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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 318-11
Units: Imperial units

Anchor Information:

Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 0.625
Effective Embedment depth, h_{ef} (inch): 10.000
Code report: ICC-ES ESR-2508
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 13.13
 C_{ac} (inch): 22.06
 C_{min} (inch): 1.75
 S_{min} (inch): 3.00

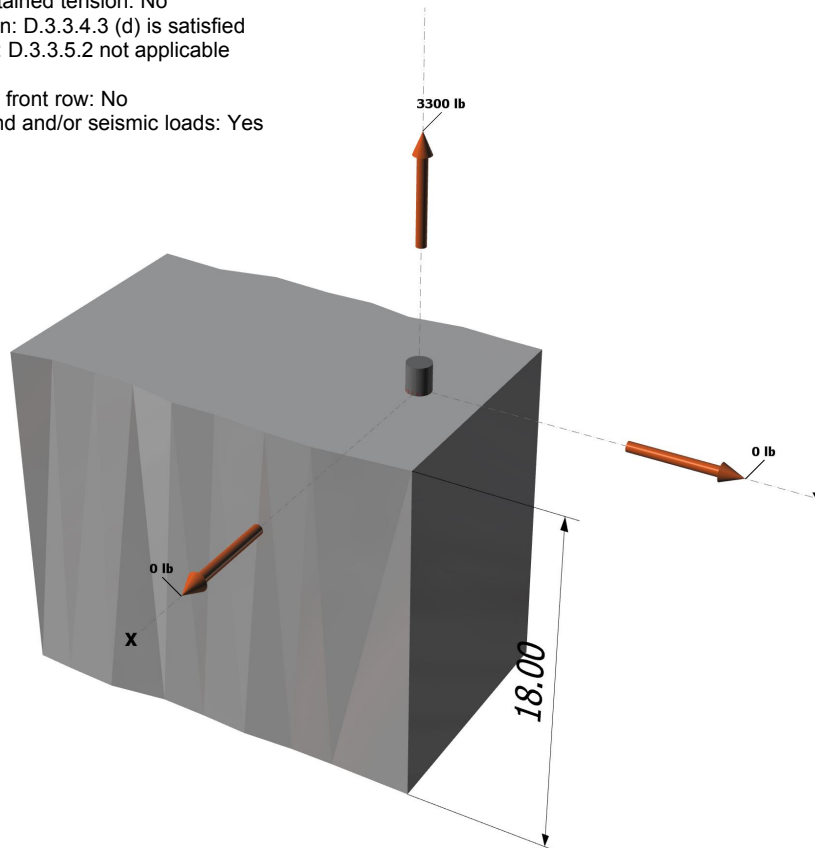
Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
 $\Psi_{e,v}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Continuous
Temperature range: 2
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Load and Geometry

Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: No
Ductility section for tension: D.3.3.4.3 (d) is satisfied
Ductility section for shear: D.3.3.5.2 not applicable
 Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

<Figure 1>

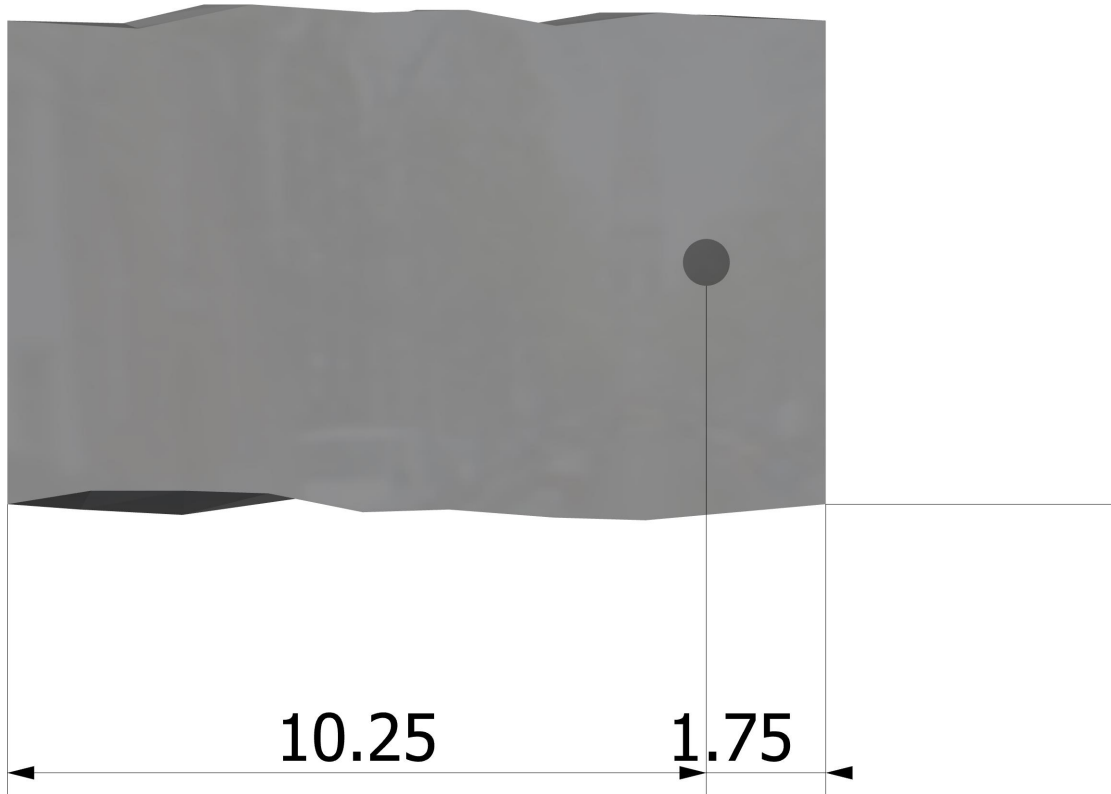


Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.



