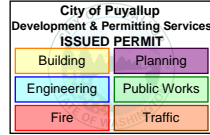
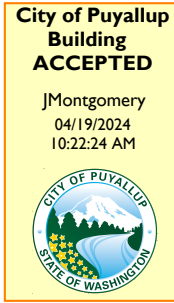


PRMH20240593

FULL SIZED LEDGIBLE REPORT
IS REQUIRED TO BE PROVIDED
BY THE PERMITTEE ON SITE
FOR ALL INSPECTIONS



February 20, 2024

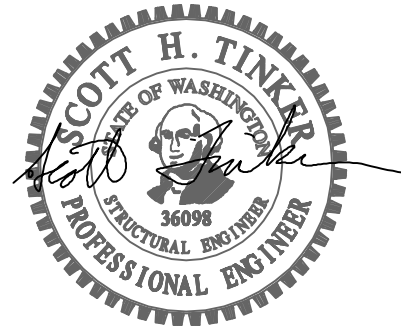
STRUCTURAL CALCULATIONS
(Permit Submittal)

CENTERIS DATA CENTER
SCALE MATRIX T+I
1023 39th Avenue SE
Puyallup, WA 98374

Quantum Job Number: 23444.01

Prepared for:
CENTERIS DATA CENTERS
18300 Cascade Avenue S
Seattle, WA 98118

Prepared by:
QUANTUM CONSULTING ENGINEERS
1511 Third Avenue, Suite 323
Seattle, WA 98101
TEL 206.957.3900
FAX 206.957.3901





QUANTUM | CONSULTING ENGINEERS

STRUCTURAL DESIGN CRITERIA

CENTERIS – DATA CENTER
1023 39TH AVENUE SE
PUYALLUP, WA 98374

QUANTUM JOB NUMBER: 23444.01

CODE CRITERIA:

BUILDING CODE.....	2018 INTERNATIONAL BUILDING CODE
BUILDING DEPARTMENT.....	CITY OF PUYALLUP
SEISMIC ZONE.....	SDC = D
.....	SITE CLASS = D
.....	R 3.5
.....	$S_s = 1.26$ $S_1 = 0.43$
.....	$S_{DS} = 1.01$ $S_{D1} = 0.50$

MATERIALS CRITERIA:

CONCRETE (28 DAY STRENGTH):

FOUNDATION/S.O.G.....f'c=3,000 PSI

REINFORCING STEEL:

GRADE 60.....Fy=60,000 PSI

STRUCTURAL STEEL:

WIDE-FLANGE SECTIONS: A-992.....	Fy=50,000 PSI
MISCELLANEOUS SECTIONS: A-36.....	Fy=36,000 PSI
TUBE SECTIONS: A-500.....	Fy=46,000 PSI
WELDING.....	Fy=70,000 PSI

⚠ This is a beta release of the new ATC Hazards by Location website. Please [contact us](#) with feedback.

ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

ATC Hazards by Location

Search Information

Address: 1015 39th Ave SE Puyallup, WA 98374
Coordinates: 47.1590004, -122.2794422
Elevation: 489 ft
Timestamp: 2023-12-01T15:14:56.409Z
Hazard Type: Seismic
Reference Document: ASCE7-16
Risk Category: III
Site Class: D-default



Basic Parameters

Name	Value	Description
S_S	1.257	MCE_R ground motion (period=0.2s)
S_1	0.433	MCE_R ground motion (period=1.0s)
S_{MS}	1.508	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.005	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.914	Coefficient of risk (0.2s)
CR_1	0.898	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
$SsRT$	1.257	Probabilistic risk-targeted ground motion (0.2s)
$SsUH$	1.375	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
$S1RT$	0.433	Probabilistic risk-targeted ground motion (1.0s)
$S1UH$	0.483	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
$S1D$	0.6	Factored deterministic acceleration value (1.0s)
PGA_d	0.5	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

PRMH20240593



CoolSpec™ Version 7.3.25

Product Data: 8/28/2023 (Current)
10/3/2023 4:42:51 PM

Job Information

Selected by

Custom Mechanical Solutions	Eric Pruehs
12507 Bel-Red Road	Tel 4254445780
Bellevue, WA 98005 US	eric@cmswa.com

Cooling Tower Definition

Manufacturer	Marley	Fan Motor Speed	1800 rpm
Product	NC Steel	Required Fan Motor Output per cell *	45.63 BHp
Model	NC8407UAN1	Required Fan Motor Output total *	45.63 BHp
Cells	1	Fan Motor Capacity per cell	50.00 Hp
CTI Certified	Yes	Fan Motor Output per cell	50.00 BHp
Fan	10 ft, 6 Blades, Low Sound	Fan Motor Output total	50.00 BHp
Fan Speed	389 rpm, 12221 fpm	Air Flow per cell	178600 cfm
Fans per cell	1	Air Flow total	178600 cfm
Fill Type	MX75	Static Lift	12 ft
		Distribution Head Loss	0 ft
		ASHRAE 90.1 Performance	48.2 gpm/Hp

Model Group Standard Low Sound (A)

* Required Fan Motor Output assumes VFD operation

Conditions

Tower Water Flow	1725 gpm	Air Density In	0.07298 lb/ft³
Hot Water Temperature	81.28 °F	Air Density Out	0.07306 lb/ft³
Range	7.68 °F	Humidity Ratio In	0.01101
Cold Water Temperature	73.60 °F	Humidity Ratio Out	0.01999
Approach	6.80 °F	Wet-Bulb Temp. Out	76.76 °F
Wet-Bulb Temperature	66.80 °F	Estimated Evaporation	14 gpm
Relative Humidity	50 %	Total Heat Rejection	6614300 Btu/h
Capacity	103.0 %		

• This selection satisfies your design conditions.

Weights & Dimensions

	Per Cell	Total
Shipping Weight	10760 lb	10760 lb
Heaviest Section	10760 lb	
Max Operating Weight	24430 lb	24430 lb
Width	21'	21'
Length	11' - 10 ¾"	11' - 10 ¾"
Height	11' - 11 ¾"	

Minimum Enclosure Clearance

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

Solid Wall	7 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	24.0	18.0	15.0	12.0	9.0	7.5	6.0
Ambient Temperature °F	-20.87	-4.66	3.44	11.55	19.65	23.71	27.76

BEAM DESIGN - GRAVITY

- assume uniform load, simple span (conserv.)

$l = 15'$

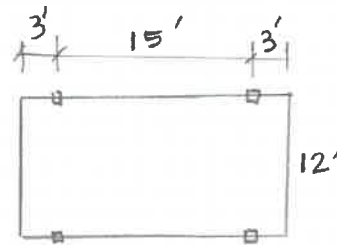
$w = \frac{29^k/2}{21'} = 690 \frac{lb}{ft}$

$M \leq \frac{w l^2}{8} \times 12'' = 233 \text{ k.in}$

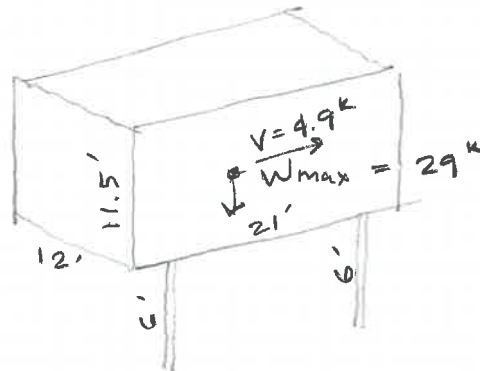
$A992 \text{ Steel} = \frac{M}{.66 F_y}$
 $= 7.1 \text{ in}^3$

W12 x 26

$S = 33.4 \gg 7.1 \text{ OK}$



PLAN



- check cantilever for point load

$l = 3'$

$P = 29^k/4 = 7.25^k$

$M = P \cdot l \cdot 12'' = 261 \text{ k.in}$

W12 x 26 OK

∴ DESIGN FOR COMBINED GRAVITY & LATERAL

ASCE 7-16 TABLE 15.4-2

CONC. OR STEEL COOLING TOWER

$R = 3.5 \quad \Omega_0 = 1.75 \quad C_d = 3.0$

$\therefore C_s = \frac{S_{DS}}{R} = \frac{1.01}{3.5} = 0.29 \leftarrow \text{governs}$

$C_{s \text{ min}} = 0.044 S_{DS} = 0.044$

$V_{ASD} = 0.29 (1.7) 29^k = 5.9^k > V_{\text{wind}}$

Vertical seismic = $5.9^k \left(\frac{11.5'}{12'} \right) / 21' = 120 \frac{lb}{ft}$

Vertical seismic = $.14 S_{DS} DL = 0.14 (1.01) 690 \frac{lb}{ft} = 98 \frac{lb}{ft}$ } 208 $\frac{lb}{ft}$



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FAX 206.957.3901
www.quantumce.com

SDC - COOLING TOWER

project

2/8/2024

date

23444.01

project no.

TVM

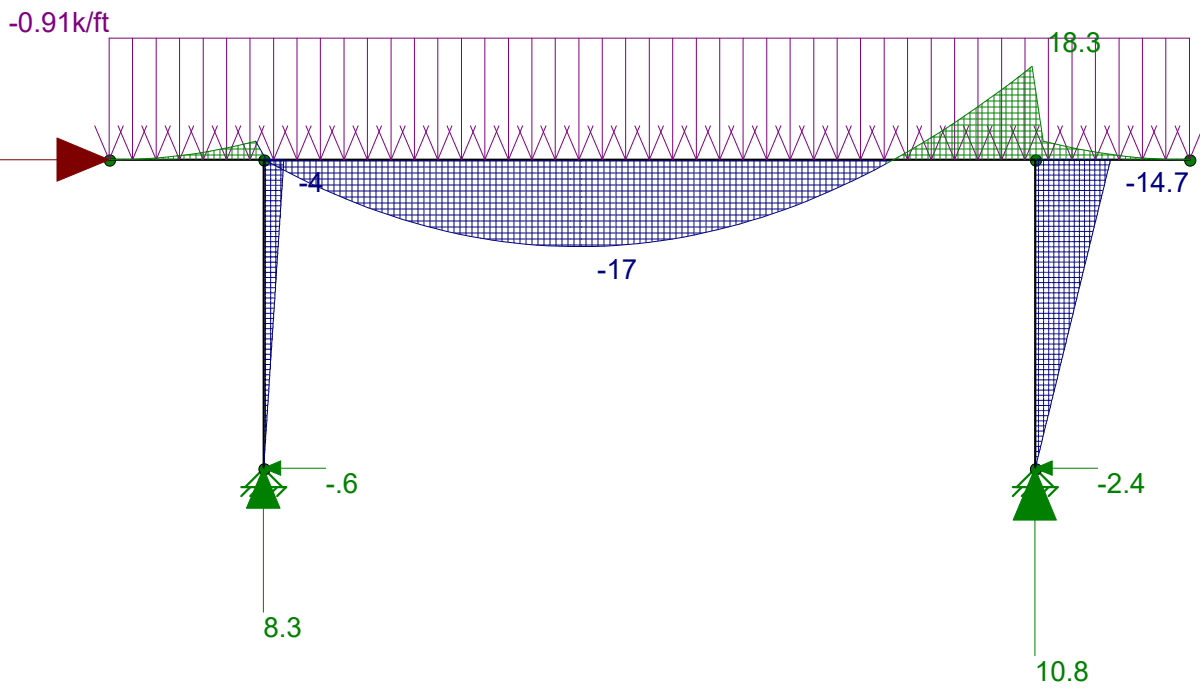
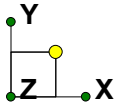
designer

sheet

CENTERIS

client

checked by



FTG = 10.8 k / 2 ksf (4/3)
 FTG = 4.05 sqft
 2.5 SQUARE FTG. OK

Loads: LC 1, Gravity + E
 Results for LC 1, Gravity + E
 Member Bending Moments (k-ft)
 Reaction and Moment Units are k and k-ft

QCE	Moment Frame - longitudinal	
TVM		Feb 8, 2024 at 5:25 AM
23444.01		Moment Frame - Long.r2d

