EGV Engineering

Structural Calculations

Job: Casa Ohad – Louvered Swing Gate
Address: 6200 SW 123rd Terrace, Pinecrest, FL

SPECIALTY ENGINEER SHOP DRAWING REVIEW

Review of design calculations and drawings prepared by delegated engineer (Specialty Engineer) does not constitute a detailed check of calculations, nor does it relieve the Specialty Engineer from the responsibility of the detailing of the specialty component or system.

Review is limited to confirming the following:
- That the specialty engineering documents conform with the intent of the engineer of record as expressed on the Structural Documents and have been prepared by a structural engineer registered in Florida;
- That the effect of the Specialty Engineer's work on the structural frame conforms with the intent of the Structural Documents.

☑ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS NOTED
☐ SUBMIT SPECIFIED ITEM ☐ REVISE & RESUBMIT
☐ NON-COMPLIANT SUBMITTAL ☐ REJECTED
☐ ACKNOLEDGE RECEIPT FOR RECORD

CFS ENGINEERING GROUP, INC.

BY CS 07-31-26 DATE

Reviewed for compliance with loading criteria and general conformance to design intent.

CALCULATIONS BASED ON:

1. 2023 Florida Building Code (8th Edition)
2. Minimum Design Loads for Buildings and Other Structures ASCE 7-22
3. Building Code Requirements for Structural Concrete ACI 318-19
4. Aluminum Design Manual (ADM) 2015
5. AISC Steel Design Manual 15th Edition

■ NO EXCEPTIONS TAKEN ☐ REJECTED
☐ MAKE CORRECTIONS AS NOTED ☐ SUBMIT SPECIFIED ITEM
☐ REVIEW AND RESUBMIT ☐ NOT REVIEWED

Submittal is reviewed only as to general conformity with design concept of the project and general compliance with the information given in the Contract Documents. Corrections and or comments made as part of this submittal review do not relieve contractor of responsibility from conformance with the Contract Documents, applicable codes, and laws- all of which have priority over this submittal. The design professional does not warrant or represent that the information within the submittal is either accurate or complete. Sole responsibility for correct design, details, and dimensions shall remain with the party providing the submittal. Contractor is responsible for all dimensions, quantities and performance requirements to be confirmed and correlated at the job site;for all information that pertains solely to the fabrication process or to techniques of construction;for all coordination of the work of all trades; for assuring consistency with the Contract Documents; and for performing the work in a safe and satisfactory manner.

FAO ARCHITECTURE, LLC.

Reviewed by: FAO Date: 7-31-26

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CALCULATION STATEMENT:

To the best of my knowledge, ability, belief and professional judgement, I hereby attest that the manual calculations and computer generated calculations are in compliance with the existing governing codes.

Prepared By:
Erick Guillen, PE
Lic. No. 92192

Digitally signed by Erick Guillen
Location: Ohad Louvered Fencing & Gates
Reason: This item has been digitally signed & sealed by Erick Guillen, PE on 08/01/2026. Printed copies of this document are not considered signed & sealed and the signature must be verified on any electronic copies.
Date: 2026.08.01 08:18:01-04'00'

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WIND LOAD ANALYSIS FOR 4′H LOUVERED SECTIONS

Type of fence: ***Louvered Fence Panels*** & ***Swing Gate***

Height of gate: **48"**

Exposure Category: ***C*** — *Refer to AISC 7 − 22 Section* 26.7.3

Ultimate Wind Speed, V_{ULT}: **115 *mph*** — *Refer to AISC 7 − 22 Figure* 26.5 − 1*B*

$V_{ULT} = 115\ mph\ for\ fences\ if\ h \leq 72"\ at\ grade$ — *Refer to FBC 7th Ed* 2020 *Section* 1616.2.1

Cross Sectional Shape: ***Square*** (in^4)

Method of calculation: ***ASD***

Velocity pressure exposure coefficient, K_Z: **0.85** — *Refer to AISC 7 − 22 Section* 26.10.1

Topographic factor, K_{ZT}: **1.0** — *Refer to AISC 7 − 22 Section* 26.8.2

Wind Diectionality Factor, K_D: **0.85** — *Refer to AISC 7 − 22 Section* 26.6 − 1

Basic wind speed, V: **115 *mph*** — *Refer to AISC 7 − 22 Section* 26.5

Velocity pressure, q_h *(See below)* — *Refer to AISC 7 − 22 Section* 26.10.2

$$q_Z = 0.00256 * K_Z * K_{ZT} * K_d * V^2 = 0.00256 * 0.85 * 1.0 * 0.85 * 115^2 = \mathbf{24.46}\ \frac{\boldsymbol{lbs}}{\boldsymbol{sf}}$$

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DESIGN PRESSURE AT 4′ WIDE DOUBLE SWING LOUVERED GATE

$Gust\ effect\ factor, G$: **0.85** *Refer to AISC 7 − 22 Section* 26.11.1

s $(Height\ of\ panel)$: **48"**

h $(Vertical\ distance\ from\ top\ of\ panel\ to\ ground\ surface)$: **48"**

B $(Width\ of\ gate\ leaf\ panel)$: **4′ − 0"**

$\frac{B}{s}(Aspect\ ratio) =$ **1.00**

$\frac{s}{h}(Clearance\ ratio)$: **1.00**

$Porosity, \%\ Open, \varepsilon$: **0.40**

$Force\ coefficient, C_f$: **1.45** *Refer to AISC 7 − 22 Figure* 29.3 − 1

$P = q_h * G * C_f = 24.46 * 0.85 * 1.45 =$ $\mathbf{30.15\frac{lbs}{sf}}$

$P_{ASD} = P * 0.6 = 30.15 * 0.6 =$ $\mathbf{18.09\frac{lbs}{sf}}$

$P_{POROSITY} = P_{ASD} * \varepsilon = 18.09 * 0.40 =$ $\mathbf{7.24\frac{lbs}{sf}}$

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DESIGN CHECK – 2" x 2" x .125" Terminal/Line Posts

$Material: 6061 - T6\ Aluminum$

$S_X = 0.5518\ in^3$

$L = 48\ in\ (Post\ height)$

$W = 48\ in\ (Post\ spacing)$

$Member\ Type = Cantilevered$

$$P_W, Wind\ Shear\ Force = \frac{L * W * P_{POROSITY}}{144} = \frac{48 * 48 * 7.24}{144} = 115.84\ lbs$$

$$M_W, Wind\ Induced\ Moment = \frac{L * P_W}{2 * 12} = \frac{48 * 115.84}{24} = 231.68\ lb * ft$$

$Confirm\ if\ selected\ member\ is\ adequate: 2"\ x\ 2"\ x\ .125"\ Aluminum\ Alloy$

