



Anchor Designer™
Software
Version 3.0.7947.3

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1. Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-14
Units: Imperial units

Anchor Information:

Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.625
Effective Embedment depth, h_{ef} (inch): 12.000
Code report: ICC-ES ESR-4057
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 13.38
 c_{ac} (inch): 21.86
 c_{min} (inch): 1.75
 s_{min} (inch): 3.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Cracked
Compressive strength, f'_c (psi): 4000
 $\Psi_{c,v}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Continuous
Temperature range, Short/Long: 150/110°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate

Length x Width x Thickness (inch): 13.00 x 13.00 x 0.87
Yield stress: 36000 psi

Profile type/size: HSS8X8X1/4

Recommended Anchor

Anchor Name: SET-3G - SET-3G w/ 5/8"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: ICC-ES ESR-4057





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Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: Yes

Anchors subjected to sustained tension: No

Ductility section for tension: 17.2.3.4.3 (d) is satisfied

Ductility section for shear: 17.2.3.5.3 (c) is satisfied

Ω_0 factor: not set

Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

N_{ua} [lb]: 576

V_{uax} [lb]: 12493

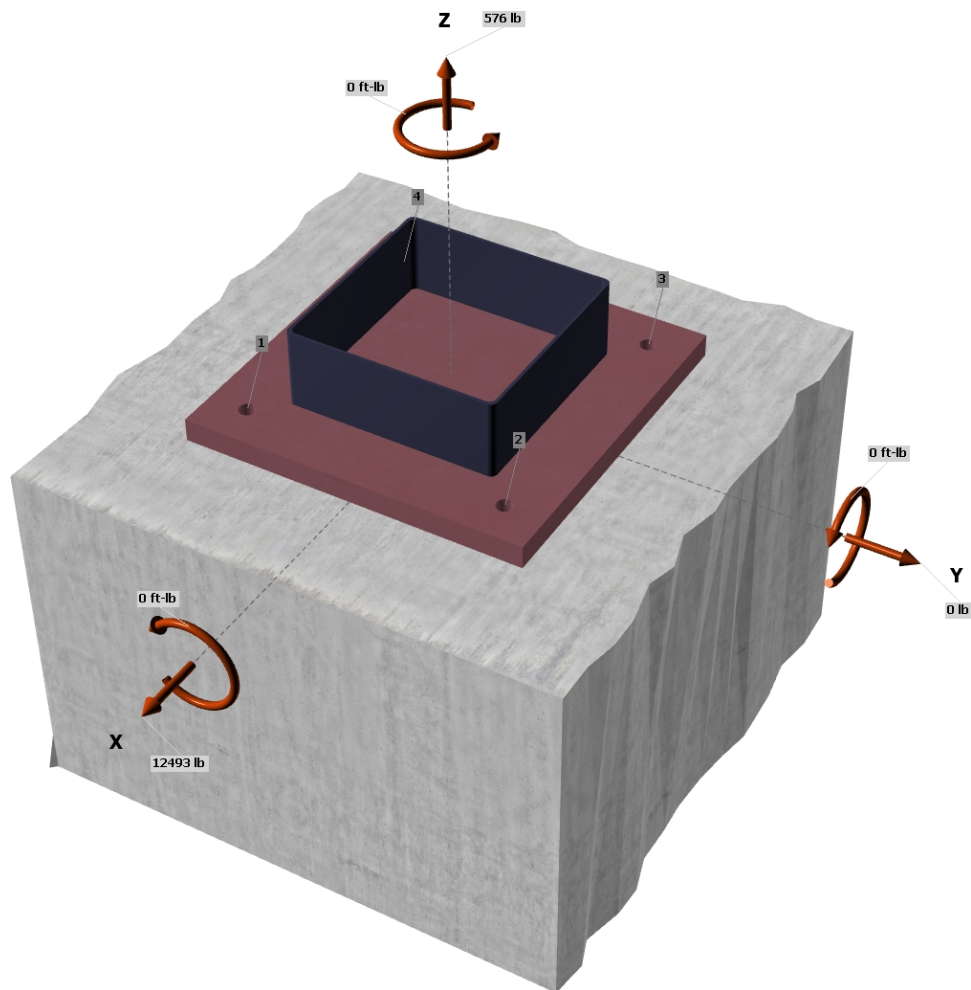
V_{uay} [lb]: 0

M_{ux} [ft-lb]: 0

M_{uy} [ft-lb]: 0

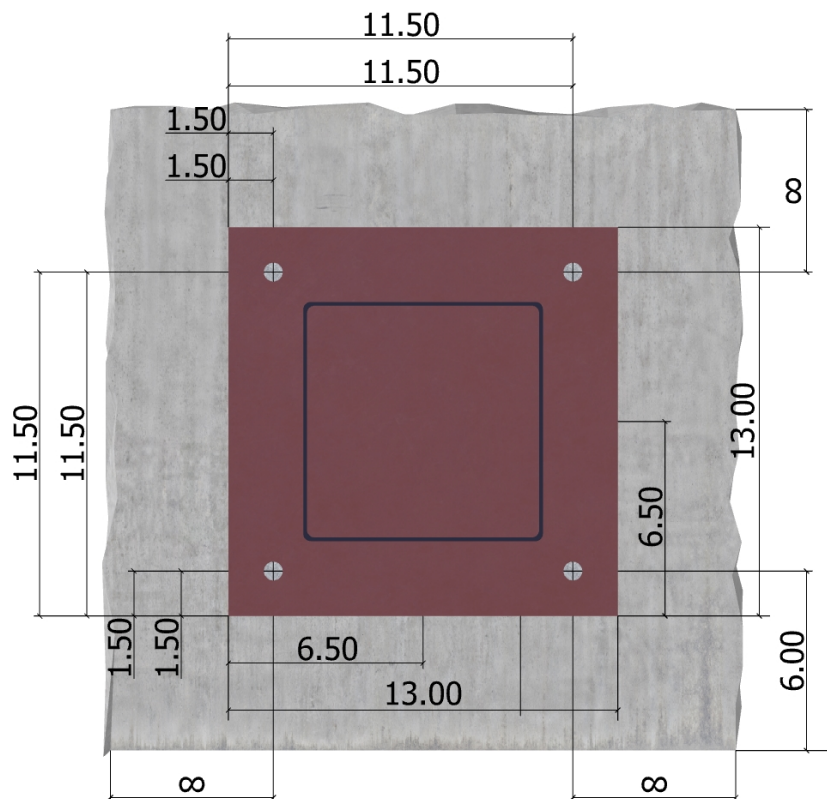
M_{uz} [ft-lb]: 0

<Figure 1>



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<Figure 2>





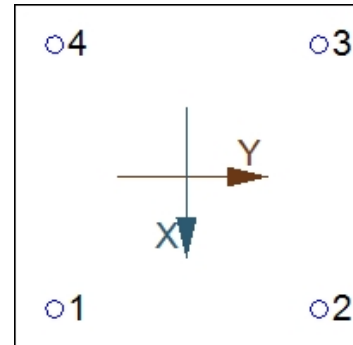
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3. Resulting Anchor Forces

| Anchor | Tension load, N _{ua} (lb) | Shear load x, V _{uax} (lb) | Shear load y, V _{uay} (lb) | Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb) |
|--------|---------------------------------------|--|--|---|
| 1 | 144.0 | 3123.3 | 0.0 | 3123.3 |
| 2 | 144.0 | 3123.3 | 0.0 | 3123.3 |
| 3 | 144.0 | 3123.3 | 0.0 | 3123.3 |
| 4 | 144.0 | 3123.3 | 0.0 | 3123.3 |
| Sum | 576.0 | 12493.0 | 0.0 | 12493.0 |

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 576
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

| N _{sa} (lb) | φ | φN _{sa} (lb) |