Beam: **M3**

Shape: **W12X26**

Material: **A992**

Length: **21 ft**

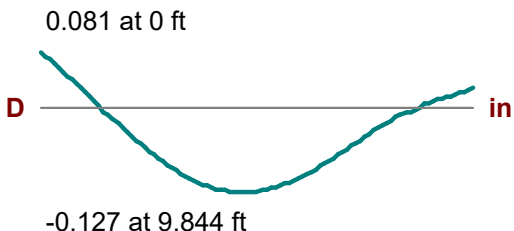
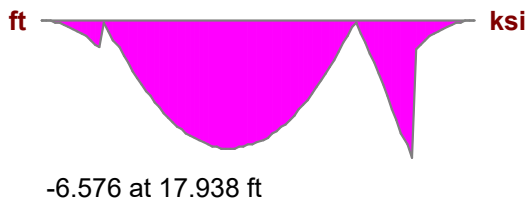
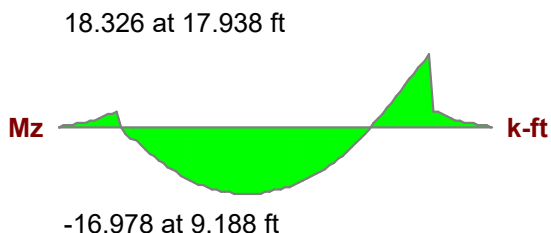
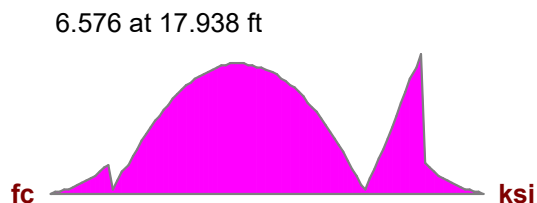
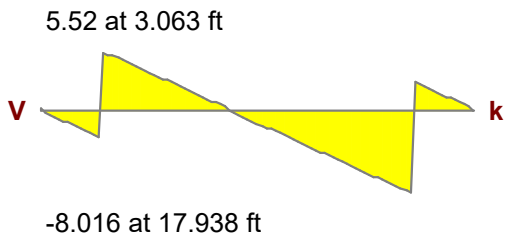
I Joint: **N3**

J Joint: **N6**

LC 1: Gravity + E

Code Check: **0.377 (bending)**

Report Based On 97 Sections



AISC 14th (360-10): ASD Code Check

Direct Analysis Method

Max Bending Check	0.377	Max Shear Check	0.143	Max Defl Ratio	L/851
Location	17.938 ft	Location	17.938 ft	Location	0 ft
Equation	H1-1b			Span	1

Bending Flange	Compact	Compression Flange	Non-Slender	Qs=1
Bending Web	Compact	Compression Web	Slender	Qa=1

Fy	50 ksi	Lb	21 ft	In Plane	21 ft
Pnc/om	40.947 k	KL/r	167.575		48.8
Pnt/om	229.042 k				
Mn/om	52.654 k-ft	L Comp Flange	21 ft		
Vn/om	56.12 k	Stiffness Reduction	0.8		
Cb	1.531				

Column: **M2**

Shape: **HSS6X6X6**
 Material: **A500 Gr.B Rect**
 Length: **6 ft**
 I Joint: **N2**
 J Joint: **N5**

LC 1: Gravity + E

Code Check: **0.434 (bending)**

Report Based On 97 Sections

10.803 at 0 ft



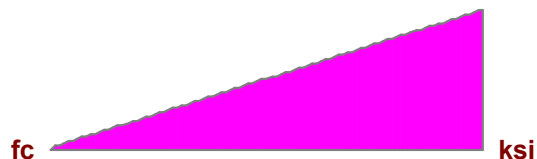
1.425 at 0 ft



2.455 at 0 ft



13.426 at 6 ft



Mz k-ft

-14.731 at 6 ft



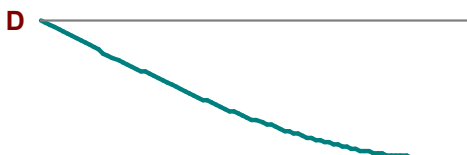
ft ksi

-13.426 at 6 ft



D in

-0.27 at 5.563 ft **DRIFT = 0.27 (3) / 0.7**
DRIFT = 1.16" = H/62 OK



AISC 14th (360-10): ASD Code Check

Direct Analysis Method

Max Bending Check **0.434**
 Location **6 ft**
 Equation **H1-1b**

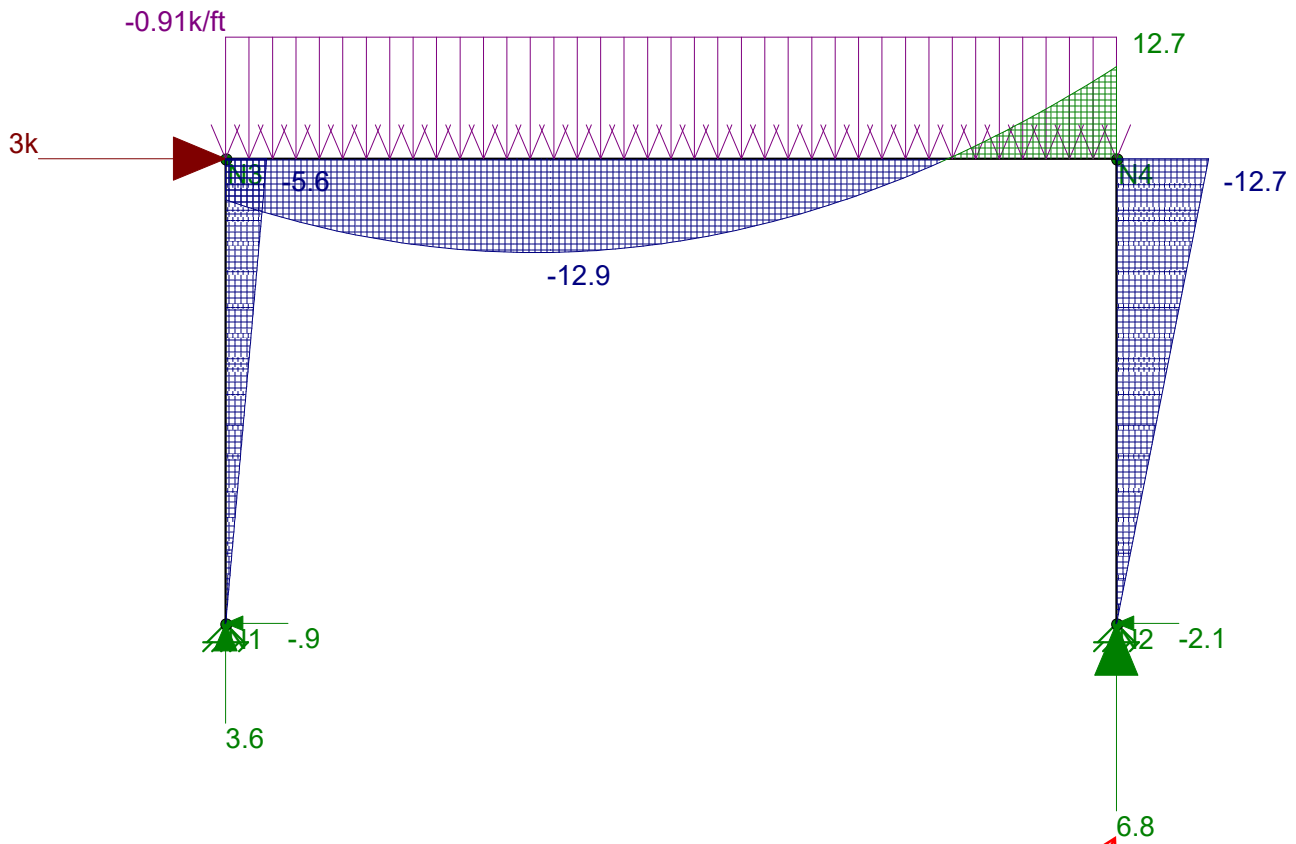
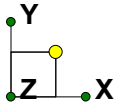
Max Shear Check **0.043**
 Location **6 ft**
 Max Defl Ratio **L/1122**

Bending Flange **Compact**
 Bending Web **Compact**

Compression Flange **Non-Slender**
 Compression Web **Non-Slender**

Fy **46 ksi**
 Pnc/om **195.276 k**
 Pnt/om **208.79 k**
 Mn/om **36.267 k-ft**
 Vn/om **57.137 k**
 Cb **1.667**

Out Plane In Plane
 Lb **6 ft** **6 ft**
 KL/r **31.54** **31.54**
 L Comp Flange **6 ft**
 Stiffness Reduction **0.8**

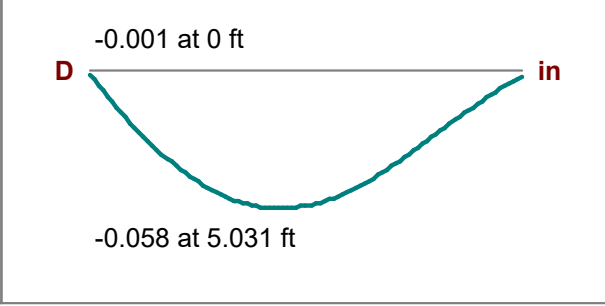
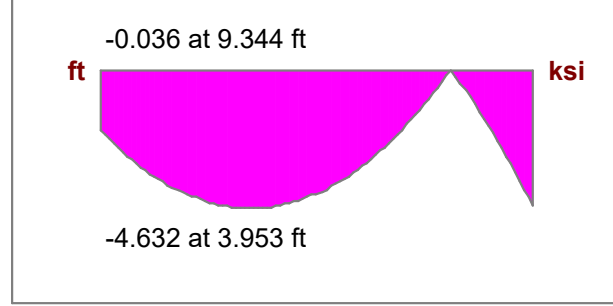
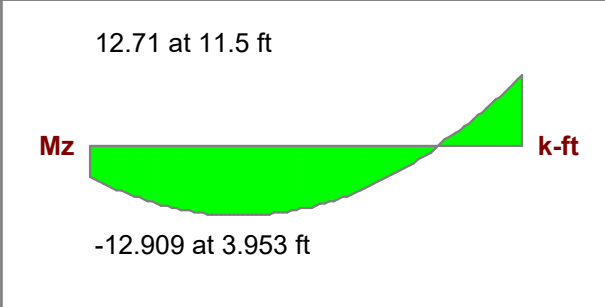
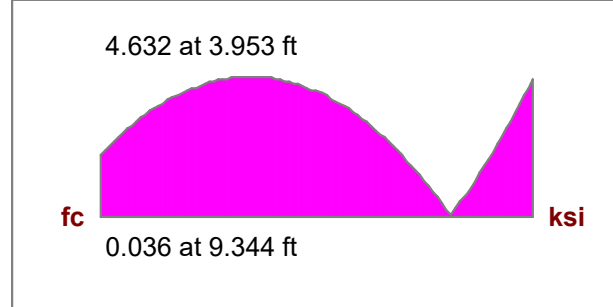
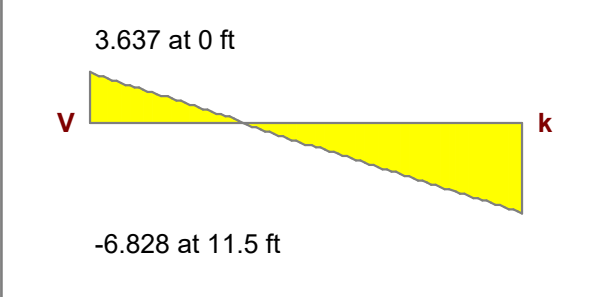
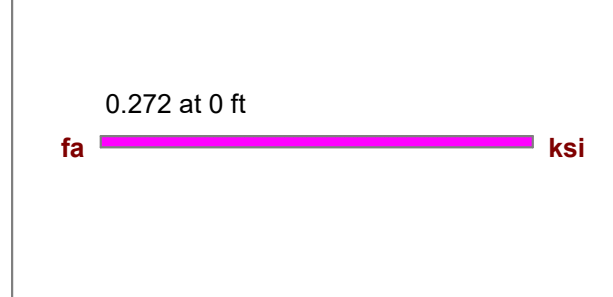
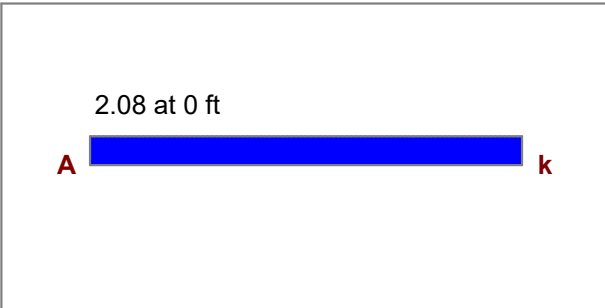


Less than 10.8 k
(Long. Direction Controls)

Loads: LC 1, Gravity + E
 Results for LC 1, Gravity + E
 Member Bending Moments (k-ft)
 Reaction and Moment Units are k and k-ft

QCE	Moment Frame - transverse	Feb 8, 2024 at 5:32 AM
TVM		Moment Frame - Trans.r2d
23444.01		