$S_X, Section\ of\ Modulus = 0.5518\ in^3$

$F_Y, Yield\ Strength\ of\ 6061 - T6\ Aluminum\ Alloy = 35\ ksi$

$$F_{B,Allowable}, Allowable\ Bending\ Stress = 0.6 * F_Y = 21\ ksi$$

$$M_{,Allowable}, Allowable\ Moment = \frac{F_{B,Allowable} * S_X * 1000}{12} = \frac{21 * 0.5518 * 1000}{12} = 965\ lbs * ft$$

$M_{,Allowable} > M_W \ldots\ldots\ldots 965 > 231 \ldots\ldots\ldots TRUE!$

2" x 2" x .125" 6061 – T6 is GOOD for use as terminal/line posts @ 4′ H Louver Panels

EOV ENGINEERING

DESIGN CHECK – 2" x 2" x .125" Gate/Fence Panel Frame

$Material: 6061 - T6\ Aluminum$

$S_X = 0.5518\ in^3$

$L = 48\ in\ (Unbraced\ length)$

$W = 46\ in\ (Unbraced\ height)$

$Member\ Type = Simple$

$$P_W, Wind\ Shear\ Force = \frac{L * W * P_{POROSITY}}{144} = \frac{48 * 48 * 7.24}{144} = 115.84\ lbs$$

$$M_W, Wind\ Induced\ Moment = \frac{L * P_W}{8 * 12} = \frac{48 * 115.84}{96} = 57.92\ lb * ft$$

$Confirm\ if\ selected\ member\ is\ adequate: 2"\ x\ 2"\ x\ .125"\ Aluminum\ Alloy$

$S_X, Section\ of\ Modulus = 0.5518\ in^3$

$F_Y, Yield\ Strength\ of\ 6061 - T6\ Aluminum\ Alloy = 35\ ksi$

$F_{B,Allowable}, Allowable\ Bending\ Stress = 0.6 * F_Y = 21\ ksi$

$$M_{,Allowable}, Allowable\ Moment = \frac{F_{B,Allowable} * S_X * 1000}{12} = \frac{21 * 0.5518 * 1000}{12} = 965\ lbs * ft$$

$M_{,Allowable} > M_W \ldots\ldots\ldots 965 > 58 \ldots\ldots\ldots TRUE!$

2" x 2" x .125" 6061 – T6 is GOOD for use as the gate frame @ 4′ H Louver Panels

EG ENGINEERING

DESIGN CHECK – 2" x .375" Oval Louvered Blades

$Material: Louver\ Blade\ 6061-T6\ Alloy$

$A = 0.4520\ in^2$

$S_X = 0.2060\ in^3$

$L = 48\ in\ (Louver\ blade\ unbraced\ length)$

$W = 2\ in\ (Louver\ blade\ height)$

$Member\ Type = Simple$

$$P_W, Wind\ Shear\ Force = \frac{L * W * P_{POROSITY}}{144} = \frac{48 * 2 * 7.24}{144} = 4.83\ lbs$$

$$M_W, Wind\ Induced\ Moment = \frac{L * P_W}{8 * 12} = \frac{48 * 4.83}{8 * 12} = 2.42\ lb * ft$$

$Confirm\ if\ selected\ member\ is\ adequate: 2"\ x\ .375"\ Louver\ Blade$

$S_X, Section\ of\ Modulus = 0.2060\ in^3$

$F_Y, Yield\ Strength\ of\ 6061-T6\ Aluminum\ Alloy = 35\ ksi$

$F_{B,Allowable}, Allowable\ Bending\ Stress = 0.6 * F_Y = 21\ ksi$

$$M_{,Allowable}, Allowable\ Moment = \frac{F_{B,Allowable} * S_X * 1000}{12} = \frac{21 * 0.2060 * 1000}{12} = 360.50\ lbs * ft$$

$M_{,Allowable} > M_W \ldots\ldots\ldots 360.5 > 2.42 \ldots\ldots\ldots TRUE!$

2" x .375" Louvered Blades are GOOD for use @ 4′ H Louver Panels

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DESIGN ANALYSIS FOR LOADING ON SWING GATE HINGE

$Width\ of\ gate\ leaf, W = 4' - 0"$

$Height\ of\ gate\ leaf, H = 4' - 0"$

$Tributary\ Width\ of\ gate\ leaf, W_T = 4' - 0"$

$Tributary\ Heigh\ of\ gate\ leaf, H_T = 2' - 0"$

$Hinge\ Spacing, S_H = 3' - 6"$

$Gust\ effect\ factor, G$: **0.85** $Refer\ to\ AISC\ 7-22\ Section\ 26.11.1$

$Ratio\ of\ solid\ to\ open\ gross\ area, \varepsilon$: **0.40** $\frac{in^2}{in^2}$

$Force\ coefficient, C_f$: **1.45** $Refer\ to\ AISC\ 7-22\ Figure\ 29.4-1$

$$Acting\ wind\ pressure, P_W = q_Z * G * C_f * 0.6 * \varepsilon = 24.46 * 0.85 * 1.45 * 0.6 * 0.40 = 7.24\frac{lb}{ft^2}$$

$Acting\ wind\ force\ on\ tributary\ area, V = P_W * W_T * H_T = 7.24 * 4 * 2 = 57.88\ lb$

$To\ be\ conservative, use\ 75\ lb\ rated\ hinge\ in\ lieu\ of\ 57\ lb$

$Frame\ Weight = 18\ lbs$

$Louver\ Weight = 20\ lbs\ @\ 2\ lbs\ each$

$Total\ Gate\ Weight, W_G = 45\ lbs\ (Accounting\ misc.\ hardware\ items)$

$Gravity\ Sag\ Moment, W_{SAG} = W_G * H_T = 1{,}080\ lbs * in$

$$In-Plane\ Hinge\ Couple, H_D = \frac{W_{SAG}}{S_H} = 25.71\ lbs\ per\ hinge$$

$$Hinge\ Rating = \sqrt{57^2 + 45^2 + 25.71^2} = 77\ lbs$$

Gate hinges shall be rated for 100 lb minimum

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DESIGN ANALYSIS FOR FASTENERS AT HINGE INTO METAL POST

Note: See previous sheet for V, H_D *and* W_G

Design loads per hinge:

$$Upper\ Gate\ Hinge\ Reaction, R_{UPPER} = \sqrt{V^2 + H_D^2} = \sqrt{57.88^2 + 25.71^2} = 63.33\ lbs$$

$$Lower\ Gate\ Hinge\ Reaction, R_{LOWER} = \sqrt{V^2 + H_D^2 + W_G^2} = \sqrt{57.88^2 + 25.71^2 + 45^2} = 77.69\ lbs$$