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<Figure 2>



Recommended Anchor

Anchor Name: SET-XP® - SET-XP w/ 5/8"Ø F1554 Gr. 36
Code Report Listing: ICC-ES ESR-2508





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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 | 3300.0 | 0.0 | 0.0 | 0.0 |
| Sum | 3300.0 | 0.0 | 0.0 | 0.0 |

Maximum concrete compression strain (%): 0.00
 Maximum concrete compression stress (psi): 0
 Resultant tension force (lb): 3300
 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

4. Steel Strength of Anchor in Tension (Sec. D.5.1)

| N _{sa} (lb) | φ | φN _{sa} (lb) |
|----------------------|------|-----------------------|
| 13110 | 0.75 | 9833 |

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. D-6)}$$

| k _c | λ _a | f' _c (psi) | h _{ef} (in) | N _b (lb) |
|----------------|----------------|-----------------------|----------------------|---------------------|
| 17.0 | 1.00 | 2500 | 10.000 | 26879 |

$$0.75 \phi N_{cb} = 0.75 \phi (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. D.4.1 \& Eq. D-3)}$$

| A _{Nc} (in ²) | A _{Nco} (in ²) | Ψ _{ed,N} | Ψ _{c,N} | Ψ _{cp,N} | N _b (lb) | φ | 0.75 φN _{cb} (lb) |
|------------------------------------|-------------------------------------|-------------------|------------------|-------------------|---------------------|------|----------------------------|
| 360.00 | 900.00 | 0.735 | 1.00 | 1.000 | 26879 | 0.65 | 3852 |

6. Adhesive Strength of Anchor in Tension (Sec. 5.5)

$$\tau_{k,cr} = \tau_{k,cr}^{short-term} K_{sat} \alpha_{N,seis}$$

| τ _{k,cr} (psi) | f ^{short-term} | K _{sat} | α _{N,seis} | τ _{k,cr} (psi) |
|-------------------------|-------------------------|------------------|---------------------|-------------------------|
| 432 | 1.72 | 1.00 | 1.00 | 743 |

$$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef} \text{ (Eq. D-22)}$$

| λ _a | τ _{cr} (psi) | d _a (in) | h _{ef} (in) | N _{ba} (lb) |
|----------------|-----------------------|---------------------|----------------------|----------------------|
| 1.00 | 743 | 0.63 | 10.000 | 14590 |

$$0.75 \phi N_a = 0.75 \phi (A_{Na} / A_{Na0}) \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \text{ (Sec. D.4.1 \& Eq. D-18)}$$

| A _{Na} (in ²) | A _{Na0} (in ²) | Ψ _{ed,Na} | Ψ _{cp,Na} | N _{ba} (lb) | φ | 0.75 φN _a (lb) |
|------------------------------------|-------------------------------------|--------------------|--------------------|----------------------|------|---------------------------|
| 157.79 | 259.22 | 0.765 | 1.000 | 14590 | 0.65 | 3313 |



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11. Results

Interaction of Tensile and Shear Forces (Sec. D.7)

| Tension | Factored Load, N_{ua} (lb) | Design Strength, ϕN_n (lb) | Ratio | Status |
|-------------------|------------------------------|----------------------------------|-------------|-----------------------|
| Steel | 3300 | 9833 | 0.34 | Pass |
| Concrete breakout | 3300 | 3852 | 0.86 | Pass |
| Adhesive | 3300 | 3313 | 1.00 | Pass (Governs) |

SET-XP w/ 5/8"Ø F1554 Gr. 36 with hef = 10.000 inch meets the selected design criteria.

12. Warnings

- Concrete compressive strength used in concrete breakout strength in tension, adhesive strength in tension and concrete pryout strength in shear for SET-XP adhesive anchor is limited to 2,500 psi per ICC-ES ESR-2508 Section 5.3.
- Minimum spacing and edge distance requirement of $6d_a$ per ACI 318 Sections D.8.1 and D.8.2 for torqued cast-in-place anchor is waived per designer option.
- Per designer input, ductility requirements for tension have been determined to be satisfied – designer to verify.
- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of D.3.3.5.3 for shear need not 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.

ASD Factor = 0.7 (Assume all seismic neglect offsetting dead load)
Overstrength Factor = 2.5

Allowable Seismic Uplift Force = $3313\# \times 0.7 / 2.5 = 928\#$, Approximately 1/3 capacity of HDU2 holdown