Beam: **M3**
 Shape: **W12X26**
 Material: **A992**
 Length: **11.5 ft**
 I Joint: **N3**
 J Joint: **N4**
LC 1: Gravity + E
 Code Check: **0.150 (bending)**
 Report Based On 97 Sections



AISC 14th (360-10): ASD Code Check
 Direct Analysis Method

Max Bending Check	0.150	Max Shear Check	0.122	Max Defl Ratio	L/2485
Location	3.953 ft	Location	11.5 ft	Location	5.031 ft
Equation	H1-1b			Span	1

Bending Flange	Compact	Compression Flange	Non-Slender	Qs=1
Bending Web	Compact	Compression Web	Slender	Qa=0.994

Fy	50 ksi	Lb	11.5 ft	In Plane	11.5 ft
Pnc/om	123.434 k	KL/r	91.767		26.724
Pnt/om	229.042 k				
Mn/om	91.235 k-ft	L Comp Flange	11.5 ft		
Vn/om	56.12 k	Stiffness Reduction	0.8		
Cb	1.293				

Column: **M2**

Shape: **HSS6X6X6**
 Material: **A500 Gr.B Rect**
 Length: **6 ft**
 I Joint: **N2**
 J Joint: **N4**

LC 1: Gravity + E

Code Check: **0.368 (bending)**

Report Based On 97 Sections

6.828 at 0 ft



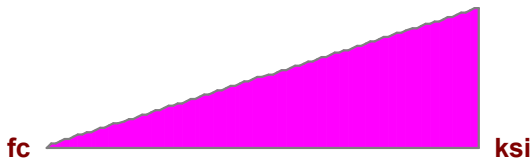
0.901 at 0 ft



2.118 at 0 ft



11.584 at 6 ft



Mz k-ft

-12.71 at 6 ft



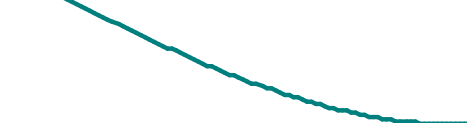
ft ksi

-11.584 at 6 ft



D in

-0.253 at 5.75 ft



AISC 14th (360-10): ASD Code Check

Direct Analysis Method

Max Bending Check **0.368**
 Location **6 ft**
 Equation **H1-1b**

Max Shear Check **0.037**
 Location **6 ft**
 Max Defl Ratio **L/1301**

Bending Flange **Compact**
 Bending Web **Compact**

Compression Flange **Non-Slender**
 Compression Web **Non-Slender**

Fy **46 ksi**
 Pnc/om **195.276 k**
 Pnt/om **208.79 k**
 Mn/om **36.267 k-ft**
 Vn/om **57.137 k**
 Cb **1.667**

Out Plane In Plane
 Lb **6 ft** **6 ft**
 KL/r **31.54** **31.54**

L Comp Flange **6 ft**
 Stiffness Reduction **0.8**

COOLING TOWER SUPPORT (Cont.)

PRMH20240593

MOMENT CONNECTION DETAILING

$$M_{max} = 177 \text{ k}\cdot\text{in} \quad (\text{from RISA-20 TRANSV.})$$

$$\Omega_o = 1.75$$

$$M_{design} = 310 \text{ k}\cdot\text{in}$$

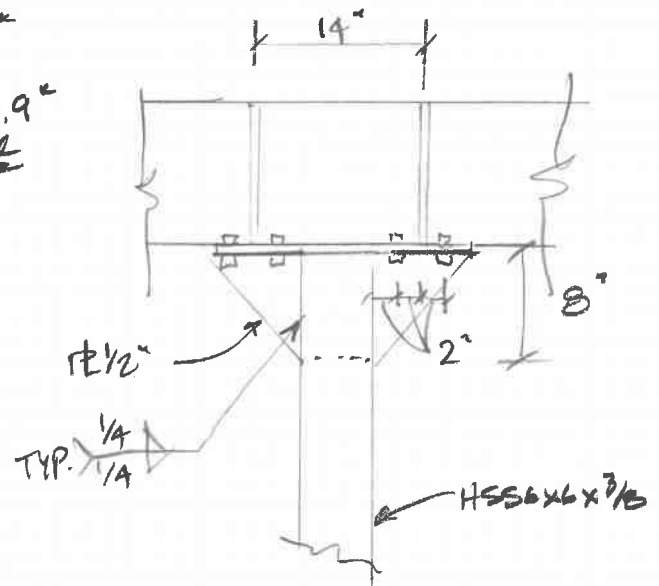
$$3/4" \phi \text{ A325 N} \quad T_{allow} = 19.9"$$

$$T/C = \frac{M}{14"} = 22.1 \text{ } 1/4 \text{ bolts} = 5.5" \ll 19.9" \quad \underline{OK}$$

$$T/C \text{ col} = \frac{M}{6"} = 51.7"$$

$$\text{weld} = 51.7" / 8" / 2 \text{ sides} = 3.23 \text{ } 1/16"$$

$\therefore 1/4"$ fillet



TRANSVERSE

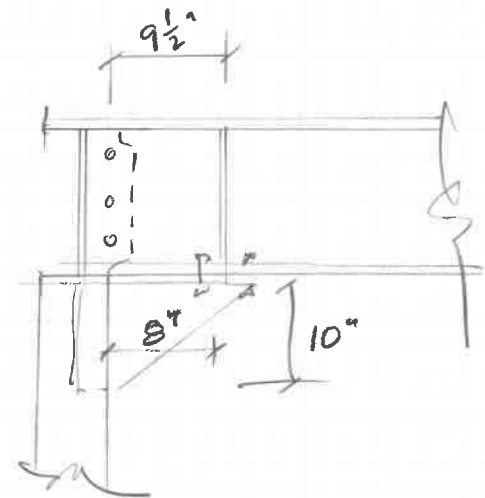
$$\text{amplified moment} : 267 \text{ k}\cdot\text{in}$$

$$T/C = \frac{267 \text{ k}\cdot\text{in}}{9.5"} = 28.1 \text{ } 1/3 \text{ bolts} = 9.4" < 11.9" \text{ capacity } \underline{OK}$$

$$M_{GUSSET} = 28.1" (8") = 224.8 \text{ k}\cdot\text{in}$$

$$\begin{aligned} \text{PL } 1/2" \times 10" \text{ S} &= 8.33 \quad \phi_b = \frac{M}{S} \\ &= 27.0 \approx 36(75) \quad \underline{OK} \end{aligned}$$

$$T/C \text{ col} = \frac{267}{3} = 89 \text{ } 1/10" / 2 \text{ sides} = 4.45 \text{ } 1/16" \text{ fillet}$$



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SDC - COOLING Tower

project

2/8/2024

date

TVM

designer

23444.01

project no.

sheet

CENTERIS
client

checked by

PRMH20240593



Job/Project: 23-04056 Centeris Data Center 2023		Representative: CHC - Columbia	
ESP-Systemwize: WIZE-0BBC1FCA	Created On: 12/07/2023	Phone: (510)293-1993	
Location/Tag: CHP- 3		Email: mtikhanchikov@chhydro.com	
Engineer: Wood-Harbinger, Inc.		Submitted By: Michael Tikhanchikov	Date: 12/07/2023
Contractor: Hermanson Company LLP		Approved By:	Date:

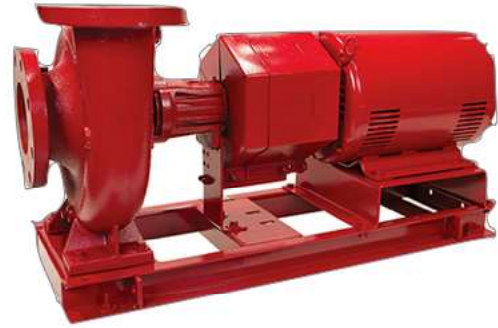
Base Mounted End Suction Pump

Series: e-1510

Model: 4EB

Features & Design

- ANSI/OSHA Coupling Guard
- Center Drop Out Spacer Coupling
- Fabricated Heavy Duty Baseplate
- Internally Self-Flushing Mechanical Seal



*The Bell & Gossett Series e-1510 is available in 26 sizes and a variety of configuration options that enable customization and flexibility to fit a broad range of operating conditions.

<http://bellgossett.com/pumps-circulators/end-suction-pumps/e-1510/>

Pump Selection Summary

Duty Point Flow	593.0 US gpm
Duty Point Head	92.0 ft
Control Head	27.6 ft
Duty Point Pump Efficiency	80.4 %
Part Load Efficiency Value (PLEV)	75.6 %
Impeller Diameter	10.5 in
Motor Power	20 hp
Duty Point Power	17 bhp
Motor Speed	1800 rpm
RPM @ Duty Point	1713 rpm
NPSHr	7.51 ft
Minimum Shutoff Head	108 ft
Minimum Flow at RPM	131 US gpm
Flow @ BEP	654 US gpm
Fluid Temperature	68 °F
Fluid Type	Water
Weight (approx. - consult rep for exact)	602 lbs
Pump Floor Space Calculation	6.65 ft ²

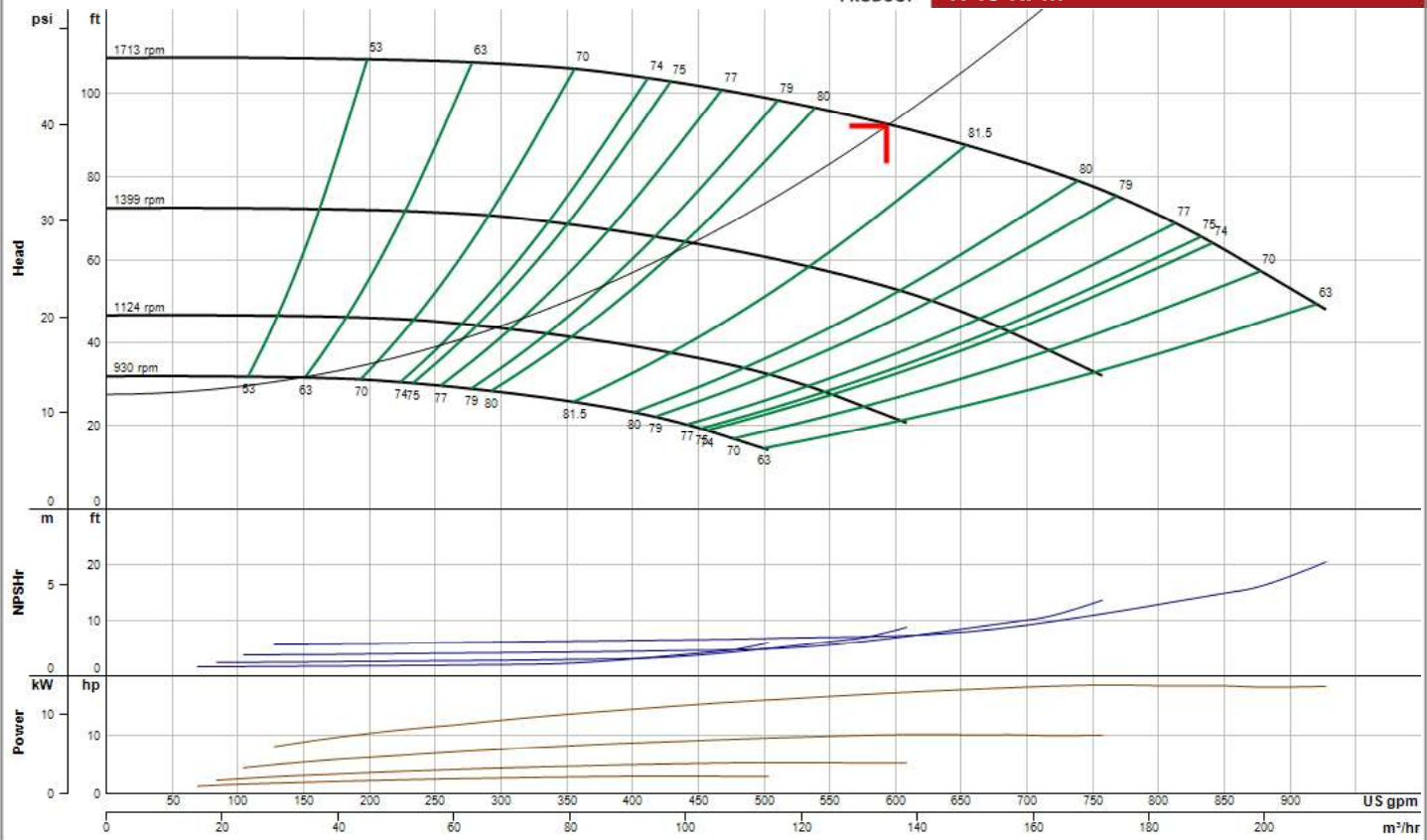
Performance Curve

Energy Efficiency Ratings:

