APPLIED ENGINEERING
CONSULTING STRUCTURAL ENGINEERS
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Milpitas, CA. 95035
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PC 26-116 068 BEM 26-122495

STRUCTURAL CALCULATIONS
FOR

Quantumscape B2 Phase-2.53 Industrial Tool Installations
at
Quantumscape Battery, Inc.
1710 Automation Parkway
San Jose, CA 95131

JOB # 26023.00
June 5th, 2026

CLIENT:

Pacific Crest Engineering

CITY OF SAN JOSE
BUILDING DIVISION
B.P. # PC26-116068
DATE 6/9/26

DISCLAIMER: Structural design of this project by the undersigned was limited to the specific members and details shown in these calculations. Applied Engineering will accept no responsibility for any work not recorded in these calculations.

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Project	**Quantumscape B2 Phase-2.53**	**Sheet**		**of**	
Client	**Pacific Crest Engineering, Inc.**	**Proj No.**	26023.00	**Date**	May-26
	Design Criteria	**By:**	ST	**File**	DC26023

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Client	**Pacific Crest Engineering, Inc.**	**Proj No.**	26023.00	**Date**	May-26
	Design Criteria	**By:**	ST	**File**	DC26023

Code: 2025 Edition of California Building Code

Seismic load factors: (Per ASCE7-22)

$S_s = 1.98$ $S_{DS} = 1.42$

$S_1 = 0.81$ $S_{D1} = 0.93$

Lateral analysis:

Seismic for non-structural components & equipment anchorage:

$F_p = 0.4\, I_p\, S_{DS} W_p\, (1+2.5\,(z/h))\, (C_{AR}/R_{po}R_\mu)$

Equipment & component anchorage & Support							
Component	C_{AR}	R_{po}	R_μ	I_p	Ω_0	**Fp/Wp**	
						LRFD	**ASD**
Equipment on Grade (Ip=1.0)	1.0	1.5	1.0	1.0	2.0	0.428	-
Equipment on Grade (Ip=1.5)	1.0	1.5	1.0	1.5	2.0	0.642	-

Structural Steel members:

ASTM A36, Fy=36ksi (Channels, angles or other rolled shapes)
ASTM A307 (Machine Bolts)
ASTM A276 (S.S. Shapes & PL.)

Concrete:

Fc'= 3,000 psi

Expansion Anchors:

Hilti Kwik Bolt- TZ2 Concrete Expansion Anchors, ICC #ESR-4266

NOTE: Manufacturer's software has been utilized to calculate the capacity of typical anchors that are used throughout the calculations and are included in the Appendix section for reference. Loads applied as software inputs are arbitrary. Actual loads & unity equations are calculated & checked within the main body of calculations

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Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**		**of**	
Client	**Pacific Crest Engineering**	**Proj No.**	26023	**Date**	Mar-26
Seismic Factors		**By:**	ST	**File**	EA26023

Code: 2025 Edition of California Building Code

Seismic factors:

S_S =	1.98
S_1 =	0.81
S_{ms} =	2.14
S_{M1} =	1.39

S_{DS} = 2/3 * S_{MS} = **1.43**

S_{D1} = 2/3 * S_{M1} = 0.93

Seismic (@ grade level) **Ip = 1.0**

$$F_p = \frac{0.4\, S_{DS}\, I_p\, W_p}{R_\mu} [1 + 2.5\,(z/h)]\,[C_{AR}/R_{po}]$$

C_{AR} =	1.0	I_p =	1.0	Component Importance factor
R_{po} =	1.5	z =	0.0	@ point of attachment
Ω_{0p} =	2.0	h =	25.0	average roof height
R_μ =	1.0			

$F_p = \frac{0.571}{1.0}$ x (1 + 0) 0.67 W_p = 0.380 W_p

$F_{pmin} = 0.3\, S_{DS}\, I_p\, W_p$ = 0.30 1.427 1.0 W_p = 0.428 W_p **GOVERNS**

$F_{pmax} = 1.6\, S_{DS}\, I_p\, W_p$ = 1.6 1.427 1.0 W_p = 2.28 W_p

F_p = *0.428 Wp* (LRFD Design level)

Seismic (@ grade level) **Ip = 1.5**

$$F_p = \frac{0.4\, S_{DS}\, I_p\, W_p}{R_\mu} [1 + 2.5\,(z/h)]\,[C_{AR}/R_{po}]$$

C_{AR} =	1.0	I_p =	1.5	Component Importance factor
R_{po} =	1.5	z =	0.0	@ point of attachment
Ω_{0p} =	2.0	h =	25.0	average roof height
R_μ =	1.0			

$F_p = \frac{0.856}{1.0}$ x (1 + 0) 0.67 W_p = 0.571 W_p

$F_{pmin} = 0.3\, S_{DS}\, I_p\, W_p$ = 0.30 1.427 1.5 W_p = 0.642 W_p **GOVERNS**

$F_{pmax} = 1.6\, S_{DS}\, I_p\, W_p$ = 1.6 1.427 1.5 W_p = 3.42 W_p

F_p = *0.642 Wp* (LRFD Design level)

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Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**		**of**	
Client	**Pacific Crest Engineering**	**Proj No.**	26023	**Date**	Mar-26
Furnace		**By:**	ST	**File**	EA26023

Code: 2025 Edition of California Building Code

Lateral Forces: ***(LRFD)***

Use F_p = ***0.642*** ***Wp*** S_{DS} = 1.427 Ω_0 = 2

Equipment info:

Height	h =	87.9	in	=	7.33	ft	h_{cog} =	3.60	ft (c.o.g. = 43.1")
Width	w =	40.0	in	=	3.33	ft	w_{cog} =	1.54	ft (c.o.g. = 18.5")
Length	l =	49.5	in	=	4.13	ft	l_{cog} =	2.06	ft
Weight	W =	10000	lbs						

F_p = 0.642 x 10000 = **6420** **lbs**

$\Omega_0 F_p$ = 2.000 x 6420 = 12840 lbs

M_{ot} = F_p * h_{cog} = 6420 x 3.60 = 23106.1 lb.ft

M_{ot_om} = Ω_0* F_p * h_{cog} = 2.0 x 6420 x 3.60 = 46212.2 lb.ft

M_r = (0.9-0.2SDS) W wcog = 0.61 x 10000 x 1.54 = 9476 lb.ft

n = 2 No. of base plates resisting tension

m = 4 No. of base plates resisting shear

Calculations for concrete anchors: **For LC including overstrength factor**

Uplift at each base plate

$$T = \frac{M_{ot\_om} - M_r}{w^* n} = \frac{46212.2 - 9476.1}{3.33 \times 2} = 5510.4 \text{ lb per anch}$$ **Overturning**

Shear at each base plate

$$V = \frac{\Omega_0 F_p}{m} = \frac{12840}{4} = 3210.0 \text{ lb per anch}$$

Anchor Loads

Try g= 4 Anchor(s) at each base plate

Check Unity Equation

N_{ua} = 1 x T = 5510 lbs V_{ua} = 1 x V = 3210 lbs

TRY: 1/2" Stainless Steel HILTI KB-TZ2 w/ 3 1/4" Eff. Embd.

(See Hilti PROFIS outputs in following pages)

USE: 4 x 1/2" Stainless Steel HILTI KB-TZ2 w/ 3 1/4" Eff. Embd. at each base plate

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Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Furnace - BP	Date:	5/22/2026
Fastening point:			

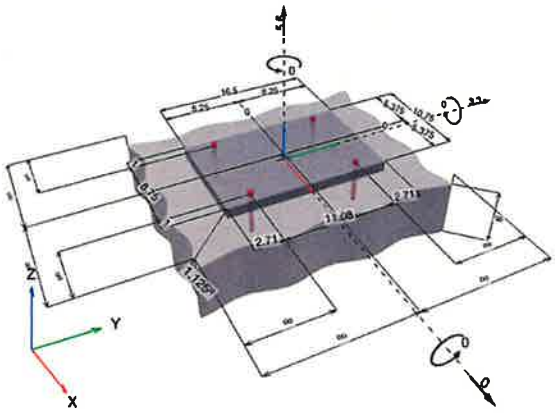
Specifier's comments:

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 1/2 (3 1/4) hnom3**
Item number:	2210262 KB-TZ2 1/2x5 1/2 SS304
Specification text:	HILTI ∅ 1/2 IN KWIK BOLT TZ2 - SS 304 WITH 3.75 IN NOMINAL EMBEDMENT DEPTH PER ICC-ES ESR-4266 , HAMMER DRILL BIT INSTALLATION PER MPII
Effective embedment depth:	$h_{ef,act}$ = 3.250 in., h_{nom} = 3.750 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/1/2025 | 12/1/2027
Proof:	Design Method ACI 318-19 / Mech
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 1.125 in.
Anchor plate[R]:	l_x x l_y x t = 10.750 in. x 16.500 in. x 1.125 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 6.000 in.
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: not present, shear: not present; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.10.5.3 (d)) Shear load: yes (17.10.6.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [kip, ft.kip]



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Design:	Furnace - BP	Date:	5/22/2026
Fastening point:			

1.1 Design results

Case	Description	Forces [kip] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 5.600; V_x = 0.000; V_y = 3.300; M_x = 0.00000; M_y = 0.00000; M_z = 0.00000;	yes	56

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Design:	Furnace - BP	Date:	5/22/2026
Fastening point:			

2 Proof I Utilization (Governing Cases)

		Design values [kip]		Utilization	
Loading	Proof	Load	Capacity	β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	5.600	10.093	56 / -	OK
Shear	Steel Strength	0.825	5.426	- / 16	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.555	0.152	5/3	42	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

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Design:	Furnace - BP	Date:	5/22/2026
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Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**		**of**	
Client	**Pacific Crest Engineering**	**Proj No.**	26023	**Date**	Mar-26
Electrical Cabinet		**By:**	ST	**File**	EA26023

Code: 2025 Edition of California Building Code

Lateral Forces: ***(LRFD)***

Use F_p = ***0.428*** ***Wp*** S_{DS} = 1.427 Ω_0 = 2

Equipment info:

Height	h =	84.0	in	=	7.00	ft	h_{cog} =	3.94	ft (c.o.g. = 47.3")
Width	w =	18.0	in	=	1.50	ft	w_{cog} =	0.74	ft (c.o.g. = 8.9")
Length	l =	101.7	in	=	8.47	ft	l_{cog} =	4.53	ft (c.o.g. = 54.4")
Weight	W =	2350	lbs						

F_p = 0.428 x 2350 = **1006** **lbs**

$\Omega_0 F_p$ = 2.000 x 1006 = 2012 lbs

M_{ot} = F_p * h_{cog} = 1006 x 3.94 = 3966.2 lb.ft

M_{ot_om} = Ω_0* F_p * h_{cog} = 2.0 x 1006 x 3.94 = 7932.4 lb.ft

M_r = (0.9-0.2SDS) W wcog = 0.61 x 2350 x 0.74 = 1074 lb.ft

n = 1 No. of base plates resisting tension

m = 2 No. of base plates resisting shear

Calculations for concrete anchors: **For LC including overstrength factor**

Uplift at each base plate

$$T = \frac{M_{ot\_om} - M_r}{w^* n} = \frac{7932.4 - 1074.3}{1.50 \times 1} = 4572.1 \text{ lb per anch}$$

Overturning

Shear at each base plate

$$V = \frac{\Omega_0 F_p}{m} = \frac{2012}{2} = 1005.8 \text{ lb per anch}$$

Anchor Loads

Try g= 4 Anchor(s) at each base plate

Check Unity Equation

N_{ua} = 1 x T = 4572 lbs V_{ua} = 1 x V = 1006 lbs

TRY: 1/2" Stainless Steel HILTI KB-TZ2 w/ 2 1/2" Eff. Embd.