|----------------------|------|-----------------------|
| 12880 | 0.75 | 9660 |

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.4.2.2a)}$$

| k _c | λ _a | f' _c (psi) | h _{ef} (in) | N _b (lb) |
|----------------|----------------|-----------------------|----------------------|---------------------|
| 17.0 | 1.00 | 4000 | 12.000 | 44694 |

$$0.75\phi N_{cbg} = 0.75\phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. 17.3.1 \& Eq. 17.4.2.1b)}$$

| A _{Nc} (in ²) | A _{Nco} (in ²) | C _{a,min} (in) | Ψ _{ec,N} | Ψ _{ed,N} | Ψ _{c,N} | Ψ _{cp,N} | N _b (lb) | φ | 0.75φN _{cbg} (lb) |
|------------------------------------|-------------------------------------|-------------------------|-------------------|-------------------|------------------|-------------------|---------------------|------|----------------------------|
| 1564.00 | 1296.00 | 6.00 | 1.000 | 0.800 | 1.00 | 1.000 | 44694 | 0.65 | 21035 |

6. Adhesive Strength of Anchor in Tension (Sec. 17.4.5)

$$\tau_{k,cr} = \tau_{k,cr,short-term} K_{sat} (f'_c / 2,500)^n \alpha_{N,seis}$$

| τ _{k,cr} (psi) | f _{short-term} | K _{sat} | α _{N,seis} | f' _c (psi) | n | τ _{k,cr} (psi) |
|-------------------------|-------------------------|------------------|---------------------|-----------------------|------|-------------------------|
| 1356 | 1.00 | 1.00 | 1.00 | 4000 | 0.24 | 1518 |

$$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef} \text{ (Eq. 17.4.5.2)}$$

| λ _a | τ _{cr} (psi) | d _a (in) | h _{ef} (in) | N _{ba} (lb) |
|----------------|-----------------------|---------------------|----------------------|----------------------|
| 1.00 | 1518 | 0.63 | 12.000 | 35765 |

$$0.75\phi N_{ag} = 0.75\phi (A_{Na} / A_{Na0}) \Psi_{ec,Na} \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \text{ (Sec. 17.3.1 \& Eq. 17.4.5.1b)}$$

| A _{Na} (in ²) | A _{Na0} (in ²) | C _{Na} (in) | C _{a,min} (in) | Ψ _{ec,Na} | Ψ _{ed,Na} | Ψ _{cp,Na} | N _{ba} (lb) | φ | 0.75φN _{ag} (lb) |
|------------------------------------|-------------------------------------|----------------------|-------------------------|--------------------|--------------------|--------------------|----------------------|------|---------------------------|
| 681.56 | 307.10 | 8.76 | 6.00 | 1.000 | 0.905 | 1.000 | 35765 | 0.65 | 35036 |