Pump & Motor PEIc: 0.94 ERcI: 6
 Pump, Motor & Drive: PEIv: 0.46 ERvI: 54

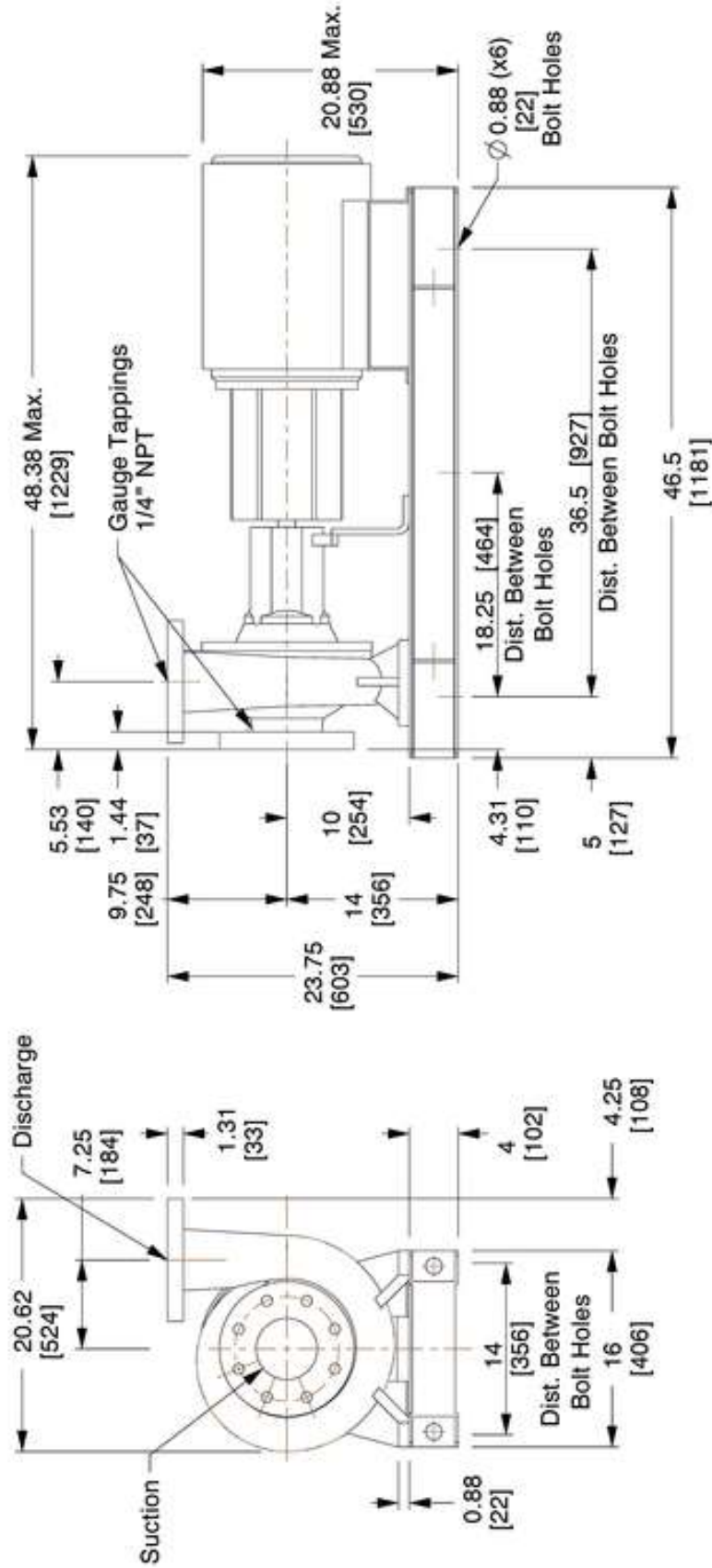
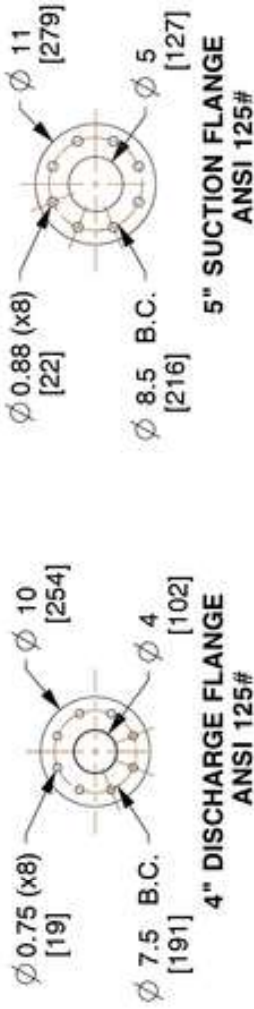


e-1510
4EB
1713 RPM



Performance curve meets 14.6 / ISO 9906 acceptance criteria

WIZE-0BBC1FCA



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

BG-E1510-4EB-SS-256T-L

Series e-1510 Centrifugal Pumps - Base Mounted

Seal Type: Standard Seal | Motor Frame: 256T | Frame Type: L | Flange: ANSI 125#

Dimensions : IN (mm)

Scale : N.T.S.

Submittal # : B-880.34D

Primary Pump Anchorage Design

IBC 2018, ASCE 7-16, ACI 318-14

1.) Primary Pump

Weight: 0.7 kips
 Total Height H: 24.00 in
 Total Width B: 14.00 in
 Total Width L: 47.00 in
 Center of Gravity: 15.00 in

2) Seismic Design per ASCE 7-16 Chapter 13 Non-Structural Components

Wet Side HVACR

ap = 1
 Rp = 2.5
 Sds = 1.01
 Ie = 1.25

Lateral Loads

Lateral resistance is provided by the Primary Pump anchored to the concrete slab.

Fp = 0.14 kips ASCE 7-16 EQ 13.3-1
 X Fpmin = 0.27 kips ASCE 7-16 EQ 13.3-2 Controls
 Fpmax = 1.41 kips ASCE 7-16 EQ 13.3-3

EQ = 0.27 kips

Shear Connection

Number of Anchors = 3.0
 Anchor Shear = $V \cdot \Omega / \#$ = 0.09 kips/anchor < Capacity = 5.6 kips OK
 3/4" Titan HD Anchors with 5" Embed

Overturning Resistance About Width

	C.O.G.	EQ	OT Moment
Primary Pump	15 in	0.3 kips	0.33 k-ft
	Moment Arm	DL	Res. Moment
Resisting Dead Load	7 in	0.7 kips	0 k-ft
F.O.S. = M_R / M_{OT} =	1.2 OK		

PRMH20240593



Job/Project: 23-04056 Centeris Data Center 2023	Representative: CHC - Columbia	
ESP-Systemwize: WIZE-0BBC1FCA	Created On: 12/07/2023	Phone: (510)293-1993
Location/Tag: CWP- 3	Email: mtikhanchikov@chhydro.com	
Engineer: Wood-Harbinger, Inc.	Submitted By: Michael Tikhanchikov	Date: 12/07/2023
Contractor: Hermanson Company LLP	Approved By:	Date:

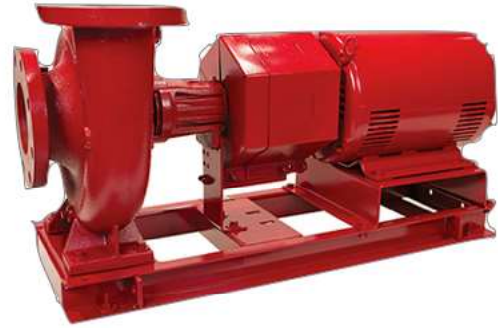
Base Mounted End Suction Pump

Series: e-1510

Model: 6G

Features & Design

- ANSI/OSHA Coupling Guard
- Center Drop Out Spacer Coupling
- Fabricated Heavy Duty Baseplate
- Internally Self-Flushing Mechanical Seal



*The Bell & Gossett Series e-1510 is available in 26 sizes and a variety of configuration options that enable customization and flexibility to fit a broad range of operating conditions.

<http://bellgossett.com/pumps-circulators/end-suction-pumps/e-1510/>

Pump Selection Summary

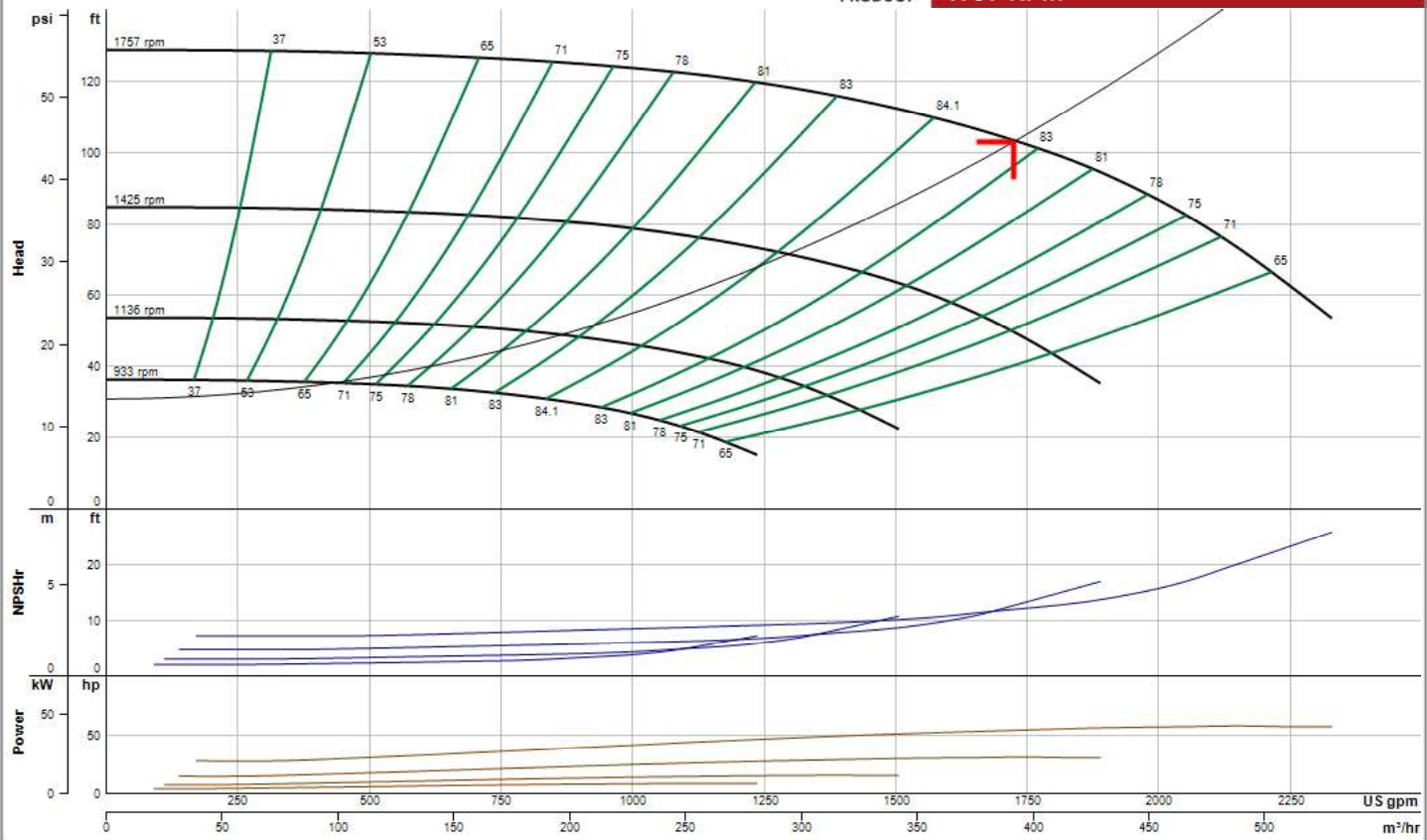
Duty Point Flow	1725.0 US gpm
Duty Point Head	103.0 ft
Control Head	30.9 ft
Duty Point Pump Efficiency	83 %
Part Load Efficiency Value (PLEV)	81.0 %
Impeller Diameter	11.25 in
Motor Power	60 hp
Duty Point Power	53.8 bhp
Motor Speed	1800 rpm
RPM @ Duty Point	1757 rpm
NPSHr	12.1 ft
Minimum Shutoff Head	129 ft
Minimum Flow at RPM	362 US gpm
Flow @ BEP	1573 US gpm
Fluid Temperature	68 °F
Fluid Type	Water
Weight (approx. - consult rep for exact)	1690 lbs
Pump Floor Space Calculation	13.69 ft²