(See Hilti PROFIS outputs in following pages)

USE: 4 x 1/2" Stainless Steel HILTI KB-TZ2 w/ 2 1/2" Eff. Embd. at each base plate

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Design:	Electrical Cabinet - BP	Date:	5/22/2026
Fastening point:			

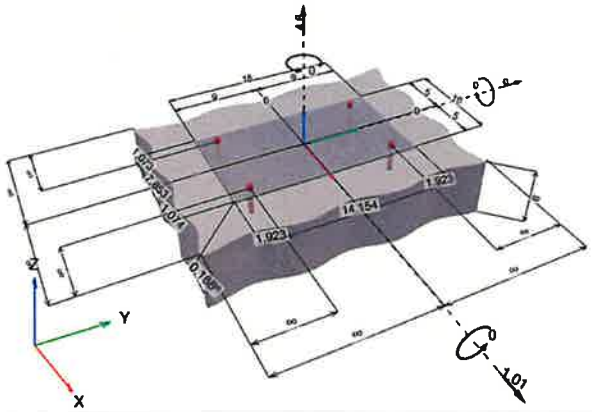
Specifier's comments:

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 1/2 (2 1/2) hnom2**
Item number:	2210260 KB-TZ2 1/2x3 3/4 SS304
Specification text:	HILTI ⌀ 1/2 IN KWIK BOLT TZ2 - SS 304 WITH 3 IN NOMINAL EMBEDMENT DEPTH PER ICC-ES ESR-4266 , HAMMER DRILL BIT INSTALLATION PER MPII
Effective embedment depth:	$h_{ef,act}$ = 2.500 in., h_{nom} = 3.000 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/1/2025 | 12/1/2027
Proof:	Design Method ACI 318-19 / Mech
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.188 in.
Anchor plate[R]:	l_x x l_y x t = 10.000 in. x 18.000 in. x 0.188 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 6.000 in.
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: not present, shear: not present; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.10.5.3 (d)) Shear load: yes (17.10.6.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [kip, ft.kip]



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1.1 Design results

Case	Description	Forces [kip] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 4.600; V_x = 1.010; V_y = 0.000; M_x = 0.00000; M_y = 0.00000; M_z = 0.00000;	yes	52

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Fastening point:			

2 Proof I Utilization (Governing Cases)

		Design values [kip]		Utilization	
Loading	Proof	Load	Capacity	β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	4.600	8.865	52 / -	OK
Shear	Steel Strength	0.253	5.426	- / 5	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.519	0.047	5/3	35	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

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Gas Panel		**By:**	ST	**File**	EA26023

Code: 2025 Edition of California Building Code

Lateral Forces: ***(LRFD)***

Use F_p = ***0.642 Wp*** S_{DS} = 1.427 Ω_0 = 2

Equipment info: ***Analysis for Seismic load parallel to short dim. Of equipment***

Height	h =	52.5	in	=	4.38	ft	h_{cog} =	2.19 ft
Width	w =	25.1	in	=	2.09	ft	w_{cog} =	1.05 ft
Length	l =	34.8	in	=	2.90	ft	l_{cog} =	1.45 ft
Weight	W =	375	lbs					

F_p = 0.642 x 375 = **241** **lbs**

$\Omega_0 F_p$ = 2.0 x 241 = 482 lbs

M_{ot} = $F_p * h_{cog}$ = 241 x 2.2 = 527 lb.ft

M_{ot_om} = $\Omega_0 * F_p * h_{cog}$ = 2.0 x 241 x 2.19 = 1054 lb.ft

M_r = (0.9-0.2SDS) W wcog = 0.61 x 375 x 1.05 = 241 lb.ft

n = 2 No. of clip(s) resisting tension

m = 2 No. of clip(s) resisting shear

Calculations for concrete anchors: **For LC including overstrength factor**

Uplift at clip

$$T = \frac{M_{ot\_om} - M_r}{w^* n} = \frac{1054 - 241}{2.09 \times 2} = 194.0 \text{ lb per Clip}$$

Overturning

Shear at clip

$$V = \frac{\Omega_0 F_p}{m} = \frac{482}{2} = 240.8 \text{ lb per Clip}$$

Calculations for concrete anchors: ***Analysis for Seismic load parallel to long dim. Of equipment***

Width w = 34.8 in = 2.90 ft w_{cog} = 1.45 ft

M_r = (0.9-0.2SDS) W wcog = 0.61 x 375 x 1.45 = 334 lb.ft

n = 2 No. of clip(s) resisting tension

m = 2 No. of clip(s) resisting shear

Uplift at clip

$$T = \frac{M_{ot\_om} - M_r}{w^* n} = \frac{1054 - 334}{2.90 \times 2} = 124 \text{ lb per Clip}$$

Overturning

Shear at clip

$$V = \frac{\Omega_0 F_p}{m} = \frac{482}{2} = 240.8 \text{ lb per Clip}$$

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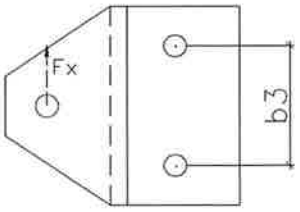
Gas Panel		**By:**	ST	**File** EA26023

Applied Loads Worst Condition

F_x = 240.8 lbs

F_y = 194.0 lbs



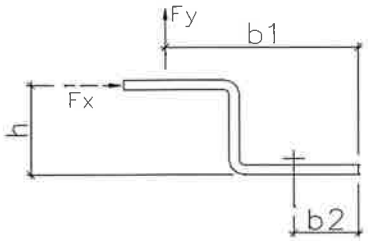
Dimensions

b_1 = 5.00 in

b_2 = 1.50 in

h = 2.00 in

b_3 = 3.00 in



Anchor Loads

Try g= 2 Anchor(s) at each clip

$$T = \frac{F_y \times b_1 + F_x \times h}{b_2 \times g} = 484 \text{ lbs}$$

$V_1 = \text{Sqrt}\left[(F_x/g)^2 + (F_x \cdot (b_1-b_2)/b_3)^2 \right] =$ 306 lbs Fx Par. To bolts

$V_2 = F_x / g =$ 120 lbs Fx Perp. To bolts

V_{max} = 306 lbs

Check Unity Equation

N_{ua} = 1 x T = 484 lbs V_{ua} = 1 x V = 306 lbs

TRY: 1/2" Stainless Steel HILTI KB-TZ2 w/ 2 1/2" Eff. Embd. W/ 3 inches spacing

φN_n =	3103	x	0.5	=	1552	lb/Anch	Tension
φV_n =	8911	x	0.5	=	4455.5	lb/Anch	Shear

(See Hilti PROFIS anchor capacity calcs in following pages)

$$\frac{N_{ua}}{\varphi N_n} + \frac{V_{ua}}{\varphi V_n} = \frac{484}{1552} + \frac{306}{4456} = 0.38 < 1.2 \text{ OK}$$

32%

USE: 2 x 1/2" Stainless Steel HILTI KB-TZ2 w/ 2 1/2" Eff. Embd. at each clip

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Check Clip Bending

Analysis for Seismic load parallel to short dim. Of equipment

Uplift at clip

$$T = \frac{M_{ot} - M_r}{w^* n} = \frac{527 - 241}{2.09 \times 2} = 68.2 \text{ lb per Clip}$$

Shear at clip

$$V = \frac{F_p}{m} = \frac{241}{2} = 120.4 \text{ lb per Clip}$$

Analysis for Seismic load parallel to long dim. Of equipment

Uplift at clip

$$T = \frac{M_{ot} - M_r}{w^* n} = \frac{527 - 334}{2.90 \times 2} = 33 \text{ lb per Clip}$$

Overturning

Shear at clip

$$V = \frac{F_p}{m} = \frac{241}{2} = 120.4 \text{ lb per Clip}$$

Applied Loads Worst Condition

F_x = 120.4 lbs

F_y = 68.2 lbs

Check Clip Bending φ = 0.9

$M_u = F_y(b_1-b_2) + F_x(h) = 238.62 + 240.75 = 0.479$ k-in

Angle bending profile:

min bending width w = 4.5 in thickness t = 1/4 in F_y = 36 ksi

$Z = wt^2/4 = 0.070$ in^3

$\varphi M_n = \varphi Z F_y = 2.278$ k-in > 0.479 k-in **OKAY**

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Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Gas Panel - Z-clip	Date:	5/22/2026
Fastening point:			

Specifier's comments:

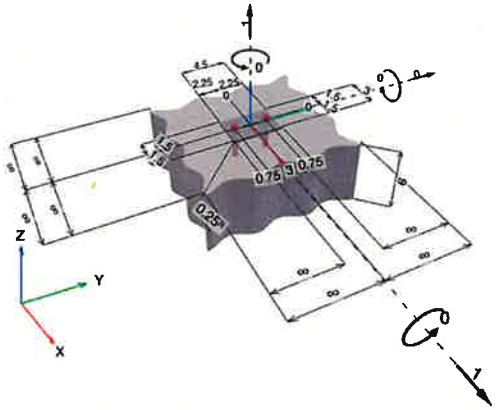
1 Input data

safe set

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 1/2 (2 1/2) hnom2**
Item number:	2210260 KB-TZ2 1/2x3 3/4 SS304
Specification text:	HILTI ⌀ 1/2 IN KWIK BOLT TZ2 - SS 304 WITH 3 IN NOMINAL EMBEDMENT DEPTH PER ICC-ES ESR-4266 , HAMMER DRILL BIT INSTALLATION PER MPII
Effective embedment depth:	$h_{ef,act}$ = 2.500 in., h_{nom} = 3.000 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/1/2025 | 12/1/2027
Proof:	Design Method ACI 318-19 / Mech
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.250 in.
Anchor plate[R]:	l_x x l_y x t = 3.000 in. x 4.500 in. x 0.250 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 6.000 in.
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: not present, shear: not present; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.10.5.3 (d)) Shear load: yes (17.10.6.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [kip, ft.kip]