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8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

| V_{sa} (lb) | ϕ_{grout} | ϕ | $\alpha_{V,seis}$ | $\phi_{grout}\alpha_{V,seis}\phi V_{sa}$ (lb) |
|---------------|----------------|--------|-------------------|---|
| 7730 | 1.0 | 0.65 | 0.75 | 3768 |

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min[7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}]$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

| l_e (in) | d_a (in) | λ_a | f'_c (psi) | c_{a1} (in) | V_{bx} (lb) |
|------------|------------|-------------|--------------|---------------|---------------|
| 5.00 | 0.625 | 1.00 | 4000 | 6.00 | 7797 |

$\phi V_{cbgx} = \phi (A_{Vc} / A_{Vco}) \psi_{ec,V} \psi_{ed,V} \psi_{c,V} \psi_{h,V} V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1b)

| A_{Vc} (in ²) | A_{Vco} (in ²) | $\psi_{ec,V}$ | $\psi_{ed,V}$ | $\psi_{c,V}$ | $\psi_{h,V}$ | V_{bx} (lb) | ϕ | ϕV_{cbgx} (lb) |
|-----------------------------|------------------------------|---------------|---------------|--------------|--------------|---------------|--------|----------------------|
| 252.00 | 162.00 | 1.000 | 1.000 | 1.000 | 1.000 | 7797 | 0.70 | 8490 |

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cpg} = \phi \min[k_{cp}N_{ag}; k_{cp}N_{cbg}] = \phi \min[k_{cp}(A_{Na}/A_{Na0})\psi_{ec,Na}\psi_{ed,Na}\psi_{cp,Na}N_{ba}; k_{cp}(A_{Nc}/A_{Nco})\psi_{ec,N}\psi_{ed,N}\psi_{cp,N}N_b]$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

| k_{cp} | A_{Na} (in ²) | A_{Na0} (in ²) | $\psi_{ed,Na}$ | $\psi_{ec,Na}$ | $\psi_{cp,Na}$ | N_{ba} (lb) | N_a (lb) |
|----------|-----------------------------|------------------------------|----------------|----------------|----------------|---------------|------------|
| 2.0 | 681.56 | 307.10 | 0.905 | 1.000 | 1.000 | 35765 | 71868 |

| A_{Nc} (in ²) | A_{Nco} (in ²) | $\psi_{ec,N}$ | $\psi_{ed,N}$ | $\psi_{c,N}$ | $\psi_{cp,N}$ | N_b (lb) | N_{cb} (lb) | ϕ |
|-----------------------------|------------------------------|---------------|---------------|--------------|---------------|------------|---------------|--------|
| 1564.00 | 1296.00 | 1.000 | 0.800 | 1.000 | 1.000 | 44694 | 43149 | 0.70 |

| |
|---------------------|
| ϕV_{cpg} (lb) |
| 60409 |

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.6.)

| | | | | | |
|--------------------------|------------------------------|----------------------------------|----------------|-----------------------|--------|
| Tension | Factored Load, N_{ua} (lb) | Design Strength, ϕN_n (lb) | Ratio | Status | |
| Steel | 144 | 9660 | 0.01 | Pass | |
| Concrete breakout | 576 | 21035 | 0.03 | Pass (Governs) | |
| Adhesive | 576 | 35036 | 0.02 | Pass | |
| Shear | Factored Load, V_{ua} (lb) | Design Strength, ϕV_n (lb) | Ratio | Status | |
| Steel | 3123 | 3768 | 0.83 | Pass (Governs) | |
| T Concrete breakout x+ | 6247 | 8490 | 0.74 | Pass | |
| Pryout | 12493 | 60409 | 0.21 | Pass | |
| Interaction check | $N_{ua}/\phi N_n$ | $V_{ua}/\phi V_n$ | Combined Ratio | Permissible | Status |
| Sec. 17.6..2 | 0.00 | 0.83 | 82.9% | 1.0 | Pass |

SET-3G w/ 5/8"Ø A193 Gr. B8/B8M (304/316SS) with hef = 12.000 inch meets the selected design criteria.



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12. Warnings

- Per designer input, ductility requirements for tension have been determined to be satisfied – designer to verify.
- Per designer input, ductility requirements for shear have been determined to be satisfied – designer to verify.
- Designer must exercise own judgement to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.