Performance Curve

Energy Efficiency Ratings:
 Pump & Motor PEIc: 0.93 ERcI: 7
 Pump, Motor & Drive: PEIv: 0.46 ERvI: 54

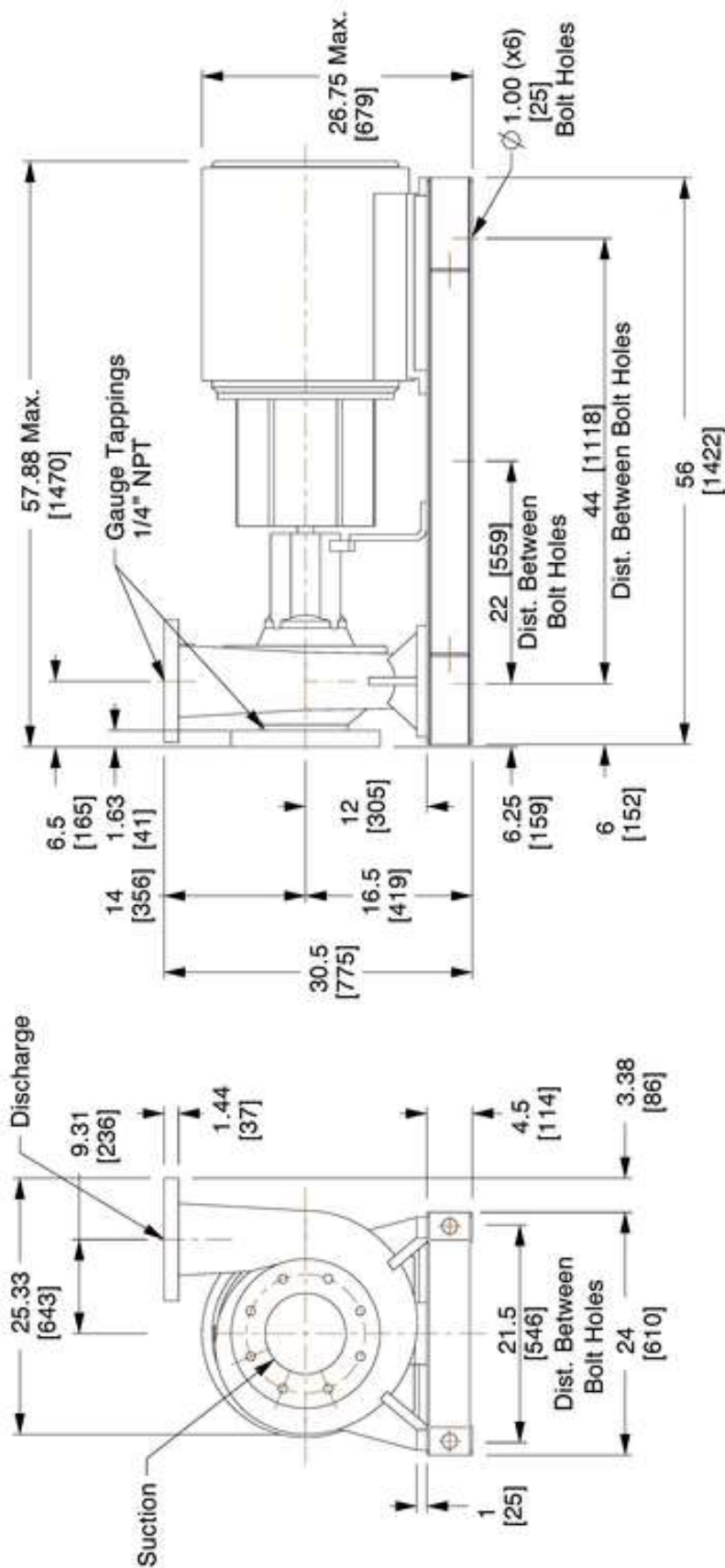
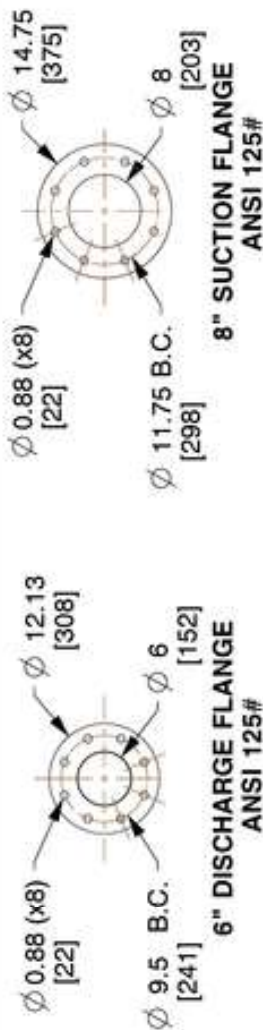


e-1510
6G
1757 RPM



Performance curve meets 14.6 / ISO 9906 acceptance criteria

WIZE-0BBC1FCA



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

BG-E1510-6G-SS-364T-L

Series e-1510 Centrifugal Pumps - Base Mounted

Seal Type: Standard Seal | Motor Frame: 364T | Frame Type: L | Flange: ANSI 125#

Dimensions : IN (mm)

Scale : N.T.S.

Submittal # : B-880.48B

Condenser Pump Anchorage Design

IBC 2018, ASCE 7-16, ACI 318-14

1.) Condenser Pump

Weight: 2.0 kips
 Total Height H: 30.50 in
 Total Width B: 21.50 in
 Total Width L: 56.00 in
 Center of Gravity: 17.00 in

2) Seismic Design per ASCE 7-16 Chapter 13 Non-Structural Components

Wet Side HVACR

ap = 1
 Rp = 2.5
 Sds = 1.01
 Ie = 1.25

Lateral Loads

Lateral resistance is provided by the Condenser Pump anchored to the concrete slab.

Fp = 0.40 kips ASCE 7-16 EQ 13.3-1
 X Fpmin = 0.76 kips ASCE 7-16 EQ 13.3-2 Controls
 Fpmax = 4.04 kips ASCE 7-16 EQ 13.3-3

EQ = 0.76 kips

Shear Connection

Number of Anchors = 3.0
 Anchor Shear = $V \cdot \Omega / \#$ = 0.25 kips/anchor < Capacity = 5.6 kips OK
 3/4" Titan HD Anchors with 5" Embed

Overturning Resistance About Width

	C.O.G.	EQ	OT Moment
Condenser Pump	17 in	0.8 kips	1.07 k-ft
	Moment Arm	DL	Res. Moment
Resisting Dead Load	10.75 in	2.0 kips	2 k-ft
F.O.S. = M_R / M_{OT} =	1.7 OK		



YK CHILLER PERFORMANCE SPECIFICATION

Unit Tag	Qty	Model No.	Net Capacity (tons)	Power	Refrigerant
CH-3	1	YKE3ELQ7-EKHS	575.0	460/3/60.0	R-513A

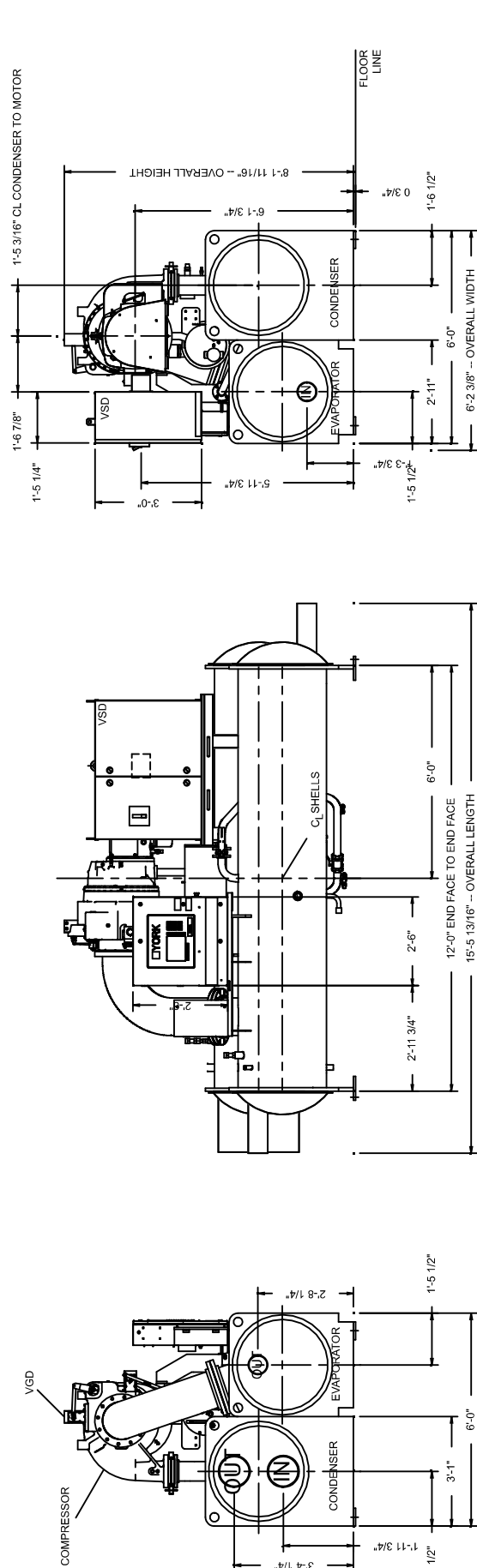
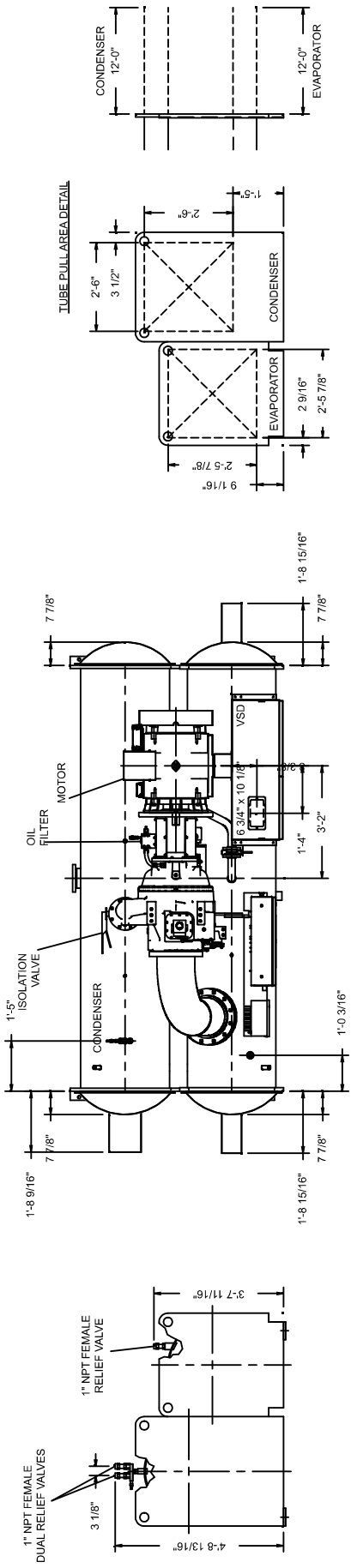
PIN					
YKE3ELQ7-EKHSWLMNF3VVB0575359212CBARY1CRGXXW00X41CRGXXW00XXXXXA3XAUXXXXXXXSMYXXXBXAUXJXXXXXXXXBXXBAXXSXXXXX					
Basic Model	Extended Model	Evaporator Heat Exchanger	Condenser Heat Exchanger		
Y K E 3 E L Q 7 - E K H S W L M N F 3 V V B 0 5 7 5 3 5 9 2 1 2 C B A R Y 1 C R G X X W 0 0 X 4 1 C R G X 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 A 3 X A U X X X X X S M Y X X X B X A U X J X X X X X X X B X X B X A X X S X X X X X					
60 65 70 75 80 85 90 95 100 105 110					

Unit Data	Evaporator	Condenser
EWT (°F):	78.50	75.00
LWT (°F):	55.00	83.77
Flow Rate (gpm):	587.7	1725
Pressure Drop (ft H2O):	14.8	14.6
Fluid Type (%):	WATER	WATER
Circuit No. of Passes:	3	2
Fouling Factor (ft ² °F hr / Btu):	0.000100	0.000250
Tube No. / Description:	656 - 0.025" Enhanced Copper (1")	471 - 0.025" Enhanced Copper (3/4")
Design Working Pressure (psig):	150	150
Entering Water Nozzle @ Location:	R	R
Leaving Water Nozzle @ Location:	L	R
Water Box Weight, ea (lb) :	152	280
Cover Plate Weight , ea (lb):	N/A	N/A
Return Head Weight (lb):	N/A	96
Water Weight (lb):	723	1234
Water Volume(gal):	87	148