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Company:		Page:	2
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Gas Panel - Z-clip	Date:	5/22/2026
Fastening point:			

1.1 Design results

Case	Description	Forces [kip] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 1.000; V_x = 1.000; V_y = 0.000; M_x = 0.00000; M_y = 0.00000; M_z = 0.00000;	yes	33

Hilti PROFIS Engineering 3.1.31

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Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	I	E-Mail:	
Design:	Gas Panel - Z-clip	Date:	5/22/2026
Fastening point:			

2 Proof I Utilization (Governing Cases)

		Design values [kip]		Utilization	
Loading	Proof	Load	Capacity	β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	1.000	3.103	33 / -	OK
Shear	Pryout Strength	1.000	8.911	- / 12	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.322	0.112	5/3	18	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**	**of**
Client	**Pacific Crest Engineering**	**Proj No.** 26023 **Date**	Mar-26
Transformer		**By:** ST **File**	EA26023

Code: 2025 Edition of California Building Code

Lateral Forces: ***(LRFD)***

Use F_p = ***0.428 Wp*** S_{DS} = 1.427 Ω_0 = 2

Equipment info:

Height	h =	44.0	in	=	3.67	ft	h_{cog} =	1.83 ft
Width	w =	23.3	in	=	1.94	ft	w_{cog} =	0.97 ft
Length	l =	25.0	in	=	2.08	ft		
Weight	W =	1290	lbs					

F_p = 0.428 x 1290 = **552 lbs**

$\Omega_0 F_p$ = 2.000 x 552 = 1104 lbs

$M_{ot} = F_p * h_{cog}$ = 552 x 1.83 = 1012.2 lb.ft

$M_{ot\_om} = \Omega_0 * F_p * h_{cog}$ = 2.0 x 552 x 1.83 = 2024.4 lb.ft

M_r = (0.9-0.2SDS) W wcog = 0.61 x 1290 x 0.97 = 768 lb.ft

n = 2 No. of anch(s) resisting tension

m = 4 No. of anch(s) resisting shear

Calculations for concrete anchors: **For LC including overstrength factor**

Uplift at anchor

$$T = \frac{M_{ot\_om} - M_r}{w^* n} = \frac{2024.4 - 768.1}{1.94 \times 2} = 324.2 \text{ lb per anch}$$

Overturning

Shear at anchor

$$V = \frac{\Omega_0 F_p}{m} = \frac{1104}{4} = 276.1 \text{ lb per anch}$$

Check Unity Equation

N_{ua} = 1 x T = 324 lbs V_{ua} = 1 x V = 276 lbs

TRY: 5/8" Stainless Steel HILTI KB-TZ2 w/ 2 3/4" Eff. Embd.

φN_n = 2557 x 1 = 2557 lb/Anch Tension (See Hilti PROFIS outputs in appendix)

φV_n = 7344 x 1 = 7344 lb/Anch Shear

$$\frac{N_{ua}}{\varphi N_n} + \frac{V_{ua}}{\varphi V_n} = \frac{324}{2557} + \frac{276}{7344} = \mathbf{0.16} < \mathbf{1.2}$$ **OK**

14%

USE: 5/8" Stainless Steel HILTI KB-TZ2 w/ 2 3/4" Eff. Embd.

APPLIED ENGINEERING

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Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**	**of**
Client	**Pacific Crest Engineering**	**Proj No.** 26023	**Date** Mar-26
Unwind/Rewind		**By:** ST	**File** EA26023

Code: 2025 Edition of California Building Code

Lateral Forces: ***(LRFD)***

Use F_p = ***0.428*** ***Wp*** S_{DS} = 1.427 Ω_0 = 2

Equipment info: ***Analysis for Seismic load parallel to short dim. Of equipment***

Height	h =	89.0	in	=	7.42	ft	h_{cog} =	3.71 ft
Width	w =	46.4	in	=	3.86	ft	w_{cog} =	1.93 ft
Length	l =	53.1	in	=	4.43	ft	l_{cog} =	2.21 ft
Weight	W =	2800	lbs					

F_p = 0.428 x 2800 = **1198** **lbs**

$\Omega_0 F_p$ = 2.0 x 1198 = 2397 lbs

M_{ot} = F_p * h_{cog} = 1198 x 3.7 = 4444 lb.ft

M_{ot_om} = Ω_0* F_p * h_{cog} = 2.0 x 1198 x 3.71 = 8888 lb.ft

M_r = (0.9-0.2SDS) W wcog = 0.61 x 2800 x 1.93 = 3324 lb.ft

n = 2 No. of clip(s) resisting tension

m = 4 No. of clip(s) resisting shear

Calculations for concrete anchors: **For LC including overstrength factor**

Uplift at clip

$$T = \frac{M_{ot\_om} - M_r}{w^* n} = \frac{8888 - 3324}{3.86 \times 2} = 720.1 \text{ lb per Clip}$$

Overturning

Shear at clip

$$V = \frac{\Omega_0 F_p}{m} = \frac{2397}{4} = 599.2 \text{ lb per Clip}$$

Calculations for concrete anchors: ***Analysis for Seismic load parallel to long dim. Of equipment***

Width	w =	53.1	in	=	4.43	ft	w_{cog} =	2.21 ft

M_r = (0.9-0.2SDS) W wcog = 0.61 x 2800 x 2.21 = 3811 lb.ft

n = 2 No. of clip(s) resisting tension

m = 4 No. of clip(s) resisting shear

Uplift at clip

$$T = \frac{M_{ot\_om} - M_r}{w^* n} = \frac{8888 - 3811}{4.43 \times 2} = 573 \text{ lb per Clip}$$

Overturning

Shear at clip

$$V = \frac{\Omega_0 F_p}{m} = \frac{2397}{4} = 599.2 \text{ lb per Clip}$$

APPLIED ENGINEERING

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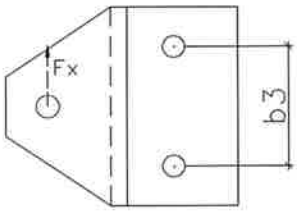
Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**		**of**
Client	**Pacific Crest Engineering**	**Proj No.**	26023 **Date**	Mar-26
Unwind/Rewind		**By:**	ST **File**	EA26023

Applied Loads Worst Condition

F_x = 599.2 lbs

F_y = 720.1 lbs



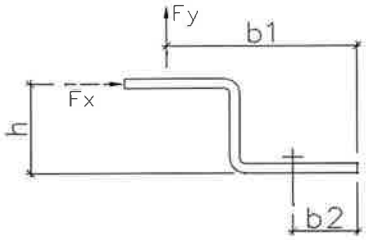
Dimensions

b_1 = 5.00 in

b_2 = 1.50 in

h = 2.00 in

b_3 = 5.00 in



Anchor Loads

Try g= 2 Anchor(s) at each clip

$$T = \frac{F_y \times b_1 + F_x \times h}{b_2 \times g} = 1600 \text{ lbs}$$

$V_1 = \text{Sqrt}\left[(F_x/g)^2 + (F_x \cdot (b_1-b_2)/b_3)^2 \right] =$ 515 lbs Fx Par. To bolts

$V_2 = F_x / g =$ 300 lbs Fx Perp. To bolts

V_{max} = 515 lbs

Check Unity Equation

N_{ua} = 1 x T = 1600 lbs V_{ua} = 1 x V = 515 lbs

TRY: 1/2" Stainless Steel HILTI KB-TZ2 w/ 2 1/2" Eff. Embd. W/ 5 inches spacing

φN_n =	3694	x 0.5	= 1847	lb/Anch	Tension	(See Hilti PROFIS anchor capacity calcs
φV_n =	10609	x 0.5	= 5304.5	lb/Anch	Shear	in following pages)

$$\frac{N_{ua}}{\varphi N_n} + \frac{V_{ua}}{\varphi V_n} = \frac{1600}{1847} + \frac{515}{5305} = \mathbf{0.96} < \mathbf{1.2}\ \mathbf{OK}$$

80%

USE: 2 x 1/2" Stainless Steel HILTI KB-TZ2 w/ 2 1/2" Eff. Embd. at each clip

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Project Q.S. B2 Ph 2.53 - Industrial Tool Installation	**Sheet**		**of**
Client Pacific Crest Engineering	**Proj No.**	26023 **Date**	Mar-26
Unwind/Rewind	**By:**	ST **File**	EA26023

Check Clip Bending ***Analysis for Seismic load parallel to short dim. Of equipment***

Uplift at clip

$$T = \frac{M_{ot} - M_r}{w^* n} = \frac{4444 - 3324}{3.86 \times 2} = 144.9 \text{ lb per Clip}$$

Shear at clip

$$V = \frac{F_p}{m} = \frac{1198}{4} = 299.6 \text{ lb per Clip}$$

Analysis for Seismic load parallel to long dim. Of equipment

Uplift at clip

$$T = \frac{M_{ot} - M_r}{w^* n} = \frac{4444 - 3811}{4.43 \times 2} = 71 \text{ lb per Clip}$$

Overturning

Shear at clip

$$V = \frac{F_p}{m} = \frac{1198}{4} = 299.6 \text{ lb per Clip}$$

Applied Loads Worst Condition

F_x = 299.6 lbs

F_y = 144.9 lbs

Check Clip Bending φ = 0.9

$M_u = F_y(b_1-b_2) + F_x(h) = 507.16 + 599.2 = 1.106$ k-in

Angle bending profile:

min bending width w = 6 in thickness t = 1/4 in F_y = 36 ksi

$Z = wt^2/4 = 0.094$ in^3

$\varphi M_n = \varphi Z F_y = 3.038$ k-in > 1.106 k-in **OKAY**

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Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Unwind/Rewind - Z-Clip	Date:	5/22/2026
Fastening point:			

Specifier's comments:

