lansing, MI, United States							MARLEY	
							ORDER 0	
DRAWN BY		CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV
MICHAEL CHIMKO_230811_093358748 V1		QTC			08/14/23	SYS	MC862633P	



**Front Elevation of Tower
(Face A)**



**Side Elevation of Tower
(Face B, Coil 2)**

NOTES

1. The tower assembly tolerance applicable to all dimensions is + or - 1/8" (3 mm). Consult suppliers of supporting structure for construction tolerances.
2. The units of measure are in IP (SI) units unless otherwise noted.
3. See Schematic Plan drawing for additional notes.

MD5016TAF2LCGF – Schematic Elevation Basso MSU Option 3 Counter East Lansing, MI, United States							MARLEY	
							ORDER 0	
DRAWN BY	CHECKED	REV BY	REV CHK	DATE	APPROVED	DRAWING NUMBER	REV	
MICHAEL CHIMKO_230811_093358748 V1	QTC			08/14/23	SYS	MC862633S		



YK CHILLER PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model No.	Net Capacity (tons)	Power	Refrigerant
CH-2800	1	YKY5Z9K7-DKHS	2800	4160/3/60.0	R-513A

PIN					
YKY5Z9K7-DKHSMTYPE5VVD2800605354CBARY1MLGBXW00XW1MLGBXW00XXXXXA3XAUNTXXXXXSMXYEBBXAXJXXXXXXXXXBXXBAXSXXXXX					
Basic Model	Extended Model	Evaporator Heat Exchanger	Condenser Heat Exchanger		
Y K Y 5 Z 9 K 7 - D K H S M T Y P E 5 V V D 2 8 0 0 6 0 5 3 5 4 C B A R Y 1 M L G B X W 0 0 X W 1 M L G B X W					
5 10 15 20 25 30 35 40 45 50 55					
Condenser Heat Exchanger (Cont)	Unit Options	Motor Options	Power Options	Doc & Testing Options	Ship Options
Warranty Options	Misc Options				
0 0 X X X X X X A 3 X A U N T X X X X X S M X Y X E B B X A X X J X X X X X X X B X X B X A A X S X X X X X					
60 65 70 75 80 85 90 95 100 105 110					

Unit Data	Evaporator	Condenser
EWT (°F):	56.00	85.00
LWT (°F):	42.00	94.30
Flow Rate (gpm):	4784	8420
Pressure Drop (ft H2O):	24.6	26.5
Fluid Type (%):	WATER	WATER
Circuit No. of Passes:	2	2
Fouling Factor (ft ² °F hr / Btu):	0.000100	0.000250
Tube No. / Description:	656 - 0.025" Enhanced Copper (1")	496 - 0.025" Enhanced Copper (1")
Design Working Pressure (psig):	150	150
Entering Water Nozzle @ Location:	L	L
Leaving Water Nozzle @ Location:	L	L
Water Box Weight, ea (lb)(1):	2121	1974
Cover Plate Weight, ea (lb):	2966	1916
Return Head Weight (lb):	1108	793
Water Weight (lb):	8846	10486
Water Volume(gal):	1062	1259

Performance Data		Electrical Data		Other	
Job KW:	1693	Job FLA:	240	Operating Wt. (lb):	109588
Motor KW:	1634	Motor FLA:	262	Per Isolator (lb):	13699
KW/Ton.R:	0.6045	LRA:	1772	Refrigerant Wt. (lb):	5754
NPLV.IP(KW/Ton.R):	0.3541			Oil Charge (gal):	24
Gear Code:	MT	Min Circuit Ampacity (Amps):	300	Motor Wt. (lb):	10531
OptiSound Cntrl:	YES	Max Fuse/Breaker:	500	Compressor Wt. (lb):	9100
Shaft HP:	2108			Starter Wt. (lb):	N/A
Isolation Valves:	YES			Ship Wt (lb):	90256
Oil Cooler Type:	Standard				
Condenser Inlet:	Diffuser				
Heat Rejection Capacity(mbtu/hr):	38.97	Type Starter: Variable Speed Drive			

		VSD Model: MVVSD2250RK-84	
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(1) Not including cover plate on marine water boxes.

AHRI Message:

Auxiliary components included in total KW - oil pump & heater, chiller controls.

Certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Certified units may be found in the AHRI Directory at www.ahridirectory.org.