Performance Data		Electrical Data		Other	
Job KW:	206.6	Job FLA:	265	Operating Wt. (lb):	19539
Motor KW:	199.6	Motor FLA:	288	Per Isolator (lb):	4885
KW/Ton.R:	0.3594	LRA:	1950	Refrigerant Wt. (lb):	1007
NPLV.IP(KW/Ton. R):	0.2121			Oil Charge (gal):	11
Gear Code:	WL	Min Circuit Ampacity (Amps):	331	Motor Wt. (lb):	1653
OptiSound Cntrl:	YES	Max Fuse/Breaker:	500	Compressor Wt. (lb):	1889
Shaft HP:	254			Starter Wt. (lb):	780
Isolation Valves:	YES			Ship Wt (lb):	17582
Oil Cooler Type:	Standard				
Condenser Inlet:	Standard				
Heat Rejection Capacity(mbtu/hr):	7.547	Type Starter: VSD w/ IEEE filter			

NOZZLE LEGEND

- EVAPORATOR INLET RIGHT SIDE 3 PASSES 6 DIA. (150 Psig DWP)
 - EVAPORATOR OUTLET LEFT SIDE 3 PASSES 6 DIA. (150 Psig DWP)
 - CONDENSER INLET LEFT SIDE 2 PASSES 10 DIA. (150 Psig DWP)
 - CONDENSER OUTLET LEFT SIDE 2 PASSES 10 DIA. (150 Psig DWP)
- Victaulic Grooved Nozzles (per ANSI / AWWA C-506)



SHIPPING WT.: 17,582 LBS, OPERATING WT.: 19,539 LBS, LOAD PER ISOLATOR 4,885 LBS

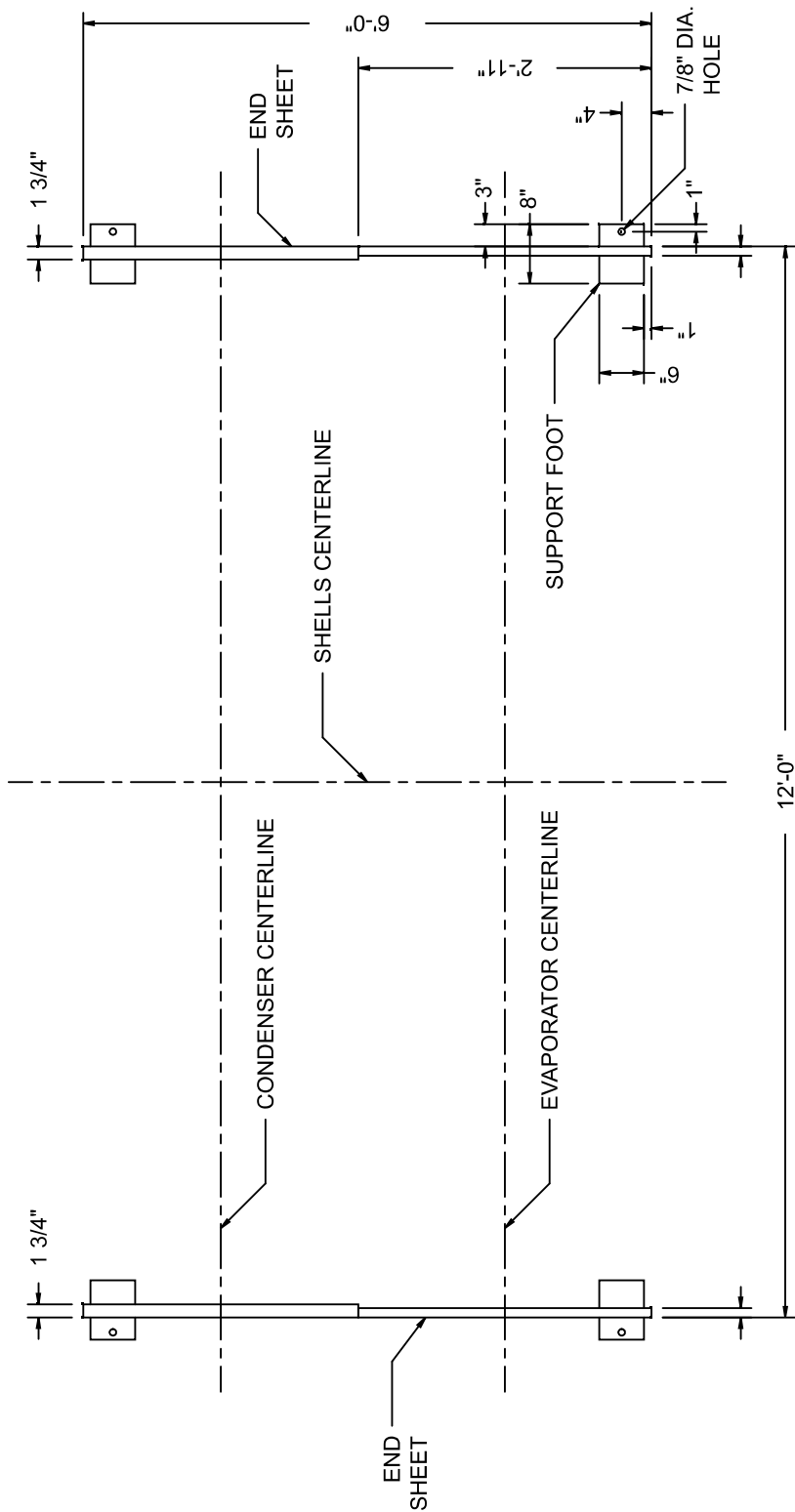
PRODUCT DRAWING
 MaxE Centrifugal Liquid Chiller
 MODEL: YK E3 EL Q7 _ EK H
NOT FOR CONSTRUCTION

Project Name: Centeris Ph. 2
 Location:
 Engineer:
 Contractor:
 For:

Sold To:
 Cust Purch Order#:
 Contract#:
 UNIT **CH-3**
 TAG:

Date: October 06, 2023
 Rev. Date: October 06, 2023
 Form No.: 160.76-EG1
 Dwg. Lev.: 1215
 Dwg. Scale: NTS





DIMENSIONS ARE TYPICAL ALL FOUR PADS

FLOOR LAYOUT (NOT TO SCALE)

PRODUCT DRAWING
 FLOOR LAYOUT W/STEEL PAD ISOLATORS
 MODEL: YK E3 EL Q7 _ EK H
NOT FOR CONSTRUCTION

Project Name: Centeris Ph. 2
 Location:
 Engineer:
 Contractor:
 For:

Sold To:
 Cust Purch Order#:
 Contract#:
 UNIT TAG: CH-3

Date: October 03, 2023
 Rev. Date: October 06, 2023
 Form No.: 160.76-EG1
 Dwg. Lev.: 1215
 Dwg. Scale: NTS



York Chiller Anchorage Design

IBC 2018, ASCE 7-16, ACI 318-14

1.) York Chiller

Weight: 22.0 kips
 Total Height H: 98.00 in
 Total Width B: 72.00 in
 Total Width L: 185.75 in
 Center of Gravity: 58.80 in

2) Seismic Design per ASCE 7-16 Chapter 13 Non-Structural Components

Wet Side HVACR

ap = 1
 Rp = 2.5
 Sds = 1.01
 Ie = 1.25

Lateral Loads

Lateral resistance is provided by the York Chiller anchored to the concrete slab.

Fp = 4.44 kips ASCE 7-16 EQ 13.3-1
 X Fpmin = 8.33 kips ASCE 7-16 EQ 13.3-2 Controls
 Fpmax = 44.44 kips ASCE 7-16 EQ 13.3-3

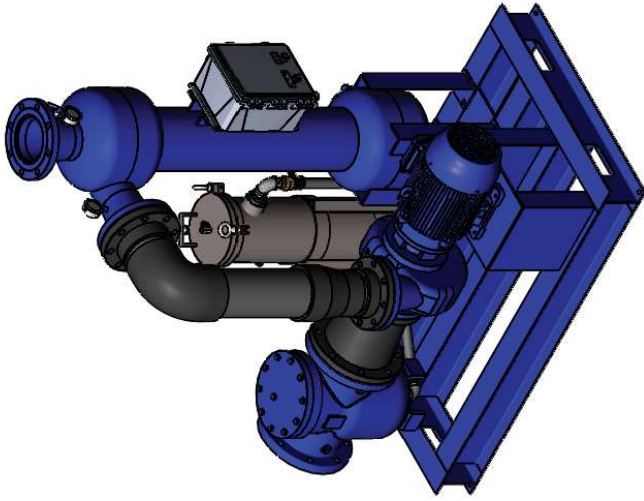
EQ = 8.33 kips

Shear Connection

Number of Anchors = 2.0
 Anchor Shear = $V \cdot \Omega / \#$ = 4.17 kips/anchor < Capacity = 5.6 kips OK
 3/4" Titan HD Anchors with 5" Embed

Overturning Resistance About Width

	C.O.G.	EQ	OT Moment
York Chiller	58.8 in	8.3 kips	40.8 k-ft
	Moment Arm	DL	Res. Moment
Resisting Dead Load	36 in	22.0 kips	66 k-ft
F.O.S. = M_R / M_{OT} =	1.6 OK		



NOTES

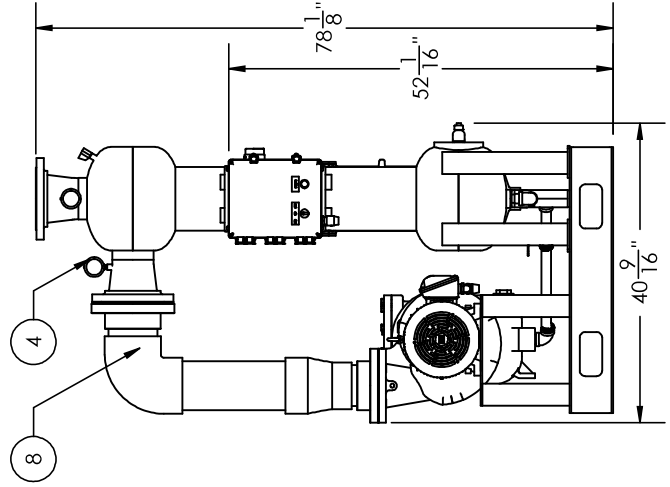
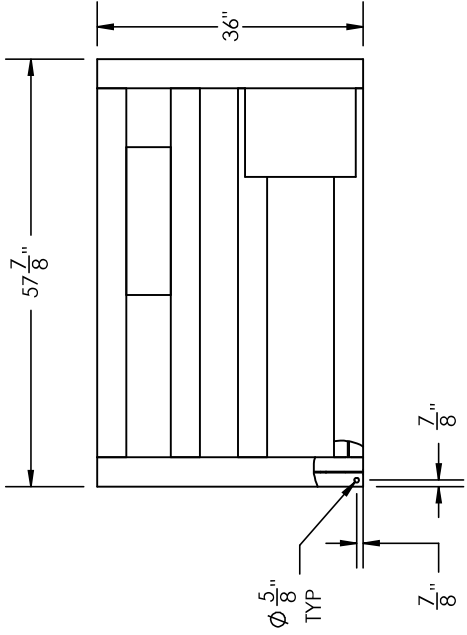
- 1) ALL DIMENSIONS GIVEN IN INCHES UNLESS OTHERWISE SPECIFIED.
- 2) MAX OPERATING PRESSURE: 150 PSI
- 3) TANK CONSTRUCTION: CARBON STEEL
- 4) EXTERIOR: EPOXY/POWDER COATED
- 5) APPROXIMATE MASS: 1202 LBS

#	COMPONENT
1	NEMA 4X, UL, 460V/3PH/60HZ CONTROL PANEL
2	SEPARATOR: 5" ICS, COATED CARBON STEEL
3	PUMP: 10HP 3600RPM, 460/3/60, 850 GPM @ 35' TDH
4	INLET/OUTLET PRESSURE GAUGES: 2.5" 0-160 PSI, LIQ FILLED
5	BAG FILTER: 100GPM CARBON STEEL HOUSING
6	BAG CHANGE INDICATOR: MIDWEST #555-043
7	BASE: COATED CARBON STEEL I-BEAM
8	FACE PIPE: 6" PVC SCH 80