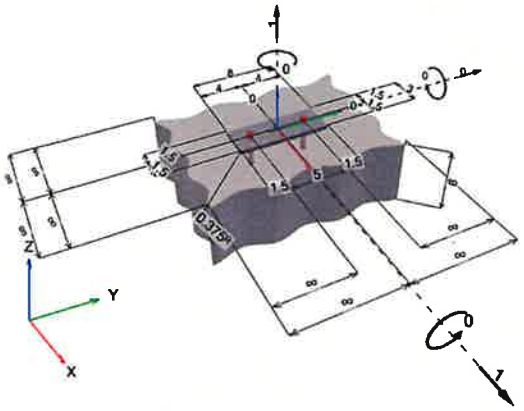
1 Input data

safe set

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 1/2 (2 1/2) hnom2**
Item number:	2210261 KB-TZ2 1/2x4 1/2 SS304
Specification text:	HILTI ⌀ 1/2 IN KWIK BOLT TZ2 - SS 304 WITH 3 IN NOMINAL EMBEDMENT DEPTH PER ICC-ES ESR-4266 , HAMMER DRILL BIT INSTALLATION PER MPII
Effective embedment depth:	$h_{ef,act}$ = 2.500 in., h_{nom} = 3.000 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/1/2025 | 12/1/2027
Proof:	Design Method ACI 318-19 / Mech
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.375 in.
Anchor plate[R]:	l_x x l_y x t = 3.000 in. x 8.000 in. x 0.375 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 6.000 in.
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: not present, shear: not present; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.10.5.3 (d)) Shear load: yes (17.10.6.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [klp, ft.klp]



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Design:	Unwind/Rewind - Z-Clip	Date:	5/22/2026
Fastening point:			

1.1 Design results

Case	Description	Forces [kip] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 1.000; V_x = 1.000; V_y = 0.000; M_x = 0.00000; M_y = 0.00000; M_z = 0.00000;	yes	28

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Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Unwind/Rewind - Z-Clip	Date:	5/22/2026
Fastening point:			

2 Proof I Utilization (Governing Cases)

		Design values [kip]		Utilization	
Loading	Proof	Load	Capacity	β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	1.000	3.694	28 / -	OK
Shear	Pryout Strength	1.000	10.609	- / 10	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.271	0.094	5/3	14	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

Company:		Page:	4
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Unwind/Rewind - Z-Clip	Date:	5/22/2026
Fastening point:			

4 Remarks; Your Cooperation Duties

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- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

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Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**		**of**	
Client	**Pacific Crest Engineering**	**Proj No.**	26023	**Date**	Mar-26
ESUC		**By:**	ST	**File**	EA26023

Code: 2025 Edition of California Building Code

Lateral Forces: ***(LRFD)***

Use F_p = ***0.428 Wp*** S_{DS} = 1.427 Ω_0 = 2

Equipment info:

Height	h =	60.0	in	=	5.00	ft	h_{cog} =	2.50 ft
Width	w =	19.7	in	=	1.64	ft	w_{cog} =	0.82 ft
Length	l =	28.3	in	=	2.36	ft		
Weight	W =	386	lbs					

F_p = 0.428 x 386 = **165 lbs**

$\Omega_0 F_p$ = 2.000 x 165 = 330 lbs

$M_{ot} = F_p * h_{cog}$ = 165 x 2.50 = 413.0 lb.ft

$M_{ot\_om} = \Omega_0 * F_p * h_{cog}$ = 2.0 x 165 x 2.50 = 826.0 lb.ft

M_r = (0.9-0.2SDS) W wcog = 0.61 x 386 x 0.82 = 195 lb.ft

n = 2 No. of clip(s) resisting tension

m = 4 No. of clip(s) resisting shear

Calculations for concrete anchors: **For LC including overstrength factor**

Uplift at clip

$$T = \frac{M_{ot\_om} - M_r}{w * n} = \frac{826.0 - 194.6}{1.64 \times 2} = 192.5 \text{ lb per Clip}$$

Overturning

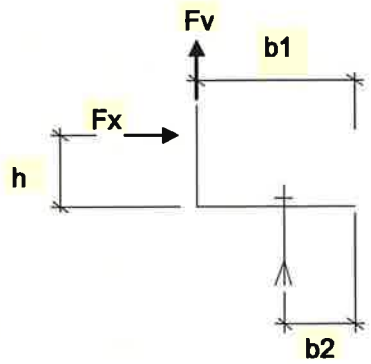
Shear at clip

$$V = \frac{\Omega_0 F_p}{m} = \frac{330}{4} = 82.6 \text{ lb per Clip}$$

Applied Loads

F_x = 82.6 lbs

F_y = 192.5 lbs



Dimensions

b_1 = 3.00 in

b_2 = 1.50 in

h = 6.50 in

Anchor Loads

$$T = \frac{F_y \times b_1 + F_x \times h}{b_2} = 743 \text{ lbs}$$

V = F_x = 83 lbs

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Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**		**of**	
Client	**Pacific Crest Engineering**	**Proj No.**	26023	**Date**	Mar-26
ESUC		**By:**	ST	**File**	EA26023

Check Unity Equation

N_{ua} = 1 x T = 743 lbs V_{ua} = 1 x V = 83 lbs

TRY: 1/2" Stainless Steel HILTI KB-TZ2 w/ 2 1/2" Eff. Embd.

φN_n = 2216 x 1 = 2216 lb/Anch Tension (See Hilti PROFIS outputs in appendix)

φV_n = 5426 x 1 = 5426 lb/Anch Shear

$$\frac{N_{ua}}{\varphi N_n} + \frac{V_{ua}}{\varphi V_n} = \frac{743}{2216} + \frac{83}{5426} = 0.35 < 1.2 \text{ OK}$$

29%

USE: 1 x 1/2" Stainless Steel HILTI KB-TZ2 w/ 2 1/2" Eff. Embd. at each clip

Check connection of the clip to equip.:

Uplift at clip

$$T = \frac{M_{ot} - M_r}{w^* n} = \frac{413.0 - 194.6}{1.64 \times 2} = 66.6 \text{ lb per Clip}$$

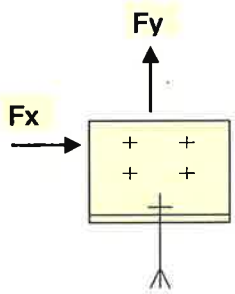
Shear at clip

$$V = \frac{F_p}{m} = \frac{165}{4} = 41.3 \text{ lb per Clip}$$

Applied Loads

F_x = 41.3 lbs

F_y = 66.6 lbs



Try: 3 x #12 Sheet metal screw(s)

t_1 = 3/16 in Min. Thick. of member in contact w/ screw head or washer

t_2 = 20 gage Min. Thick. of member not in contact w/ screw head or washer

$$F_v = \frac{\text{Sqrt}((F_x)^2 + (F_y)^2)}{3} = 26 \text{ lb}$$ Shear in ea. Screw

$$F_t = \frac{41.3}{3} = 14 \text{ lb}$$ Tension in ea. Screw

	(ASD)		(LRFD)				
							(See SSMA Table in appendix)
P_{s_LRFD} =	**188**	x 3 x 0.5 =	**282**	>	26	**OK**	Shear
P_{t_LRFD} =	**95**	x 3 x 0.5 =	**142.5**	>	14	**OK**	Tension

USE: 3 x #12 Sheet metal screw(s) at each clip

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CONSULTING STRUCTURAL ENGINEERS Milpitas, CA (408) 263-5900

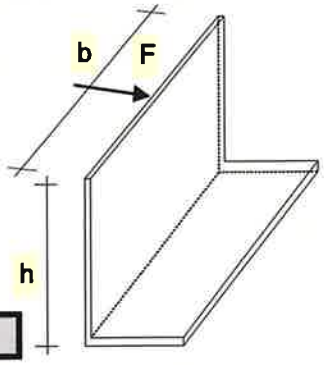
Project	**Q.S. B2 Ph 2.53 - Industrial Tool Installation**	**Sheet**		**of**	
Client	**Pacific Crest Engineering**	**Proj No.**	26023	**Date**	Mar-26
ESUC		**By:**	ST	**File**	EA26023

Check bending of the clip to equip.:

Clip: 1

Design Method: *(LRFD)*

φ = 0.9 Ω = 1.67 ψ = 0.90 (LRFD=φ , ASD=1/Ω)



b = 3.00 in Full Plate/Clip Width

h = 6.50 in Plate/Clip Height

t = 0.250 in Plate/Clip thickness

F_y = 30000 psi Minimum Yield Stress of the plate/Clip Material

$$Z_y = \frac{b \times t^2}{4} = \frac{3.00 \quad 0.06}{4} = 0.047 \text{ in}^3$$

$$F_{max} = \frac{\psi \cdot F_Y \cdot Z}{h} = \frac{0.9 \quad 30000 \quad 0.047}{6.50} = \mathbf{195 \text{ lb}}$$

F_{max} = 194.7 lb > Fx = 41.3 lb OK 21%

USE: 0.25" Thk. Clip at each anchor location

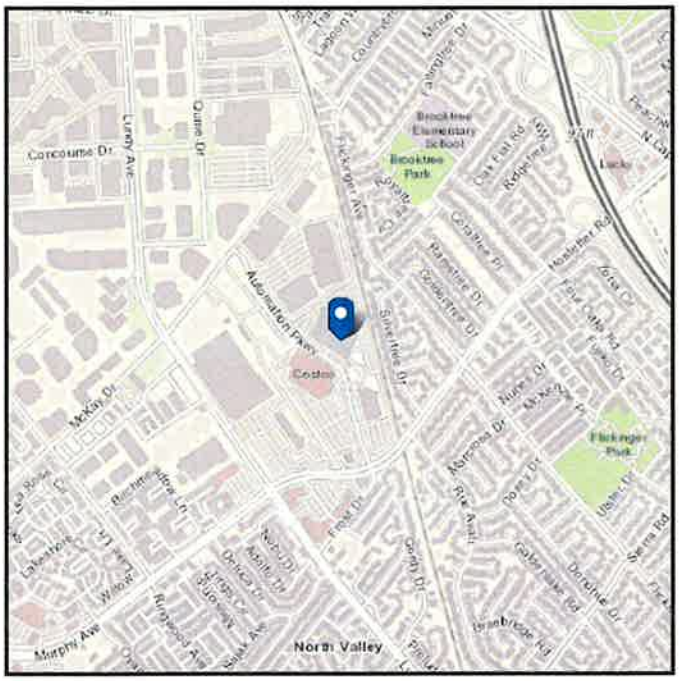
APPENDIX - A

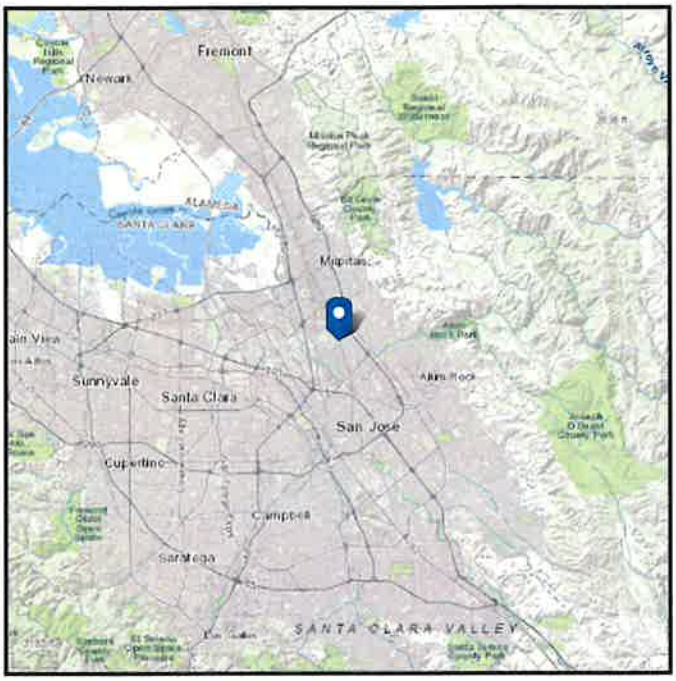
ASCE Hazards Report

Address:
1710 Automation Pkwy
San Jose, California
95131

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: CD

Latitude: 37.391597
Longitude: -121.883605
Elevation: 79.97279660768584 ft (NAVD 88)