Conservatively, the lower hinge carries the full vertical gate weight and controls

Number of fasteners per each side of the hinges, n: 2

$$R_{SCREW,L} = \frac{R_{LOWER}}{2} = \frac{77.69}{2} = 38.84\ lbs\ per\ screw$$

$$T_{SCREW} = \frac{V}{2} = 28.94\ lbs$$

$$V_{SCREW} = \sqrt{(\frac{V}{2})^2 + (\frac{H_D}{2})^2} = \sqrt{(\frac{25.71}{2})^2 + (\frac{45}{2})^2} = 25.91\ lbs$$

Anchor selection: Dewalt Drilit

Description: 1/4" *Diameter &* 20 *threads per inch*

Embedment Depth: 3" *long into* 2" *x* 2" *x* 1/8" *aluminum tubing*

$$Tension, T_{Allowable} = 515\ lbs\ based\ on\ material\ thickness\ of\ 1/8"$$

$$Shear, V_{Allowable} = 1{,}070\ lbs\ based\ on\ material\ thickness\ of\ 1/8"$$

$$\frac{T_{SCREW}}{T_{Allowable}} + \frac{V_{SCREW}}{V_{Allowable}} = \frac{28.94}{515} + \frac{25.91}{1{,}070} = 0.06 + 0.03 = 0.09 \ldots less\ than\ 1.0 \ldots\ GOOD!$$

Use Dewalt Drilit 1/4" Diameter @ 20 threads per inch at hinge locations

Four (4) fasteners per hinge into 2" Sq. x 1/8" aluminum tubing

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DESIGN ANALYSIS FOR ANCHORS ONTO CONCRETE PILASTERS

$Fastener\ locations\ in\ relation\ with\ centroid, y_i = -18\ in, -6\ in, 6\ in\ \&\ 18\ in$

$\sum y_i^2 = (-18)^2 + (-6)^2 + (6)^2 + (18)^2 = 720\ in$

$Gravity\ Sag\ Moment, W_{SAG} = 1{,}080\ lbs * in\ (See\ page\ 7\ for\ reference)$

$Tension\ caused\ by\ gate\ sagging\ moment, T_{SAG} = \frac{W_{SAG} * y_i}{\sum y_i^2} = 27\ lbs$

$Tension\ per\ anchor, T_A = \frac{P_W}{4} = 29\ lbs$

$Max\ Tension, T_{MAX} = T_{SAG} + T_A = 27 + 29 = 56\ lbs$

$V_D = \frac{W_G}{4} = 12\ lbs\ per\ anchor$

$Anchor\ selection: Dewalt\ Screw - Bolt +$

$Diameter: 3/8"\ Diameter$

$Embedment\ Depth: 3 - 1/4"\ into\ CIP\ 4{,}000\ psi\ pilasters$

$Tension, T_{Allowable} = 2{,}265\ lbs\ based\ on\ f'c = 4{,}000\ psi$

$Shear, V_{Allowable} = 2{,}000\ lbs\ based\ on\ f'c = 4{,}000\ psi$

$$\frac{T}{T_{Allowable}} + \frac{V}{V_{Allowable}} = \frac{56}{2{,}265} + \frac{12}{2{,}000} = 0.03 + 0.06 = 0.09 \ldots less\ than\ 1.0 \ldots\ GOOD!$$

Use 3/8" dia. x 3 − 1/4" emb. depth Dewalt Screw − Bolt
+ anchor spaced at 12" on center along post to fasten onto concrete pilaster

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DESIGN ANALYSIS FOR ANCHORS ONTO CMU PILASTERS

$Fastener\ locations\ in\ relation\ with\ centroid, y_i = -18\ in, -6\ in, 6\ in\ \&\ 18\ in$

$\sum y_i^2 = (-18)^2 + (-6)^2 + (6)^2 + (18)^2 = 720\ in$

$Gravity\ Sag\ Moment, W_{SAG} = 1{,}080\ lbs * in\ (See\ page\ 7\ for\ reference)$

$Tension\ caused\ by\ gate\ sagging\ moment, T_{SAG} = \frac{W_{SAG} * y_i}{\sum y_i^2} = 27\ lbs$

$Tension\ per\ anchor, T_A = \frac{P_W}{4} = 29\ lbs$

$Max\ Tension, T_{MAX} = T_{SAG} + T_A = 27 + 29 = 56\ lbs$

$V_D = \frac{W_G}{4} = 12\ lbs\ per\ anchor$

$Anchor\ selection: Dewalt\ Screw - Bolt +$

$Diameter: 3/8"\ Diameter$

$Embedment\ Depth: 3 - 1/4"\ into\ grouted\ CMU\ pilasters$

$Tension, T_{Allowable} = 1{,}085$

$Shear, V_{Allowable} = 935\ lbs$

$$\frac{T}{T_{Allowable}} + \frac{V}{V_{Allowable}} = \frac{56}{1{,}085} + \frac{12}{935} = 0.05 + 0.01 = 0.06 \ldots less\ than\ 1.0 \ldots\ GOOD!$$

Use 3/8" dia. x 3 − 1/4" emb. depth Dewalt Screw − Bolt
+ anchor spaced at 12" on center along post to fasten onto grouted CMU pilaster

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DESIGN CHECK – Concrete Footing for Posts

$Lateral\ Bearing\ @\ Bottom, S_3 = F * S * D$

$Lateral\ Bearing\ @ \frac{D}{3}, S_1 = 0.33 * S_3$

$Area, A = \frac{2.34 * P}{B * S_1}$

$Required\ Depth, D = \frac{A}{2} * \left(1 + \sqrt{1 + \frac{4.36 * H}{A}}\right), for\ non-constrained$

$$Required\ Depth, D = \sqrt{\frac{4.25 * P * H}{B * S_3}}, for\ constrained$$

$Lateral\ Soil\ Bearing\ Capacity, S = 0.2 \frac{kips}{ft}$ $\quad$ $Refer\ to$ 2018 $IBC, Table$ 1806.2

$Isolated\ Pole\ Factor, F = 4$ $\quad$ $Refer\ to$ 2018 IBC 1806.3.4

TABLE 1806.2 PRESUMPTIVE LOAD-BEARING VALUES

CLASS OF MATERIALS	VERTICAL FOUNDATION PRESSURE (psf)	LATERAL BEARING PRESSURE (psf/ft below natural grade)	LATERAL SLIDING RESISTANCE	
			Coefficient of friction[a]	Cohesion (psf)[b]
1. Crystalline bedrock	12,000	1,200	0.70	—
2. Sedimentary and foliated rock	4,000	400	0.35	—
3. Sandy gravel and gravel (GW and GP)	3,000	200	0.35	—
4. Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, SC, GM and GC)	2,000	150	0.25	—
5. Clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CL, ML, MH and CH)	1,500	100	—	130

IBC 2018, Table 1806.2

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Non-Constrained

$Lateral\ Force\ @\ Top\ of\ Pole$ $\quad$ P = 0.217 kips

$Height\ of\ Pole\ Above\ Grade$ $\quad$ H = 4.00 ft

$Diameter\ of\ Pole's\ Footing$ $\quad$ B = 12 in

$Lateral\ Soil\ Bearing\ Capacity$ $\quad$ FS = 0.8 $\frac{kips}{ft}$

$First\ Trial\ Depth, D_1 = 2.00\ ft$

$Lateral\ Soil\ Bearing\ @\ D$ $\quad S_1 = 1.60\ \frac{kips}{sf}$

$Lateral\ Soil\ Bearing\ @ \frac{D}{3}$ $\quad S_3 = 0.53\ \frac{kips}{sf}$

$Constant \frac{2.34P}{BS_1}$ $\quad A = 0.50$

$Required\ Footing\ Depth$ $\quad D_{REQD} = 1.99\ ft$

$Trial\ 1\ldots D_1 = 2.00\ ft\ \ldots\ D_1 > D_{REQD}\ \ldots\ DEPTH\ WORKS!$

Use 12 in diameter x 24 in deep circular footings for 4′ W x 4′ H louvered fence & gates

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GENERAL INFORMATION

SCREW-BOLT+™

High Performance Screw Anchor

PRODUCT DESCRIPTION

The Screw-Bolt+ anchor is a one piece, heavy duty screw anchor with a finished hex head or flat head (countersunk). It is simple to install, easy to identify and fully removable. The patented thread design, designed for use with standard ANSI drill bits, reduces installation torque and enhances productivity. The steel threads along the anchor body tap into the hole during installation to provide keyed engagement and allow for reduced edge and spacing distances. The Screw-Bolt+ is available as bright zinc-plated or mechanically galvanized plating. Suitable base materials include normal-weight concrete, sand-lightweight concrete, concrete over steel deck, concrete masonry and solid clay brick.

GENERAL APPLICATIONS AND USES

- Racking, shelving and material handling
- Support ledgers and sill plate attachments
- Barriers, guards and temporary supports
- Glazing and window attachments
- Retrofits, repairs and maintenance
- Fencing and railing
- Cracked and uncracked concrete
- Seismic and wind loading

FEATURES AND BENEFITS

+ Designed for standard ANSI tolerance drill bits
+ Patented thread design offers toughened threads for tapping high strength concrete
+ Low installation torque in concrete and masonry
+ Universal product for concrete and grouted/solid masonry
+ Ratchet teeth on underside of hex washer head lock against the fixture
+ Can be installed closer to a free edge than traditional expansion anchors
+ Fully removable and reinstallable in same hole (see www.DEWALT.com)
+ Fast installation with powered impact wrench, but can also be installed manually
+ Diameter, length and identifying marking stamped on head of each anchor
+ One-piece, finished head design

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES), ESR-3889 for concrete.
- International Code Council, Evaluation Service (ICC-ES), ESR-4042 for masonry.
- Code Compliant with the International Building Code/International Residential Code: 2018 IBC/IRC, 2015 IBC/IRC, 2012 IBC/IRC, and 2009 IBC/IRC
- Tested in accordance with ACI 355.2, ASTM E488 and ICC-ES AC193 for use in structural applications in concrete under the design provisions of ACI 318 (Strength Design Method)
- Evaluated and qualified by an accredited independent testing laboratory for recognition in cracked and uncracked concrete including seismic and wind loading (Category 1 anchors)
- Evaluated and qualified by an accredited independent testing laboratory for sensitivity and reliability against brittle failure, e.g. hydrogen embrittlement

GUIDE SPECIFICATIONS

CSI Divisions: 03 16 00 - Concrete Anchors, 04 05 19.16 - Masonry Anchors and 05 05 19 - Post-Installed Concrete Anchors. Screw anchors shall be Screw-Bolt+ as supplied by DEWALT, Towson, MD. Anchors shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

MATERIAL SPECIFICATIONS

Anchor component		Specification
Anchor Body and hex washer head		Case hardened low carbon steel (see minimum strength properties on the next page)
Plating	Standard zinc plated version	Zinc plating according to ASTM B633, SC1 Type III (Fe/Zn 5). Minimum plating requirements for Mild Service Condition.
	Mechanically galvanized version	Mechanically Galvanized Zinc plating according to ASTM B695, Class 55

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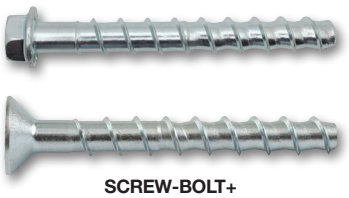

SCREW-BOLT+

HEAD STYLES

- Hex Washer Head or Flat Head

ANCHOR MATERIALS

- Zinc plated carbon steel or mechanically galvanized plating

ANCHOR SIZE RANGE (TYP.)

- 1/4" diameter through 3/4" diameter (see ordering information)

SUITABLE BASE MATERIALS

- Normal-weight concrete
- Lightweight concrete
- Concrete over steel deck
- Grouted Concrete Masonry (CMU)
- Brick Masonry

TENSION ZONE CRACKED CONCRETE
SEISMIC REGION QUALIFICATION
CODE LISTED ICC-ES ESR-3889 CONCRETE
CODE LISTED ICC-ES ESR-4042 MASONRY
DDA DEWALT DESIGN ASSIST
DUSTX+ ANCHOR INSTALLATION SYSTEM

NEW ENGINEERING

Allowable Load Capacities for Screw-Bolt+ in Normal-Weight Concrete[1,2,3,4,5]

Nominal Anchor Diameter in.	Minimum Nominal Embedment Depth in. (mm)	Minimum Concrete Compressive Strength									
		f'c = 2,500 psi (17.3 MPa)		f'c = 3,000 psi (20.7 MPa)		f'c = 4,000 psi (27.6 MPa)		f'c = 6,000 psi (41.4 MPa)		f'c = 8,000 psi (55.2 MPa)	
		Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)
1/4	1 (25)	330 (1.5)	415 (1.8)	350 (1.6)	440 (2.0)	385 (1.7)	480 (2.1)	430 (1.9)	520 (2.3)	430 (1.9)	520 (2.3)
	1-5/8 (41)	710 (3.2)	415 (1.8)	750 (3.3)	440 (2.0)	815 (3.6)	480 (2.1)	815 (3.6)	520 (2.3)	815 (3.6)	520 (2.3)
	2-1/2 (64)	915 (4.1)	505 (2.2)	965 (4.3)	535 (2.4)	1,050 (4.7)	585 (2.6)	1,070 (4.8)	635 (2.8)	1,070 (4.8)	635 (2.8)
3/8	1-1/2 (38)	660 (2.9)	890 (4.0)	720 (3.2)	975 (4.3)	835 (3.7)	1,125 (5.0)	1,020 (4.5)	1,375 (6.1)	1,020 (4.5)	1,590 (7.1)
	2 (51)	920 (4.1)	1,080 (4.8)	1,005 (4.5)	1,185 (5.3)	1,160 (5.2)	1,365 (6.1)	1,180 (5.2)	1,585 (7.1)	1,365 (6.1)	1,585 (7.1)
	3-1/4 (83)	1,855 (8.3)	1,580 (7.0)	2,035 (9.1)	1,735 (7.7)	2,265 (10.1)	2,000 (8.9)	2,265 (10.1)	2,140 (9.5)	2,590 (11.5)	2,140 (9.5)
	4-1/2 (114)	2,725 (12.1)	1,580 (7.0)	2,985 (13.3)	1,735 (7.7)	3,450 (15.3)	2,000 (8.9)	3,770 (16.8)	2,140 (9.5)	3,770 (16.8)	2,140 (9.5)
1/2	1-3/4 (44)	710 (3.2)	1,495 (6.7)	780 (3.5)	1,640 (7.3)	900 (4.0)	1,895 (8.4)	1,100 (4.9)	2,320 (10.3)	1,100 (4.9)	2,675 (11.9)
	2-1/2 (64)	1,670 (7.4)	2,010 (8.9)	1,830 (8.1)	2,200 (9.8)	2,115 (9.4)	2,540 (11.3)	2,115 (9.4)	2,885 (12.8)	2,115 (9.4)	2,885 (12.8)
	4-1/4 (108)	3,315 (14.7)	2,350 (10.5)	3,630 (16.1)	2,575 (11.5)	4,120 (18.3)	2,970 (13.2)	4,120 (18.3)	3,380 (15.0)	4,120 (18.3)	3,380 (15.0)
	5-1/2 (140)	3,935 (17.5)	2,350 (10.5)	4,310 (19.2)	2,575 (11.5)	4,975 (22.1)	2,970 (13.2)	5,330 (23.7)	3,380 (15.0)	5,330 (23.7)	3,380 (15.0)
5/8	2-1/2 (64)	1,435 (6.4)	2,655 (11.8)	1,570 (7.0)	2,910 (12.9)	1,815 (8.1)	3,355 (14.9)	2,220 (9.9)	4,110 (18.3)	2,220 (9.9)	4,295 (19.1)
	3-1/4 (83)	2,440 (10.9)	3,015 (13.4)	2,670 (11.9)	3,305 (14.7)	3,085 (13.7)	3,815 (17.0)	3,085 (13.7)	4,295 (19.1)	3,085 (13.7)	4,295 (19.1)
	5 (127)	3,615 (16.1)	3,420 (15.2)	3,960 (17.6)	3,745 (16.7)	4,570 (20.3)	4,325 (19.2)	4,825 (21.5)	4,870 (21.7)	5,570 (24.8)	4,870 (21.7)
	6-1/4 (159)	5,130 (22.8)	3,420 (15.2)	5,620 (25.0)	3,745 (16.7)	6,490 (28.9)	4,325 (19.2)	7,945 (35.3)	4,870 (21.7)	7,945 (35.3)	4,870 (21.7)
3/4	2-1/2 (64)	1,510 (6.7)	2,905 (12.9)	1,655 (7.4)	3,180 (14.1)	1,910 (8.5)	3,675 (16.3)	2,340 (10.4)	4,500 (20.0)	2,340 (10.4)	5,195 (23.1)
	4-1/4 (108)	2,975 (13.2)	4,265 (19.0)	3,260 (14.5)	4,670 (20.8)	3,765 (16.7)	5,395 (24.0)	4,435 (19.7)	6,070 (27.0)	5,125 (22.8)	6,070 (27.0)
	5 (127)	4,755 (21.2)	4,265 (19.0)	5,210 (23.2)	4,670 (20.8)	6,015 (26.8)	5,395 (24.0)	7,365 (32.8)	6,070 (27.0)	7,365 (32.8)	6,070 (27.0)
	6-1/4 (159)	5,125 (22.8)	4,265 (19.0)	5,615 (25.0)	4,670 (20.8)	6,480 (28.8)	5,395 (24.0)	7,940 (35.3)	6,070 (27.0)	7,940 (35.3)	6,070 (27.0)

1. Tabulated load values are for anchors installed in uncracked concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Allowable load capacities are calculated using an applied safety factor of 4.0 to average ultimate load capacities.
3. Allowable load capacities must be multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.
4. Linear interpolation may be used to determine allowable loads for intermediate embedments and compressive strengths.
5. For lightweight concrete multiply tabulated allowable load values by a reduction factor of 0.60.

EG ENGINEERING

Allowable Screw-Bolt+ Tension and Shear Load Capacities Installed into the face of Grout-Filled Concrete Masonry Units[1,2,3,4,5,6,7,8,9]

CODE LISTED
ICC-ES ESR-4042

Tension Load

Anchor Diameter, d in.	Minimum Embedment h_{nom} in. (mm)	Allowable Load at c_{cr} and s_{cr} lbs (kN)	Spacing Distance, s			Edge or End Distance, c_2 or c_1 (see Illustration of Screw-Bolt+ Installed into Grouted Concrete Masonry Wall detail)		
			Critical Distance, s_{cr} in. (mm)	Minimum Distance, s_{min} in. (mm)	Allowable Load Factor at s_{min}	Critical Distance, c_{cr} in. (mm)	Minimum Distance, c_{min} in. (mm)	Allowable Load Factor at c_{min}
1/4	1-5/8 (41)	315 (1.4)	4 (102)	2 (51)	1.00 (no reduction)	3-3/4 (95)	1-1/4 (32)	0.60
	2-1/2 (64)	605 (2.7)						
3/8	2 (51)	450 (2.0)	6 (152)	3 (76)	1.00 (no reduction)	6 (152)	1-1/2 (38)	0.70
	3-1/4 (83)	1,085 (4.8)						
1/2	2-1/2 (64)	610 (2.7)	8 (203)	4 (102)	1.00 (no reduction)	8 (203)	2-5/8 (67)	0.75
	4-1/4 (108)	1,190 (5.3)						
5/8	3-1/4 (83)	880 (3.9)	10 (254)	4 (102)	1.00 (no reduction)	10 (254)	3-3/8 (88)	0.90
	5 (127)	1,270 (5.6)						
3/4	4 (102)	1,150 (5.1)	12 (305)	4 (102)	1.00 (no reduction)	12 (305)	4 (102)	1.00 (no reduction)
	6-1/4 (159)	1,355 (6.0)						

Shear Load

Anchor Diameter, d in.	Minimum Embedment h_{nom} in. (mm)	Allowable Load at c_{cr} and s_{cr} Direction 1 & 2 lbs[9] (kN)	Allowable Load at c_{cr} and s_{cr} Direction 3 & 4 lbs[9] (kN)	Spacing Distance, s			Edge or End Distance, c_2 or c_1 (see Illustration of Screw-Bolt+ Installed into Grouted Concrete Masonry Wall)			
				Critical Distance, s_{cr} in. (mm)	Minimum Distance, s_{min} in. (mm)	Allowable Load Factor at s_{min}	Critical Distance, c_{cr} in. (mm)	Minimum Distance, c_{min} in. (mm)	Allowable Load Factor at c_{min}	
									Load Perpendicular to Edge or End (Direction 1 & 2)[9]	Load Perpendicular to Edge or End (Direction 3 & 4)[9]
1/4	1-5/8 (41)	400 (1.8)	400 (1.8)	4 (102)	2 (51)	1.00 (no reduction)	3-3/4 (95)	1-1/4 (32)	0.35	1.00 (no reduction)
	2-1/2 (64)	505 (2.2)	505 (2.2)							
3/8	2 (51)	815 (3.6)	815 (3.6)	6 (152)	3 (76)	1.00 (no reduction)	6 (152)	1-1/2 (38)	0.27	1.00 (no reduction)
	3-1/4 (83)	935 (4.2)	935 (4.2)							
1/2	2-1/2 (64)	1,380 (6.1)	1,380 (6.1)	8 (203)	4 (102)	1.00 (no reduction)	8 (203)	2-5/8 (67)	0.20	1.00 (no reduction)
	4-1/4 (108)	2,180 (9.7)	2,180 (9.7)							
5/8	3-1/4 (83)	2,090 (9.3)	2,225 (9.9)	10 (254)	4 (102)	1.00 (no reduction)	10 (254)	3-3/8 (86)	0.23	1.00 (no reduction)
	5 (127)	2,640 (11.7)	2,640 (11.7)							
3/4	4 (102)	2,800 (12.5)	3,330 (14.8)	12 (305)	4 (102)	1.00 (no reduction)	12 (305)	4 (102)	0.25	1.00 (no reduction)
	6-1/4 (159)	3,100 (13.8)	3,685 (16.4)							

For SI: 1 inch = 25.4 mm; 1 lbs = 0.0044 kN, 1 psi = 0.006894 MPa.

1. All values are for anchors installed in fully grouted concrete masonry wall construction with materials meeting minimum compressive strength, f'm, of 1,500 psi (10.3 MPa). Concrete masonry units must be light-, medium, or normal-weight conforming to ASTM C90. Allowable loads are based on a safety factor of 5.0.
2. Anchors may be installed in any location in the face of the masonry wall (cell, web, bed joint) except within 1-1/4-inch from the of the vertical mortar joint (head joint), center-to-center, provided the minimum edge and end distances are maintained. Anchors may not be placed in the head joint unless the vertical joint is mortared full-depth.
3. A maximum of two anchors may be installed in a single masonry cell in accordance with the spacing and edge or end distance requirements. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor. See the figure for Illustration of Screw-Bolt+ Anchors Installed into Grouted Concrete Masonry Wall.
4. The critical spacing distance, s_{cr}, is the anchor spacing where full load values in the table may be used. The minimum spacing distance, s_{min}, is the minimum anchor spacing for which values are available and installation is permitted. Spacing distance is measured from the centerline to centerline between two anchors.
5. The critical edge or end distance, c_{cr}, is the distance where full load values in the table may be used. The minimum edge or end distance, c_{min}, is the minimum distance for which values are available and installation is permitted. Edge or end distance is measured from anchor centerline to the closest unrestrained edge.
6. The tabulated values are applicable for anchors installed into the ends of grout-filled concrete masonry units (e.g. wall opening) where minimum edge distances are maintained.
7. Load values for anchors installed less than s_{cr} and c_{cr} must be multiplied by the appropriate load reduction factor based on actual spacing (s) or edge distance (c). Load factors are multiplicative; both spacing and edge reduction factors must be considered.
8. Linear interpolation of load values between minimum spacing (s_{min}) and critical spacing (s_{cr}) and between minimum edge or end distance (c_{min}) and critical edge or end distance (c_{cr}) is permitted.
9. See the figure for Direction of Shear Loading in Relation to Edge and End of Masonry Wall figure for illustration of shear load directions.

ENGINEERING

GENERAL INFORMATION

DRILIT®

Self-Drilling Screws

PRODUCT DESCRIPTION

Drilit® self-drilling fasteners eliminate separate drilling and tapping operations for faster, more economical installations.

GENERAL APPLICATIONS AND USES

- Steel Framing
- Steel Decking
- Purlins and Girt
- HVAC and Ductwork
- Fastening Accessories to Steel Framing
- Fastening Plywood Subfloor to Steel Framing

FEATURES AND BENEFITS

+ Eliminates separate drilling and tapping operations
+ Fasteners coated with Stalgard® typically show no red rust or other base metal corrosion on significant surfaces after 1000 hours of salt spray exposure in accordance with ASTM B117
+ Stalgard® coating provides improved corrosion resistance compared with fasteners with standard zinc plating
+ Screws with EPDM Bonded Sealing washers are available in multiple sizes and configurations for applications requiring a weather-tight seal
+ Fasteners coated with Stalgard® are compatible with ACQ-treated lumber with a maximum retention of 0.4 pcf and CA-B treated lumber with a maximum retention of 0.3 pcf

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES), ESR-3294
- International Code Council, Evaluation Service (ICC-ES), ESR-4367
- Code compliant with the International Building Code/International Residential Code: 2021 IBC/IRC, 2018 IBC/IRC, 2015 IBC/IRC, and 2012 IBC/IRC
- Tested in accordance with ICC-ES AC118 for use in Steel-to-Steel Connections
- Tested in accordance with ICC-ES AC500 for attaching Miscellaneous Building Materials to Steel
- City of Los Angeles, LABC & LARC Supplement (within ICC-ES evaluation reports)
- Florida Building Code Supplement including HVHZ (within ICC-ES evaluation reports)

GUIDE SPECIFICATIONS

05 05 23 - Metal Fastenings, 06 05 23 - Wood, Plastic and Composite Fastenings, 09 22 16.23 - Fasteners. Fasteners shall be Drilit self-drilling screws as supplied by DEWALT, Towson, MD. Fasteners shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

MATERIAL SPECIFICATIONS

Fastener Component		Specification
Fastener		Case hardened carbon steel
Plating/Coating	Zinc	Zinc plating according to ASTM B633, SC1 Type III (Fe/Zn 5). Minimum plating requirements for Mild Service Condition
	Stalgard[1]	Stalgard coating 1,000 hour rating in ASTM B117 salt spray test
1. Stalgard is silver in color unless otherwise noted.		

SECTION CONTENTS

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FASTENER MATERIALS

- Carbon Steel

HEAD STYLES

- Hex Washer Head
- Pan Head
- Wafer Head
- Flat Head

DIAMETERS

- #6, #8, #10, #12
- 1/4", 5/16"

FINISH

- Stalgard®
- Zinc

DRILL POINT TYPES

- #1, #2, # 3, #4, #4.5, #5

FASTENER STYLES

- Standard Drill Screws
- Drill Screws with Extended Drilling Capacity
- Drill Screws with Bonded Sealing Washer
- Drill Screws for Wood-to-Metal Applications

CODE LISTED
ICC-ES ESR-3294
STEEL-TO-STEEL

CODE LISTED
ICC-ES ESR-4367
WOOD-TO-STEEL

ENGINEERING

PERFORMANCE DATA

Fastener Strengths[1,2,3,4,5,6,7]

Description	Tension (lbf)			Shear (lbf)			Minimum Torsional Strength (In-lbs)
	Ultimate	ASD	LRFD	Ultimate	ASD	LRFD	
#6-20	1,345	450	675	815	270	410	24
#8-18	1,615	535	805	1,100	365	550	42
#10-16	2,670	890	1,335	1,675	555	835	61
#10-24	2,635	875	1,315	1,570	520	785	65
#12-14	3,210	1,070	1,605	1,785	595	890	92
#12-24	3,550	1,180	1,775	2,185	725	1,090	100
1/4"-14	5,020	1,670	2,510	2,305	765	1,150	150
1/4"-20	5,190	1,730	2,595	2,980	990	1,490	168
5/16"-18	8,710	2,900	4,355	4,720	1,570	2,360	438

1. Ultimate strengths are based on laboratory tests.
2. Allowable (ASD) strengths are based on a safety factor ,Ω, of 3.0 in accordance with ICC-ES AC118 and AISI S100-16.
3. Design (LRFD) strengths are based on a resistance factor, ϕ, of 0.50 in accordance with ICC-ES AC118 and AISI S100-16.
4. For ASD tension connections, the lower of the ASD tension strength, ASD pull-out strength and ASD pull-over strength must be used for design.
5. For LRFD tension connections, the lower of the LRFD tension strength, LRFD pull-out strength and LRFD pull-over strength must be used for design.
6. For ASD shear connections, the lower of the ASD Shear (Bearing) Capacity and the ASD Fastener Shear Strength must be used for design.
7. For LRFD shear connections, the lower of the LRFD Shear (Bearing) Capacity and the LRFD Fastener Shear Strength must be used for design.

Ultimate Shear (Bearing) Capacity of Screw Connections, lbf[1,3]

Description	Point Type	Steel Thickness (Lapped Sheets/Bars)								
		26-26 Ga.	24-24 Ga.	22-22 Ga.	20-20 Ga.	18-18 Ga.	16-16 Ga.	14-14 Ga.	12-12 Ga.	1/8"-1/8"
#6-20	#2	170 [2]	260 [2]	365 [2]	480 [2]	740 [2]	-	-	-	-
#8-18	#2	300	500	540	740	1,045	-	-	-	-
#10-16	#1	400	585	670	880	1,330	-	-	-	-
#10-16	#3	200 [2]	460	520	730	1,250	1,520	1,670	-	-
#10-24	#2	200 [2]	305 [2]	430 [2]	565 [2]	865 [2]	-	-	-	-
#12-14	#1	435	715	760	1,030	1,545	-	-	-	-
#12-14	#3	210 [2]	325 [2]	455 [2]	775	1,360	1,620	1,970	1,990	-
#12-24	#4	-	-	-	-	-	1,430	1,930	2,455	2,570
#12-24	#4.5	-	-	-	-	-	1,385	1,920	2,170	2,255
#12-24	#5	-	-	-	-	-	1,350	1,825	2,150	2,225
1/4"-14	#1	515	860	890	1,300	1,770	-	-	-	-
1/4"-14	#3	225 [2]	350 [2]	490 [2]	930	1,445	2,100	2,580	2,650	-
1/4"-20	#5	-	-	-	-	-	1,655	2,275	-	3,210

1. Ultimate strengths are based on laboratory tests unless otherwise noted.
2. Ultimate strengths were calculated in accordance with AISI S100-16 based on steel with a minimum tensile strength of F_u = 45 ksi.
3. Ultimate load capacities must be reduced by a minimum safety factor to determine allowable loads (ASD) or by a load resistance factor to determine strength design capacities (LRFD).

Allowable (ASD) and Design (LRFD) Shear (Bearing) Capacity of Screw Connections, lbf[1,2,3,4]

Description	Point Type	Material Thickness																	
		26-26 Ga.		24-24 Ga.		22-22 Ga.		20-20 Ga.		18-18 Ga.		16-16 Ga.		14-14 Ga.		12-12 Ga.		1/8"-1/8"	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
#6-20	#2	55	80	85	130	120	180	155	235	245	365	-	-	-	-	-	-	-	-
#8-18	#2	100	150	165	250	180	270	245	370	345	520	-	-	-	-	-	-	-	-
#10-16	#1	130	200	195	290	220	335	290	440	440	665	-	-	-	-	-	-	-	-
#10-16	#3	65	100	150	230	170	260	240	365	415	625	505	760	555	835	-	-	-	-
#10-24	#2	65	100	100	155	145	215	190	285	290	435	405	605	-	-	-	-	-	-
#12-14	#1	145	215	235	355	250	380	340	515	515	770	-	-	-	-	-	-	-	-
#12-14	#3	70	105	105	165	150	230	255	385	450	680	540	810	655	985	660	995	-	-
#12-24	#4	-	-	-	-	-	-	-	-	-	-	475	715	640	965	815	1,225	855	1,285
#12-24	#4.5	-	-	-	-	-	-	-	-	-	-	460	690	640	960	720	1,085	750	1,125
#12-24	#5	-	-	-	-	-	-	-	-	-	-	450	675	605	910	715	1,075	740	1,110
1/4"-14	#1	170	255	285	430	295	445	430	650	590	885	-	-	-	-	-	-	-	-
1/4"-14	#3	75	110	115	175	160	245	310	465	480	720	700	1,050	860	1,290	880	1,325	-	-
1/4"-20	#5	-	-	-	-	-	-	-	-	-	-	550	825	755	1,135	-	-	1,070	1,605

1. Allowable (ASD) strengths are based on a safety factor ,Ω, of 3.0 in accordance with ICC-ES AC118 and AISI S100-16.
2. Design (LRFD) strengths are based on a resistance factor, ϕ, of 0.50 in accordance with ICC-ES AC118 and AISI S100-16.
3. For ASD shear connections, the lower of the ASD Shear (Bearing) Capacity and the ASD Fastener Shear Strength must be used for design.
4. For LRFD shear connections, the lower of the LRFD Shear (Bearing) Capacity and the LRFD Fastener Shear Strength must be used for design.

ENGINEERING

Ultimate Tension Pull-Out Capacity of Screw Connections, lbf[1,3]

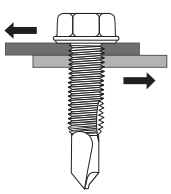
Description	Point Type	Thickness of Steel Not in Contact with Screw Head													
		26 Ga.	24 Ga.	22 Ga.	20 Ga.	18 Ga.	16 Ga.	14 Ga.	12 Ga.	0.12	1/8"	3/16"	1/4"	5/16"	3/8"
#6-20	#2	95 [2]	125 [2]	155 [2]	190 [2]	250 [2]	315 [2]	395 [2]	-	-	-	-	-	-	-
#8-18	#2	120	195	265	300	490	700	960	-	-	-	-	-	-	-
#10-16	#1	150	240	315	360	565	825	1,090	-	-	-	-	-	-	-
#10-16	#2	130	205	270	300	420	550	660	1,125	-	-	-	-	-	-
#10-16	#3	130	205	270	300	420	550	660	1,125	-	-	-	-	-	-
#10-24	#2	130 [2]	175 [2]	220 [2]	260 [2]	345 [2]	435 [2]	545 [2]	760 [2]	-	-	-	-	-	-
#10-24	#3	130 [2]	175 [2]	220 [2]	260 [2]	345 [2]	435 [2]	545 [2]	760 [2]	-	-	-	-	-	-
#10-24	#3 w/wings	-	-	-	-	-	535	-	-	-	1,500	-	-	-	-
#12-14	#1	160	260	330	390	640	920	1,260	-	-	-	-	-	-	-
#12-14	#3	140	210	295	345	580	765	1,075	1,550	1,955	-	-	-	-	-
#12-24	#4 w/wings	-	-	-	-	585	-	-	-	-	1,605	-	2,085	-	-
#12-24	#4	-	-	-	310	450	495 [2]	620 [2]	865 [2]	990 [2]	1,415	3,235	3,770	-	-
#12-24	#4.5	-	-	-	310	450	495 [2]	620 [2]	865 [2]	990 [2]	1,415	3,235	3,770	-	4,125
#12-24	#5	-	-	-	310	450	495 [2]	620 [2]	865 [2]	990 [2]	1,415	3,235	3,770	-	4,125
1/4"-14	#1	225	340	430	570	800	1,165	-	-	-	-	-	-	-	-
1/4"-14	#3	150	235	300	340	700	890	1,160	1,795	2,120	-	-	-	-	-
1/4"-20	#4 w/wings	-	-	-	-	-	535	-	-	-	1,670	-	4,065	4,170	-
1/4"-20	#5	-	-	-	345 [2]	460 [2]	575 [2]	720 [2]	1,005 [2]	1,150 [2]	1,550	-	4,825	5,285	5,400
5/16"-18	#3	-	-	-	455	565	1,205	1,710	2,420	2,600	-	3,715	5,120	-	-

1. Ultimate strengths are based on laboratory tests unless otherwise noted.
2. Ultimate strengths were calculated in accordance with AISI S100-16 based on steel with a minimum tensile strength of $F_u = 45$ ksi.
3. Ultimate load capacities must be reduced by a minimum safety factor to determine allowable loads (ASD) or by a load resistance factor to determine strength design capacities (LRFD).

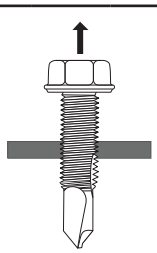
Allowable Tension Pull-Out Capacity of Screw Connections, lbf[1,2]

Description	Point Type	Thickness of Steel Not in Contact with Screw Head													
		26 Ga.	24 Ga.	22 Ga.	20 Ga.	18 Ga.	16 Ga.	14 Ga.	12 Ga.	0.12	1/8"	3/16"	1/4"	5/16"	3/8"
#6-20	#2	30	40	50	60	80	105	115	-	-	-	-	-	-	-
#8-18	#2	40	65	85	100	160	230	320	-	-	-	-	-	-	-
#10-16	#1	50	80	105	120	185	275	360	-	-	-	-	-	-	-
#10-16	#2	40	65	90	100	140	180	220	375	-	-	-	-	-	-
#10-16	#3	40	65	90	100	140	180	220	375	-	-	-	-	-	-
#10-24	#2	40	55	70	85	115	145	180	250	-	-	-	-	-	-
#10-24	#3	40	55	70	85	115	145	180	250	-	-	-	-	-	-
#10-24	#3 w/wings	-	-	-	-	-	175	-	-	-	500	-	-	-	-
#12-14	#1	50	85	110	130	210	305	420	-	-	-	-	-	-	-
#12-14	#3	45	70	95	115	190	255	355	515	650	-	-	-	-	-
#12-24	#4 w/wings	-	-	-	-	-	195	-	-	-	535	-	695	-	-
#12-24	#4	-	-	-	100	150	165	205	290	330	470	1,075	1,255	-	-
#12-24	#4.5	-	-	-	100	150	165	205	290	330	470	1,075	1,255	-	1,375
#12-24	#5	-	-	-	100	150	165	205	290	330	470	1,075	1,255	-	1,375
1/4"-14	#1	75	110	140	190	265	385	-	-	-	-	-	-	-	-
1/4"-14	#3	50	75	100	110	230	295	385	595	705	-	-	-	-	-
1/4"-20	#4 w/wings	-	-	-	-	-	175	-	-	-	555	-	1,355	1,390	-
1/4"-20	#5	-	-	-	115	155	190	240	335	385	515	-	1,605	-	1,800
5/16"-18	#3	-	-	-	150	185	400	570	805	865	-	1,235	1,705	-	-

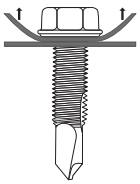
1. Allowable (ASD) strengths are based on a safety factor ,Ω, of 3.0 in accordance with ICC-ES AC118 and AISI S100-16.
2. For ASD tension connections, the lower of the ASD tension strength, ASD pull-out strength and ASD pull-over strength must be used for design.



Shearing (Bearing)



Tension Pull-Out



Pull-Over

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