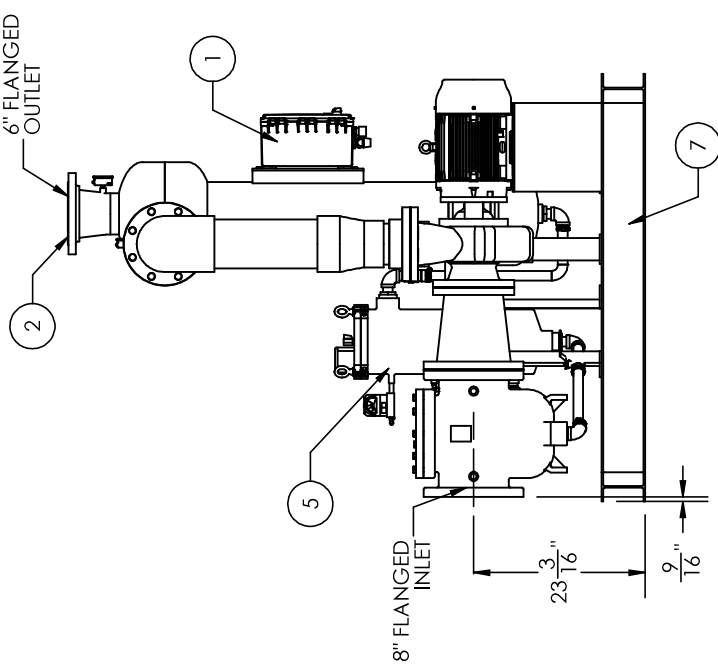
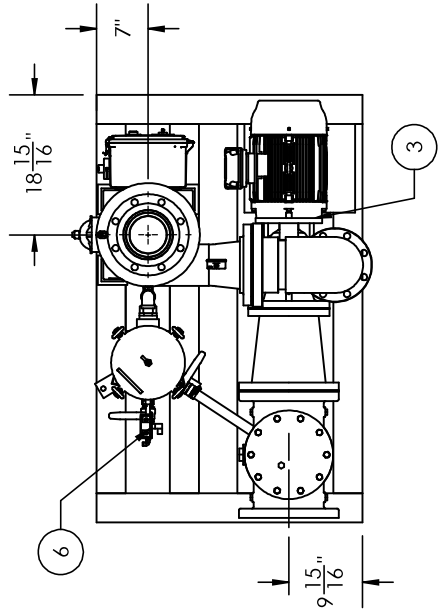


120-J TALBERT ROAD
MOORESVILLE, NC 28117
PH: (704) 662-3133
FAX: (704) 662-3155

DRAWING DATE:	8/1/2018	DRAWING TITLE:	ICSR 850 GPM LH WITH FACE PIPING AND PUMP
SCALE:	1:26	DRAWING NUMBER:	200290-000018
SHEET 1 OF 3		CAT NUMBER:	200290-000018 LH-R 850GPM
DRAWN BY:	BJH	REV. NO. 0	
CHECKED BY:		GENERAL TOLERANCES	ANGULAR ± 1°
APPROVED BY:		(EXCEPT AS NOTED)	FRACTIONAL ± 1/8" Dec: 2 PL ± 0.05", 3 PL ± 0.010"



PRMH20240593



NO.	REVISION NOTES	DATE	BY
1			
2			
3			

Seperator Anchorage Design

IBC 2018, ASCE 7-16, ACI 318-14

1.) Seperator

Weight: 1.5 kips
 Total Height H: 78.00 in
 Total Width B: 36.00 in
 Total Width L: 58.00 in
 Center of Gravity: 39.00 in

2) Seismic Design per ASCE 7-16 Chapter 13 Non-Structural Components

Wet Side HVACR

ap = 1
 Rp = 2.5
 Sds = 1.01
 Ie = 1.25

Lateral Loads

Lateral resistance is provided by the Seperator anchored to the concrete slab.

Fp = 0.30 kips ASCE 7-16 EQ 13.3-1
 X Fpmin = 0.57 kips ASCE 7-16 EQ 13.3-2 Controls
 Fpmax = 3.03 kips ASCE 7-16 EQ 13.3-3

EQ = 0.57 kips

Shear Connection

Number of Anchors = 2.0 3/4" Titan HD Anchors with 5" Embed
 Anchor Shear = $V \cdot \Omega / \#$ = 0.28 kips/anchor < Capacity = 5.6 kips OK

Overturning Resistance About Width

	C.O.G.	EQ	OT Moment
Seperator	39 in	0.6 kips	1.85 k-ft
	Moment Arm	DL	Res. Moment
Resisting Dead Load	18 in	1.5 kips	2 k-ft
F.O.S. = M_R / M_{OT} =	1.2 OK		



AHRI 16.24Q-P

#514-231004094217

Customer	CMS	Date	10/4/2023
Project	OPTION #1 REPLACEMENT HEX	Engineer	Anthony Bancala
HEX Type	A100-IS10-179-TKTM44	Contact Person	Taylor Rush
		Quote	A-4726 No Fouling Factor
Units Connected	1 (Parallel)		

Calculated Parameters	Unit	Hot Side	Cold Side
Flow Type			CounterCurrent
Heat Load	BTU/h		7345456.20
Inlet Temperature	°F	78.5	52.5
Outlet Temperature	°F	53.6	61.0
Mass Flow Rate	lb/h	294817.28	862747.92
Volumetric Flow Rate	GPM (US)	590.00	1724.91
Total Pressure Drop	psi(g)	1.34	9.93
Fouling Factor	Hrft ² °F/KBTU	0.0000	0.0000
Surface Margin	%		0.0
LMTD	°F		5.9
HTC (Available/Required)	BTU/ft ² ·hr·°F		620 / 620

Properties of Fluid	Unit	Hot Side	Cold Side
Fluid		Water	Water
Liquid Viscosity	cP	1.0291	1.1919
Wall Viscosity	cP	1.1919	1.0291
Liquid Density	lb/ft ³	62.30	62.36
Liquid Heat Capacity	BTU/lb·°F	1.0006	1.0017
Liquid Thermal Conductivity	BTU/h·ft·°F	0.3453	0.3399

Specifications	Unit	Hot Side	Cold Side
HEX Type			A100-IS10-179-TKTM44
Number of Plates			179
Grouping			1x89 + 0x0 / 1x89 + 0x0
Plate Thickness	in		0.0157
Plate Material / Ratio			AISI304 / 28%
Effective Area	ft ²		1998.57
Gasket Material			NBRH (SonderLock) 5/302 °F
Frame	Type		IS, painted frame
	Length	ft	5.11
	Maximum Number of Plates		237
	Assembly Measurement	in	20.6132
Volume	ft ³	7.48	7.48
Weight, empty/operating	lb		5293 / 6226
Paint Category			Category C2L
Paint Color			BLUE RAL 5010
Connection	Inlet	F1: 8 INCH studded end connection ANSI B16.5 #150	F3: 8 INCH studded end connection ANSI B16.5 #150
	Outlet	F4: 8 INCH studded end connection ANSI B16.5 #150	F2: 8 INCH studded end connection ANSI B16.5 #150
Pressure Vessel Code			ASME
Minimum Design Temperature	°F		52.5
Maximum Design Temperature	°F		230.0
Maximum Differential Pressure	psi(g)		150.0
Maximum Test Pressure	psi(g)		195.0
Maximum Design Pressure	psi(g)	150.0	150.0

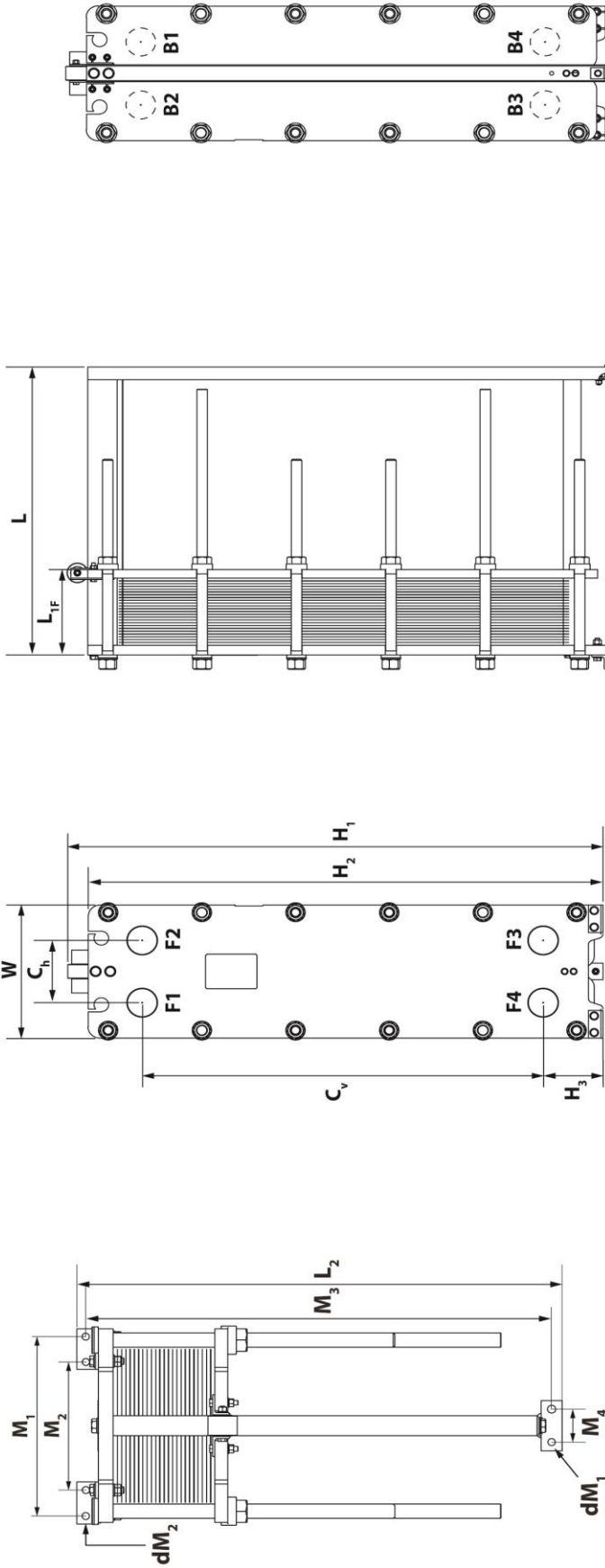
H1.6-1.3.28-beta 2304

This Heat exchanger is certified by the AHRI Liquid to Liquid Heat Exchangers Certification Program, based on AHRI standard 400. AHRI certified units are subject to rigorous and continuous testing, have performance ratings independently measured and are third party verified. Certified units may be found in the AHRI Directory at www.ahridirectory.com

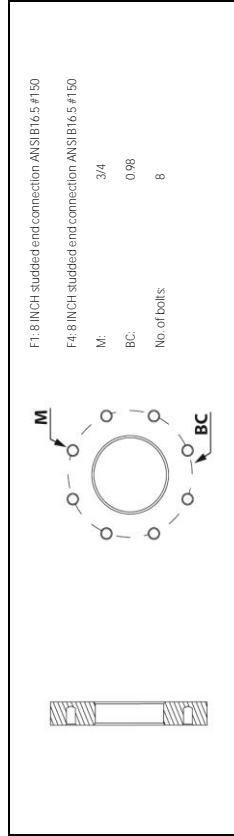


PRMH20240593

HIGH LEVEL SCHEMATIC DRAWING - ONLY FOR ILLUSTRATIVE PURPOSES (VALUES IN TABLE BELOW ARE CORRECT)

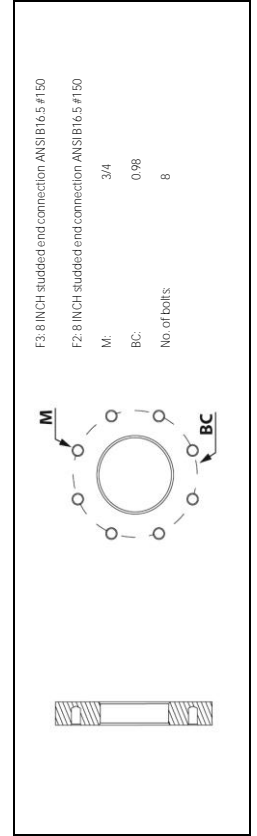


Connections



Hot Side: Inlet F1 / Outlet F4

Cold Side: Inlet F3 / Outlet F2

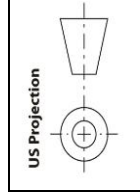


Dimensions

Cv	58.6220	L _{IF}	24.5502
Ch	15.5512	L	61.2992
H1	86.6339	L2	67.2047
H2	82.6969	M1	24.4094
H3	12.4666	M2	
W	30.3150	M3	64.4888
dM1/dM2	0.7087 / 0.9813	M4	
Tie Bolts	12 pcs. 1 3/8" (8 Short, 4 Long)		

Materials used

Cover material	Carbon Steel
Plate material	ANSI304
Plate thickness	0.0157
Gasket material	NBRH (Standard) 5/302 *F
Paint Class	Category C2L
Paint Color	BLUE RAL 5010



Tolerances: acc. to ISO 2768-c
 Customer Name: CMS
 Calculation Number: A-4726 No Fouling Factor
 Date of quotation: 10/4/2023
 Polaris Reference: AHRI16.240-P
 HEX Type: A100-I510-179
 Design Code: ASME
 Design Temperature: 230.0 [°F]
 Design Pressure: 150.0 [psi(g)]
 Test Pressure: 195.0 [psi(g)]

Seperator Anchorage Design

IBC 2018, ASCE 7-16, ACI 318-14

1.) Seperator

Weight: 6.4 kips
 Total Height H: 87.00 in
 Total Width B: 30.00 in
 Total Width L: 61.30 in
 Center of Gravity: 43.50 in

2) Seismic Design per ASCE 7-16 Chapter 13 Non-Structural Components

Wet Side HVACR

ap = 1
 Rp = 2.5
 Sds = 1.01
 Ie = 1.25

Lateral Loads

Lateral resistance is provided by the Seperator anchored to the concrete slab.