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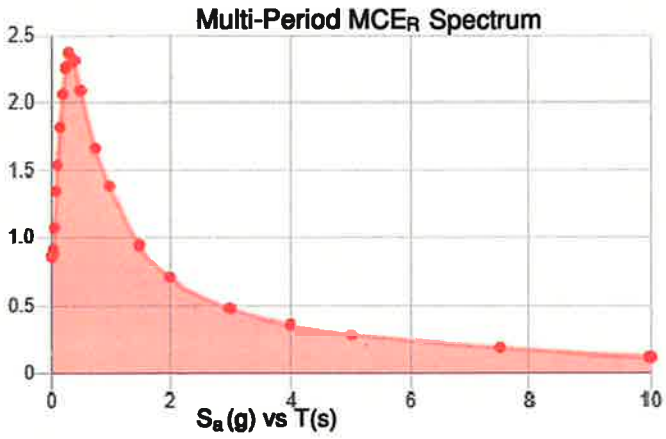
Seismic

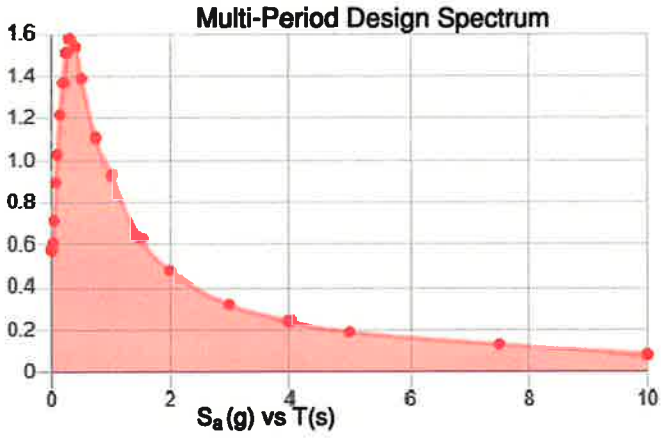
Site Soil Class: CD

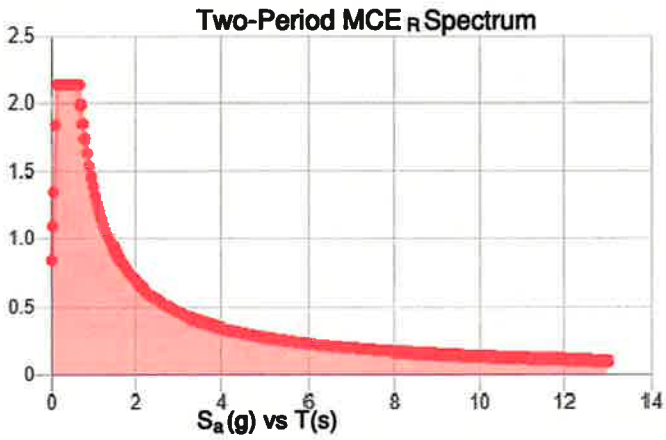
Results:

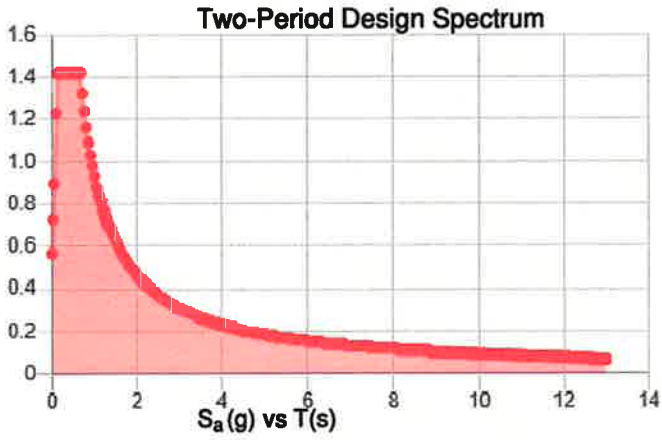
PGA_M :	0.73	T_L :	12
S_{MS} :	2.14	S_S :	1.98
S_{M1} :	1.39	S_1 :	0.81
S_{DS} :	1.42	V_{S30} :	365
S_{D1} :	0.93		

Seismic Design Category: E









MCER Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

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Data Accessed: **Fri Mar 06 2026**

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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Screw Capacities

Table Notes

1. Capacities based on AISI S100 Section E4.
2. When connecting materials of different steel thicknesses or tensile strengths, use the lowest values. Tabulated values assume two sheets of equal thickness are connected.
3. Capacities are based on Allowable Strength Design (ASD) and include safety factor of 3.0.
4. Where multiple fasteners are used, screws are assumed to have a center-to-center spacing of at least 3 times the nominal diameter (d).
5. Screws are assumed to have a center-of-screw to edge-of-steel dimension of at least 1.5 times the nominal diameter (d) of the screw.
6. Pull-out capacity is based on the lesser of pull-out capacity in sheet closest to screw tip or tension strength of screw.
7. Pull-over capacity is based on the lesser of pull-over capacity for sheet closest to screw header or tension strength of screw.
8. Values are for pure shear or tension loads. See AISI Section E4.5 for combined shear and pull-over.
9. Screw Shear (Pss), tension (Pts), diameter, and head diameter are from CFSEI Tech Note (F701-12).
10. Screw shear strength is the average value, and tension strength is the lowest value listed in CFSEI Tech Note (F701-12).
11. Higher values for screw strength (Pss, Pts), may be obtained by specifying screws from a specific manufacturer.

Allowable Screw Connection Capacity (lbs)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	#6 Screw (Pss = 643 lbs, Pts = 419 lbs) 0.138" dia, 0.272" Head			#8 Screw (Pss= 1278 lbs, Pts = 586 lbs) 0.164" dia, 0.272" Head			#10 Screw (Pss= 1644 lbs, Pts = 1158 lbs) 0.190" dia, 0.340" Head			#12 Screw (Pss= 2330 lbs, Pts = 2325 lbs) 0.216" dia, 0.340" Head			¼" Screw (Pss= 3048 lbs, Pts = 3201 lbs) 0.250" dia, 0.409" Head		
				Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over
18	0.0188	33	33	44	24	84	48	29	84	52	33	105	55	38	105	60	44	127
27	0.0283	33	33	82	37	127	89	43	127	96	50	159	102	57	159	110	66	191
30	0.0312	33	33	95	40	140	103	48	140	111	55	175	118	63	175	127	73	211
33	0.0346	33	45	151	61	140	164	72	195	177	84	265	188	95	265	203	110	318
43	0.0451	33	45	214	79	140	244	94	195	263	109	345	280	124	345	302	144	415
54	0.0566	33	45	214	100	140	344	118	195	370	137	386	394	156	433	424	180	521
68	0.0713	33	45	214	125	140	426	149	195	523	173	386	557	196	545	600	227	656
97	0.1017	33	45	214	140	140	426	195	195	548	246	386	777	280	775	1,016	324	936
118	0.1242	33	45	214	140	140	426	195	195	548	301	386	777	342	775	1,016	396	1,067
54	0.0566	50	65	214	140	140	426	171	195	534	198	386	569	225	625	613	261	752
68	0.0713	50	65	214	140	140	426	195	195	548	249	386	777	284	775	866	328	948
97	0.1017	50	65	214	140	140	426	195	195	548	356	386	777	405	775	1,016	468	1,067
118	0.1242	50	65	214	140	140	426	195	195	548	386	386	777	494	775	1,016	572	1,067

Weld Capacities

Table Notes

1. Capacities based on the AISI S100 Specification Sections E2.4 for fillet welds and E2.5 for flare groove welds.
2. When connecting materials of different steel thicknesses or tensile strengths, use the lowest values.
3. Capacities are based on Allowable Strength Design (ASD).
4. Weld capacities are based on E60 electrodes. For material thinner than 68 mil, 0.030" to 0.035" diameter wire electrodes may provide best results.
5. Longitudinal capacity is considered to be loading in the direction of the length of the weld.
6. Transverse capacity is loading in perpendicular direction of the length of the weld.
7. For flare groove welds, the effective throat of weld is conservatively assumed to be less than 2t.
8. For longitudinal fillet welds, a minimum value of EQ E2.4-1, E2.4-2, and E2.4-4 was used.
9. For transverse fillet welds, a minimum value of EQ E2.4-3 and E2.4-4 was used.
10. For longitudinal flare groove welds, a minimum value of EQ E2.5-2 and E2.5-3 was used.

Allowable Weld Capacity (lbs / in)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	Fillet Welds		Flare Groove Welds	
				Longitudinal	Transverse	Longitudinal	Transverse
43	0.0451	33	45	499	864	544	663
54	0.0566	33	45	626	1084	682	832
68	0.0713	33	45	789	1365	859	1048
97	0.1017	33	45	1125	1269	-[1]	-[1]
54	0.0566	50	65	905	1566	985	1202
68	0.0713	50	65	1140	1972	1241	1514
97	0.1017	50	65	1269	1269	-[1]	-[1]

[1] Weld capacity for material thickness greater than 0.10" requires engineering judgment to determine leg of welds, W1 and W2.

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Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	General - 5/8"	Date:	5/22/2026
Fastening point:			

Specifier's comments:

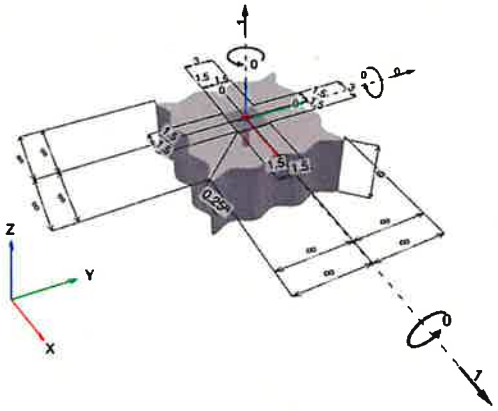
1 Input data

safe set

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 5/8 (2 3/4) hnom1**
Item number:	2210277 KB-TZ2 5/8x4 1/4 SS304
Specification text:	HILTI ⌀ 5/8 IN KWIK BOLT TZ2 - SS 304 WITH 3.25 IN NOMINAL EMBEDMENT DEPTH PER ICC-ES ESR-4266 , HAMMER DRILL BIT INSTALLATION PER MPII
Effective embedment depth:	$h_{ef,act}$ = 2.750 in., h_{nom} = 3.250 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/1/2025 | 12/1/2027
Proof:	Design Method ACI 318-19 / Mech
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.250 in.
Anchor plate[R]:	l_x x l_y x t = 3.000 in. x 3.000 in. x 0.250 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 6.000 in.
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: not present, shear: not present; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.10.5.3 (d)) Shear load: yes (17.10.6.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [kip, ft.kip]



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Company:		Page:	2
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	General - 5/8"	Date:	5/22/2026
Fastening point:			

1.1 Design results

Case	Description	Forces [kip] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 1.000; V_x = 1.000; V_y = 0.000; M_x = 0.00000; M_y = 0.00000; M_z = 0.00000;	yes	40

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Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	General - 5/8"	Date:	5/22/2026
Fastening point:			

2 Proof I Utilization (Governing Cases)

		Design values [kip]		Utilization	
Loading	Proof	Load	Capacity	β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	1.000	2.557	40 / -	OK
Shear	Pryout Strength	1.000	7.344	- / 14	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.391	0.136	5/3	25	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

Company:		Page:	4
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	General - 5/8"	Date:	5/22/2026
Fastening point:			

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Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	General - 1/2"	Date:	5/22/2026
Fastening point:			

Specifier's comments:

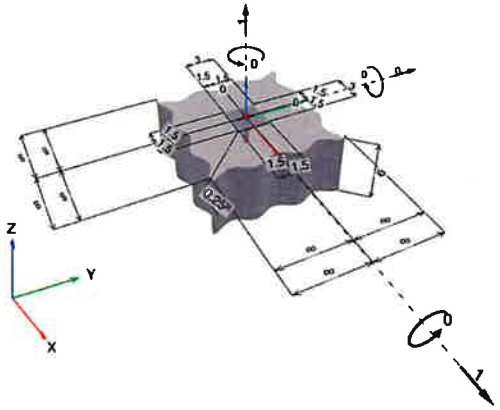
1 Input data

safe set

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 1/2 (2 1/2) hnom2**
Item number:	2210260 KB-TZ2 1/2x3 3/4 SS304
Specification text:	HILTI ⌀ 1/2 IN KWIK BOLT TZ2 - SS 304 WITH 3 IN NOMINAL EMBEDMENT DEPTH PER ICC-ES ESR-4266 , HAMMER DRILL BIT INSTALLATION PER MPII
Effective embedment depth:	$h_{ef,act}$ = 2.500 in., h_{nom} = 3.000 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	12/1/2025 | 12/1/2027
Proof:	Design Method ACI 318-19 / Mech
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.250 in.
Anchor plate[R] :	l_x x l_y x t = 3.000 in. x 3.000 in. x 0.250 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 6.000 in.
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: not present, shear: not present; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.10.5.3 (d)) Shear load: yes (17.10.6.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [kip, ft.kip]



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Company:		Page:	2
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	General - 1/2"	Date:	5/22/2026
Fastening point:			

1.1 Design results

Case	Description	Forces [kip] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	$N = 1.000$; $V_x = 1.000$; $V_y = 0.000$; $M_x = 0.00000$; $M_y = 0.00000$; $M_z = 0.00000$;	yes	46

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Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	General - 1/2"	Date:	5/22/2026
Fastening point:			

2 Proof I Utilization (Governing Cases)

		Design values [kip]		Utilization	
Loading	Proof	Load	Capacity	β_N / β_V [%]	Status
Tension	Concrete Breakout Failure	1.000	2.216	46 / -	OK
Shear	Steel Strength	1.000	5.426	- / 19	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.451	0.184	5/3	33	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

Hilti PROFIS Engineering 3.1.31

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Company:		Page:	4
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	General - 1/2"	Date:	5/22/2026
Fastening point:			

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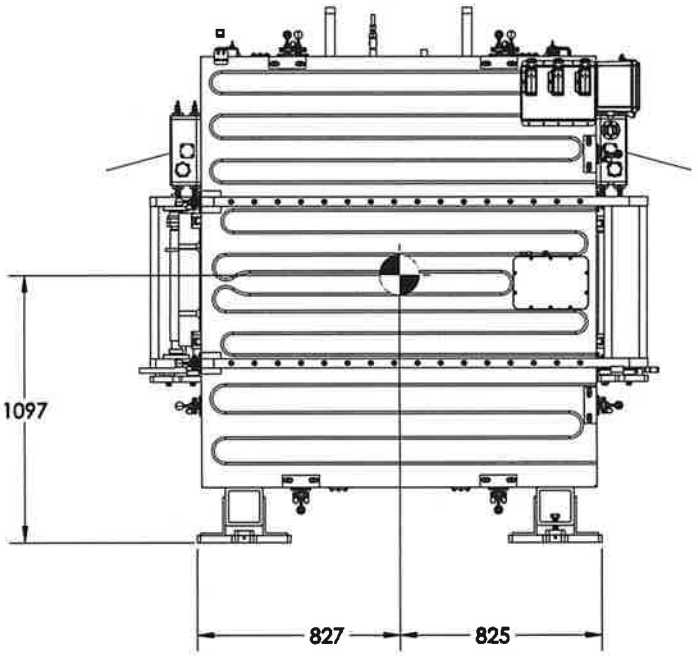
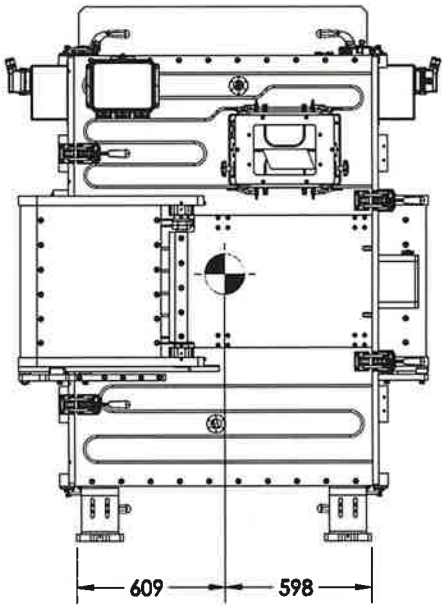
APPENDIX - B
EQUIPMENT / TOOL
MANUFACTURER INFORMATION





FURNACE
TOTAL MAX. WT. = 10,000#

TPTAL WEIGHT: 8883 LBS

		NAME	DATE
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS TOLERANCES ON ANGLE 0.5° SURF ROUGH 63u X:±2.54, .XX:±0.254, .XXX:±0.127 INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-2009	DESIGNED BY		
	DRAWN BY		
THIRD ANGLE PROJECTION	MATERIAL		
	FINISH		

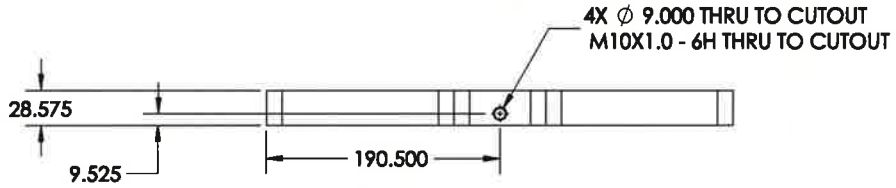
TITLE:

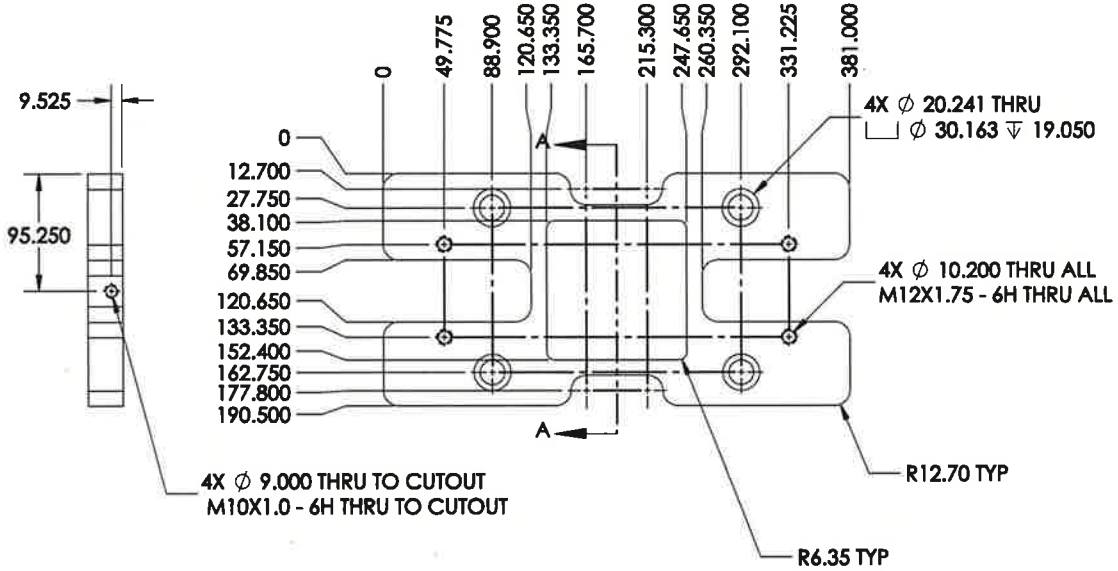
ASSEMBLY, OVEN, SINTER

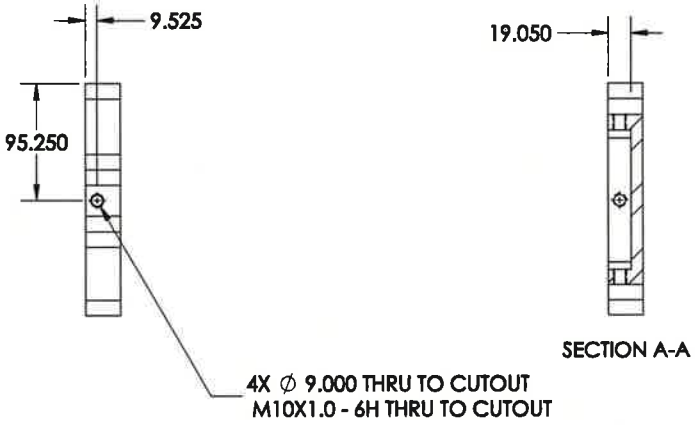
SIZE	DWG. NO.	REV
B	0234451 COG FOR MJ	

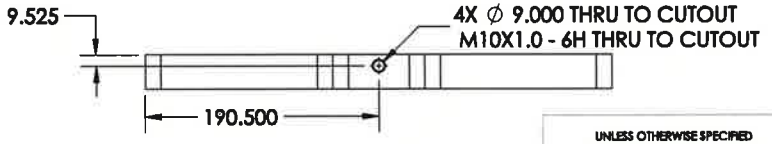
SCALE: 1:20 | DO NOT SCALE DRAWING | SHEET 1 OF 1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE	3/17/2026	KW









FURNACE BASE PLATE

		NAME	DATE
DESIGNED BY		KELLY WARD	3/17/26
DRAWN BY		KELLY WARD	3/17/26

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES ON ANGLE 0.5° SURF ROUGH 63u
.X±2.54, .XX±0.254, .XXX±0.127
INTERPRET DIMENSIONS AND TOLERANCES
PER ASME Y14.5-2009

THIRD ANGLE PROJECTION

MATERIAL
CARBON STEEL

FINISH

QuantumScape

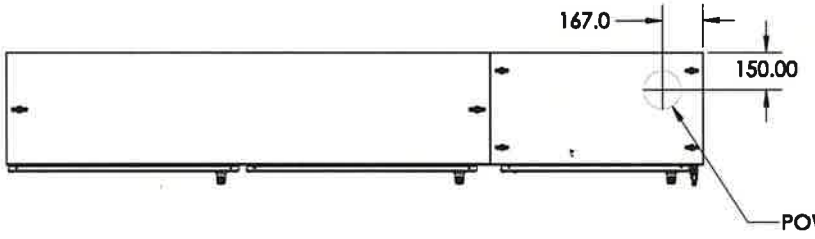
TITLE:

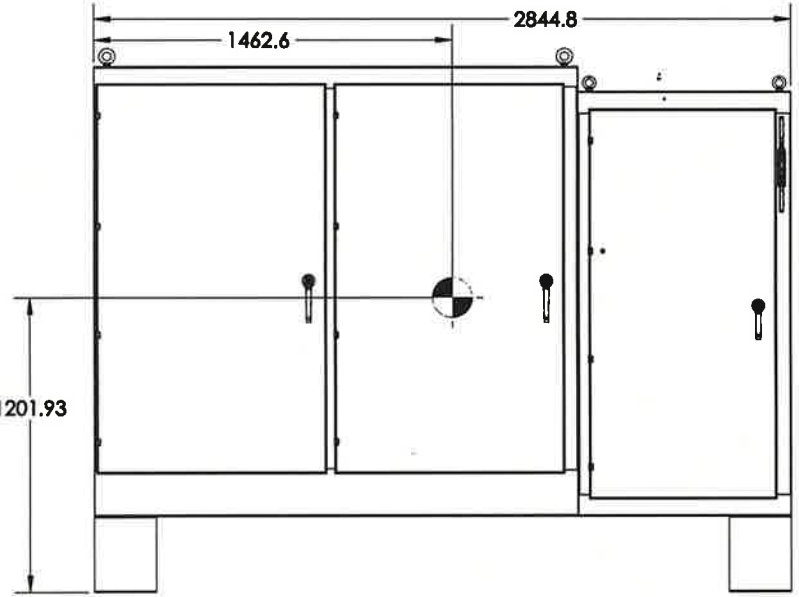
PLATE, FOOT BASE

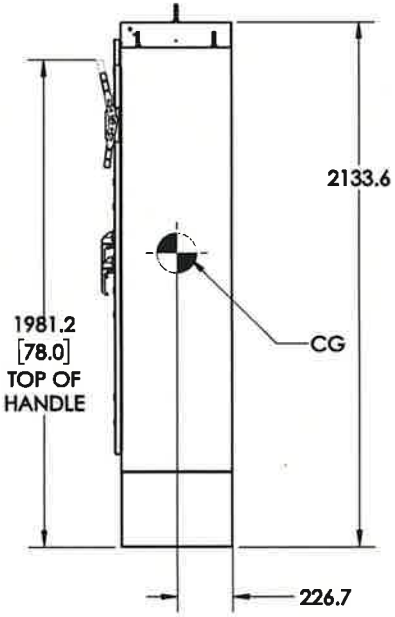
SIZE	DWG. NO.	REV
B	0237063	A

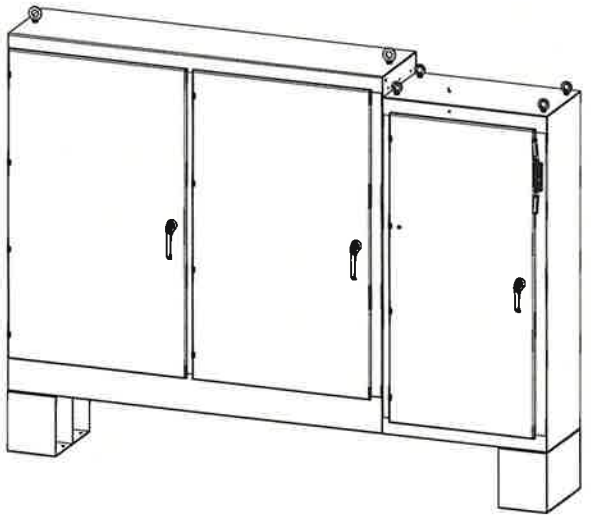
SCALE: 1:4 | DO NOT SCALE DRAWING | SHEET 1 OF 1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	1	PRELIMINARY	3/25/2026	KW
	2	ADD WIDER DISSCONNECT BOX	4/16/2026	KW
	3	ADD NEW RISER CONSTRUCTION METHOD	5/14/2026	KW



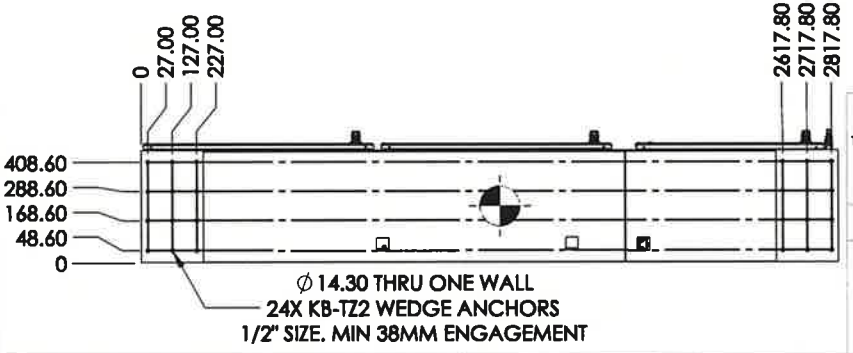






ELECTRICAL CABINET
TOTAL MAX. WT. = 2,350#

TOTAL WEIGHT
APPROX 2350 LBS



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES ON ANGLE 0.5° SURF ROUGH 63u
.X±2.54, .XX±0.254, .XXX±0.127
INTERPRET DIMENSIONS AND TOLERANCES
PER ASME Y14.5-2009

THIRD ANGLE PROJECTION

	NAME	DATE
DESIGNED BY		
DRAWN BY		
MATERIAL		
FINISH		

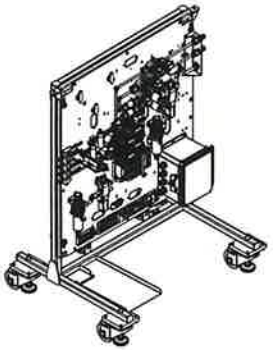
QuantumScape

TITLE:

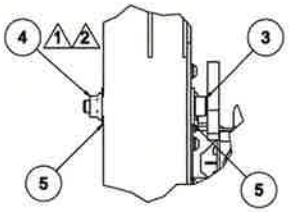
SIZE B | DWG. NO. PD ASSEMBLY | REV 3

SCALE: 1:20 | DO NOT SCALE DRAWING | SHEET 1 OF 1

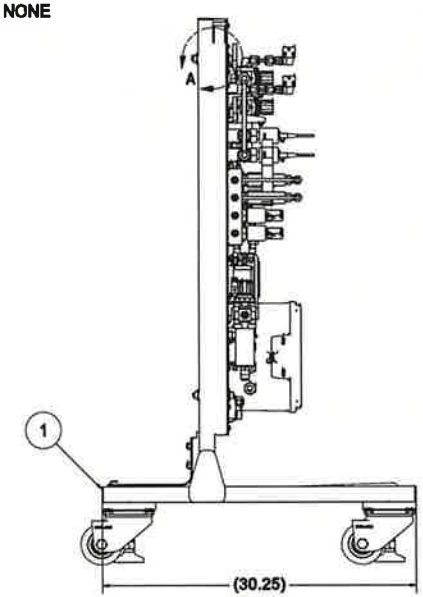
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
1.1	ADDED DIMENSIONS AND INPUT/OUTPUT NOTES	03/05/2026	J. SEUL
1	INITIAL RELEASE	03/03/2026	J. SEUL

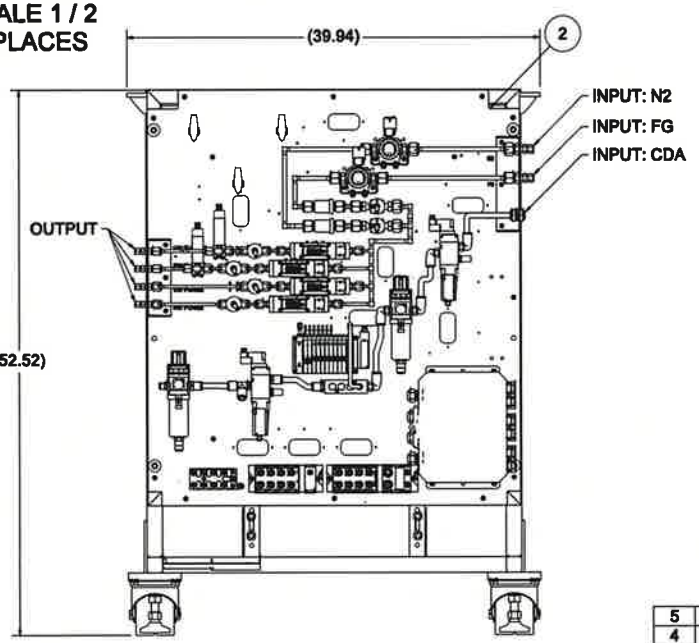


REFERENCE VIEW
SCALE: NONE



DETAIL A
SCALE 1 / 2
4 PLACES





GAS PANEL
TOTAL MAX. WT. = 375#

ITEM	QTY	PART NUMBER	TITLE	VENDOR	VENDOR PN
5	8		M10 OVERSIZED WASHER	MCMASTER CARR	91116A170
4	4		M10X1.5 FLANGE NUT	MCMASTER-CARR	90374A116
3	4		M10 X 1.5, L: 90, SSHS BOLT	MCMASTER-CARR	91502A235
2	1	0239228	ST1500 GAS PANEL ASSEMBLY		
1	1	0239177	CC GAS PANEL		

Parts List

DIMENSIONS AND TOLERANCES PER ANSI Y14.5 DO NOT SCALE DWG	MACHINED SURFACES ARE	DRAWN JLB01	3/3/2026
THIRD ANGLE PROJECTION		CHECKED	
		QA	
		MFG	
INFORMATION CONTAINED IN THIS DOCUMENT IS CONSIDERED BY QUANTUMSCAPE AS CONFIDENTIAL AND IS NOT TO BE USED IN ANY MANNER WITHOUT THE EXPRESS PERMISSION OF QUANTUMSCAPE		TOL'S .XX ± .01in/0.25mm .XXX ± .005in/0.127mm ANGLES ± °	
0239178	0239178.iam		

QUANTUMSCAPE

CC GAS PANEL

DWG NO. 0239178 REV 1.1

MATERIAL: SHEET 1 OF 1

3. PART SHALL BE EXTERNALLY WIPED DOWN WITH ISOPROPYL ALCOHOL

2 TORQUE FASTENER TO 30.0 ± 3.8 FT-LBS (40.7 ± 5.1 N-m)

1 USE KRYTOX EG2000 CLEANROOM RATED GREASE AS THREAD LUBRICATION. INSTALL PER MANUFACTURES INSTRUCTION

NOTES: UNLESS OTHERWISE SPECIFIED

Maddox

ENERGY EFFICIENT TRANSFORMER

- 3 Phase Isolation
- Dry Type
- ANN Self Cooled

Drawing for Record

This drawing is a record of our final design for the noted order number.

Purchaser:
PO#:
SWO#: W018480
Qty: 1

Unit Number: MT66504

Coils:	Aluminum
Cat. No.:	BA150H-X/Z3/MDX
kVA:	150
Primary:	480 Delta Volts
Secondary:	104 Delta Volts
Primary Taps:	2.5 %
-Taps FCAN	2
-Taps FCBN	2
Frequency:	60 Hz
BIL:	10 kV
Insulation Class:	220 °C
Temperature Rise:	150 °C
Impedance:	4.0 %
Min. Efficiency: (Calculated @ 35% Loaded)	98.83 %
Weight:	1290 Lbs

Windings	For Cable Size	Terminations
Primary @ Front	#6 AWG up to 300MCM	Lugs: 300MCM-6 (1/Ph)
Secondary @ Front	By Customer	Pads*
Ground lugs @ the base of enclosure: 1X 300MCM-6 + 4 ports 2/0-14 AWG		

*NEMA terminal connector dimensions (CC 1-2009 Annex C)

Wiring Connection:

Primary: H1-H2-H3

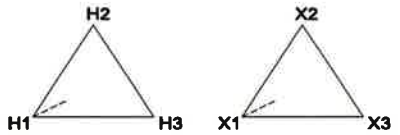
Voltage	% Tap	Jumpers To:
504	105.0	1-1-1
492	102.5	2-2-2
480	100.0	3-3-3
468	97.5	4-4-4
456	95.0	5-5-5

Secondary:

Voltage	Connect Loads To:
104	X1-X2-X3

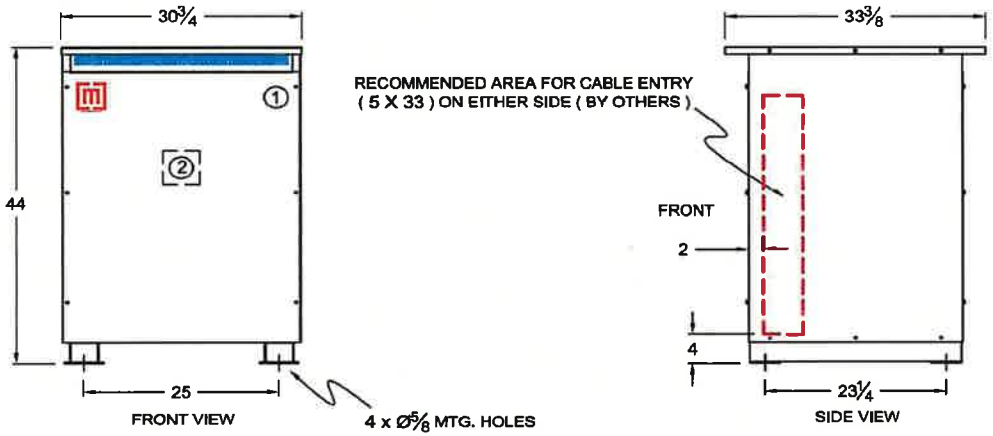
Standards:
1)- CSA Certified
2)- UL Listed

Standard Features:
1)- Anti-vibration pads installed between the enclosure base and the core & coil assembly
2)- Lug for Earth grounding provided
3)- Transformer meets NRCan 2019 & DOE 2016 minimum efficiency level



B-6

① - REMOVABLE PANELS FOR EASY ACCESS TO TERMINALS
② - LOCATION OF NAMEPLATE



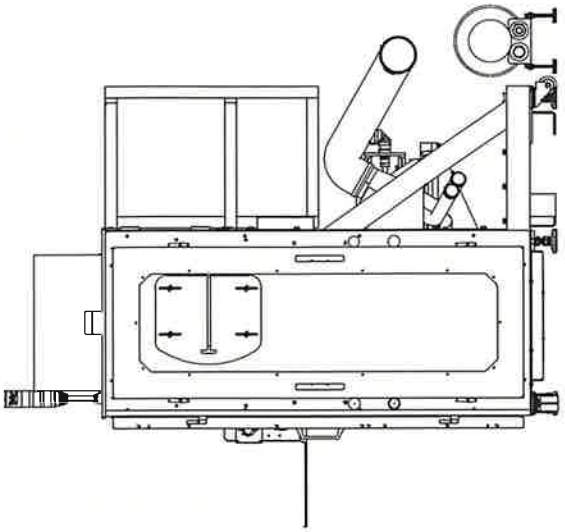
CSA Enclosure:
1)- Type 3R (NEMA 3R)
- Sprinklerproof when the angle between sprinkler heads and opening in the enclosure does not exceed 45 degree from the vertical.

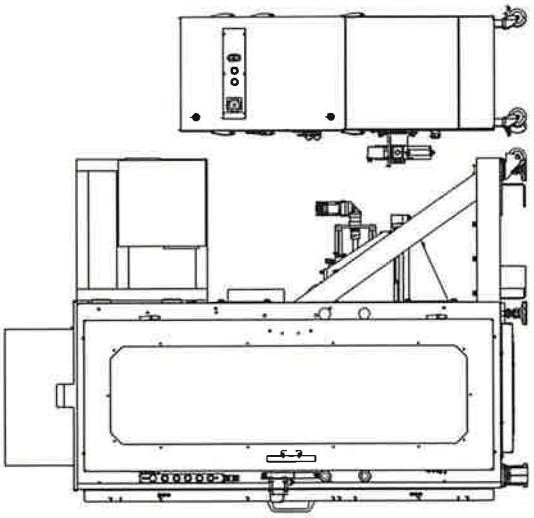
2)- Ventilated
3)- ASA 61 grey
4)- Floor mounting

Rev.	Remarks	By	Appr. By	Date

Prepared by: AP
Approved by: VS
Date: MAY 14, 2026

TRANSFORMER TOTAL MAX. WT. = 1,290#

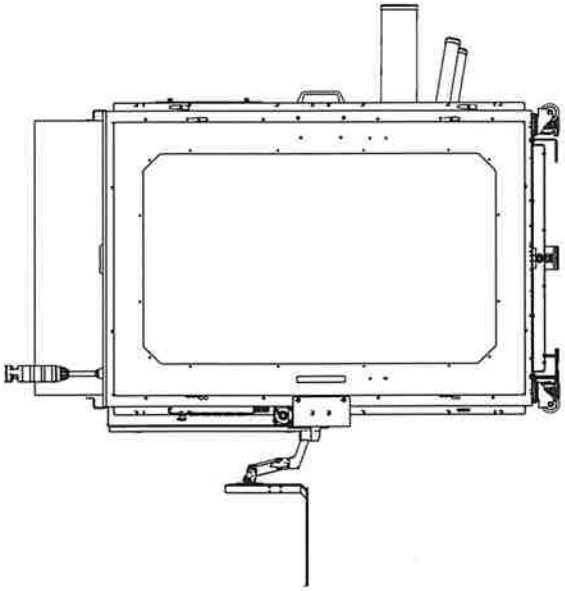


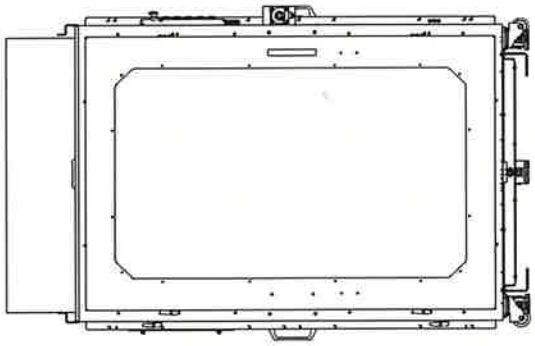


UNWIND/REWIND
TOTAL MAX. WT. = 1,290#

ESUC
TOTAL MAX. WT. = 386#

RWH - UNWIND





RWH - REWIND