Fp = 1.29 kips ASCE 7-16 EQ 13.3-1
 X Fpmin = 2.42 kips ASCE 7-16 EQ 13.3-2 Controls
 Fpmax = 12.93 kips ASCE 7-16 EQ 13.3-3

EQ = 2.42 kips

Shear Connection

Number of Anchors = 2.0
 Anchor Shear = V/# = 1.21 kips/anchor < Capacity = 5.6 kips OK
 3/4" Titan HD Anchors
 with 6 1/4" Embed

Overturning Resistance About Width

	C.O.G.	EQ	OT Moment
Seperator	43.5 in	2.4 kips	8.79 k-ft

	Moment Arm	DL	Res. Moment
Resisting Dead Load	15 in	6.4 kips	8 k-ft

F.O.S. = M_R / M_{OT} = 0.9 Use Tension Capacity of Anchors

Anchor Tension = T/# = 3.51 kips/anchor < Capacity = 4.7 kips OK

Combined Uc = 0.97 < 1.0 OK



Quantum Consulting Engineers LLC
 1511 Third Avenue, Suite 323
 Seattle, WA 98101

Project: Centeris Data Centers

Date: 2/8/24

Job No: 23444.01

Designer: TVM

Sheet: 1

Client: Centeris

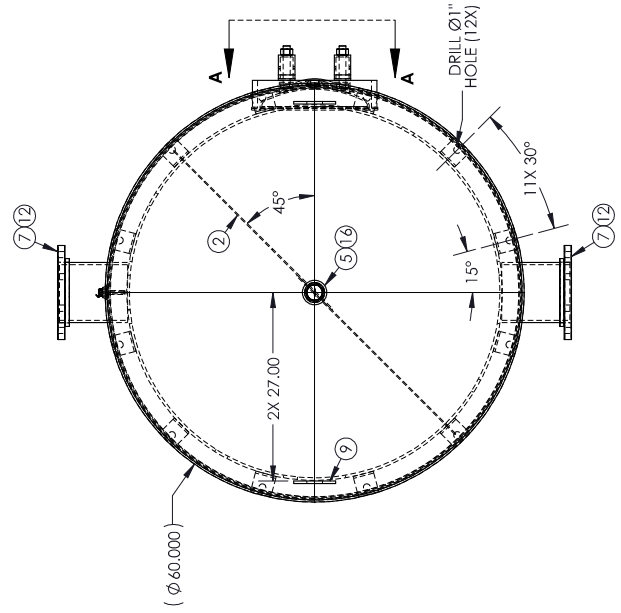
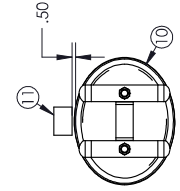
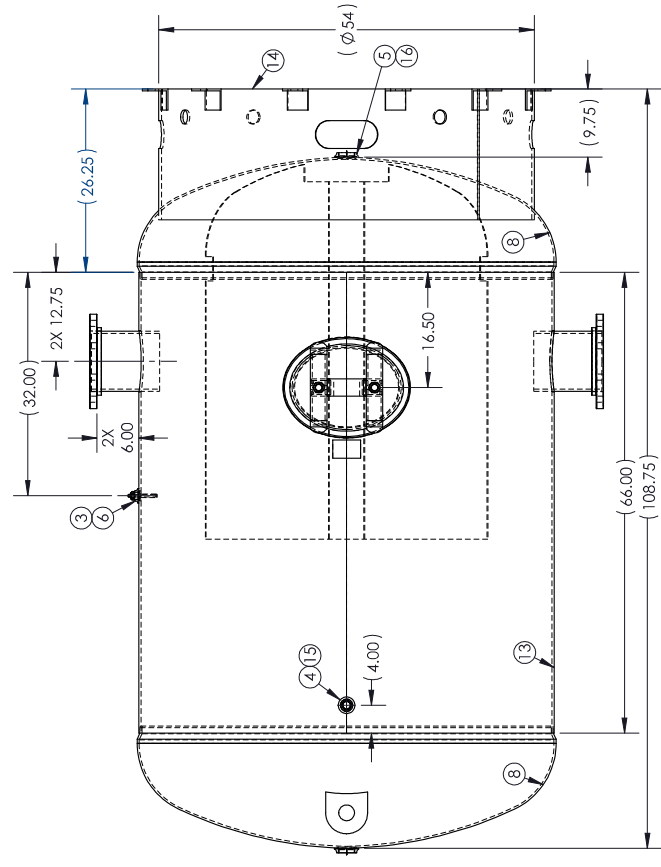
Checked:

REV.	DESCRIPTION	PROCESS NO.	CHANGE NO.	DATE	REV BY
A	CUSTOMER APPROVAL	SALES-336		2/1/2024	J. TANNAHILL

REVISIONS - LAST SAVED: Thursday, February 1, 2024 2:37:46 PM

NOTES:
 BUILT FOR 125 PSI WORKING PRESSURE.
 CONSTRUCTED IN ACCORDANCE WITH THE LATEST MANDATORY EDITION
 OF THE ASME BOILER & PRESSURE VESSEL CODE SECTION VIII DIV. I.
 U STAMPED.
 HYDRO TEST @ 163 PSI.
 BOLT HOLES TO STRADDLE CENTERLINE.

ITEM	PART #	DESCRIPTION	QTY.	ITEM	PART #	DESCRIPTION	QTY.
1	1001.63500	ANGLE.3"X3"X1/4X3"LG.STL.SA-36	12	9	1001.59604	LUG.LIFT.P1.VERT.6"X6".RAD.3/8"	2
2	1003.54088	BAFFLE.60"XANK.1250GAL.P-1	1	10	1001.62557	MANWAY.12X1.6X3/4X4.SA 106C	1
3	1001.70655	BULB WELL ASSY	1	11	1001.62761	NAMEPLATE.BLANK.ASME.SA36	1
4	1001.69684	FLANGE.1"NPT.FLAT.3M.SA 181-70	1	12	1001.34235	PIPE.8"X9.75"LG.SCH40.SA538-ERW	2
5	1001.69656	FLANGE.2"NPT.FLAT.3M.SA 181-70	2	13	1002.99455	PLT..31.3"X87"X.186-7/8.STL.SA516-70	1
6	1001.69688	FLANGE.3/4"NPT.FLAT.3M.SA 181-70	1	14	1002.99136	PLT..3/8.STL.SA-36.60.00"X105.00"	1
7	1001.69758	FLG.8".F50.1.50#.SA 105	2	15	1001.62844	PLUG.HOLE.1"NPT.PLASTIC	1
8	1001.69826	HEAD.60"DIA.BL..294THK.SA516-70.2:1 JOG	2	16	1001.62847	PLUG.HOLE.2"NPT.PLASTIC	2



Lochinvar, LLC
 290 N. Main St. #100
 Lebanon, Tennessee 37090
 P: 615.889.8900 | F: 615.547.1000
 High Efficiency Boilers & Water Heaters

Dimensions in INCHES unless noted.
 Tolerances:
 Finish: ±.015
 Angles: ±1°
 Parallel: ±.010
 Perpendicular: ±.010
 Chamfer: ±.010
 (2) PH ±.03
 (3) PH ±.05

Approval By: The Applicable Product Engineering Department.

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Critical Characteristics For Inspection:
 (Symbol: circle with a vertical line through it) Scale: NTS

Drawn: J. TANNAHILL
 Date: 02/01/2024
 Title: DRWG. DRG. Desc: CVL1050-805282

Part Desc: CVL1050-805282
 Part No: CUSTOMER APPROVAL
 Rev: 01:1
 Of: 3

EFFICIENCY	MA WP= 125 PSI @ 210° F
SHELL - 70%	MDMT= 0° F @ 125 PSI
HEAD - 85%	RT=N/A
	NDE=N/A
	CA=N/A
	HT/PH=N/A
FOR NON CORROSIVE SERVICE	

CUSTOMER APPROVAL

DATE: _____ APPROVED BY: _____

Ground Supported Circular Tank For Liquids Seismic Anchorage Design

IBC 2018, ASCE 7-16 Chapter 15

Seismic Criteria:

Site Class:	D	R:	3	ASCE Table 15.4-2
S_s :	1.26	D:	5	tank diameter, ft
S_1 :	0.43	h:	9.0625	Top of Liquid, ft
S_{D5} :	1.01	Tc:	1.2907	ASCE EQ 15.7-12
S_{D1} :	0.5	T_L :	6	ASCE Figure 22-14
I_E :	1			

$$T_s = S_{D1}/S_{D5} = 0.50$$

$$T_i < T_s \quad \text{Conservative}$$

$$\therefore S_{ai} = S_{ds} = 1.01 \quad \text{ASCE EQ 15.7-7}$$

$$T_c < T_L$$

$$\therefore S_{ac} = 1.5S_{D1}/T_c = 0.500 \quad \text{ASCE EQ 15.7-10}$$

$$V_i = S_{ai} I_E / (R) = 0.34 W_i \quad \text{ASCE EQ 15.7-5}$$

$$V_c = S_{ac} I_E / (1.5) = 0.33 W_c \quad \text{ASCE EQ 15.7-6}$$

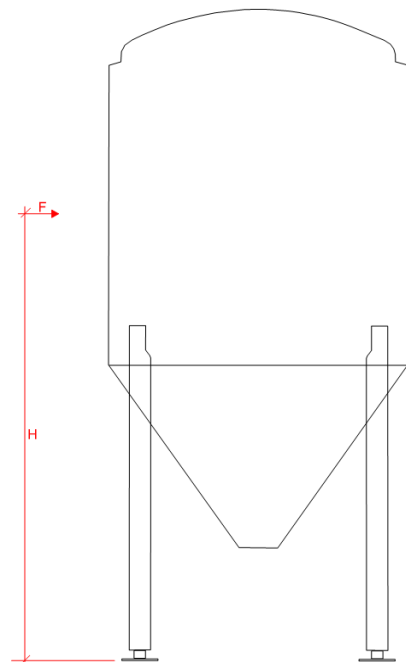
Tank with 4 Legs:


Ht to Center of Mass, H:	58 in
Distance between Opp. Legs, X:	50 in
Tank Weight:	2.30 k
Liquid Weight, W_L :	10.43 k
Weight, W_i :	12.00 k
Weight, W_c :	4.35 k

Shear and Overturning Loads:

$V = V_i + V_c$	5.49 k	ASCE EQ 15.7-4
# Shear Anchors:	12	
Shear/Leg:	0.46 k	ULT
	0.32 k	ASD
OT Moment:	319.7 k-in	
Tension/Side:	-6.4 k	ULT
# Tension Anchors:	2	
Net Uplift/Leg:	-1.10 k	ULT (0.9-0.2Sds)DL + 1.0EQ
	-0.86 k	ASD (0.6-0.14Sds)DL + 0.7EQ

Use 3/4" \emptyset Titen HD Screw Anchors, OK by Inspection



	Quantum Consulting Engineers LLC 1511 Third Avenue, Suite 323 Seattle, WA 98101	Project: Centeris Scale Matrix T+I Client: Centeris	Date: 2/12/24 Designer: TVM Checked:	Job No: 23444.01 Sheet: