| Spec. Sec. 05 4000 | Material<br>Cold-Formed Metal Framing | Manufacturer | Description |
|---|---|---|---|
| | 2 ½" x 16 Ga (1 5/8" Fl) Stud | CEMCO | Item #1 |
| | 3 5/8" x 16 Ga (1 5/8" Fl) Stud | CEMCO | Item #1 |
| | 3 5/8" x 16 Ga (2" Fl) Stud | CEMCO | Item #1 |
| | 3 5/8" x 18Ga (1 5/8" Fl) Stud | CEMCO | Item #1 |
| | 4" x 16 Ga (1 5/8" Fl) Stud | CEMCO | Item #1 |
| | 4" x 16 Ga (2" Fl) Stud | CEMCO | Item #1 |
| | 6" x 14 Ga (1 5/8" Fl) Stud | CEMCO | Item #1 |
| | 6" x 16 Ga (1 5/8" Fl) Stud | CEMCO | Item #1 |
| | 6" x 16 Ga (2" Fl) Stud | CEMCO | Item #1 |
| | 6" x 18 Ga (1 5/8" Fl) Stud | CEMCO | Item #1 |
| | 8" x 16Ga 1 5/8" Fl Stud | CEMCO | Item #1 |
| | 10" x 16 Ga (1 1/2" Fl) Stud | CEMCO | Item #1 |
| | 10" x 16 Ga (2" Fl) Stud | CEMCO | Item #1 |
| | 2 1/2" x 14 Ga (1 ½" Fl) Track | CEMCO | Item #2 |
| | 3 5/8" x 16 Ga (1 ½" Fl) Track | CEMCO | Item #2 |
| | 3 5/8" x 18Ga (1 ½" Fl) Track | CEMCO | Item #2 |
| | 4" x 16 Ga (1 ½" Fl) Track | CEMCO | Item #2 |
| | 6" x 16 Ga (1 ½" Fl) Track | CEMCO | Item #2 |
| | 6" x 18 Ga (1 ½" Fl) Track | CEMCO | Item #2 |
| | 6" x 18 Ga (1 ¼" Fl) Track | CEMCO | Item #2 |
| | 8" x 16Ga (1 ½" Fl) Track | CEMCO | Item #2 |
| | 10" x 16 Ga (1 1/2" Fl) Track | CEMCO | Item #2 |
| | 6" 16Ga Notch Track | CEMCO | Item #3 |
| | 6" 18Ga Notch Track | CEMCO | Item #3 |
| | 3 5/8" 16Ga Slotted track | CEMCO | Item #4 |

| | | | |
|---|---|---|---|
| | 6” 16Ga Slotted Track | CEMCO | Item #4 |
| | 8” 16Ga Slotted Track | CEMCO | Item #4 |
| | 3 5/8” 18Ga Slotted Track | CEMCO | Item #4 |
| | 6” 18Ga Slotted Track | CEMCO | Item #4 |
| | 1 ½” x 1 ½” x 16 Ga Angle | CEMCO | Item #5 |
| | 2” x 2” x 16 Ga Angle | CEMCO | Item #5 |
| | 3” x 3” x 16 Ga Angle | CEMCO | Item #5 |
| | 2” x 2” x 12 Ga Angle | CEMCO | Item #5 |
| | 4” x 16 Ga Flat Strap | CEMCO | Item #6 |
| | 6” 12Ga Flat Strap | CEMCO | Item #6 |
| | 6” 16Ga Flat Strap | CEMCO | Item #6 |
| | 6” 18Ga Flat Strap | CEMCO | Item #6 |
| | 1 ½” x 16 Ga Cold Rolled Channel | CEMCO | Item #7 |
| | Z Metal Furring Channel | CEMCO | Item #8 |
| | DriftTrak DTSLB | The Steel Network | Item #9 |
| | Hilti Screws, Fasteners & Anchors | Hilti | Item #10 |

# ITEM #1

**Corporate Headquarters**
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**Fax:** 626.330.7598

**Manufacturing Facilities**
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**Structural Engineering/Design**
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Pittsburg, CA 94565
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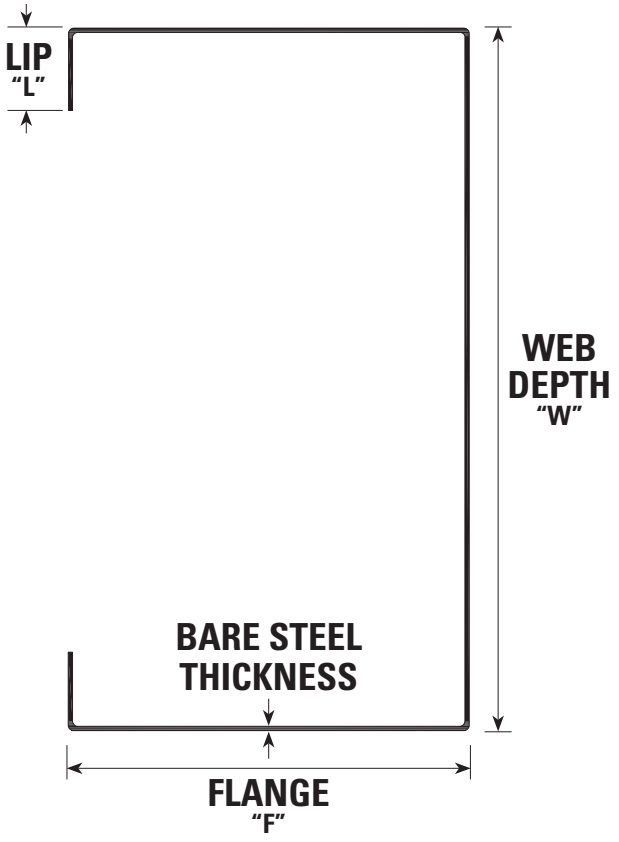
**Technical Services**
263 North Covina Lane
City of Industry, CA 91744
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# 250S162-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

250S162-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 250S162-54 | 0.0566 | 0.0538 | 50 | G60[3] | 2-1/2 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

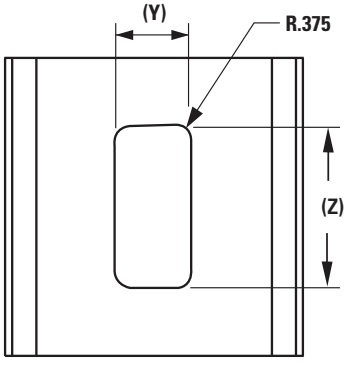
### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (in)[2] | Weight (lb/ft) | Ix (in)[3] | Sx (in)[3] | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 (in)[4] | Cw (in)[6] | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.358 | 1.22 | 0.370 | 0.284 | 9.42 | 2353 | 565 | 55.4 | 33.9 | 15.84 | 0.383 | 0.223 | -1.443 | 0.845 | 1.868 | 0.403 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed Kϕ = 0.

## Technical Services

Technical Services: 800.416.2278
Structural Engineering/Design: 925.473.9340
www.cemcosteel.com

This technical information reflects the most current information available and supersedes any and all previous publications effective August 1, 2016.

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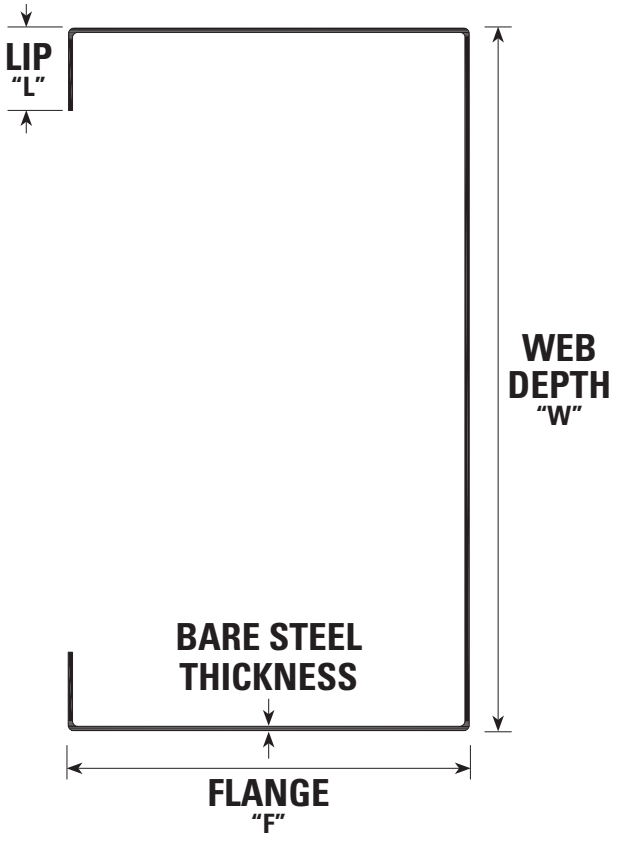
**Fax:** 626.249.5005

# 362S162-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

362S162-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 362S162-54 | 0.0566 | 0.0538 | 50 | G60[3] | 3-5/8 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

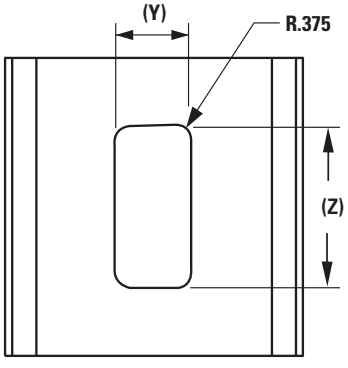
### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.422 | 1.44 | 0.873 | 0.444 | 13.28 | 3372 | 1016 | 50 | 34.4 | 22.65 | 0.451 | 0.457 | -1.283 | 0.774 | 2.020 | 0.597 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed $K\phi = 0$.

## Technical Services

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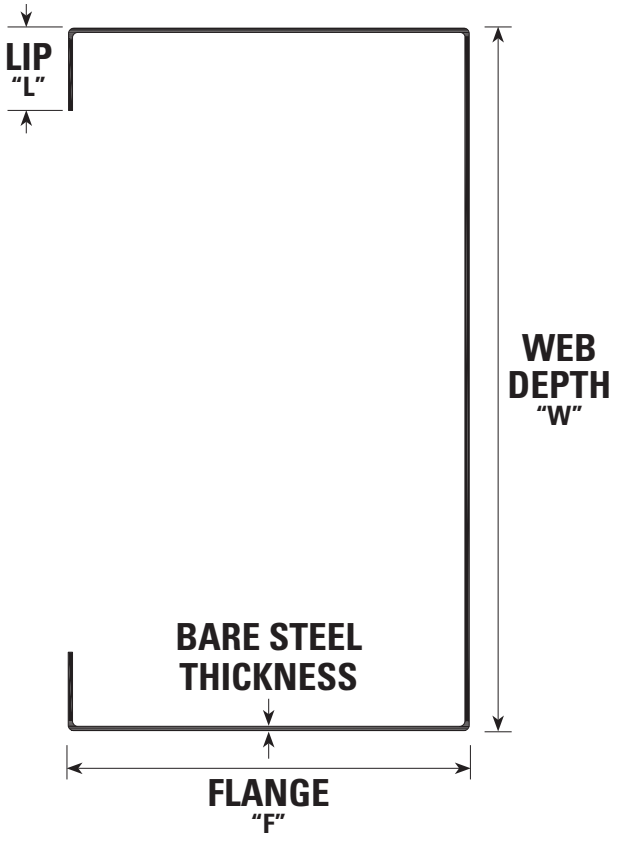
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# 362S200-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

362S200-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 362S200-54 | 0.0566 | 0.0538 | 50 | G60[3] | 3-5/8 | 2 | 5/8 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
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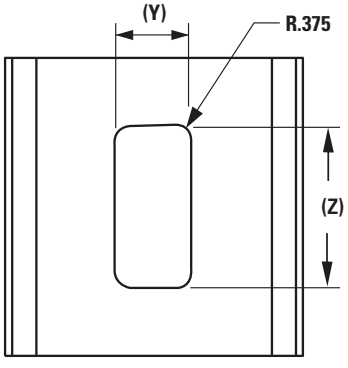
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (in)[2] | Weight (lb/ft) | Ix (in)[3] | Sx (in)[3] | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 (in)[4] | Cw (in)[6] | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.479 | 1.63 | 1.030 | 0.49 | 14.66 | 3372 | 1016 | 50 | 43.3 | 25.83 | 0.511 | 0.896 | -1.715 | 1.016 | 2.382 | 0.482 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed $K\phi = 0$.

## Technical Services

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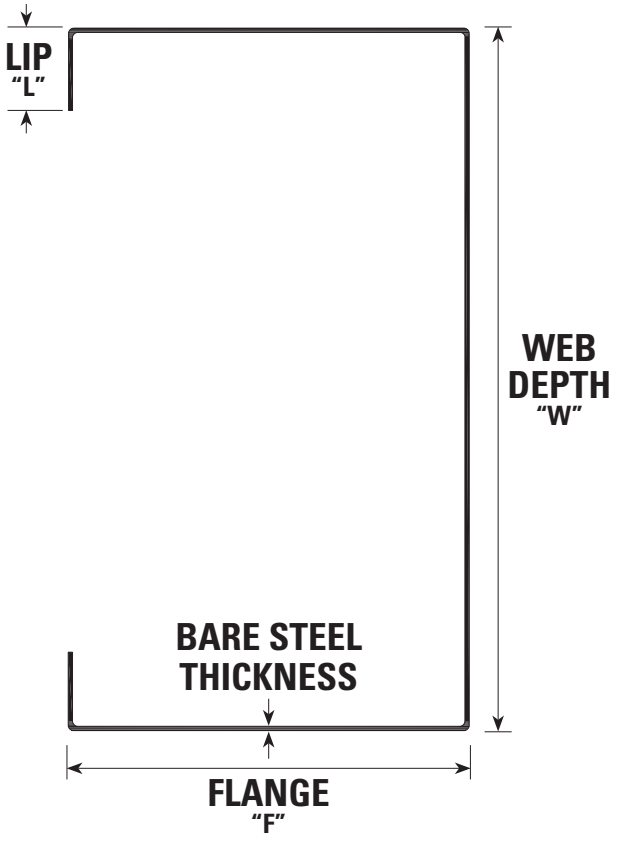
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# 362S162-43 C-STUDS 43 MIL. (18 GA. STRUCTURAL)

## Geometric Properties

362S162-43 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 362S162-43 | 0.0451 | 0.0428 | 33 | G60[3] | 3-5/8 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 43-mil: Yellow

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
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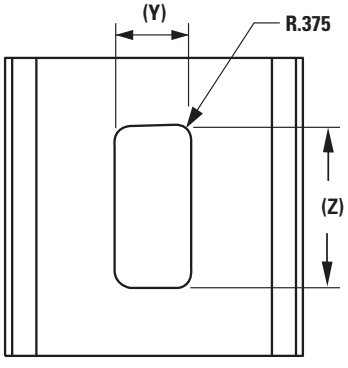
### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0451 | 0.340 | 1.16 | 0.710 | 0.372 | 7.34 | 1739 | 676 | 33.0 | 42.5 | 12.73 | 0.230 | 0.376 | -1.297 | 0.782 | 2.036 | 0.594 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed $K\phi = 0$.

## Technical Services

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Expanding Your Solutions

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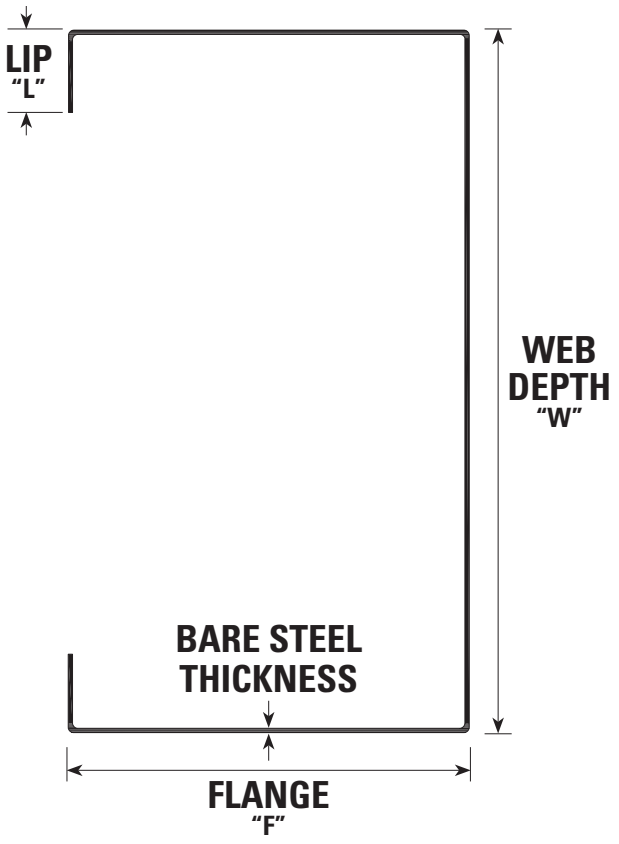
# 400S162-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

400S162-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 400S162-54 | 0.0566 | 0.0538 | 50 | G60[3] | 4 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
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- ATI CCRR-0224
- 2012 AISI
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### LEED v3 for Building and Design Construction

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- MR Credit 4: Recycled Content.

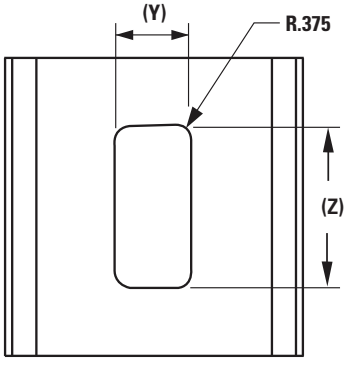
### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (in)[2] | Weight (lb/ft) | Ix (in)[3] | Sx (in)[3] | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 (in)[4] | Cw (in)[6] | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.443 | 1.51 | 1.098 | 0.498 | 14.9 | 3372 | 1223 | 50 | 34.1 | 25.47 | 0.473 | 0.560 | -1.238 | 0.754 | 2.090 | 0.649 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed Kϕ = 0.

## Technical Services

Technical Services: 800.416.2278
Structural Engineering/Design: 925.473.9340
www.cemcosteel.com

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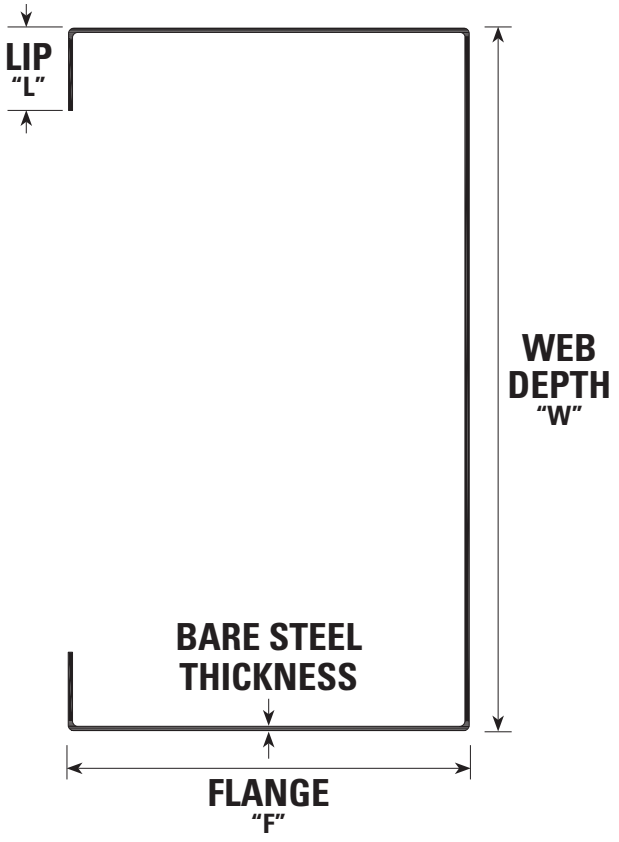
City of Industry, CA 91744
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# 400S200-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

400S200-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 400S200-54 | 0.0566 | 0.0538 | 50 | G60[3] | 4 | 2 | 5/8 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

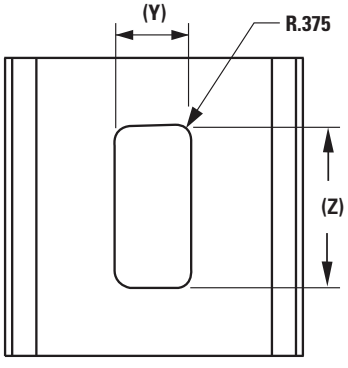
### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (in)[2] | Weight (lb/ft) | Ix (in)[3] | Sx (in)[3] | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 (in)[4] | Cw (in)[6] | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.500 | 1.70 | 1.292 | 0.549 | 16.43 | 3372 | 1223 | 50 | 42.9 | 28.88 | 0.534 | 1.083 | -1.662 | 0.993 | 2.433 | 0.534 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed Kϕ = 0.

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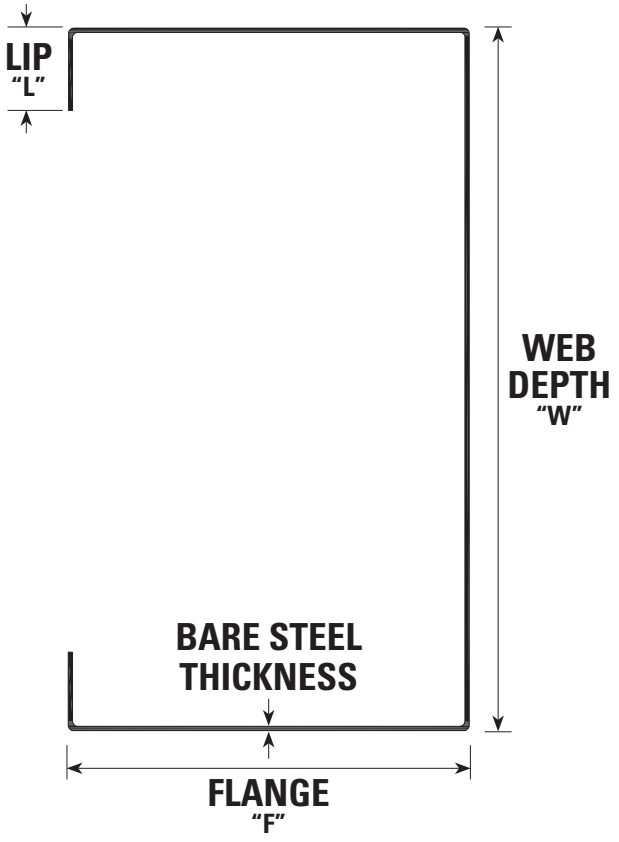
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# 600S162-68 C-STUD 68 MIL (14 GA. STRUCTURAL)

## Geometric Properties

600S162-68 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 600S162-68 | 0.0713 | 0.0677 | 50 | G60[3] | 6 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 68-mil: Orange

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

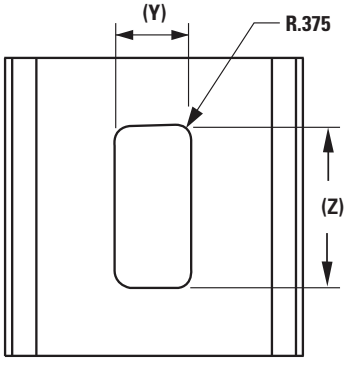
### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0713 | 0.693 | 2.36 | 3.525 | 1.164 | 39.47 | 5350 | 2879 | 56.6 | 30.8 | 59.60 | 1.174 | 1.626 | -1.032 | 0.655 | 2.543 | 0.835 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed $K\phi = 0$.

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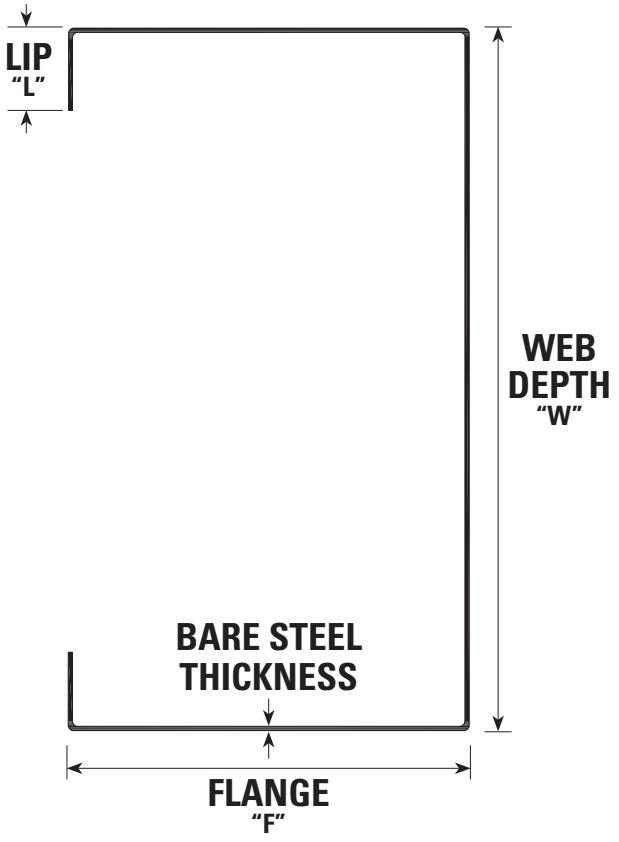
**Fax:** 626.249.5005

# 600S162-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

600S162-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 600S162-54 | 0.0566 | 0.0538 | 50 | G60[3] | 6 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
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### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
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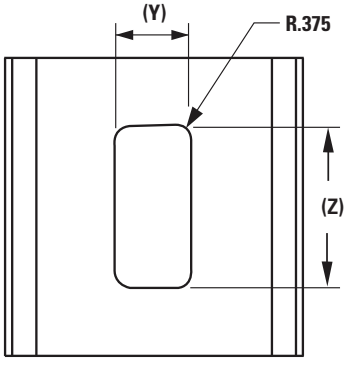
### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (in)[2] | Weight (lb/ft) | Ix (in)[3] | Sx (in)[3] | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 (in)[4] | Cw (in)[6] | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.556 | 1.89 | 2.860 | 0.916 | 30.33 | 2823 | 1947 | 55.3 | 31.4 | 43.25 | 0.594 | 1.337 | -1.049 | 0.663 | 2.562 | 0.832 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed Kϕ = 0.

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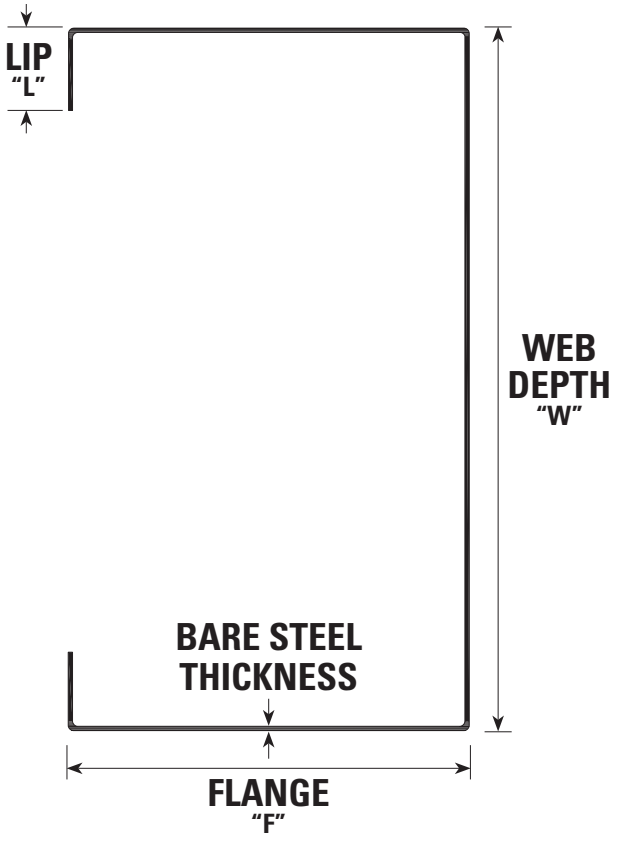
# 600S200-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

600S200-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 600S200-54 | 0.0566 | 0.0538 | 50 | G60[3] | 6 | 2 | 5/8 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
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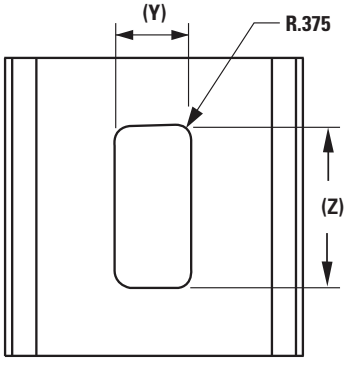
- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (in)[2] | Weight (lb/ft) | Ix (in)[3] | Sx (in)[3] | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 (in)[4] | Cw (in)[6] | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.613 | 2.09 | 3.319 | 1.015 | 30.4 | 2823 | 1947 | 50 | 41.6 | 45.71 | 0.655 | 2.493 | -1.432 | 0.887 | 2.829 | 0.744 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed $K\phi = 0$.

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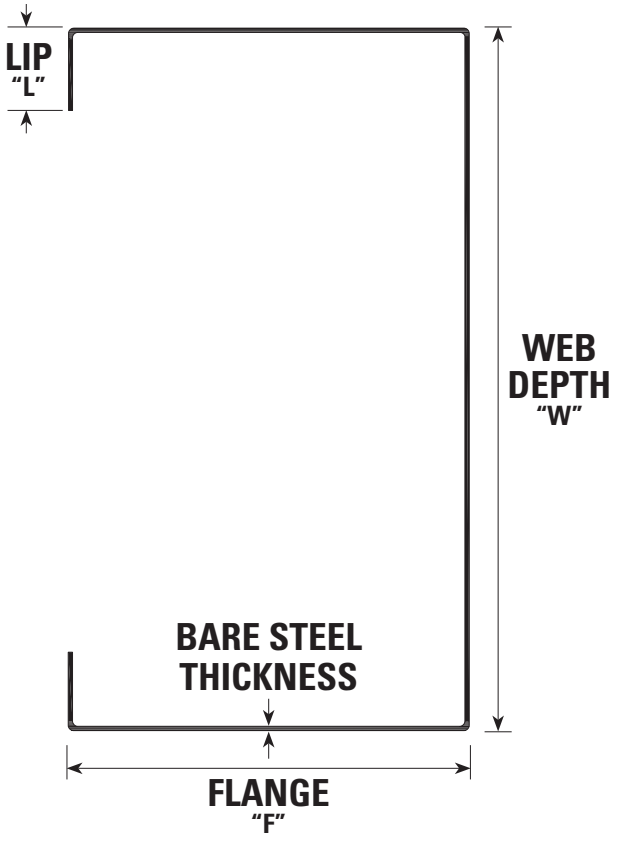
# 600S162-43 C-STUDS 43 MIL. (18 GA. STRUCTURAL)

## Geometric Properties

600S162-43 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 600S162-43 | 0.0451 | 0.0428 | 33 | G60[3] | 6 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 43-mil: Yellow

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
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### LEED v3 for Building and Design Construction

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- MR Credit 4: Recycled Content.

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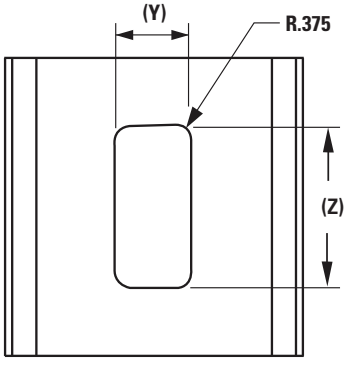
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 33 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0451 | 0.447 | 1.52 | 2.316 | 0.767 | 16.68 | 1416 | 1240 | 36.3 | 39 | 24.16 | 0.303 | 1.095 | -1.062 | 0.670 | 2.577 | 0.830 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed $K\phi = 0$.

## Technical Services

Technical Services: 800.416.2278
Structural Engineering/Design: 925.473.9340
www.cemcosteel.com

This technical information reflects the most current information available and supersedes any and all previous publications effective August 1, 2016.

**Corporate Headquarters**
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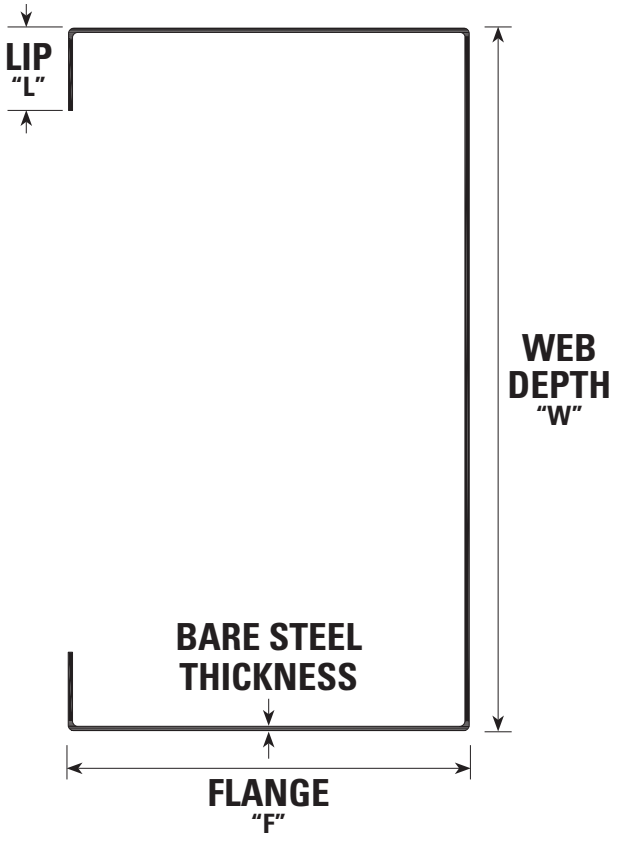
**Fax:** 626.330.7598

**Technical Services**
263 North Covina Lane
City of Industry, CA 91744
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# 800S162-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

800S162-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 800S162-54 | 0.0566 | 0.0538 | 50 | G60[3] | 8 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

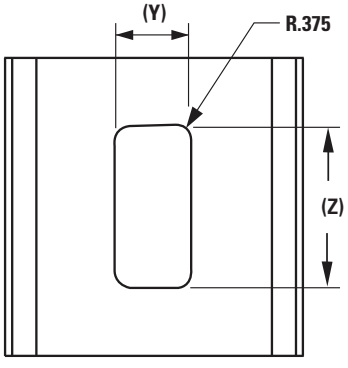
### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.670 | 2.28 | 5.600 | 1.229 | 36.79 | 2091 | 2091 | 50 | 32.1 | 54.79 | 0.715 | 2.539 | -0.914 | 0.594 | 3.113 | 0.914 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed $K\phi = 0$.

## Technical Services

Technical Services: 800.416.2278
Structural Engineering/Design: 925.473.9340
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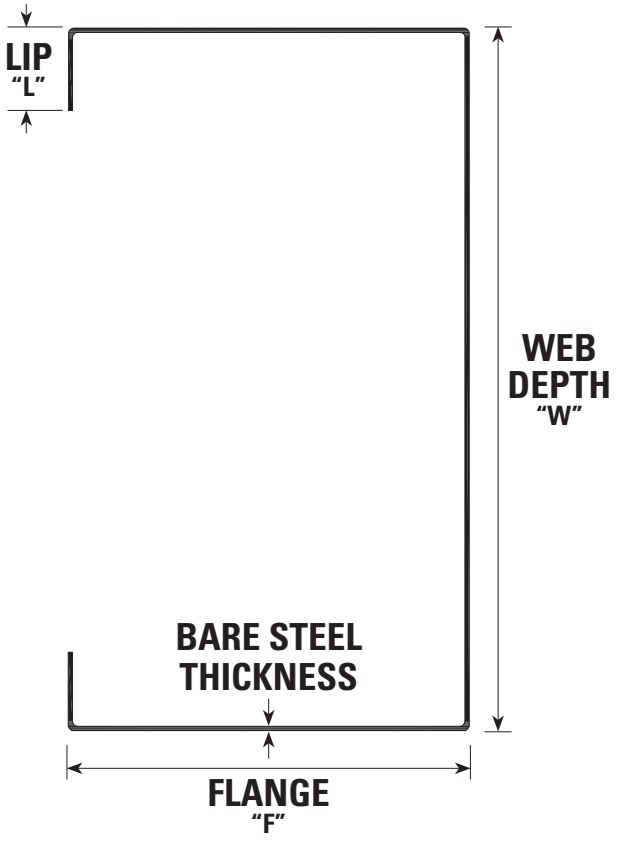
**Fax:** 626.249.5005

# 1000S162-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

1000S162-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 1000S162-54 | 0.0566 | 0.0538 | 50 | G60[3] | 10 | 1-5/8 | 1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

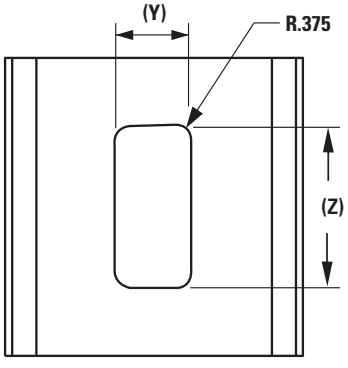
### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (in)[2] | Weight (lb/ft) | Ix (in)[3] | Sx (in)[3] | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 (in)[4] | Cw (in)[6] | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.783 | 2.66 | 9.391 | 1.572 | 47.07 | 1661 | 1661 | 50 | 31.3 | 67.42 | 0.836 | 4.198 | -0.812 | 0.538 | 3.692 | 0.952 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed Kϕ = 0.

## Technical Services

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Structural Engineering/Design: 925.473.9340
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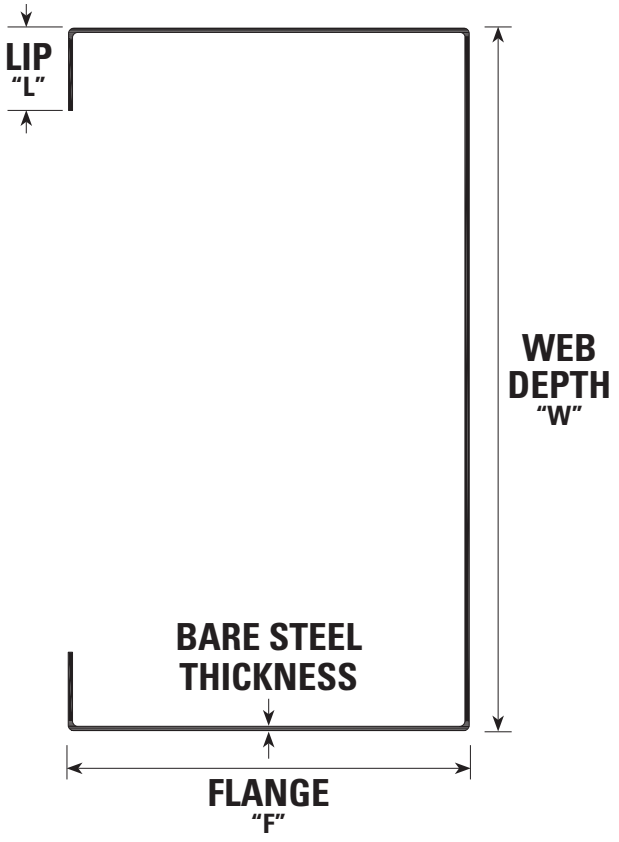
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# 1000S200-54 C-STUDS 54 MIL. (16 GA. STRUCTURAL)

## Geometric Properties

1000S200-54 "S" structural load-bearing studs are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Flange Size (in) | Lip (in) |
|---|---|---|---|---|---|---|---|
| 1000S200-54 | 0.0566 | 0.0538 | 50 | G60[3] | 10 | 2 | 5/8 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016 (Pending)
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

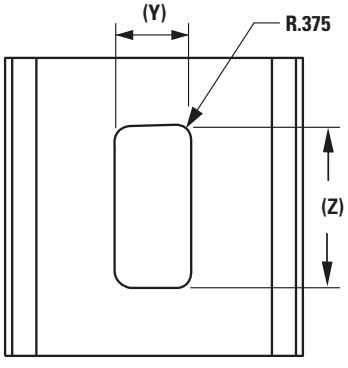
### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

### CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing




## Hole Detail

| Standard Hole Centers are 24" | (Z) (in) | (Y) (in) |
|---|---|---|
| 2-1/2" studs | 2.000 | 0.750 |
| 3-1/2" to 14" studs | 3.250 | 1.500 |

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | | | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (in)[2] | Weight (lb/ft) | Ix (in)[3] | Sx (in)[3] | Ma (in-k) | Vag (lb) | Vanet (lb) | Fya (ksi) | Lu (in) | Mnd (in-k) | Jx1000 (in)[4] | Cw (in)[6] | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.839 | 2.86 | 10.769 | 1.705 | 51.05 | 1661 | 1661 | 50 | 39.8 | 77.89 | 0.896 | 7.665 | -1.135 | 0.737 | 3.896 | 0.915 |

**Notes:**
**1.** Web-height to thickness ratio exceeds 200. Web Stiffeners are requiOrange at all support points and concentrated loads.
**2.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2
**3.** For deflection calculations, use the effective moment of interia.
**4.** Mad = Mnd/1.67
**5.** Allowable moment is lesser of Ma and Mad. Stud distortional buckling is based on an assumed $K\phi = 0$.

## Technical Services

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# ITEM #2

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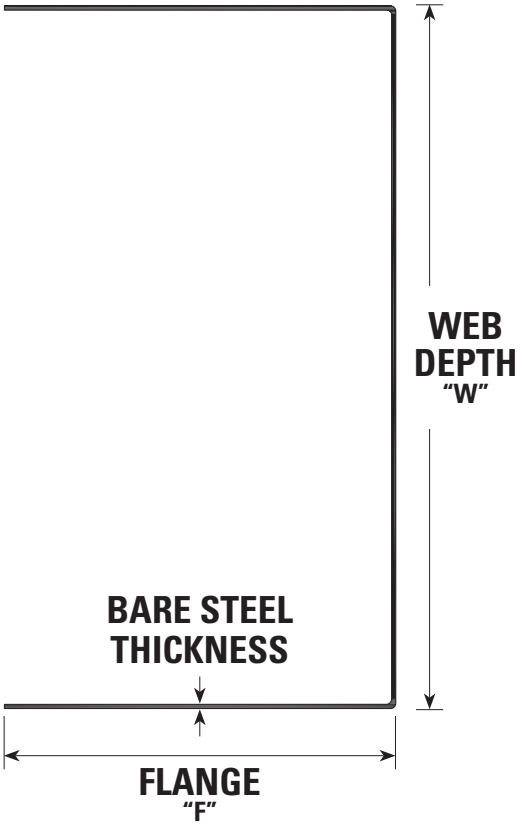
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# 250T150-68 "T" UN-PUNCHED TRACK (14 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 68-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 250T150-68 | 0.0713 | 0.0677 | 50 | G60[3] | 2-1/2 | 1-1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 68-mil: Orange

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 250T150-68 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0713 | 0.391 | 1.33 | 0.445 | 0.276 | 8.27 | 3199 | 50 | 0.663 | 0.114 | -0.953 | 0.561 | 1.531 | 0.613 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

**Technical Services**
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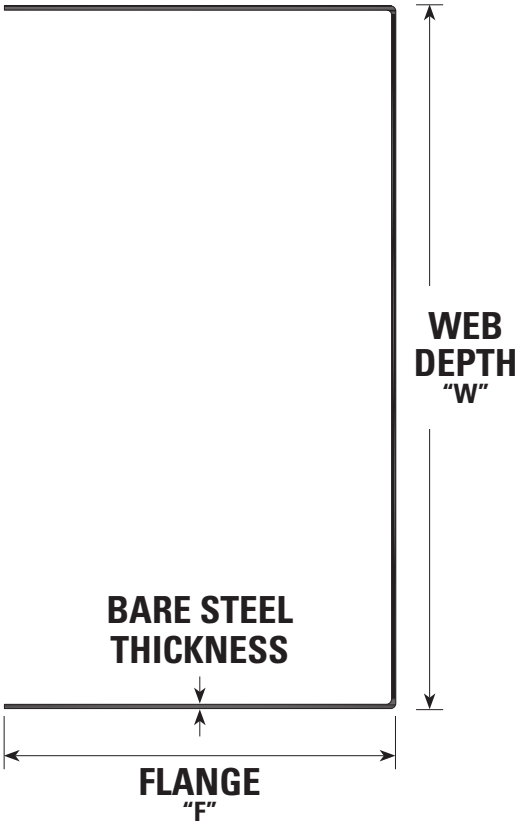
**Fax:** 626.249.5005

# 362T150-54 "T" UN-PUNCHED TRACK (16 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 54-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 362T150-54 | 0.0566 | 0.0538 | 50 | G60[3] | 3-5/8 | 1-1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 54-mil: Green

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 362T150-54 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.374 | 1.27 | 0.735 | 0.325 | 9.74 | 3372 | 50 | 0.400 | 0.202 | -0.844 | 0.516 | 1.768 | 0.772 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

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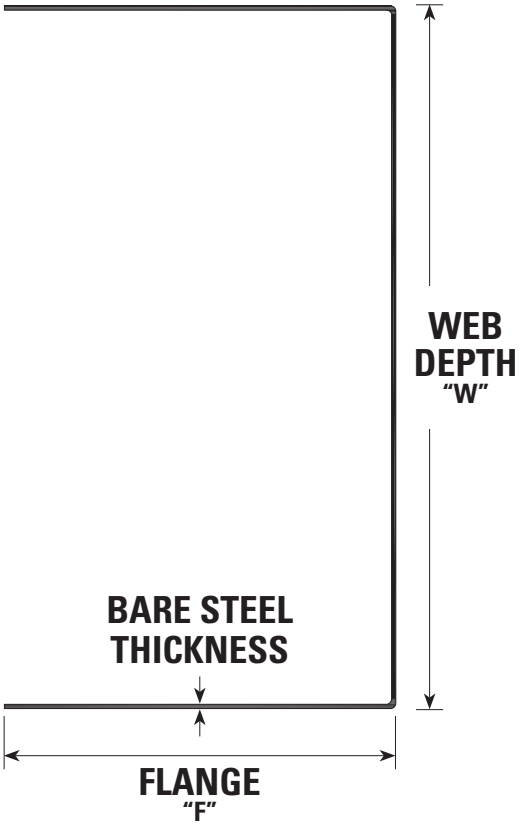
# 362T150-43 "T" UN-PUNCHED TRACK (18 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 43-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 362T150-43 | 0.0451 | 0.0428 | 33 | G60[3] | 3-5/8 | 1-1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 43-mil: Yellow

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 362T150-43 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 33 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0451 | 0.298 | 1.02 | 0.574 | 0.255 | 5.04 | 1739 | 33.0 | 0.202 | 0.160 | -0.850 | 0.519 | 1.766 | 0.768 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

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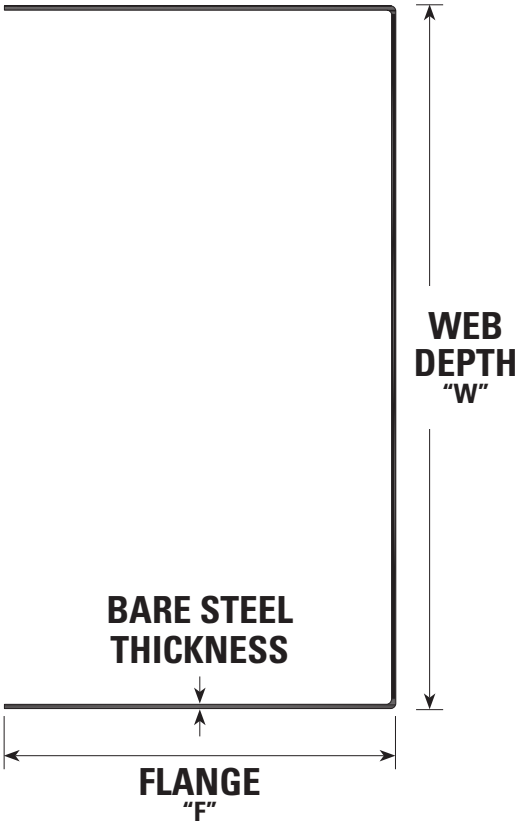
# 400T150-54 "T" UN-PUNCHED TRACK (16 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 54-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 400T150-54 | 0.0566 | 0.0538 | 50 | G60[3] | 4 | 1-1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 54-mil: Green

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 400T150-54 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.396 | 1.35 | 0.918 | 0.374 | 11.19 | 3372 | 50 | 0.422 | 0.252 | -0.811 | 0.501 | 1.860 | 0.810 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

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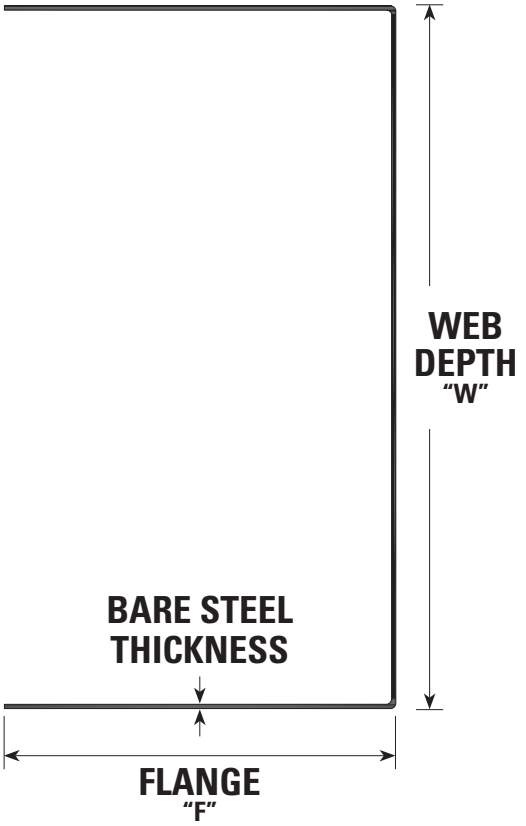
# 600T150-54 "T" UN-PUNCHED TRACK (16 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 54-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 600T150-54 | 0.0566 | 0.0538 | 50 | G60[3] | 6 | 1-1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 54-mil: Green

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 600T150-54 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.509 | 1.73 | 2.400 | 0.609 | 18.24 | 2728 | 50 | 0.543 | 0.632 | -0.675 | 0.434 | 2.401 | 0.921 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

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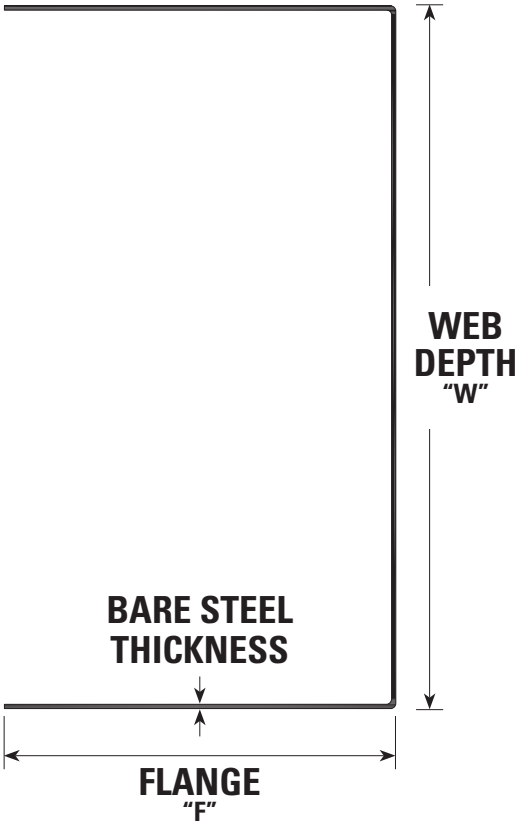
# 600T150-43 "T" UN-PUNCHED TRACK (18 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 43-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 600T150-43 | 0.0451 | 0.0428 | 33 | G60[3] | 6 | 1-1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 43-mil: Yellow

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 600T150-43 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 33 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0451 | 0.405 | 1.38 | 1.890 | 0.474 | 9.36 | 1377 | 33.0 | 0.275 | 0.504 | -0.680 | 0.437 | 2.398 | 0.920 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

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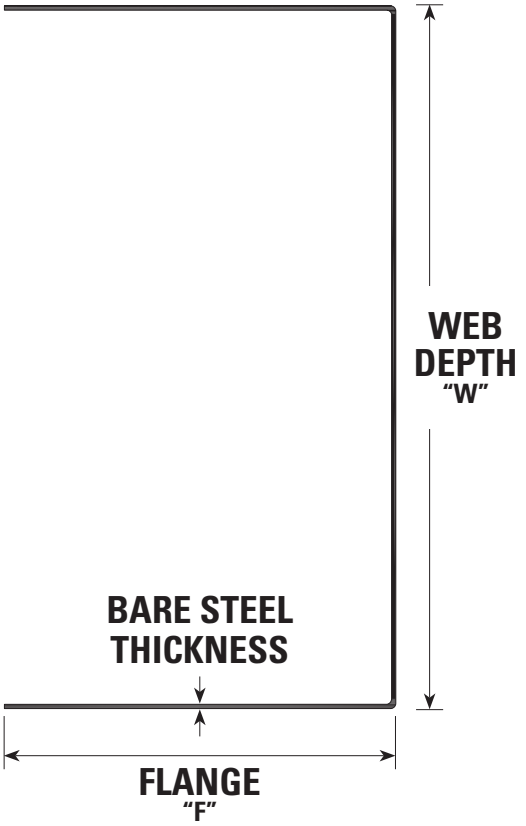
# 600T125-43 "T" UN-PUNCHED TRACK (18 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 43-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 600T125-43 | 0.0451 | 0.0428 | 33 | G60[3] | 6 | 1-1/4 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 43-mil: Yellow

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 600T125-43 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 33 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0451 | 0.383 | 1.30 | 1.768 | 0.461 | 9.11 | 1377 | 33.0 | 0.260 | 0.307 | -0.513 | 0.335 | 2.288 | 0.950 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

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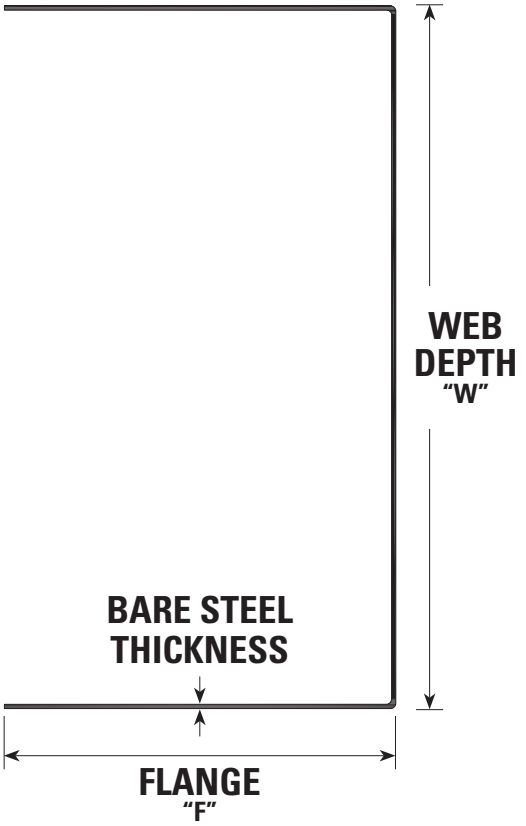
# 800T150-54 "T" UN-PUNCHED TRACK (16 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 54-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 800T150-54 | 0.0566 | 0.0538 | 50 | G60[3] | 8 | 1-1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 54-mil: Green

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 800T150-54 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.622 | 2.12 | 4.692 | 0.844 | 25.27 | 2039 | 50 | 0.664 | 1.215 | -0.580 | 0.383 | 2.979 | 0.962 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

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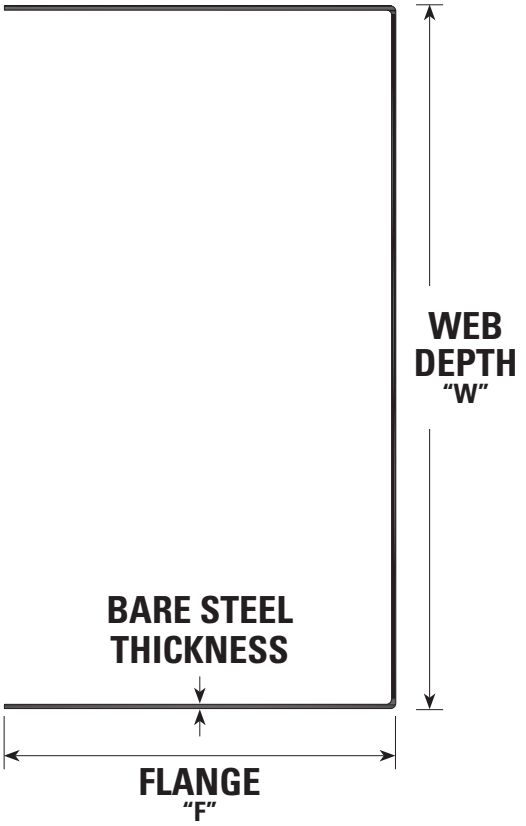
# 1000T150-54 "T" UN-PUNCHED TRACK (16 Ga. STRUCTURAL)

## Geometric Properties

"T" tracks are fabricated in 54-mil thick galvanized steel in standard G60 coating weight. G90 is available upon special request, and may require up-charges and extended lead times.




## Physical Properties

| Model No. | Design Thickness (in) | Minimum Thickness (in) | Yield (ksi) | Coating[3,4] | Web Depth (in) | Leg Size (in) |
|---|---|---|---|---|---|---|
| 1000T150-54 | 0.0566 | 0.0538 | 50 | G60[3] | 10 | 1-1/2 |

**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.
**3.** Per ASTM C955 & A1003, Table 1.
**4.** G90 available upon request. Will require extended lead time and upcharge.

## Color Code (painted on ends): 54-mil: Green

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## CSI Division: 05.40.00 – Cold-Formed Metal Framing

## 1000T150-54 "T" Un-Punched Track

| Design Thickness (in) | Gross | | Effective Properties 50 ksi | | | | | | Torsional Properties | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area $(in)^2$ | Weight (lb/ft) | Ix $(in)^3$ | Sx $(in)^3$ | Ma (in-k) | Vag (lb) | Fya (ksi) | Jx1000 $(in)^4$ | Cw $(in)^6$ | Xo (in) | m | Ro (in) | ß |
| 0.0566 | 0.735 | 2.50 | 7.880 | 1.079 | 32.29 | 1628 | 50 | 0.785 | 2.013 | -0.509 | 0.342 | 3.567 | 0.980 |

**Notes:**
**1.** Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
**2.** For deflection calculations, use the effective moment of inertia.
**3.** Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
**4.** Flange Width to thickness ratio exceeds 60, therefore it does not comply with code and only Gross Properties are calculated.

**Technical Services**
Technical Services: 800.416.2278
Structural Engineering/Design: 925.473.9340
www.cemcosteel.com

# ITEM #3

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**Fax:** 626.249.5005

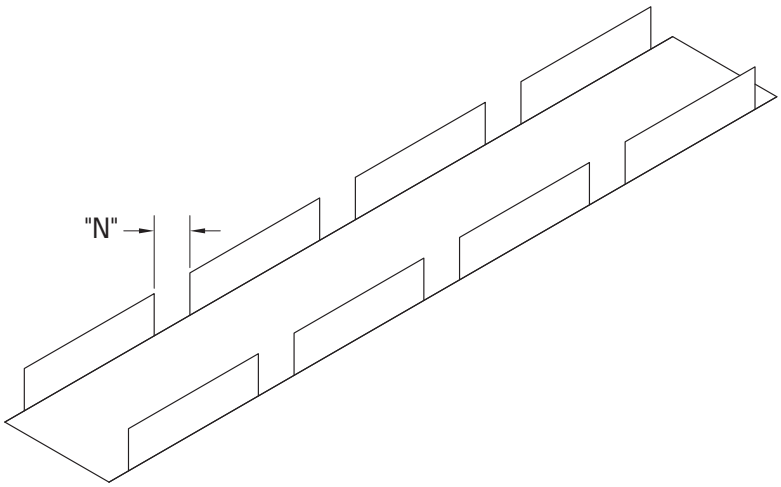
# "NT" - NOTCHED TRACK

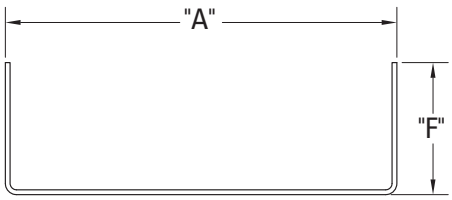
## Geometric Properties

"NT" notched-tracks are fabricated in several thicknesses for various stud flange widths. All CEMCO notched-tracks are manufactured with with 1-1/4" or 1-1/2" legs, with 1-3/4" notches. Notched-tracks come in 9' 4" and 10' 8" lengths for 16" on-center configurations, and 10' for 24" on-center. Notched-tracks are produced from hot-dipped galvanized steel in standard G60 coating weight. G90 is available upon special request.

| Mil Thickness | Design Thickness[1] | Minimum Thickness[1,2] | Yield | Web Sizes (in) | Flange (in) |
|---|---|---|---|---|---|
| 33 | 0.0346" (0.88mm) | 0.0329" (0.84mm) | 33 | 3-5/8, 4, 6 | 1-1/4, 1-1/2 |
| 43 | 0.0451" (1.15mm) | 0.028" (1.09mm) | 33 | 3-5/8, 4, 6 | 1-1/4, 1-1/3 |
| 54 | 0.0566" (1.44mm) | 0.0538" (1.37mm) | 50 | 3-5/8, 4, 6 | 1-1/4, 1-1/4 |
| 68 | 0.0713" (1.81mm) | 0.0677" (1.72mm) | 50 | 3-5/8, 4, 6 | 1-1/4, 1-1/5 |

**Notes:**
1. Uncoated Steel Thickness. Thickness is for carbon sheet steel.
2. Minimum Thickness represents 95% of the design thickness and is the minimum acceptable thickness delivered to the job site, based on Section A3.4 of the AISI 2012.




## Color Code (painted on ends):

33-mil: White
43 mil: Yellow
54 mil: Green
68 mil: Orange

## ASTM's & Code Standards

- ASTM A1003, A653, A924
- AISI 2012
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

# ITEM #4

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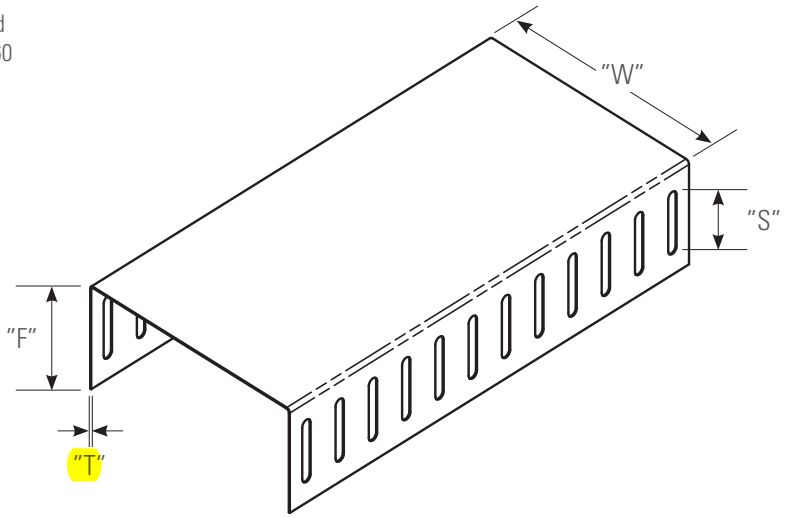
# "CST" & "SLP-TRK®" BRAND SLOTTED TRACKS 18, 30, 33, 43, 54, 68 mil

## Geometric Properties

C"CST" and "SLP-TRK®" brand slotted slip tracks are fabricated in following web depths and thicknesses. All CEMCO CST brand and Brady SLP-TRK® brand slotted slip tracks are produced from G40 coated steel for 18, 30 and 33 mil products. G60 is available upon request. All others are manufactured with G60 coating. G90 is available upon request.




## Steel Thickness

| Mil Thickness | Design Thickness (in.)[1] | Minimum Thickness (in.)[1,2] | Color Code painted on ends |
|---|---|---|---|
| 18 | 0.0188 (0.48 mm) | 0.0179 (0.45 mm) | None |
| 30 | 0.0312 (0.79 mm) | 0.0296 (0.75 mm) | Pink |
| 33 | 0.0346 (0.88 mm) | 0.0329 (0.84 mm) | White |
| 43 | 0.0451 (1.15 mm) | 0.0428 (1.09 mm) | Yellow |
| 54 | 0.0566 (1.44 mm) | 0.0538 (1.37 mm) | Green |
| 68 | 0.0713 (1.81 mm) | 0.0677 (1.72 mm) | Orange |

1. Uncoated Steel Thickness. Thickness is for carbon sheet steel.
2. Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness with 2004 AISI supplement.

## CEMCO Slotted Track Configurations

| "W" Web Size (in.) | "F" Flange Size (in.) | "S" Slot Size (in.) | "T" Steel Thickness (mil) |
|---|---|---|---|
| 2-1/2, 3-5/8, 4, 6 & 8 | 2-1/2 | 1-1/2 | 18, 30, 33, 43, 54 & 68 |
| 2-1/2, 3-5/8, 4, 6 & 8 | 3 | 2 | 54 & 68 |
| 3-5/8, 4, 6 & 8 | 3-1/4 | 2* | 54 & 68 |

* Slots are 1" down from top of track

## ASTM's & Code Standards

- ASTM A1003, A653, A924, C645, C754,C955
- ICC-ESR 1042 (Sliptrack Systems) & ICC-ESR 2012 (CEMCO CST)
- 2012/2015 IBC
- 2010/2013 CBC

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

# ITEM #5

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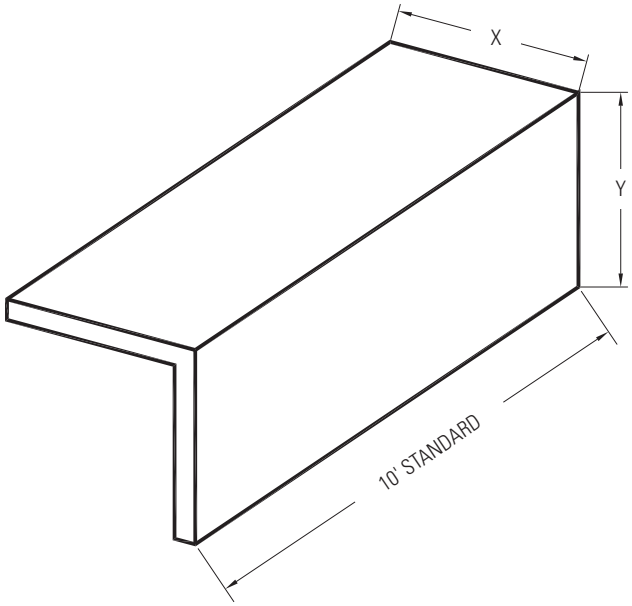
# ANGLE — 1-1/2" x 1-1/2" x 54 mil.

## Geometric Properties

1-1/2" x 1-1/2" 54-mil Angle is fabricated from hot-dipped galvanized steel in standard G60 coating. G90 coatings is available upon special request and may require extended lead time and up-charges.




## Properties: 1-1/2" x 1-1/2" x 54 mil.

| Product Code | Thickness (T) | | Yield (ksi) | X (in) | Y (in) |
|---|---|---|---|---|---|
| | Design Thickness (in) | Minimum Thickness (in) | | | |
| 16A112112 | 0.0566 | 0.0538 | 50 | 1-1/2 | 1-1/2 |

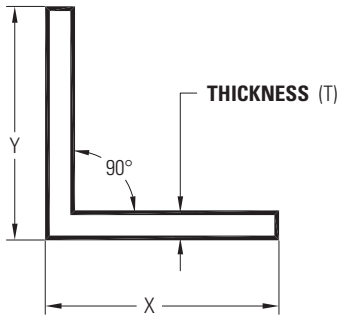
**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.

## Color Code (painted on ends):

54-mil: Green

## ASTM & Code Standards:

- ASTM A653/653M, A924/A924M, A1003/A1003M, C954
- 2012/2015 IBC
- 2010/2013 CBC
- 2012 AISI




## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

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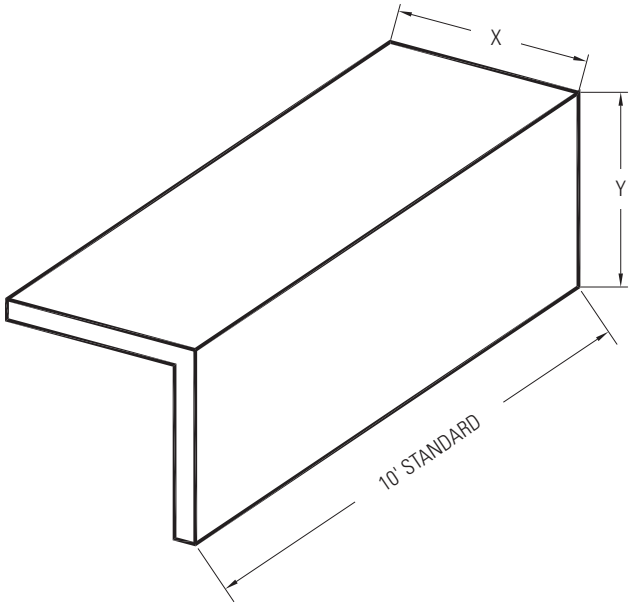
# ANGLE — 2" x 2" x 54 mil.

## Geometric Properties

2" x 2" 54-mil Angle is fabricated from hot-dipped galvanized steel in standard G60 coating. A G90 coating is available upon special request and may require extended lead time and up-charges.




## Properties: 2" x 2" x 54 mil.

| Product Code | Thickness (T) | | Yield (ksi) | X (in) | Y (in) |
|---|---|---|---|---|---|
| | Design Thickness (in) | Minimum Thickness (in) | | | |
| 16A22 | 0.0566 | 0.0538 | 50 | 2 | 2 |

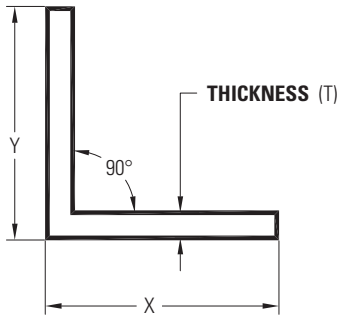
**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.

## Color Code (painted on ends):

54-mil: Green

## ASTM & Code Standards:

- ASTM A653/653M, A924/A924M, A1003/A1003M, C954
- 2012/2015 IBC
- 2010/2013 CBC
- 2012 AISI




## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

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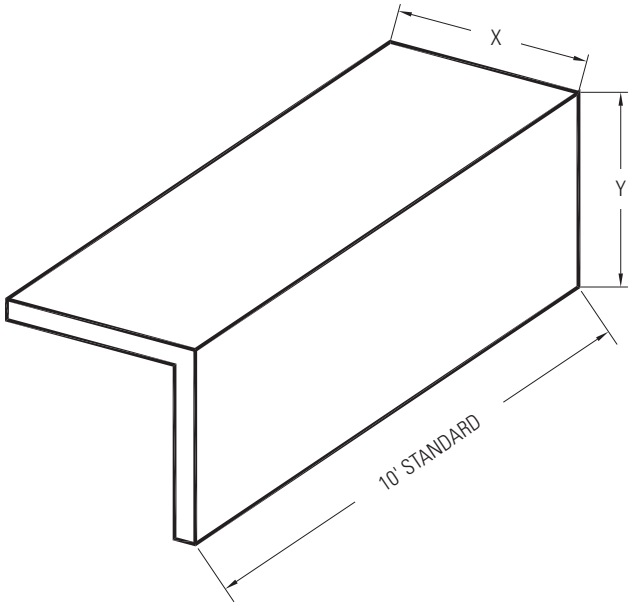
**Fax:** 626.249.5005

# ANGLE — 2" x 2" x 97 mil.

## Geometric Properties

2" x 2" 97-mil Angle is fabricated from hot-dipped galvanized steel in standard G60 coating. A G90 coating is available upon special request and may require extended lead time and up-charges.




## Properties: 2" x 2" x 97 mil.

| Product Code | Thickness (T) | | Yield (ksi) | X (in) | Y (in) |
|---|---|---|---|---|---|
| | Design Thickness (in) | Minimum Thickness (in) | | | |
| 12A22 | 0.1017 | 0.0966 | 50 | 2 | 2 |

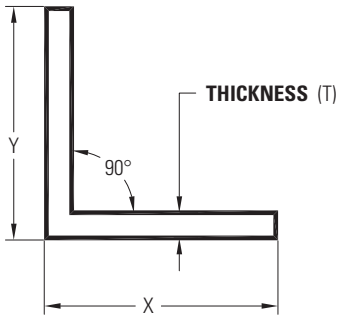
**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.

## Color Code (painted on ends):

97-mil: Red

## ASTM & Code Standards:

- ASTM A653/653M, A924/A924M, A1003/A1003M, C954
- 2012/2015 IBC
- 2010/2013 CBC
- 2012 AISI




## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

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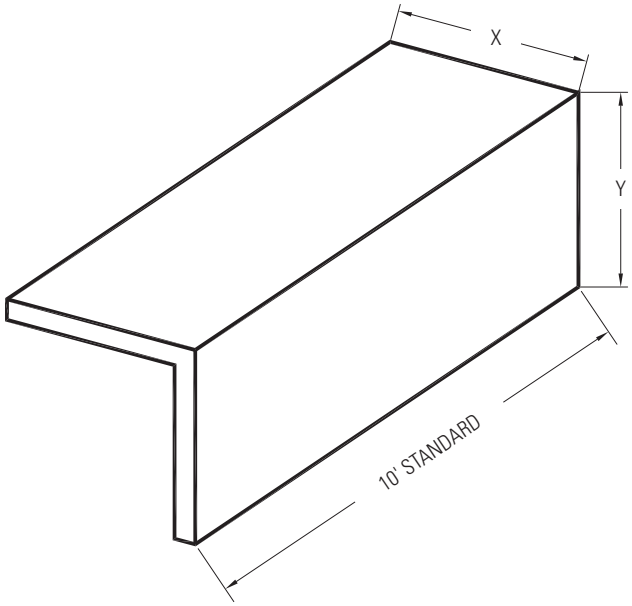
# ANGLE — 3" x 3" x 54 mil.

## Geometric Properties

3" x 3" 54-mil Angle is fabricated from hot-dipped galvanized steel in standard G60 coating. A G90 coating is available upon special request and may require extended lead time and up-charges.




## Properties: 3" x 3" x 54 mil.

| Product Code | Thickness (T) | | Yield (ksi) | X (in) | Y (in) |
|---|---|---|---|---|---|
| | Design Thickness (in) | Minimum Thickness (in) | | | |
| 16A33 | 0.0566 | 0.0538 | 50 | 3 | 3 |

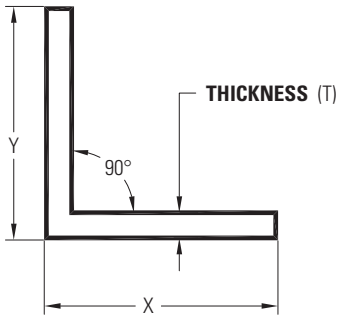
**Notes:**
**1.** Uncoated steel thickness. Thickness is for carbon sheet steel.
**2.** Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness.

## Color Code (painted on ends):

54-mil: Green

## ASTM & Code Standards:

- ASTM A653/653M, A924/A924M, A1003/A1003M, C954
- 2012/2015 IBC
- 2010/2013 CBC
- 2012 AISI




## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

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# ITEM #6

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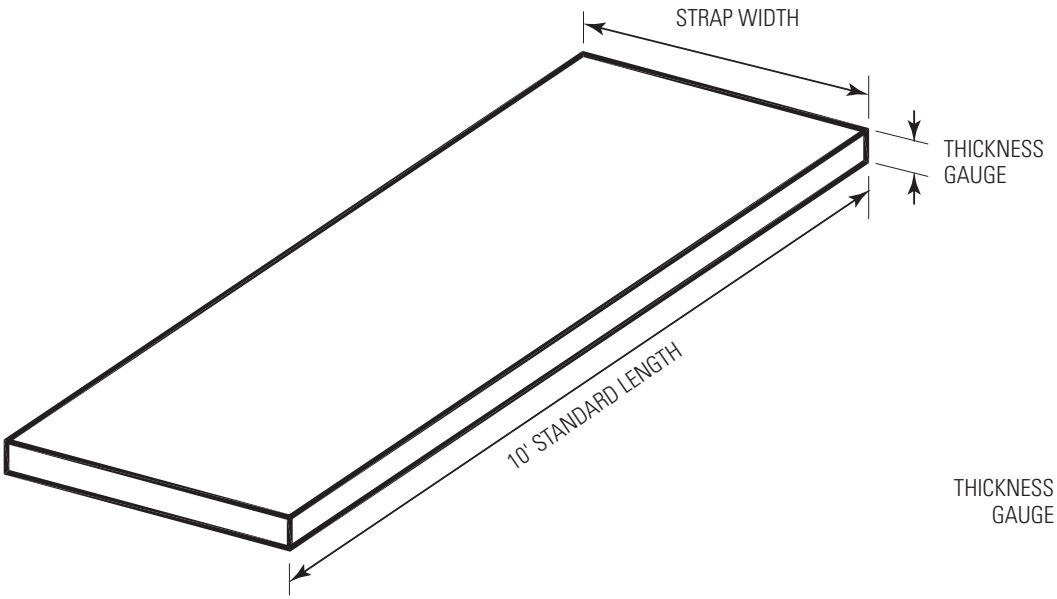
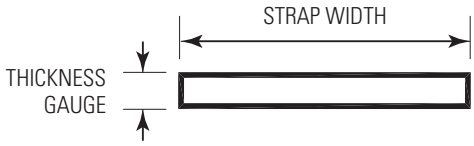
# FLAT STRAP SPECIFICATION — 4" x 54 mil (16FS4)




## Geometric Properties

| Product Code | Strap Width (in) | Thickness Gauge (mils) |
|---|---|---|
| 16FS4 | 4 | 54 |

**Coating:** Standard G40. G60 and G90 are available only upon special request and will require extended lead times.

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C645 & C754
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## Flat Strap Load Capacities (lbs.)

| Tensile Values for Straps (Tn [lbs.]) | | |
|---|---|---|
| Ω = 1.67 | | Thickness (mils) / Design Thickness / Gauge Reference |
| Strap Width (in) | Yield Strength (Ksi) | 18<br>0.0188<br>25 |
| 4 | 50 | 6778 |

**Notes:**
**1.** For lengths greater than 20 feet, strap is available in coil form
**2.** Flat Strap is also available with widths greater than 12 inches

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

**Technical Services**
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**Phone:** 800.775.2362
**Fax:** 626.330.7598

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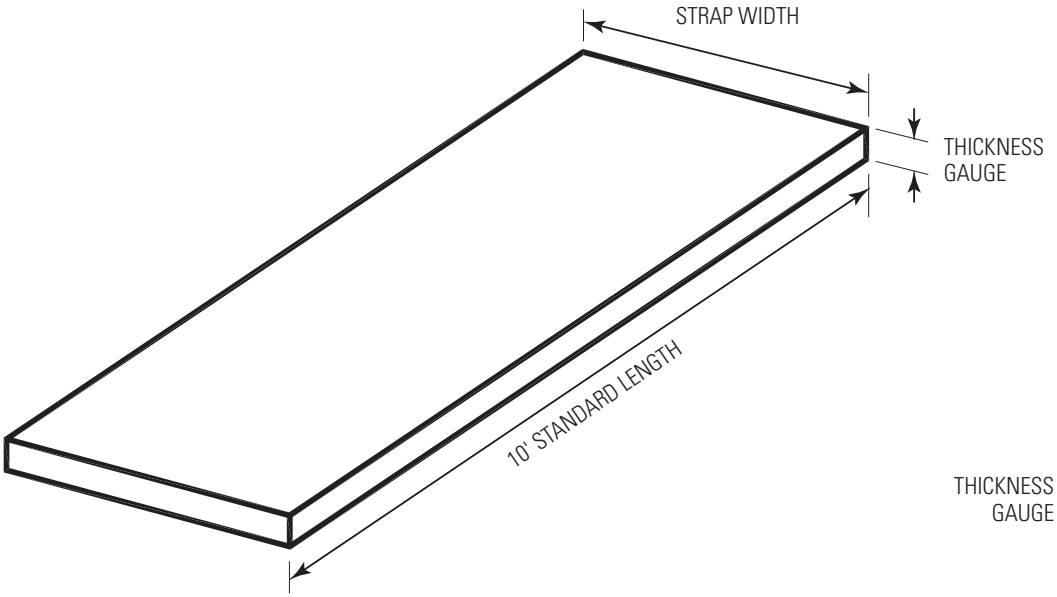
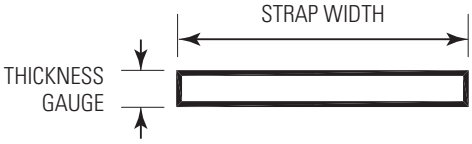
**Fax:** 626.249.5005

# FLAT STRAP SPECIFICATION — 6" x 97 mil (12FS6)




## Geometric Properties

| Product Code | Strap Width (in) | Thickness Gauge (mils) |
|---|---|---|
| 12FS6 | 6 | 97 |

**Coating:** Standard G40. G60 and G90 are available only upon special request and will require extended lead times.

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C645 & C754
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## Flat Strap Load Capacities (lbs.)

| Tensile Values for Straps (Tn [lbs.]) | | |
|---|---|---|
| Ω = 1.67 | | Thickness (mils) / Design Thickness / Gauge Reference |
| Strap Width (in) | Yield Strength (Ksi) | 18 / 0.0188 / 25 |
| 6 | 50 | 18269 |

**Notes:**
**1.** For lengths greater than 20 feet, strap is available in coil form
**2.** Flat Strap is also available with widths greater than 12 inches

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

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**Technical Services**
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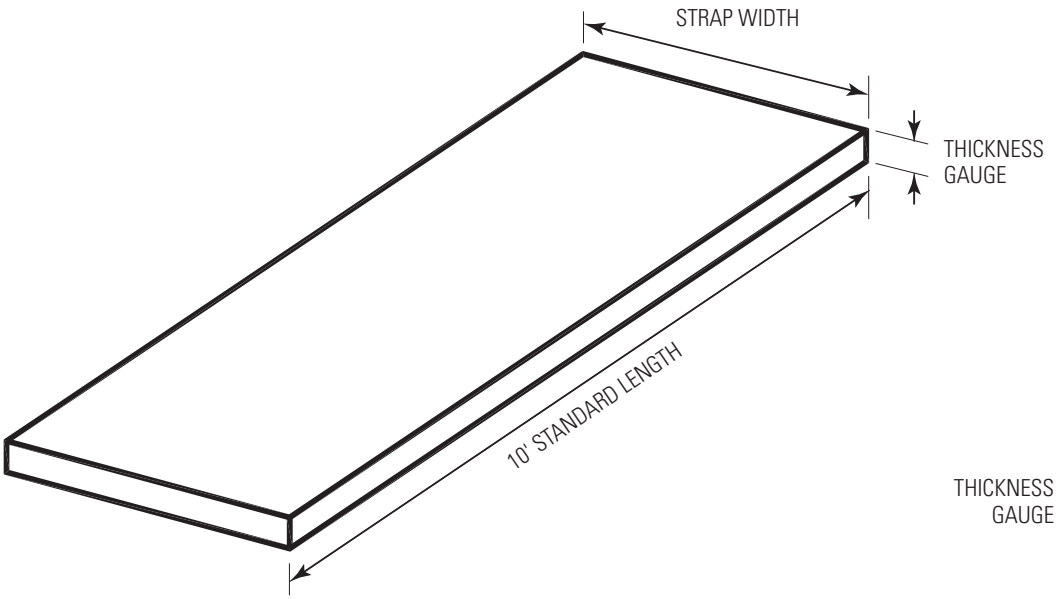
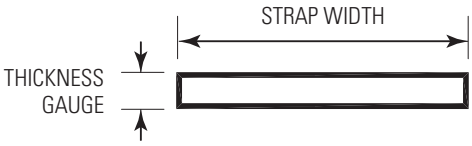
**Fax:** 626.249.5005

# FLAT STRAP SPECIFICATION — 6" x 54 mil (16FS6)




## Geometric Properties

| Product Code | Strap Width (in) | Thickness Gauge (mils) |
|---|---|---|
| 16FS6 | 6 | 54 |

**Coating:** Standard G40. G60 and G90 are available only upon special request and will require extended lead times.

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C645 & C754
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## Flat Strap Load Capacities (lbs.)

| Tensile Values for Straps (Tn [lbs.]) | | |
|---|---|---|
| Ω = 1.67 | | Thickness (mils) / Design Thickness / Gauge Reference |
| Strap Width (in) | Yield Strength (Ksi) | 18<br>0.0188<br>25 |
| 6 | 50 | 10168 |

**Notes:**
**1.** For lengths greater than 20 feet, strap is available in coil form
**2.** Flat Strap is also available with widths greater than 12 inches

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
- MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2.
- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

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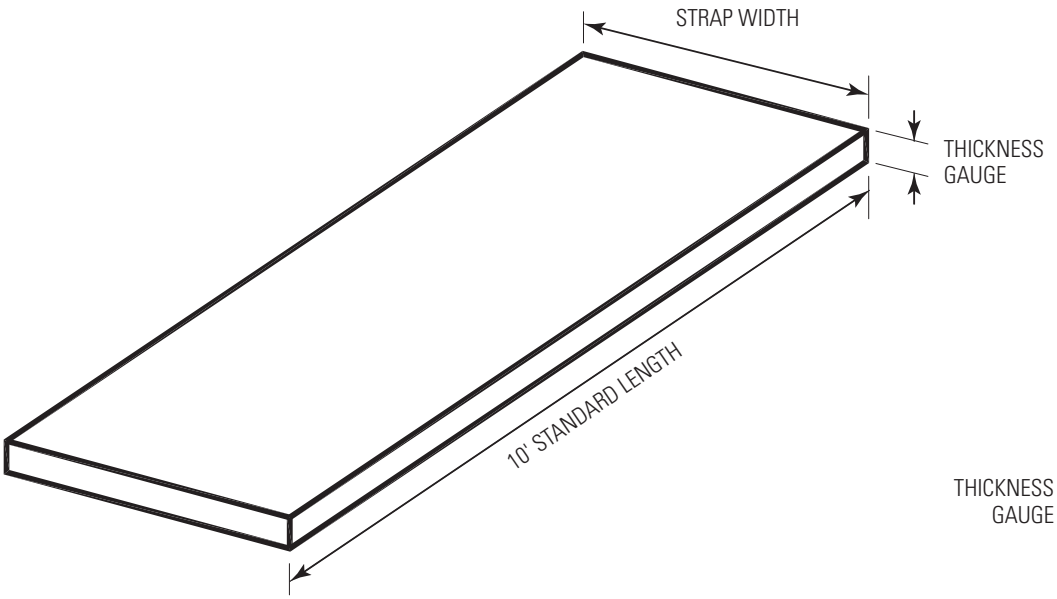
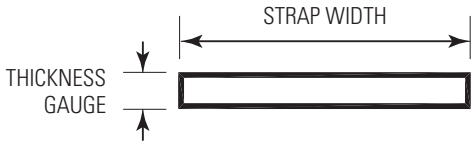
**Fax:** 626.249.5005

# FLAT STRAP SPECIFICATION — 6" x 43 mil (18FS6)




## Geometric Properties

| Product Code | Strap Width (in) | Thickness Gauge (mils) |
|---|---|---|
| 18FS6 | 6 | 43 |

**Coating:** Standard G40. G60 and G90 are available only upon special request and will require extended lead times.

## ASTM & Code Standards:

- ASTM A653/A653M, A924/A924M, A1003/1003, C645 & C754
- 2012 AISI
- 2012/2015 IBC
- 2010/2013 CBC

## Flat Strap Load Capacities (lbs.)

| Tensile Values for Straps (Tn [lbs.]) | | |
|---|---|---|
| Ω = 1.67 | | Thickness (mils) / Design Thickness / Gauge Reference |
| Strap Width (in) | Yield Strength (Ksi) | 18<br>0.0188<br>25 |
| 6 | 33 | 5347 |

**Notes:**
**1.** For lengths greater than 20 feet, strap is available in coil form
**2.** Flat Strap is also available with widths greater than 12 inches

## CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

## LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

## LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
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- MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Options 1 & 2.
- MR Credit: Building Product Disclosure and Optimization – Material Ingredients, Option 1.
- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

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# ITEM #7

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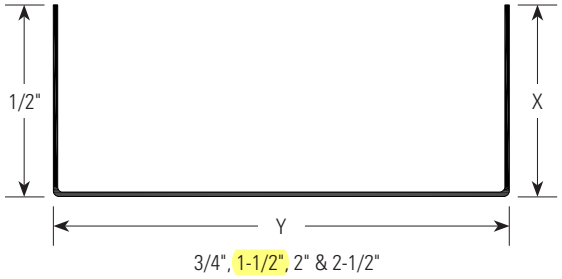
**Phone:** 800.416.2278
**Fax:** 626.249.5005

# "U" - UNPUNCHED U-SHAPED CHANNEL • 1-1/2" x 54 Mil.

## Geometric Properties

1-1/2" "U" channels are fabricated in 1/2" legs. All CEMCO U-Shaped channels are produced from hot-dipped galvanized steel in standard G60 coating. G90 is available upon special request.




## Steel Thickness

| Thickness (mil) | Design Thickness (in)[1] | Minimum Thickness (in)[1,2] |
|---|---|---|
| 54 | 0.0566 (1.44 mm) | 0.0538 (1.37 mm) |

**Notes: 1.** Uncoated Steel Thickness. Thickness is for carbon sheet steel. **2.** Minimum Thickness represents 95% of the design thickness and is the minimum acceptable thickness delivered to the job site, based on Section A4.3 of the AISI S100-2007.

**Color Code (painted on ends):** 54-mil: Green

### ASTM & Code Standards:

- ASTM A653/A653M, 924/A924M, A1003/1003, C955 & C1007
- ICC-ES & SFIA Code Compliance Certification Program
- ICC ESR-3016
- ATI CCRR-0224
- AISI S100-12
- 2012/2015 IBC
- 2010/2013 CBC

**CSI Division:** 05.40.00 – Cold-Formed Metal Framing

### LEED v3 for Building and Design Construction

- MR Credit 2: Construction Waste Management.
- MR Credit 4: Recycled Content.

### LEED v4 for Building and Design Construction

- MR Prerequisite: Construction and Demolition Waste Management Planning.
- MR Credit: Construction and Demolition Waste Management.
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- MR Credit: Building Life-Cycle Impact Reduction, Option 4.

**CEMCO cold-formed steel framing products contain 30% to 37% recycled steel.**

- Total Recycled Content: 36.9%
- Post-Consumer: 19.8%
- Pre-Consumer: 14.4%

Ask for SAFETY EDGED BY CEMCO

## U-Channel Section Properties

| Section | Design Thickness (in) | Gross Properties | | | | | | Effective Properties | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Area ($in^2$) | Weight (lb/ft) | Ix ($in^4$) | Rx (in) | Iy ($in^4$) | Ry (in) | Ix ($in^4$) | Sx ($in^3$) | Ma (in-k) | Va (lbs) |
| 150U050-54 | 0.0566 | 0.129 | 0.44 | 0.039 | 0.547 | 0.003 | 0.144 | 0.039 | 0.052 | 1.22 | 840 |

**Notes: 1.** For Deflection calculations, use effective Ixx.

## U-Shaped Channels Allowable Ceiling Spans

| Section | | | Uniform Load | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4 psf Channel Spacing o.c. (in) | | | | | 6 psf Channel Spacing o.c. (in) | | | | | 13 psf Channel Spacing o.c. (in) | | | | |
| | | | 24 | 36 | 48 | 60 | 72 | 24 | 36 | 48 | 60 | 72 | 24 | 36 | 48 | 60 | 72 |
| 150U050-54 | L/240 | Single | 5'-6" | 4'-10" | 4'-5" | 4'-1" | 3'-10" | 4'-10" | 4'-3" | 3'-10" | 3'-7" | 3'-5" | 3'-9" | 3'-3" | 3'-0" | 2'-9" | 2'-7" |
| | | Multiple | 7'-1" | 6'-2" | 5'-8" | 5'-3" | 4'-11" | 6'-2" | 5'-5" | 4'-11" | 4'-7" | 4'-4" | 4'-10" | 4'-2" | 3'-9" | 3'-4" | 3'-0" |
| | L/360 | Single | 5'-6" | 4'-10" | 4'-5" | 4'-1" | 3'-10" | 4'-10" | 4'-3" | 3'-10" | 3'-7" | 3'-5" | 3'-9" | 3'-3" | 3'-0" | 2'-9" | 2'-7" |
| | | Multiple | 7'-1" | 6'-2" | 5'-8" | 5'-3" | 4'-11" | 6'-2" | 5'-5" | 4'-11" | 4'-7" | 4'-4" | 4'-10" | 4'-2" | 3'-9" | 3'-4" | 3'-0" |

**Notes:**
**1.** Fy = 50 ksi for all sections.
**2.** Multiple span indicates two or more equal spans with channel continuous over interior supports.
**2.** Bearing Lengths = 0.75".
**3.** Allowable spans based on the compression flange laterally unbraced.

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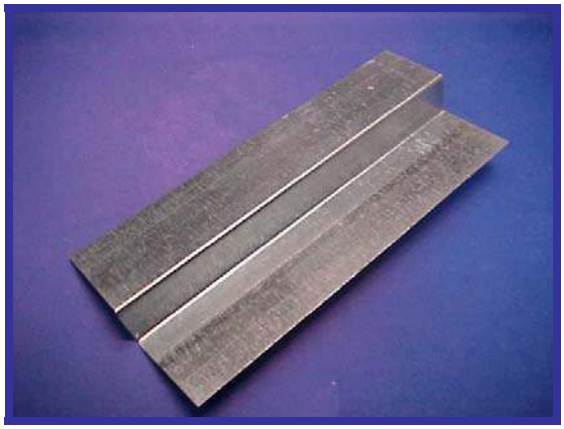
# ITEM #8

The Innovators of Quality Framing and Lath Systems

# Z-Furring Channel Specification



| MAXIMUM BLANK SIZE | MINIMUM LEG SIZE | MAXIMUM LENGTH | STEEL THICKNESS (ga) |
|---|---|---|---|
| 22” | 7/8” | 21’ | 12,14,16,18,20 & 25 |

**CEMCO Z - Furring Channel is fabricated from hot-dipped galvanized steel complying with ASTM A653 with a minimum G40 coating meeting ASTM A924. The furring channel is fabricated from minimum 25 gauge (0.0179-inch-thick) steel (uncoated). The channel is manufactured in various web depths and leg lengths (attachable flange).**


**CALIFORNIA EXPANDED METAL LATH PRODUCTS CO.**

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# ITEM #9

# DriftTrak® DTSLB

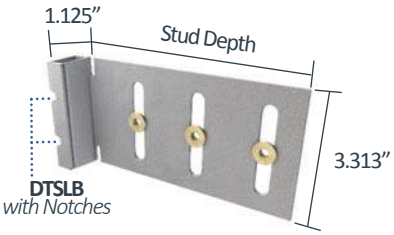
*Bypass Slab*

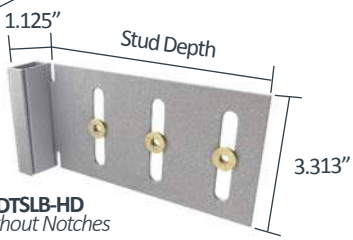
**The Steel Network, Inc.**
www.steelnetwork.com
1-888-474-4876

## Material Composition

**Clip Material:** ASTM A1003/A1003M Structural Grade 50 (340) Type H, ST50H (ST340H): 50ksi (340MPa) minimum yield strength, 65ksi (450MPa) minimum tensile strength, 68mil minimum thickness (14 gauge, 0.0713" design thickness) with ASTM A653/A653M G90 (Z275) hot dipped galvanized coating.

**Track Material:** ASTM A1003/A1003M Structural Grade 50 (340) Type H, ST50H (ST340H): 50ksi (340MPa) minimum yield strength, 65ksi (450MPa) minimum tensile strength, 97mil minimum thickness (12 gauge, 0.1017" design thickness) with ASTM A653/A653M G60 (Z180) hot dipped galvanized coating.


*US Patent #7,503,150*

## DriftTrak DTSLB Allowable (Unfactored) Loads[1]

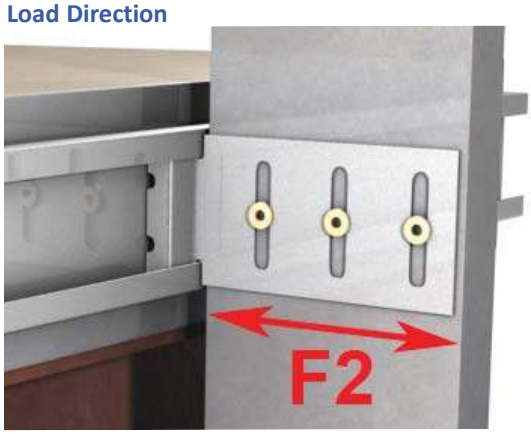
| DriftTrak® DTSLB & DTSLB-HD, Recommended Allowable Load (lbs): F2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Stud | | Fastener Pattern 1 & 2 | | | | | | | |
| | | DTSLB | | | | DTSLB-HD | | | |
| | | 8" Fastener Spacing in Track to Structure (or welded on each side) | | 16" Fastener Spacing in Track to Structure (or welded on each side) | | 8" Fastener Spacing in Track to Structure (or welded on each side) | | 16" Fastener Spacing in Track to Structure (or welded on each side) | |
| Thickness Mils (ga) | Yield Strength (ksi) | w/2 #12 Screws | w/3 #12 Screws | w/2 #12 Screws | w/3 #12 Screws | w/2 #12 Screws | w/3 #12 Screws | w/2 #12 Screws | w/3 #12 Screws |
| 33 (20) | 33 | 377 | 565 | 377 | 565 | 377 | 565 | 377 | 565 |
| 33 (20) | 50 | 544 | 808 | 544 | 753 | 544 | 817 | 544 | 817 |
| 43 (18) | 33 | 561 | 808 | 561 | 753 | 561 | 841 | 561 | 841 |
| 43 (18) | 50 | 808 | 808 | 753 | 753 | 810 | 1,215 | 810 | 953 |
| 54 (16) | 33 | 789 | 808 | 753 | 753 | 789 | 1,183 | 789 | 953 |
| 54 (16) | 50 | 808 | 808 | 753 | 753 | 1,139 | 1,618 | 953 | 953 |
| 68 (14) | 50 | 808 | 808 | 753 | 753 | 1,610 | 1,618 | 953 | 953 |
| 97 (12) | 50 | 808 | 808 | 753 | 753 | 1,618 | 1,618 | 953 | 953 |
| Maximum Allowable Clip Load | | 808 | | 753 | | 1,618 | | 953 | |

## Notes:

- Design loads are for attachment of DriftTrak DTSLB to stud only. Load tables reflect horizontal loads (F2).
- Attachment to structure engineered by others.
- Allowable loads have not been increased for wind, seismic, or other factors.
- #12 screws are provided with each step bushing for attachment to stud. Load requirements don't always justify use of a third screw.
- Clips are manufactured to fit into the DriftTrak and provide up to 2" of vertical deflection (1" up and 1" down), and free lateral movement of the structure.
- Allow a minimum of 0.875" from the structure to the inside flange of the bypassing stud to allow for track attachment. Standard offset of stud from the open face of the track should not exceed 1.25".
- One row of bridging is recommended at a maximum distance of 18" from DriftTrak to resist torsional effects.

[1] For LRFD Design Strengths refer to ICC-ESR-2049.

## Load Direction



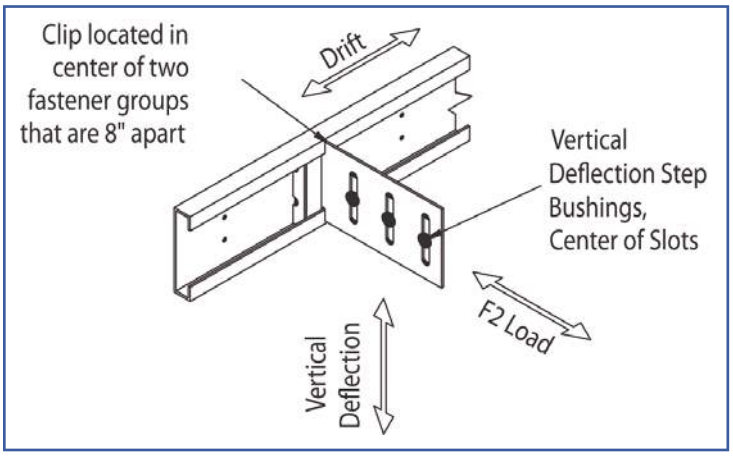

## Nomenclature

DriftTrak DTSLB is classified by multiplying stud depth by 100, followed by "HD," based on F2 strength required. Refer to load tables.*

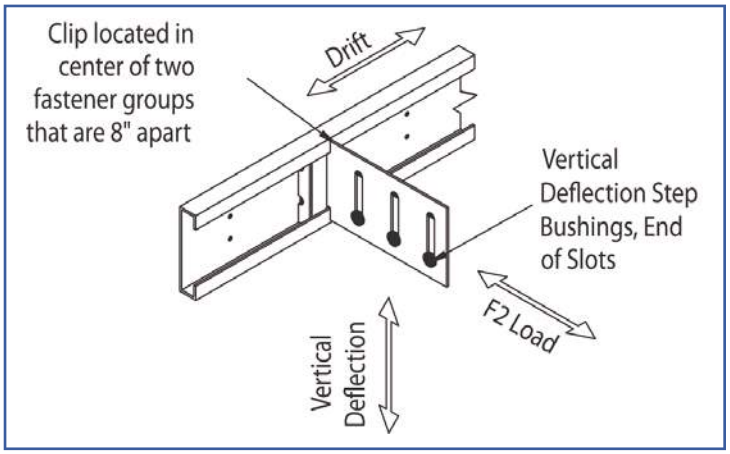
***Example:*** *6" stud depth, with an outward load (F2) of 1,000 lbs*
***Designate:*** *DriftTrak® DTSLB600-HD*

** Notches are standard in DriftTrak DTSLB. For greater F2 outward load capacity, use DTSLB-HD clips w/o notches. Refer to Allowable Load Table.*

## Fastener Patterns

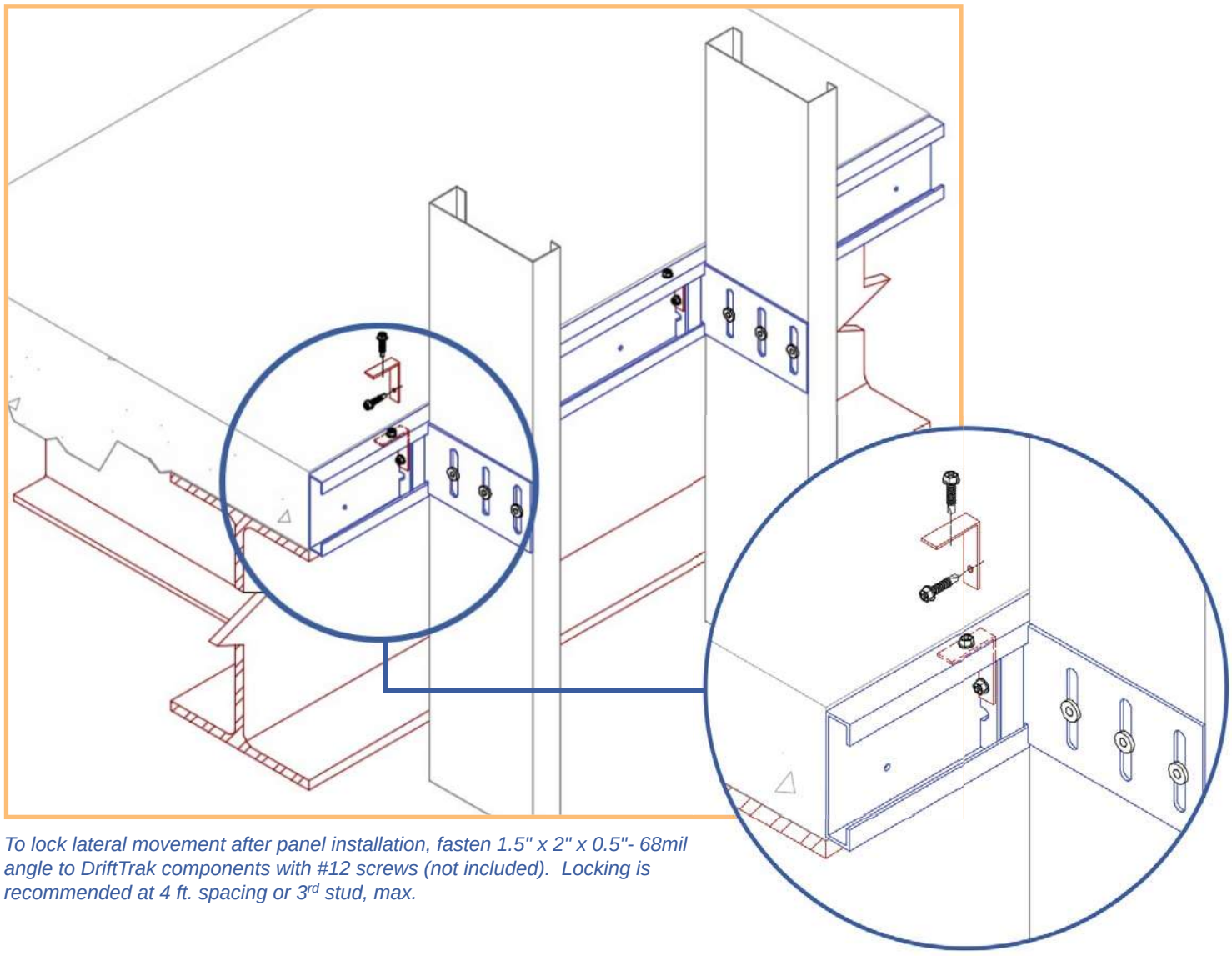



**Fastener Pattern 1** replicates a condition of out-of-plane wind or seismic force with no vertical live load deflection and full in-plane drift.



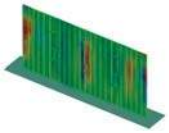

**Fastener Pattern 2** replicates a condition of out-of-plane wind or seismic force with full vertical live load deflection and full in-plane drift.

## Locking of Lateral Movement After Panel Installation



*To lock lateral movement after panel installation, fasten 1.5" x 2" x 0.5"- 68mil angle to DriftTrak components with #12 screws (not included). Locking is recommended at 4 ft. spacing or 3rd stud, max.*

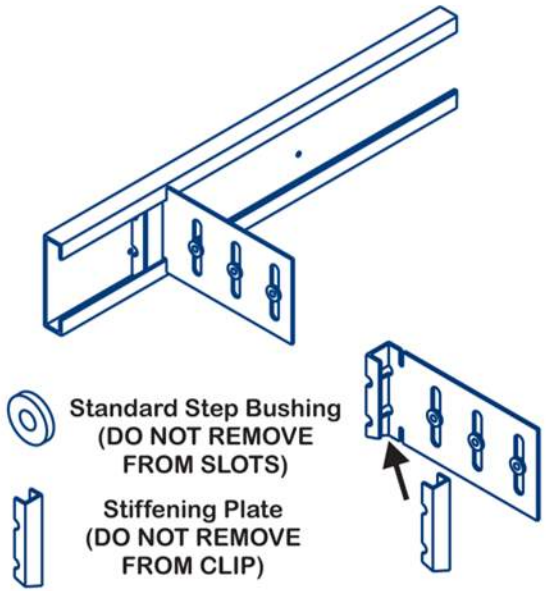
DriftTrak DTSLB362/400, DTSLB600 & DTSLB800
ICC-ESR-2049
www.icc-es.org

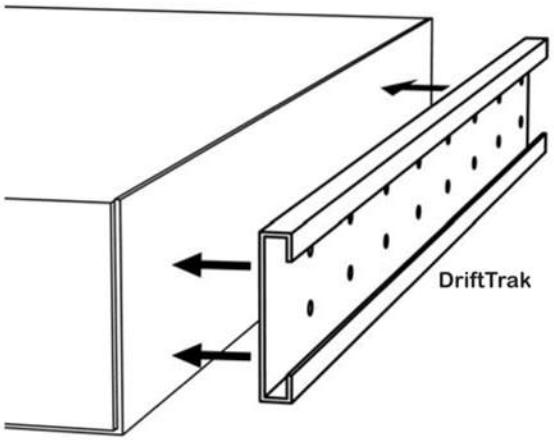


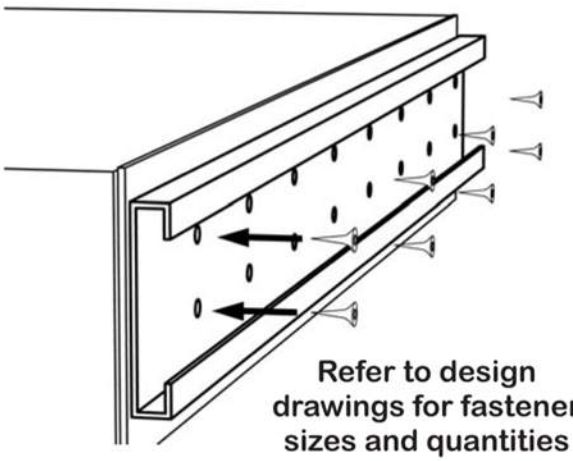
DriftTrak DTSLB Series
Blast and Seismic Design data
www.steelnetwork.com

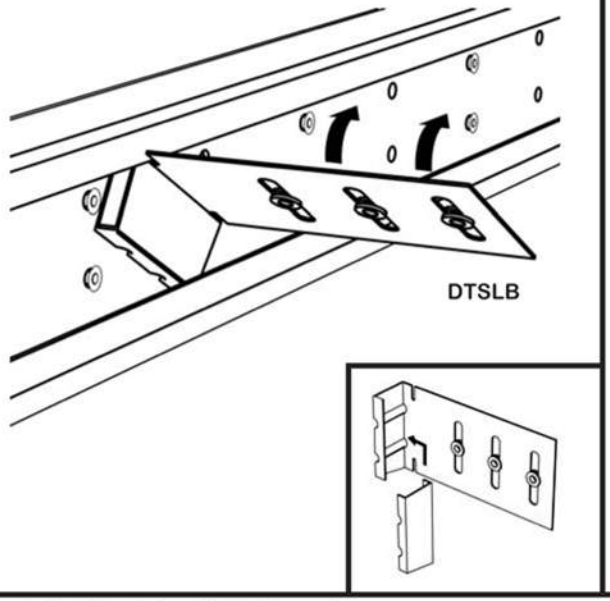
*** For more information or to review a copy of each of these reports, please visit our website at http://www.steelnetwork.com/Site/TechnicalData*

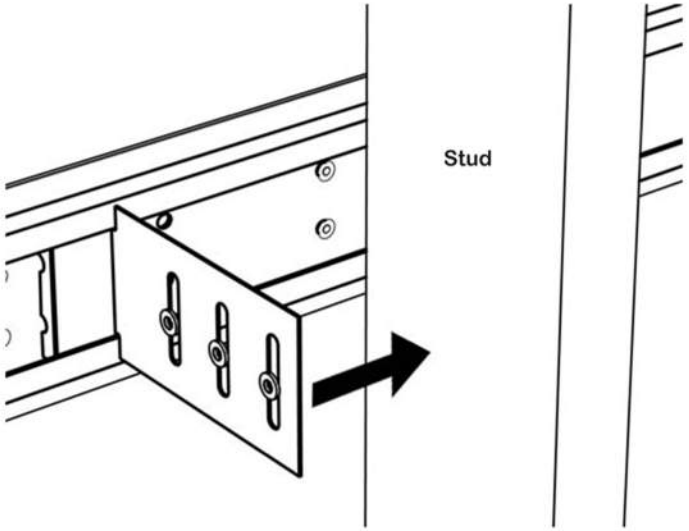
# DriftTrak® DTSLB Installation Instructions
# Vertical Deflection & Drift @ Slab Edge

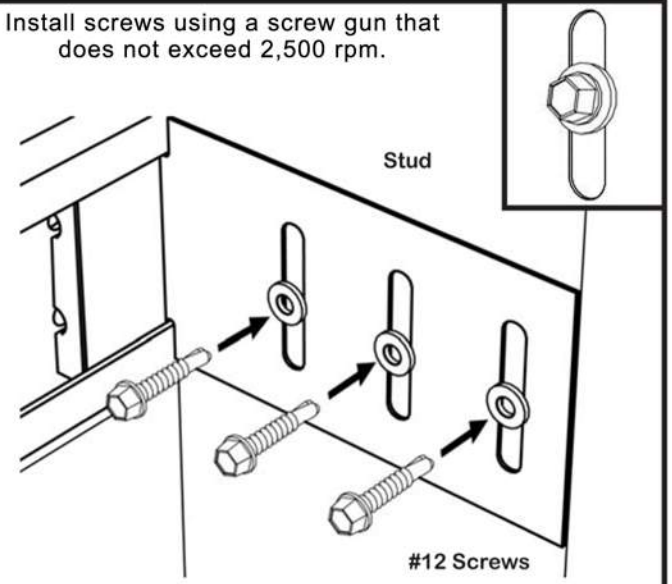



Rev 2



US Patents #7,503,150 & #7,104,024

# ITEM #10

February 22, 2010

To Whom It May Concern:

The International Building Code and International Residential Code (IBC 2006 and IRC2006) refer to ASTM C 1002 and ASTM C 954 as the necessary requirements for sharp point and self-drilling screw fasteners:

**ASTM C 1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs**

**ASTM C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness**

ASTM C 1002 covers sharp point screws for attachment of drywall to wood or light gauge steel. ASTM C 954 covers self-drilling screws for attachment of drywall to light gauge steel.

For IBC and IRC areas, drywall screws meeting the aforementioned ASTM standards are addressed within the building code by reference standard. Therefore, if the drywall screw meets the requirements of ASTM C 1002 or ASTM C 954, the design of these fasteners would be in accordance with the IBC or IRC and AISI NASPEC. Screw fastener load performance data, as well as spacing and edge distance recommendations are provided in the IBC, IRC and AISI NASPEC.

All Hilti Sharp Point and Self Drilling Screws meet the requirements of ASTM C 1002 or ASTM C 954.

The above information is current as of this date and is subject to change without notice.
I hope this addresses your needs. Please feel free to contact me if you have any further questions.

Regards,

Andrew Liechti, P.E.
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Hilti, Inc.
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Drew.Liechti@hilti.com

**Hilti, Inc.**
**5400 South 122nd East Avenue**
**Tulsa, Oklahoma 74146**
**800-879-8000 (US) or 800-363-4458 (Canada)**

**July 4, 2009**

**To Whom It May Concern:**

**This letter is to state Hilti's position regarding the installation of chemically treated lumber such as ACQ. Hilti offers a range of screw fasteners with progressive resistance to corrosion and Hydrogen-Assisted Stress Corrosion Cracking (HASCC):**

- **Screws with a high corrosion resistant finish. Within Hilti's current line of screws, this includes the following:**
  - **Cement Board Screws**
  - **Ceramic Coated Wood Screws**
  - **Wood to Metal Self-drilling Screws with Kwik Cote finish (with and without wings)**
  - **Any other screw with a Kwik Cote finish such as the collated 2" Coarse (#331919)**
  - **Please consider that these screws are hardened along their entire length and are therefore susceptible to HASCC. Whether the site-specific conditions may create HASCC must be determined by the responsible person on the project.**
- **Kwik Flex screws. In addition to the the Kwik Cote finish, Kwik Flex screws are virtually immune to HASCC due to their differential hardness – the load bearing section of the threads is not hardened.**
- **Bi-metal Kwik Flex screws. These screws feature a carbon steel drill tip for maximum drilling performance with a 300 series (18-8) stainless steel body for maximum corrosion resistance. Bi-metal Kwik Flex are virtually immune to HASCC.**
- **Please consider that hardened 410 stainless steel, 410 super-passivated stainless steel and 400 modified stainless steel are generally considered susceptible to HASCC.**

**At the time of writing, there was no standardized set of criteria for claiming ACQ compliance. The decision as to which fastener optimally meets the demands of a specific application is ultimately the judgment of the Engineer of Record or other responsible person for the project.**

**For additional information, please consult the Hilti Technical Guide or call 800-879-8000 and ask to speak with a Technical Services Engineer.**

**Best Regards,**

**Aaron Heilbrun**
**Product Manager**
**Screw Fastening Systems**

## 3.6.2.1 Product Description

The Hilti Self-Drilling Screws are designed to drill their own hole in steel base materials up to 1/2" thick. These screws are available in a variety of head styles, thread lengths and drill-flute lengths for screw diameters #6 through 1/4". Hilti self-drilling screws meet ASTM C 1513, ASTM C 954 and SAE J78 standards, as applicable.

**Product Features**

- Hex head for metal-to-metal applications
- Flush head for wood-to-metal applications
- For metal from 0.035" to 0.500" thick
- Winged reamers for wood over 1/2" thick
- Stitch screws for light gauge metal-to-metal
- Sealing screws for water resistant fastenings



## 3.6.2.2 Material Specifications

| | |
|---|---|
| **Material** | ASTM A 510 Grade 1018-1022 |
| **Heat Treatment** | Case hardened and tempered<br>• Sizes 8, 10 and 12: 0.004" to 0.009" case depth<br>• Size 1/4": 0.005" to 0.011" case depth |
| **Plating** | • Wood decking screws: Black Phosphate (8-18 x 1-5/16" PFH #3 and 8-18 x 1-15/16" and 5/16" PFH #3)<br>• Kwik-Cote and Kwik-Seal screws: 0.0007" to 0.0015" Kwik-Cote Treatment<br>Note: Due to environmental considerations, Hilti does not plate with cadmium.<br>• Most Hilti zinc plated screws conform to ASTM F 1941 (which replaces ASTM B 633), as tested in accordance with ASTM B 117. The minimum zinc thickness is 5 microns. Refer to Section 3.6.2.5 for screw coating information. |
| **Kwik-Cote Treatment** | Kwik-Cote is a unique copolymer coating that provides greater corrosion resistance than zinc or cadmium plating. |

### Listings/Approvals

**ICC-ES (International Code Council)**
ESR-2196

**COLA (City of Los Angeles)**
RR 25678

ICC-ES ESR-2196, provides IBC 2006/2009 recognition of Hilti's Self-Drilling Screw fasteners for most common applications (e.g. CFS connections, gypsum to CFS, etc.), including HWH, PPH, PBH, PWH, PPCH, PFUCH and PFTH head style screws.

## 3.6.2.3 Technical Data

**Ultimate Tensile Strengths – Pullout (Tension), lb** (kN)[1,2,3,4,5,6,7]

| Screw Designation | Nominal Diameter in. | Thickness of steel member not in contact with the screw head, GA (in.) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 20 (0.036) | 18 (0.048) | 16 (0.060) | 14 (0.075) | 12 (0.105) | 10 (0.135) |
| #6 | 0.138 | 190 (0.85) | 250 (1.11) | 320 (1.42) | 395 (1.76) | 555 (2.47) | 715 (3.18) |
| #7 | 0.151 | 210 (0.93) | 275 (1.22) | 345 (1.53) | 435 (1.93) | 605 (2.69) | 780 (3.47) |
| #8 | 0.164 | 225 (1.00) | 300 (1.33) | 375 (1.67) | 470 (2.09) | 660 (2.94) | 845 (3.76) |
| #10 | 0.190 | 260 (1.16) | 350 (1.56) | 435 (1.93) | 545 (2.42) | 765 (3.40) | 980 (4.36) |
| #12 | 0.216 | 295 (1.31) | 395 (1.76) | 495 (2.20) | 620 (2.76) | 870 (3.87) | 1120 (4.98) |
| 1/4 in. | 0.250 | 345 (1.53) | 460 (2.05) | 575 (2.56) | 715 (3.18) | 1000 (4.45) | 1290 (5.74) |

1 The lower of the ultimate pull-out, pullover, and tension fastener strength of screw should be used for design.
2 Load values based upon calculations done in accordance with Section E4 of the AISI North American Specification for the Design of Cold-Formed Steel Structural Members (NASPEC) 2007 edition.
3 The NASPEC recommends a safety factor of 3.0 be applied for allowable strength design, a Φ factor of 0.5 be applied for LRFD design or a Φ factor of 0.4 be applied for LSD design.
4 ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.
5 The screw diameters in the table above are available in head styles of pan, hex washer, pancake, flat, wafer and bugle.
6 The load data in the table is based upon sheet steel with $F_u$ = 45 ksi. For $F_u$ = 55 ksi steel, multiply values by 1.22. For $F_u$ = 65 ksi steel, multiply values by 1.44.
7 Refer to Section 3.6.2.5 to ensure drilling capacities.

# 3.6.2 Self-Drilling Screws

### Ultimate Tensile Strengths – Pullover (Tension), lb (kN)[1,2,3,4,5,6,7]

| Screw Designation | Washer or Head Diameter in. | Thickness of steel member in contact with the screw head, GA (in.) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 22 (0.030) | 20 (0.036) | 18 (0.048) | 16 (0.060) | 14 (0.075) | 12 (0.105) | 10 (0.135) |
| **Hex Washer Head (HWH)** | | | | | | | | |
| #8 | 0.335 | 675 (3.00) | 815 (3.63) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) |
| #10 | 0.399 | 805 (3.58) | 970 (4.31) | 1290 (5.74) | 1370 (6.09) | 1370 (6.09) | 1370 (6.09) | 1370 (6.09) |
| #12-14 | 0.415 | 835 (3.71) | 1010 (4.49) | 1340 (5.96) | 1680 (7.47) | 2100 (9.34) | 2325 (10.34) | 2325 (10.34) |
| #12-24 | 0.415 | 835 (3.71) | 1010 (4.49) | 1340 (5.96) | 1680 (7.47) | 2100 (9.34) | 2940 (13.08) | 3780 (16.81) |
| 1/4 in. | 0.500 | 1010 (4.49) | 1220 (5.43) | 1620 (7.21) | 2030 (9.03) | 2530 (11.25) | 3540 (13.75) | 4560 (20.28) |
| **Phillips Pan Head (PPH)** | | | | | | | | |
| #7 | 0.303 | 615 (2.74) | 735 (3.27) | 980 (4.36) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) |
| #8 | 0.311 | 630 (2.80) | 755 (3.36) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) |
| #10 | 0.364 | 740 (3.29) | 885 (3.94) | 1180 (5.25) | 1370 (6.09) | 1370 (6.09) | 1370 (6.09) | 1370 (6.09) |
| **Phillips Truss Head (PTH)** | | | | | | | | |
| #8 | 0.433 | 875 (3.89) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) | 1000 (4.45) |
| #10 | 0.411 | 830 (3.69) | 1000 (4.45) | 1330 (5.92) | 1390 (6.18) | 1390 (6.18) | 1390 (6.18) | 1390 (6.18) |
| **Phillips Pancake Head (PPCH)** | | | | | | | | |
| #10 | 0.409 | 830 (3.69) | 995 (4.43) | 1325 (5.89) | 1370 (6.09) | 1370 (6.09) | 1370 (6.09) | 1370 (6.09) |
| **Phillips Flat Truss Head (PFTH)** | | | | | | | | |
| #10 | 0.364 | 740 (3.29) | 885 (3.94) | 1180 (5.25) | 1475 (6.56) | 1840 (8.18) | 2170 (9.65) | 2170 (9.65) |

1. The lower of the ultimate pull-out, pullover, and tension fastener strength of screw should be used for design.
2. Load values based upon calculations done in accordance with Section E4 of the AISI North American Specification for the Design of Cold-Formed Steel Structural Members (NASPEC) 2007 edition.
3. The NASPEC recommends a safety factor of 3.0 be applied for allowable strength design, a Φ factor of 0.5 be applied for LRFD design or a Φ factor of 0.4 be applied for LSD design.
4. ANSI/ASME standard screw head diameters were used in the calculations and are listed in the tables.
5. Phillips Bugle Head (PBH) and Phillips Wafer Head (PWH) styles are not covered by this table because they are not intended for attachment of steel to steel.
6. The load data in the table is based upon sheet steel with $F_u$ = 45 ksi. For $F_u$ = 55 ksi steel, multiply values by 1.22. For $F_u$ = 65 ksi steel, multiply values by 1.44.
7. Refer to Section 3.6.2.5 for drilling capacities.

### Nominal Ultimate Fastener Strength of Screw

| Screw Designation | Nominal Diameter (in.) | Nominal Fastener Strength | | | |
|---|---|---|---|---|---|
| | | Tension, $P_{ts}$ lb (kN)[1] | | Shear, $P_{ss}$ lb (kN)[2,3,4] | |
| #6-20 | 0.138 | 1000 | (4.45) | 890 | (3.96) |
| #7-18 | 0.151 | 1000 | (4.45) | 890 | (3.96) |
| #8-18 | 0.164 | 1000 | (4.45) | 1170 | (5.20) |
| #10-12 | 0.190 | 2170 | (9.65) | 1645 | (7.32) |
| #10-16 | 0.190 | 1370 | (6.09) | 1215 | (5.40) |
| #10-18 | 0.190 | 1390 | (6.18) | 1645 | (7.32) |
| #12-14 | 0.216 | 2325 | (10.34) | 1880 | (8.36) |
| #12-24 | 0.216 | 3900 | (17.35) | 2285 | (10.16) |
| 1/4 in. | 0.250 | 4580 | (20.37) | 2440 | (10.85) |

1 The lower of the ultimate pull-out, pullover, and tension fastener strength of screw should be used for design.

2 The lower of the ultimate shear fastener strength and shear bearing should be used for design.

3 The NASPEC recommends a safety factor of 3.0 be applied for allowable strength design, a Φ factor of 0.5 be applied for LRFD design or a Φ factor of 0.4 be applied for LSD design.

4 When the distance to the end of the connected part is parallel to the line of the applied force the allowable shear fastener strength must be reduced for end distance, when necessary, in accordance with E4.3.2 of Appendix A of the AISI North American Specifications for the Design of Cold Formed Steel Structural Members (NASPEC) 2007 edition.

### Torsional Strength –

Screw Only. Does Not Consider Base Material Limitations

| Size | Min. Torsional Strength in-lb (Nm) | |
|---|---|---|
| 6-20 | 24 | (2.7) |
| 7-18 | 38 | (4.3) |
| 8-18 | 42 | (4.8) |
| 10-12 | 61 | (6.9) |
| 10-16 | 61 | (6.9) |
| 10-18 | 61 | (6.9) |
| 10-24 | 65 | (7.3) |
| 12-14 | 92 | (10.4) |
| 12-24 | 100 | (11.3) |
| 1/4-14 | 150 | (17.0) |
| 1/4-20 | 156 | (17.6) |

**Ultimate Shear Strengths – Bearing (Shear), lb** (kN)[1,2,3,4,5,6,7]

| Screw Designation | Nominal Diameter in. | Thickness of steel member in contact with screw head GA (in.) | Thickness of steel member not in contact with the screw head, GA (in.) | | | | |
|---|---|---|---|---|---|---|---|
| | | | **20** (0.036) | **18** (0.048) | **16** (0.060) | **14** (0.075) | ≥ **12** (0.105) |
| #7 | 0.151 | **20** (0.036) | **500** (2.22) | **660** (2.94) | **660** (2.94) | **660** (2.94) | **660** (2.94) |
| | | **18** (0.048) | **500** (2.22) | **660** (2.94) | **880** (3.91) | **880** (3.91) | **880** (3.91) |
| | | ≥ **16** (0.060) | **500** (2.22) | **660** (2.94) | **890** (3.96) | **890** (3.96) | **890** (3.96) |
| #8 | 0.164 | **20** (0.036) | **525** (2.34) | **715** (3.18) | **715** (3.18) | **715** (3.18) | **715** (3.18) |
| | | **18** (0.048) | **525** (2.34) | **805** (3.58) | **955** (4.25) | **955** (4.25) | **955** (4.25) |
| | | ≥ **16** (0.060) | **525** (2.34) | **805** (3.58) | **1120** (4.98) | **1170** (5.20) | **1170** (5.20) |
| #10-12 | 0.190 | **20** (0.036) | **565** (2.51) | **830** (3.69) | **830** (3.69) | **830** (3.69) | **830** (3.69) |
| | | **18** (0.048) | **565** (2.51) | **865** (3.85) | **1110** (4.94) | **1110** (4.94) | **1110** (4.94) |
| | | **16** (0.060) | **565** (2.51) | **865** (3.85) | **1210** (5.38) | **1390** (6.18) | **1390** (6.18) |
| | | ≥ **14** (0.075) | **565** (2.51) | **865** (3.85) | **1210** (5.38) | **1645** (7.32) | **1645** (7.32) |
| #10-16 | 0.190 | **20** (0.036) | **565** (2.51) | **830** (3.69) | **830** (3.69) | **830** (3.69) | **830** (3.69) |
| | | **18** (0.048) | **565** (2.51) | **865** (3.85) | **1110** (4.94) | **1110** (4.94) | **1110** (4.94) |
| | | ≥ **16** (0.060) | **565** (2.51) | **865** (3.85) | **1210** (5.38) | **1215** (5.40) | **1215** (5.40) |
| #10-18 | 0.190 | **20** (0.036) | **565** (2.51) | **830** (3.69) | **830** (3.69) | **830** (3.69) | **830** (3.69) |
| | | **18** (0.048) | **565** (2.51) | **865** (3.85) | **1110** (4.94) | **1110** (4.94) | **1110** (4.94) |
| | | **16** (0.060) | **565** (2.51) | **865** (3.85) | **1210** (5.38) | **1390** (6.18) | **1390** (6.18) |
| | | ≥ **14** (0.075) | **565** (2.51) | **865** (3.85) | **1210** (5.38) | **1645** (7.32) | **1645** (7.32) |
| #12-14 | 0.216 | **20** (0.036) | **600** (2.67) | **930** (4.14) | **945** (4.20) | **945** (4.20) | **945** (4.20) |
| | | **18** (0.048) | **600** (2.67) | **925** (4.11) | **1260** (5.60) | **1260** (5.60) | **1260** (5.60) |
| | | **16** (0.060) | **600** (2.67) | **925** (4.11) | **1290** (5.74) | **1570** (6.98) | **1570** (6.98) |
| | | ≥ **14** (0.075) | **600** (2.67) | **925** (4.11) | **1290** (5.74) | **1800** (8.00) | **1880** (8.36) |
| #12-24 | 0.216 | **20** (0.036) | **600** (2.67) | **930** (4.14) | **945** (4.20) | **945** (4.20) | **945** (4.20) |
| | | **18** (0.048) | **600** (2.67) | **925** (4.11) | **1260** (5.60) | **1260** (5.60) | **1260** (5.60) |
| | | **16** (0.060) | **600** (2.67) | **925** (4.11) | **1290** (5.74) | **1570** (6.98) | **1570** (6.98) |
| | | **14** (0.075) | **600** (2.67) | **925** (4.11) | **1290** (5.74) | **1800** (8.00) | **1970** (8.76) |
| | | ≥ **12** (0.090) | **600** (2.67) | **925** (4.11) | **1290** (5.74) | **1800** (8.00) | **2285** (10.16) |
| 1/4 in. | 0.250 | **20** (0.036) | **645** (2.87) | **1020** (4.54) | **1090** (4.85) | **1090** (4.85) | **1090** (4.85) |
| | | **18** (0.048) | **645** (2.87) | **995** (4.43) | **1400** (6.23) | **1460** (6.49) | **1460** (6.49) |
| | | **16** (0.060) | **645** (2.87) | **995** (4.43) | **1390** (6.18) | **1820** (8.10) | **1820** (8.10) |
| | | **14** (0.075) | **645** (2.87) | **995** (4.43) | **1390** (6.18) | **1940** (8.63) | **2280** (10.14) |
| | | ≥ **12** (0.090) | **645** (2.87) | **995** (4.43) | **1390** (6.18) | **1940** (8.63) | **2440** (10.85) |

1 The lower of the ultimate shear bearing and shear fastener strength of screw should be used for design.

2 Load values based upon calculations done in accordance with Section E4 of the AISI North American Specification for the Design of Cold-Formed Steel Structural Members (NASPEC) 2007 edition. It is assumed that the steel sheets are tight together with no gaps.

3 The NASPEC recommends a safety factor of 3.0 be applied for allowable strength design, a Φ factor of 0.5 be applied for LRFD design or a Φ factor of 0.4 be applied for LSD design.

4 ANSI/ASME standard screw head diameters were used in the calculations and are listed in the tables.

5 Load values in table are for Hex Washer Head (HWH and HHWH), Phillips Pan Head (PPH), Phillips Truss Head (PTH), Phillips Pancake Head (PPCH), and Phillips Flat Truss Head (PFTH) style screws. Phillips Bugle Head (PBH) and Phillips Wafer Head (PWH) styles are not covered by this table because they are not intended for attachment of steel to steel.

6 The load data in the table is based upon sheet steel with $F_u$ = 45 ksi. For $F_u$ = 55 ksi steel, multiply values by 1.22. For $F_u$ = 65 ksi steel, multiply values by 1.44.

7 Refer to Section 3.6.2.5 to ensure drilling capacities.

## 3.6.2.4 Installation Instructions

For general discussion of Hilti screw fastener installation, reference Section 3.6.1.7.

For allowable diaphragm shear loads and stiffness values for steel roof or floor deck utilizing Hilti self-drilling screws as frame or sidelap fasteners, reference Section 3.5 and download Hilti's Profis DF software at www.us.hilti.com/decking (US), or www.hilti.ca (Canada).

To estimate the number of sidelap screws on a steel roof or floor deck project, reference Section 3.5.1.6.

**Warning:** Because of the potential for delayed hydrogen assisted stress corrosion cracking, many hardened steel fasteners are not recommended for use with dissimilar metals or chemically treated wood when moisture may be present or in corrosive environments. For further information, contact Hilti Technical Support at 1-877-749-6337.

# Self-Drilling Screws 3.6.2

**Drywall Applications (Drywall to steel, framing and lathing screws)**

| Description | Coating[1] | Box Qty | Application |
|---|---|---|---|
| 6 x 1 PBH SD | BP | 10,000 | Fastening Drywall, plywood, insulation, etc. to metal studs from 14 ga to 20 ga |
| 6 x 1 PBH SD Zinc | Zinc-2 | 10,000 | |
| 6 x 1-1/8 PBH SD | BP | 10,000 | |
| 6 x 1-1/8 PBH SD Zinc | Zinc-2 | 10,000 | |
| 6 x 1-1/4 PBH SD | BP | 8,000 | |
| 6 x 1-1/4 PBH SD Zinc | Zinc-2 | 8,000 | |
| 6 x 1-5/8 PBH SD | BP | 5,000 | |
| 6 x 1-5/8 PBH SD Zinc | Zinc-2 | 5,000 | |
| 6 x 1-7/8 PBH SD | BP | 4,000 | |
| 6 x 1-7/8 PBH SD Zinc | Zinc-2 | 4,000 | |
| 8 x 2-3/8 PBH SD | BP | 2,500 | |
| 8 x 2-3/8 PBH SD Zinc | Zinc-2 | 2,500 | |
| 8 x 2-5/8 PBH SD | BP | 1,600 | |
| 8 x 2-5/8 PBH SD Zinc | Zinc-2 | 1,600 | |
| 8 x 3 PBH SD | BP | 1,400 | |
| 8 x 3 PBH SD Zinc | Zinc-2 | 1,400 | |
| 7 x 7/16 PPFH SD Framer | BP | 10,000 | Fastening stud to track from 14 ga to 20 ga |
| 7 x 7/16 PPFH SD Framer Zinc | Zinc-2 | 10,000 | |
| 8 x 1/2 PPH SD Framer Zinc | Zinc-2 | 10,000 | |
| 10 x 5/8 PPCH SD Framer | Zinc-1 | 7,500 | |
| 10 x 3/4 PFTH SD Framer Zinc | Zinc-1 | 7,500 | |
| 10 x 3/4 PTH SD Framer Zinc | Zinc-2 | 5,000 | |
| 8 x 1/2 PTH SD Lathing Zinc | Zinc-2 | 10,000 | Fastening wire lath to 14 ga to 20 ga |
| 8 x 3/4 PTH SD Lathing Zinc | Zinc-2 | 10,000 | |
| 8 x 1 PTH SD Lathing Zinc | Zinc-2 | 8,000 | |
| 8 x 1-1/4 PTH SD Lathing Zinc | Zinc-2 | 8,000 | |
| 6 x 1-5/8 SFH SD | BP | 5,000 | Fastening wood trim and base to 14 ga to 20 ga studs |
| 6 x 2-1/4 SFH SD Zinc | Zinc-2 | 3,000 | |

1 For coating abbreviations, Zinc-1 = ASTM F 1941; Zinc-2 = EN /ISO 4042 A3F; BP = Black Phosphate. For more information on corrosion resistance, reference Section 3.6.1.6.

**The importance of IBC 2006 / 2009 compliant screws.**

ICC-ES ESR-2196 provides IBC 2006 / 2009 recognition of Hilti's Self-Drilling Screw Fasteners. This recognition was based on a comprehensive and rigorous independent evaluation of Hilti's Self-Drilling Screw Fasteners to the latest IBC code requirements in ICC-ES AC118 Acceptance Criteria for Self-Tapping Screw Fasteners, as well as the AISI S904 and AISI S905 test standards.

AC118 provides the IBC code recognition and quality assurance for screw fasteners. ESR-2196 recognizes many types of Hilti screws for the most common applications including CFS connections, gypsum to CFS, etc. Specifically, ESR-2196 covers the HWH, PPH, PBH, PWH, PPCH, PFUCH and PFTH head style Hilti screws.

To ensure IBC 2006 / 2009 compliance of screws on your next project, reference ESR-2196.

| Manufacturing Location for Hilti Drywall Screws | | |
|---|---|---|
| Item Number | Product Description | Country of Origin |
| 451 | Screw S-MD 1/4-20 1 1/2" HWH4 KF | US |
| 452 | Screw S-MD 1/4-20 2" HWH4 KF | US |
| 8595 | Screw S-MD 12-14 2" HWH3 KF | US |
| 8598 | Screw S-MD 1/4-14 2" HWH3 KF | US |
| 10190 | Sheet metal screw 8x1/2" SHWH | TW |
| 10192 | Sheet metal screw 10X3/4 HWH 5/16 H | TW |
| 10196 | Wood screw 6 X 1 1/4 PBHS Decking | TW |
| 10215 | Wood screw 6 X 2 PBHS Decking | TW |
| 10222 | Wood screw 8 X 2 1/2 PBHS Decking | TW |
| 10224 | Wood screw 8 X 3 PBHS Decking | TW |
| 10262 | Drywall screw 8X1/2 PTH S LATH ZINC | TW |
| 10263 | Drywall screw 8X3/4 PTH S LATH ZINC | TW |
| 10264 | Drywall screw 8 X 1 PTH S LATH ZINC | TW |
| 10265 | Drywall screw 8X1 1/4 PTH S LATH ZI | TW |
| 10354 | Screw S-MD 10-24 1 1/4" PWH3 KF | US |
| 10355 | Screw S-MD 12-14 1" PFHUC3 KF | US |
| 10436 | Screw S-MD 1/4-20 2 1/2" HWH4 KF | US |
| 84290 | Drywall screw 6 X 1-1/4 PBH SD | TW |
| 84291 | Drywall screw 6x1-1/4 PBH S | TW |

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| Item Number | Product Description | Country of Origin |
|---|---|---|
| 84293 | Drywall screw 8 X 2-5/8 PBH SD | TW |
| 84294 | Drywall screw 6 X 1-1/4 PBH S CRS | TW |
| 84295 | Drywall screw 7 X 2-1/4 PBH S CRS | TW |
| 84297 | Drywall screw 6 X 1 PBH S | TW |
| 84307 | Drywall screw 6 X 1-5/8 PBH S CRS | TW |
| 84310 | Drywall screw 6 X 2 PBH S | TW |
| 84311 | Drywall screw 6 X 2-1/4 PBH S | TW |
| 84316 | Drywall screw 6X1-1/8 PBH S CRS | TW |
| 84317 | Drywall screw 8X 3 PBH S CRS | TW |
| 84319 | Drywall screw 7X 2-1/2 PBH S | TW |
| 84320 | Drywall screw 7X 2 PBH S CRS | TW |
| 84322 | Drywall screw 7X2-1/2 PBH S CRS | TW |
| 84323 | Drywall screw 6X 1-5/8 PBH S | TW |
| 84325 | Drywall screw 6X1 PBH S CRS | TW |
| 84328 | Drywall screw 8 X 3 PBH S | TW |
| 84329 | Drywall screw 6 X 1-1/8 PBH S | TW |
| 84331 | Wood screw 6 X 2 1/4 SFH S TRIM | TW |
| 86198 | Drywall screw 6 X 1 1/8 PBH S HI/LO | TW |
| 86199 | Drywall screw 6 X 1 1/4 PBH S HI/LO | TW |

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| Item Number | Product Description | Country of Origin |
|---|---|---|
| 86200 | Drywall screw 6 X 1 5/8 PBH S HI/LO | TW |
| 86201 | Drywall screw 6X2 PBH S HI/LO | TW |
| 86204 | Drywall screw 8X3 PBH S HI/LO | TW |
| 86205 | Drywall screw 10X 1-1/2 PBH S LAM | TW |
| 86206 | Drywall screw 7 X 7/16 PPH S FRMR | TW |
| 86207 | Drywall screw 6x7/16 PPH S | TW |
| 86208 | Drywall screw 8 X 1/2 PPH S | TW |
| 86211 | Drywall screw 6 X 1 PBH SD | TW |
| 86212 | Drywall screw 6X1 PBH SD ZINC | TW |
| 86213 | Drywall screw 6X 1-1/8 PBH SD | TW |
| 86214 | Drywall screw 6X1 1/8 PBH SD ZINC | TW |
| 86215 | Drywall screw 6X 1 1/4 PBH SD ZINC | TW |
| 86216 | Drywall screw 6X 1-5/8 PBH SD | TW |
| 86217 | Drywall screw 6 X 1 5/8 PBH SD ZINC | TW |
| 86218 | Drywall screw 6 X 1 7/8 PBH SD | TW |
| 86219 | Drywall screw 6 X 1 7/8 PBH SD ZINC | TW |
| 86220 | Drywall screw 8 X 2 3/8 PBH SD | TW |
| 86221 | Drywall screw 8 X 2 3/8 PBH SD ZINC | TW |
| 86222 | Drywall screw 8 X 2 5/8 PBH SD ZINC | TW |
| 86223 | Drywall screw 8 X 3 PBH SD | TW |

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| Item Number | Product Description | Country of Origin |
|---|---|---|
| 86224 | Drywall screw 8X 3 PBH SD ZINC | TW |
| 86225 | Drywall screw 7X 7/16 PPH SD FRMR | TW |
| 86226 | Drywall screw 7X7/16 PPH SD FRMR ZI | TW |
| 86228 | Drywall screw 8X1/2 PTH SD LATH ZI | TW |
| 86231 | Drywall screw 8X1 PTH SD LATH ZINC | TW |
| 86232 | Drywall screw 8X1-1/4PTH SD LATH ZI | TW |
| 86233 | Wood screw 6 X 1-5/8 SFH SD TRIM | TW |
| 86236 | Wood screw 6 X 2 1/4 SFH SD TRIM ZINC | TW |
| 87145 | Drywall screw 8X3/4 PTH SD LATH ZI | TW |
| 87572 | Screw S-MD 12-14 7/8" HWH3 KF | US |
| 87646 | Screw S-MD 12-14 1" HWH3 KF | US |
| 87647 | Screw S-MD 12-14 1 1/2" HWH3 KF | US |
| 87648 | Screw S-MD 1/4-14 1" HWH3 KF | US |
| 87649 | Screw S-MD 1/4-14 1 1/2" HWH3 KF | US |
| 2098766 | Self-drilling screw S-MD 10-16X3/4 HWH3 | TW |
| 254805 | Drywall screw 6X1 1/8 PBH S M | AE |
| 254806 | Drywall screw 6X1 1/4 PBH S M | AE |
| 254807 | Drywall screw 6X1 5/8 PBH S M | AE |
| 254809 | Drywall screw 6X1 1/4 PBH S CRS M | AE |
| 254810 | Drywall screw 6X1 5/8 S CRS M | AE |

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| Item Number | Product Description | Country of Origin |
|---|---|---|
| 311438 | Self-drilling screw S-MD 8-18X1/2 HWH 2 | TW |
| 311439 | Self-drilling screw S-MD 8-18X3/4 HWH 2 | TW |
| 311441 | Self-drilling screw S-MD 8-18X1/2 PPH 2 | TW |
| 311445 | Self-drilling screw S-MD 10-16X1/2 HWH 2 | TW |
| 311446 | Self-drilling screw S-MD 10-16X3/4 HWH 2 | TW |
| 311447 | Self-drilling screw S-MD 10-16X1 HWH 2 | TW |
| 2098767 | Self-drilling screw S-MD 10-16X5/8 HWH 3 | TW |
| 2098768 | Self-drilling screw S-MD 10-16X3/4 HHWH3 | TW |
| 2098769 | Self-drilling screw S-MD 10-16X1 HWH 3 | TW |
| 2099040 | Self-drilling screw S-MD10-16X1 1/4 HWH | TW |
| 2099041 | Self-drilling screw S-MD10-16X1 1/2 HWH | TW |
| 2099042 | Self-drilling screw S-MD 10-16X5/8 PPH 3 | TW |
| 2099043 | Self-drilling screw S-MD 10-16X3/4 PPH 3 | TW |
| 2099044 | Self-drilling screw S-MD 12-14X3/4 HWH 3 | TW |
| 2099045 | Self-drilling screw S-MD 12-14X1 HWH 3 | TW |
| 2099046 | Self-drilling screw S-MD12-14X1 1/2HWH 3 | TW |
| 2099048 | Self-drilling screw S-MD 1/4-14X3/4 HWH | TW |
| 2099049 | Self-drilling screw S-MD 1/4-14X1 HWH 3 | TW |
| 2099050 | Self-drilling screw S-MD1/4-14X1 1/2HWH | TW |
| 2099051 | Self-drilling screw S-MD 1/4-14X2 HWH 3 | TW |

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| Item Number | Product Description | Country of Origin |
|---|---|---|
| 2099047 | Self-drilling screw S-MD 12-14X2 HWH 3 | TW |
| 2099052 | Self-drilling screw S-MD 12-24X7/8 HWH 4 | TW |
| 2099053 | Self-drilling screw S-MD12-24X1 1/4HWH 4 | TW |
| 311615 | Self-drilling screw 12-24X1 1/4 HWH 5 KC | TW |
| 2099054 | Self-drilling screw S-MD12-24X1 1/4HWH 5 | TW |
| 311617 | Self-drilling screw 12-24 X 2 HWH 5 KC | TW |
| 311618 | Self-drilling screw 12-24 X 3 HWH 5 KC | TW |
| 311619 | Self-drilling screw 1/4-14X7/8 STITCH KS | TW |
| 311620 | Self-drilling screw 12-14X3/4 HWH 2 KS | TW |
| 311621 | Self-drilling screw 12-14x1 HWH 3 KS | TW |
| 311622 | Self-drilling screw 12-14x1 1/4 HWH 3 KS | TW |
| 311623 | Self-drilling screw 12-14x1 1/2 HWH 3 KS | TW |
| 311624 | Self-drilling screw 12-14x2 HWH 3 KS | TW |
| 311626 | Self-drilling screw 1/4-14X1 HWH 3 KS | TW |
| 311627 | Self-drilling screw 1/4-14X1 1/2 HWH 3 K | TW |
| 311628 | Self-drilling screw 12-24X1 1/4HWH 5 KC | TW |
| 311629 | Wood screw S-WD 8-18X1 5/16 PFH 3 | TW |
| 311630 | Wood screw S-WD 8-18X1 15/16 PFH 3 | TW |
| 311632 | Wood screw S-WD 10-24X1 PWH 3 | TW |
| 311633 | Wood screw S-WD 10-24X1 1/4 PWH 3 | TW |

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| Item Number | Product Description | Country of Origin |
|---|---|---|
| 311634 | Wood screw S-WD 10-24X1 1/2 PWH 3 | TW |
| 311635 | Self-drilling wing screw WW 10-24X1 7/16 | TW |
| 311636 | Self-drilling wing screw S-WW 12-24X2 PF | TW |
| 311637 | Self-drilling wing screw S-WW 12-24X2 1/ | TW |
| 311638 | Self-drilling wing screw S-WW1/4-20X2 3/ | TW |
| 312010 | Self-drilling screw S-MD 12-14X1 HHWH ST | TW |
| 312011 | Self-drilling screw 10-16X7/8 HWH PIL | TW |
| 314640 | Drywall screw 6X1 1/8 PBH S CRS M | AE |
| 314645 | Drywall screw 6X1 1/8 PBH SD ZI M | AE |
| 314646 | Drywall screw 6X1 1/4 PBH SD ZI M | AE |
| 314647 | Drywall screw 6X1 5/8 PBH SD ZI M | AE |
| 331919 | Drywall screw 6X2 PBH S CRS KCOTE M | AE |
| 331921 | Drywall screw 6X2 PBH S CRS M | AE |
| 331927 | Drywall screw 6X2 PBH S M | AE |
| 331931 | Drywall screw 6X2 PBH SD ZINC M | AE |
| 2098865 | Drywall screw S-DD 12-14x1 PTH 3 | TW |
| 2099055 | Drywall screw S-DD 10-18x3/4 PTH 3 | TW |
| 2099056 | Drywall screw 10 X 5/8 PPCH SD FRMR | TW |
| 372757 | Drywall screw 8X1 1/4 PWH S CMT BD | TW |
| 372759 | Drywall screw 8X1 1/4 PWH SD CMT BD | TW |

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| Item Number | Product Description | Country of Origin |
|---|---|---|
| 372760 | Drywall screw 8X1 5/8 PWH SD CMT BD | TW |
| 2099057 | Drywall screw 10X3/4 PFTH SD FRMR | TW |
| 378973 | Sidelap connector S-SLC 02 M HWH | TW |
| 378976 | Self-drilling screw S-MD 10-16x3/4M HWH3 | TW |
| 378977 | Self-drilling screw S-MD 12-24x7/8M HWH4 | TW |
| 385453 | Sidelap connector S-SLC 01 M HWH | TW |
| 388146 | Drywall screw 6X1 5/8 PBH S CRS M | AE |
| 388147 | Drywall screw 6X1 ¼ PBH S CRS M | AE |
| 388148 | Drywall screw 6X2 PBH S CRS M | AE |
| 388149 | Drywall screw 6X1 ¼ PBH S M | AE |
| 388150 | Drywall screw 6X1 5/8 PBH S M | AE |
| 406474 | Self-drilling screw S-MS 8-18x1/2 HWH | TW |
| 408123 | Screw S-MD 10-16 ¾" HWH3 KF | US |
| 408127 | Screw S-MD 12-14 1 ½" HWH4 KF | US |
| 411517 | Screw 6x1 ¼" PBH SD CRC | TW |
| 413489 | Screw 6x1 7/8" PBH SD CRC | TW |
| 418613 | Self-drilling screw S-MS01Z 8-18x1/2 HWH | TW |
| 423252 | Self-drilling screw S-MS 10-12x3/4" HHWH | TW |
| 423253 | Self-drilling screw S-MS 10-12x3/4" HHWH | TW |
| 451 | Screw S-MD ¼-20 1 ½" HWH4 KF | US |

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| Item Number | Product Description | Country of Origin |
|---|---|---|
| 452 | Screw S-MD ¼-20 2” HWH4 KF | US |
| 8595 | Screw S-MD 12-14 2” HWH3 KF | US |
| 8598 | Screw S-MD ¼-14 2” HWH3 KF | US |
| 10190 | Sheet metal screw 8x1/2" SHWH | TW |
| 10192 | Sheet metal screw 10X3/4 HWH 5/16 H | TW |
| 10196 | Wood screw 6 X 1 1/4 PBHS Decking | TW |
| 10215 | Wood screw 6 X 2 PBHS Decking | TW |
| 10222 | Wood screw 8 X 2 1/2 PBHS Decking | TW |
| TW = Taiwan AE = United Arab Emirates | | |

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# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor



## Listings/Approvals

**ICC-ES (International Code Council)**
ESR-3027
Cracked and Uncracked Concrete
ESR-3056
Grout-filled concrete masonry
**City of Los Angeles**
Research Report No. 25897

## Independent code evaluation

**IBC® / IRC® 2015**
**IBC® / IRC® 2012**
**IBC® / IRC® 2009**
**IBC® / IRC® 2006**
**IBC® / IRC® 2003**

## 3.3.6.1 Product description

Hilti KWIK HUS-EZ (KH-EZ) anchors are comprised of a body with hex washer head. The anchor is manufactured from carbon steel and is heat treated. It has a minimum 0.0003 inch (8 µm) zinc coating in accordance with DIN EN ISO 4042. The KWIK HUS-EZ (KH-EZ) system is available in a variety of lengths with diameters of 1/4-, 3/8-, 1/2-, 5/8- and 3/4-in. The hex head is larger than the diameter of the anchor and is formed with serrations on the underside. The anchor body is formed with threads running most of the length of the anchor body. The anchor is installed in a predrilled hole with a powered impact wrench or torque wrench. The anchor threads cut into the concrete on the sides of the hole and interlock with the base material during installation. Applicable base materials include normal-weight concrete, structural lightweight concrete, lightweight concrete over metal deck, and grout-filled concrete masonry.

**Guide specifications**

Screw anchors shall be KWIK HUS-EZ as supplied by Hilti, Inc. Anchors shall be manufactured from heat treated carbon steel material, zinc plated to a minimum thickness of 8 µm. Anchor head shall display name of manufacturer, product name, diameter and length. Anchors shall be installed using a drill bit of same nominal diameter as anchor.

**Product features**

- Suitable for seismic and nonseismic loads.
- Quick and easy to install.
- Length and diameter identification clearly stamped on head facilitates quality control and inspection after installation.
- Through fixture installation improves productivity and accurate installation.
- Thread design enables quality setting and exceptional load values in wide variety of base material strengths.
- Anchor is fully removable
- Anchor size is same as drill bit size.
- Suitable for reduced edge distances and spacing.

## 3.3.6.2 Material specifications

Hilti KWIK HUS-EZ anchors are manufactured from carbon steel. The anchors are bright zinc plated to a minimum thickness of 8 µm.

## 3.3.6.3 Technical data

### 3.3.6.3.1 ACI 318-14 Chapter 17 design

The technical data contained in this section are Hilti Simplified Design Tables. The load values were developed using the Strength Design parameters and variables of ESR-3027 and the equations within ACI 318-14 Chapter 17. For a detailed explanation of the Hilti Simplified Design Method, refer to section 3.1.8. Data tables from ESR-3027 are not contained in this section, but can be found on www.icc-es.org or at www.us.hilti.com.

# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

**Table 1 - KWIK HUS-EZ specifications[1]**

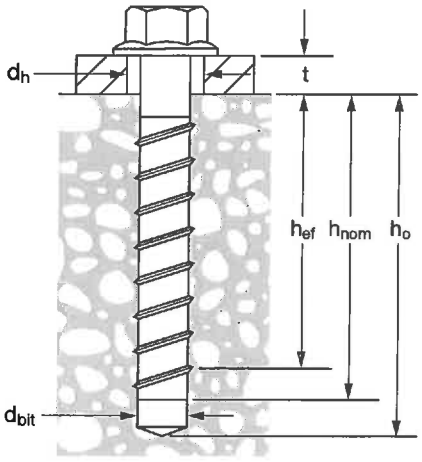
| Setting information | Symbol | Units | Nominal anchor diameter | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal bit diameter | $d_{bit}$ | | 1/4 | | 3/8 | | | 1/2 | | | 5/8 | | 3/4 | |
| Minimum nominal embedment | $h_{nom}$ | in. | 1-5/8 | 2-1/2 | 1-5/8 | 2-1/2 | 3-1/4 | 2-1/4 | 3 | 4-1/4 | 3-1/4 | 5 | 4 | 6-1/4 |
| Minimum effective embedment | $h_{ef}$ | in. | 1.18 | 1.92 | 1.11 | 1.86 | 2.50 | 1.50 | 2.16 | 3.22 | 2.39 | 3.88 | 2.92 | 4.84 |
| Minimum hole depth | $h_o$ | in. | 2 | 2-7/8 | 1-7/8 | 2-3/4 | 3-1/2 | 2-5/8 | 3-3/8 | 4-5/8 | 3-5/8 | 5-3/8 | 4-4/8 | 6-5/8 |
| Minimum fixture hole diameter | $d_h$ | in. | 3/8 | | 1/2 | | | 5/8 | | | 3/4 | | 7/8 | |
| Anchor Length = $h_{nom}$ + t | $\ell$ | | See ordering information | | | | | | | | | | | |
| Installation torque concrete | $T_{inst}$ | ft-lb | 18 | | 19 | 40 | | 45 | | | 85 | | 115 | |
| | | (Nm) | (24) | | (26) | (54) | | (61) | | | (115) | | (155) | |
| Maximum impact wrench torque rating concrete[2] | $T_{impact,max}$ | ft-lb | 114 | 137 | 114 | 450 | | 137 | 450 | | 450 | | 450 | |
| | | (Nm) | (154) | (185) | (154) | (608) | | (185) | (608) | | (608) | | (608) | |
| Installation torque masonry | | ft-lb | 21 | | 22 | | | 34 | | | 38 | | 70 | |
| | | (Nm) | (28) | | (30) | | | (46) | | | (52) | | (95) | |
| Maximum impact wrench torque rating masonry[2,3] | | ft-lb | 114 | | 114 | | 332 | 332 | | | 332 | | 332 | |
| | | (Nm) | (155) | | (155) | | (450) | (450) | | | (450) | | (450) | |
| Wrench size | | in. | 7/16 | | 9/16 | | | 3/4 | | | 15/16 | | 1-1/8 | |

1 $T_{inst}$ is the maximum installation torque that may be applied with a torque wrench.

2 Because of variability in measurement procedures, the published torque of an impact tool may not correlate properly with the above setting torques. Over torquing can damage the anchor and/or reduce its holding capacity.

3 For more information on KWIK HUS-EZ installed in masonry, see ESR-3056 and section 3.3.6.3.3.

**Figure 1 - KWIK HUS-EZ specifications**



# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

**Table 2 - Hilti KWIK HUS-EZ design strength with concrete/pullout failure in uncracked concrete[1,2,3,4,5]**

| Nominal anchor diameter | Nominal embed. in. (mm) | Tension - $\phi N_n$ | | | | Shear - $\phi V_n$ | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | $f'_c$ = 2,500 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 6,000 psi lb (kN) | $f'_c$ = 2,500 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 6,000 psi lb (kN) |
| 1/4 | 1-5/8 (41) | 585 (2.6) | 620 (2.8) | 675 (3.0) | 765 (3.4) | 1,075 (4.8) | 1,180 (5.2) | 1,360 (6.0) | 1,670 (7.4) |
| | 2-1/2 (64) | 1,525 (6.8) | 1,670 (7.4) | 1,930 (8.6) | 2,365 (10.5) | 2,235 (9.9) | 2,450 (10.9) | 2,825 (12.6) | 3,460 (15.4) |
| 3/8 | 1-5/8 (41) | 910 (4.0) | 1,000 (4.4) | 1,155 (5.1) | 1,415 (6.3) | 980 (4.4) | 1,075 (4.8) | 1,245 (5.5) | 1,520 (6.8) |
| | 2-1/2 (64) | 1,980 (8.8) | 2,165 (9.6) | 2,505 (11.1) | 3,065 (13.6) | 2,130 (9.5) | 2,335 (10.4) | 2,695 (12.0) | 3,300 (14.7) |
| | 3-1/4 (83) | 3,085 (13.7) | 3,375 (15.0) | 3,900 (17.3) | 4,775 (21.2) | 6,640 (29.5) | 7,275 (32.4) | 8,400 (37.4) | 10,290 (45.8) |
| 1/2 | 2-1/4 (57) | 1,645 (7.3) | 1,800 (8.0) | 2,080 (9.3) | 2,550 (11.3) | 1,770 (7.9) | 1,940 (8.6) | 2,240 (10.0) | 2,745 (12.2) |
| | 3 (76) | 2,785 (12.4) | 3,050 (13.6) | 3,525 (15.7) | 4,315 (19.2) | 3,000 (13.3) | 3,285 (14.6) | 3,795 (16.9) | 4,645 (20.7) |
| | 4-1/4 (108) | 5,070 (22.6) | 5,555 (24.7) | 6,415 (28.5) | 7,855 (34.9) | 10,920 (48.6) | 11,965 (53.2) | 13,815 (61.5) | 16,920 (75.3) |
| 5/8 | 3-1/4 (83) | 3,240 (14.4) | 3,550 (15.8) | 4,100 (18.2) | 5,025 (22.4) | 3,490 (15.5) | 3,825 (17.0) | 4,415 (19.6) | 5,410 (24.1) |
| | 5 (127) | 6,705 (29.8) | 7,345 (32.7) | 8,485 (37.7) | 10,390 (46.2) | 14,445 (64.3) | 15,825 (70.4) | 18,270 (81.3) | 22,380 (99.6) |
| 3/4 | 4 (102) | 4,380 (19.5) | 4,795 (21.3) | 5,540 (24.6) | 6,785 (30.2) | 9,430 (41.9) | 10,330 (45.9) | 11,930 (53.1) | 14,610 (65.0) |
| | 6-1/4 (159) | 9,345 (41.6) | 10,235 (45.5) | 11,820 (52.6) | 14,475 (64.4) | 20,125 (89.5) | 22,045 (98.1) | 25,455 (113.2) | 31,175 (138.7) |

**Table 3 - Hilti KWIK HUS-EZ design strength with concrete/pullout failure in cracked concrete[1,2,3,4,5]**

| Nominal anchor diameter | Nominal embed. in. (mm) | Tension - $\phi N_n$ | | | | Shear - $\phi V_n$ | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | $f'_c$ = 2,500 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 6,000 psi lb (kN) | $f'_c$ = 2,500 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 6,000 psi lb (kN) |
| 1/4 | 1-5/8 (41) | 300 (1.3) | 315 (1.4) | 345 (1.5) | 390 (1.7) | 765 (3.4) | 835 (3.7) | 965 (4.3) | 1,180 (5.2) |
| | 2-1/2 (64) | 760 (3.4) | 830 (3.7) | 960 (4.3) | 1,175 (5.2) | 1,585 (7.1) | 1,735 (7.7) | 2,000 (8.9) | 2,450 (10.9) |
| 3/8 | 1-5/8 (41) | 475 (2.1) | 520 (2.3) | 600 (2.7) | 730 (3.2) | 695 (3.1) | 760 (3.4) | 880 (3.9) | 1,080 (4.8) |
| | 2-1/2 (64) | 1,400 (6.2) | 1,535 (6.8) | 1,775 (7.9) | 2,170 (9.7) | 1,510 (6.7) | 1,655 (7.4) | 1,910 (8.5) | 2,340 (10.4) |
| | 3-1/4 (83) | 2,185 (9.7) | 2,390 (10.6) | 2,765 (12.3) | 3,385 (15.1) | 4,705 (20.9) | 5,155 (22.9) | 5,950 (26.5) | 7,285 (32.4) |
| 1/2 | 2-1/4 (57) | 1,035 (4.6) | 1,135 (5.0) | 1,310 (5.8) | 1,605 (7.1) | 1,115 (5.0) | 1,220 (5.4) | 1,410 (6.3) | 1,725 (7.7) |
| | 3 (76) | 1,755 (7.8) | 1,920 (8.5) | 2,220 (9.9) | 2,715 (12.1) | 1,890 (8.4) | 2,070 (9.2) | 2,390 (10.6) | 2,925 (13.0) |
| | 4-1/4 (108) | 3,190 (14.2) | 3,495 (15.5) | 4,040 (18.0) | 4,945 (22.0) | 6,875 (30.6) | 7,530 (33.5) | 8,695 (38.7) | 10,650 (47.4) |
| 5/8 | 3-1/4 (83) | 2,040 (9.1) | 2,235 (9.9) | 2,580 (11.5) | 3,165 (14.1) | 2,200 (9.8) | 2,410 (10.7) | 2,780 (12.4) | 3,405 (15.1) |
| | 5 (127) | 4,225 (18.8) | 4,625 (20.6) | 5,340 (23.8) | 6,540 (29.1) | 9,095 (40.5) | 9,965 (44.3) | 11,505 (51.2) | 14,090 (62.7) |
| 3/4 | 4 (102) | 2,755 (12.3) | 3,020 (13.4) | 3,485 (15.5) | 4,270 (19.0) | 5,940 (26.4) | 6,505 (28.9) | 7,510 (33.4) | 9,200 (40.9) |
| | 6-1/4 (159) | 5,885 (26.2) | 6,445 (28.7) | 7,440 (33.1) | 9,115 (40.5) | 12,670 (56.4) | 13,880 (61.7) | 16,030 (71.3) | 19,630 (87.3) |

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in table 6 to 15 as necessary. Compare to the steel values in table 4. The lesser of the values is to be used for the design

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by $\lambda_a$ as follows: for sand-lightweight, $\lambda_a$ = 0.68; for all-lightweight, $\lambda_a$ = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:

1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{seis}$ = 0.60

All other sizes - $\alpha_{seis}$ = 0.75

No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

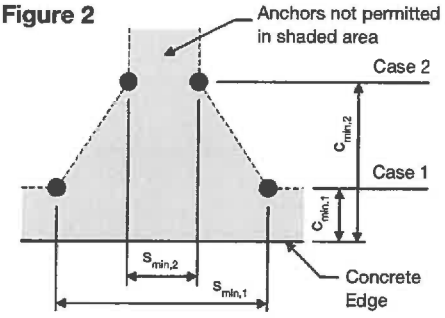
**Table 4 - Steel design strength for Hilti KWIK HUS-EZ anchors[1,2]**

| Nominal anchor diameter | Nominal embedment in. (mm) | | | Tensile $\phi N_{sa}$[3] lb (kN) | Shear $\phi V_{sa}$[4] lb (kN) | Seismic shear $\phi V_{sa,eq}$[5] lb (kN) |
|---|---|---|---|---|---|---|
| 1/4 | 1-5/8 (41) | 2-1/2 (64) | | 3,945 (17.5) | 930 (4.1) | 835 (3.7) |
| 3/8 | 1-5/8 (41) | | | 5,980 (26.6) | 2,200 (9.8) | 2,200 (9.8) |
| | 2-1/2 (64) | 3-1/4 (83) | | 6,720 (29.9) | 3,110 (13.8) | 1,865 (8.3) |
| 1/2 | 2-1/4 (57) | 3 (76) | 4-1/4 (108) | 11,780 (52.4) | 5,545 (24.7) | 3,330 (14.8) |
| 5/8 | 3-1/4 (83) | 5 (127) | | 15,735 (70.0) | 6,735 (30.0) | 4,040 (18.0) |
| 3/4 | 4 (102) | 6-1/4 (159) | | 20,810 (92.6) | 9,995 (44.5) | 6,935 (30.8) |

1 See section 3.1.8.6 to convert design strength value to ASD value.
2 KWIK HUS-EZ anchors are to be considered brittle steel elements.
3 Tensile $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318-14 Chapter 17.
4 Shear values determined by static shear tests with $\phi V_{sa} < \phi 0.60\, A_{se,V} f_{uta}$ as noted in ACI 318-14 Chapter 17.
5 Seismic shear values determined by seismic shear tests with $\phi V_{sa,eq} < \phi\, 0.60\, A_{se,V} f_{uta}$ as noted in ACI 318-14 Chapter 17. See section 3.1.8.7 for additional information on seismic applications.

3.3.6

**Figure 2**




For a specific edge distance, the permitted spacing is calculated as follows:

$$s \geq s_{min,2} + \frac{(s_{min,1} - s_{min,2})}{(c_{min,1} - c_{min,2})} (c - c_{min,2})$$

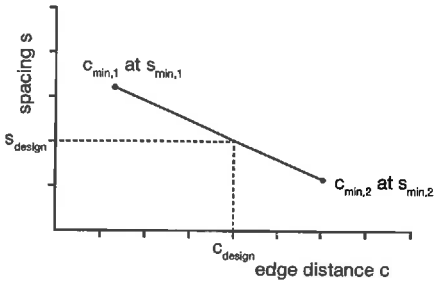



**Table 5 - KWIK HUS-EZ specifications**

| Setting information | Symbol | Units | Nominal anchor diameter | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/4 | | 3/8 | | | 1/2 | | | 5/8 | | 3/4 | |
| Effective minimum embedment | $h_{ef}$ | in. | 1.18 | 1.92 | 1.11 | 1.86 | 2.50 | 1.50 | 2.16 | 3.22 | 2.39 | 3.88 | 2.92 | 4.84 |
| Minimum member thickness | $h_{min}$ | in. | 3-1/4 | 4.125 | 3-1/4 | 4 | 4-7/8 | 4-1/2 | 4 3/4 | 6-3/4 | 5 | 7 | 6 | 8-1/8 |
| Case 1 | $c_{min,1}$ | in. | 1.50 | | | | | 1.75 | | | | | | |
| | for $s_{min,1} \geq$ | in. | 3 | | | | | | | | 4 | | | |
| Case 2 | $c_{min,2}$ | in. | 2 | 2.78 | 2.63 | 2.92 | 3.75 | 2.75 | 3.75 | 5.25 | 3.63 | 5.81 | 4.41 | 7.28 |
| | for $s_{min,2} \geq$ | in. | 1.50 | | 2.25 | | | 3 | | | | | | |

1 Linear interpolation is permitted to establish an edge distance and spacing combination between Case 1 and Case 2. Linear interpolation for a specific edge .distance c, where $c_{min,1} < c < c_{min,2}$ will determine the permissible spacings.

# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

**Table 6 - Load adjustment factors for 1/4-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]**

| 1/4-in. KH-EZ uncracked concrete | | | Spacing factor in tension $f_{AN}$ | | Edge distance factor in tension $f_{RN}$ | | Spacing factor in shear[3] $f_{AV}$ | | Edge distance in shear | | | | Conc. thickness factor in shear[4] $f_{HV}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ⊥ toward edge $f_{RV}$ | | II to edge $f_{RV}$ | | | |
| Embedment $h_{nom}$ | | in. (mm) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-1/2 | (38) | 0.71 | 0.63 | 0.78 | 0.65 | 0.59 | 0.56 | 0.40 | 0.21 | 0.78 | 0.42 | n/a | n/a |
| | 2 | (51) | 0.78 | 0.67 | 1.00 | 0.77 | 0.62 | 0.58 | 0.61 | 0.33 | 1.00 | 0.65 | n/a | n/a |
| | 2-1/2 | (64) | 0.85 | 0.72 | | 0.90 | 0.65 | 0.60 | 0.86 | 0.46 | | 0.90 | n/a | n/a |
| | 3 | (76) | 0.92 | 0.76 | | 1.00 | 0.68 | 0.62 | 1.00 | 0.60 | | 1.00 | n/a | n/a |
| | 3-1/4 | (83) | 0.96 | 0.78 | | | 0.70 | 0.63 | | 0.68 | | | 0.88 | n/a |
| | 3-1/2 | (89) | 0.99 | 0.80 | | | 0.71 | 0.64 | | 0.76 | | | 0.92 | n/a |
| | 4 | (102) | 1.00 | 0.85 | | | 0.74 | 0.66 | | 0.92 | | | 0.98 | n/a |
| | 4-1/8 | (105) | | 0.86 | | | 0.75 | 0.66 | | 0.97 | | | 1.00 | 0.81 |
| | 4-1/2 | (114) | | 0.89 | | | 0.77 | 0.68 | | 1.00 | | | | 0.84 |
| | 5 | (127) | | 0.93 | | | 0.80 | 0.70 | | | | | | 0.89 |
| | 5-1/2 | (140) | | 0.98 | | | 0.83 | 0.72 | | | | | | 0.93 |
| | 6 | (152) | | 1.00 | | | 0.86 | 0.74 | | | | | | 0.97 |
| | 7 | (178) | | | | | 0.92 | 0.78 | | | | | | 1.00 |
| | 8 | (203) | | | | | 0.98 | 0.82 | | | | | | |
| | 9 | (229) | | | | | 1.00 | 0.86 | | | | | | |
| | 10 | (254) | | | | | | 0.89 | | | | | | |
| | 11 | (279) | | | | | | 0.93 | | | | | | |
| | 12 | (305) | | | | | | 0.97 | | | | | | |
| | 14 | (356) | | | | | | 1.00 | | | | | | |

**Table 7 - Load adjustment factors for 1/4-in. diameter KWIK HUS-EZ in cracked concrete[1,2]**

| 1/4-in. KH-EZ cracked concrete | | | Spacing factor in tension $f_{AN}$ | | Edge distance factor in tension $f_{RN}$ | | Spacing factor in shear[3] $f_{AV}$ | | Edge distance in shear | | | | Conc. thickness factor in shear[4] $f_{HV}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ⊥ toward edge $f_{RV}$ | | II to edge $f_{RV}$ | | | |
| Embedment $h_{nom}$ | | in. (mm) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-1/2 | (38) | 0.71 | 0.63 | 0.88 | 0.65 | 0.59 | 0.56 | 0.40 | 0.21 | 0.80 | 0.43 | n/a | n/a |
| | 2 | (51) | 0.78 | 0.67 | 1.00 | 0.77 | 0.62 | 0.58 | 0.62 | 0.33 | 1.00 | 0.66 | n/a | n/a |
| | 2-1/2 | (64) | 0.85 | 0.72 | | 0.90 | 0.65 | 0.60 | 0.87 | 0.46 | | 0.90 | n/a | n/a |
| | 3 | (76) | 0.92 | 0.76 | | 1.00 | 0.68 | 0.62 | 1.00 | 0.60 | | 1.00 | n/a | n/a |
| | 3-1/4 | (83) | 0.96 | 0.78 | | | 0.70 | 0.63 | | 0.68 | | | 0.89 | n/a |
| | 3-1/2 | (89) | 0.99 | 0.80 | | | 0.71 | 0.64 | | 0.76 | | | 0.92 | n/a |
| | 4 | (102) | 1.00 | 0.85 | | | 0.74 | 0.66 | | 0.93 | | | 0.98 | n/a |
| | 4-1/8 | (105) | | 0.86 | | | 0.75 | 0.66 | | 0.97 | | | 1.00 | 0.81 |
| | 4-1/2 | (114) | | 0.89 | | | 0.77 | 0.68 | | 1.00 | | | | 0.85 |
| | 5 | (127) | | 0.93 | | | 0.80 | 0.70 | | | | | | 0.89 |
| | 5-1/2 | (140) | | 0.98 | | | 0.83 | 0.72 | | | | | | 0.93 |
| | 6 | (152) | | 1.00 | | | 0.86 | 0.74 | | | | | | 0.98 |
| | 7 | (178) | | | | | 0.92 | 0.78 | | | | | | 1.00 |
| | 8 | (203) | | | | | 0.98 | 0.82 | | | | | | |
| | 9 | (229) | | | | | 1.00 | 0.86 | | | | | | |
| | 10 | (254) | | | | | | 0.90 | | | | | | |
| | 11 | (279) | | | | | | 0.94 | | | | | | |
| | 12 | (305) | | | | | | 0.98 | | | | | | |
| | 14 | (356) | | | | | | 1.00 | | | | | | |

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, $f_{AV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, $f_{HV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

## Table 8 - Load adjustment factors for 3/8-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]

| 3/8-in. KH-EZ uncracked concrete | | | Spacing factor in tension $f_{AN}$ | | | Edge distance factor in tension $f_{RN}$ | | | Spacing factor in shear[3] $f_{AV}$ | | | Edge distance in shear ⊥ toward edge $f_{RV}$ | | | Edge distance in shear ll to edge $f_{RV}$ | | | Conc. thickness factor in shear[4] $f_{HV}$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Embedment $h_{nom}$ | in. | | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 |
| | (mm) | | (41) | (64) | (83) | (41) | (64) | (83) | (41) | (64) | (83) | (41) | (64) | (83) | (41) | (64) | (83) | (41) | (64) | (83) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-1/2 | (38) | n/a | n/a | n/a | 0.58 | 0.63 | 0.57 | n/a | n/a | n/a | 0.49 | 0.25 | 0.08 | 0.58 | 0.50 | 0.17 | n/a | n/a | n/a |
| | 2 | (51) | n/a | n/a | n/a | 0.76 | 0.75 | 0.66 | n/a | n/a | n/a | 0.75 | 0.38 | 0.13 | 0.76 | 0.75 | 0.26 | n/a | n/a | n/a |
| | 2-1/4 | (57) | 0.84 | 0.70 | 0.65 | 0.86 | 0.81 | 0.70 | 0.65 | 0.60 | 0.55 | 0.90 | 0.46 | 0.16 | 0.90 | 0.81 | 0.31 | n/a | n/a | n/a |
| | 2-1/2 | (64) | 0.88 | 0.72 | 0.67 | 0.95 | 0.88 | 0.75 | 0.67 | 0.61 | 0.55 | 1.00 | 0.54 | 0.18 | 1.00 | 0.88 | 0.37 | n/a | n/a | n/a |
| | 3 | (76) | 0.95 | 0.77 | 0.70 | 1.00 | 1.00 | 0.85 | 0.71 | 0.63 | 0.56 | 1.00 | 0.71 | 0.24 | 1.00 | 1.00 | 0.48 | n/a | n/a | n/a |
| | 3-1/4 | (83) | 0.99 | 0.79 | 0.72 | | | 0.90 | 0.72 | 0.64 | 0.57 | | 0.80 | 0.27 | | | 0.54 | 0.95 | n/a | n/a |
| | 3-1/2 | (89) | 1.00 | 0.81 | 0.73 | | | 0.95 | 0.74 | 0.65 | 0.58 | | 0.89 | 0.30 | | | 0.61 | 0.98 | n/a | n/a |
| | 4 | (102) | | 0.86 | 0.77 | | | 1.00 | 0.78 | 0.68 | 0.59 | | 1.00 | 0.37 | | | 0.74 | 1.00 | 0.84 | n/a |
| | 4-1/2 | (114) | | 0.90 | 0.80 | | | | 0.81 | 0.70 | 0.60 | | | 0.44 | | | 0.88 | | 0.89 | n/a |
| | 4-3/4 | (121) | | 0.93 | 0.82 | | | | 0.83 | 0.71 | 0.60 | | | 0.48 | | | 0.96 | | 0.91 | 0.64 |
| | 5 | (127) | | 0.95 | 0.83 | | | | 0.84 | 0.72 | 0.61 | | | 0.52 | | | 1.00 | | 0.94 | 0.66 |
| | 6 | (152) | | 1.00 | 0.90 | | | | 0.91 | 0.76 | 0.63 | | | 0.68 | | | | | 1.00 | 0.72 |
| | 7 | (178) | | | 0.97 | | | | 0.98 | 0.81 | 0.65 | | | 0.86 | | | | | | 0.78 |
| | 8 | (203) | | | 1.00 | | | | 1.00 | 0.85 | 0.67 | | | 1.00 | | | | | | 0.83 |
| | 9 | (229) | | | | | | | | 0.90 | 0.69 | | | | | | | | | 0.88 |
| | 10 | (254) | | | | | | | | 0.94 | 0.71 | | | | | | | | | 0.93 |
| | 11 | (279) | | | | | | | | 0.98 | 0.74 | | | | | | | | | 0.97 |
| | 12 | (305) | | | | | | | | 1.00 | 0.76 | | | | | | | | | 1.00 |
| | 14 | (356) | | | | | | | | | 0.80 | | | | | | | | | |
| | 16 | (406) | | | | | | | | | 0.84 | | | | | | | | | |
| | 18 | (457) | | | | | | | | | 0.89 | | | | | | | | | |
| | 20 | (508) | | | | | | | | | 0.93 | | | | | | | | | |
| | 24 | (610) | | | | | | | | | 1.00 | | | | | | | | | |

## Table 9 - Load adjustment factors for 3/8-in. diameter KWIK HUS-EZ in cracked concrete[1,2]

| 3/8-in. KH-EZ Cracked concrete | | | Spacing factor in tension $f_{AN}$ | | | Edge distance factor in tension $f_{RN}$ | | | Spacing factor in shear[3] $f_{AV}$ | | | Edge distance in shear ⊥ toward edge $f_{RV}$ | | | Edge distance in shear ll to edge $f_{RV}$ | | | Conc. thickness factor in shear[4] $f_{HV}$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Embedment $h_{nom}$ | in. | | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 | 1-5/8 | 2-1/2 | 3-1/4 |
| | (mm) | | (41) | (64) | (83) | (41) | (64) | (83) | (41) | (64) | (83) | (41) | (64) | (83) | (41) | (64) | (83) | (41) | (64) | (83) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-1/2 | (38) | n/a | n/a | n/a | 0.92 | 0.66 | 0.57 | n/a | n/a | n/a | 0.49 | 0.25 | 0.09 | 0.92 | 0.50 | 0.17 | n/a | n/a | n/a |
| | 2 | (51) | n/a | n/a | n/a | 1.00 | 0.79 | 0.66 | n/a | n/a | n/a | 0.76 | 0.39 | 0.13 | 1.00 | 0.77 | 0.26 | n/a | n/a | n/a |
| | 2-1/4 | (57) | 0.84 | 0.70 | 0.65 | 1.00 | 0.85 | 0.70 | 0.66 | 0.60 | 0.55 | 0.90 | 0.46 | 0.16 | 1.00 | 0.85 | 0.31 | n/a | n/a | n/a |
| | 2-1/2 | (64) | 0.88 | 0.72 | 0.67 | 1.00 | 0.92 | 0.75 | 0.67 | 0.61 | 0.55 | 1.00 | 0.54 | 0.18 | 1.00 | 0.92 | 0.37 | n/a | n/a | n/a |
| | 3 | (76) | 0.95 | 0.77 | 0.70 | 1.00 | 1.00 | 0.85 | 0.71 | 0.63 | 0.56 | 1.00 | 0.71 | 0.24 | 1.00 | 1.00 | 0.48 | n/a | n/a | n/a |
| | 3-1/4 | (83) | 0.99 | 0.79 | 0.72 | | | 0.90 | 0.73 | 0.64 | 0.57 | | 0.80 | 0.27 | | | 0.55 | 0.95 | n/a | n/a |
| | 3-1/2 | (89) | 1.00 | 0.81 | 0.73 | | | 0.95 | 0.74 | 0.65 | 0.58 | | 0.90 | 0.31 | | | 0.61 | 0.98 | n/a | n/a |
| | 4 | (102) | | 0.86 | 0.77 | | | 1.00 | 0.78 | 0.68 | 0.59 | | 1.00 | 0.37 | | | 0.75 | 1.00 | 0.84 | n/a |
| | 4-1/2 | (114) | | 0.90 | 0.80 | | | | 0.81 | 0.70 | 0.60 | | | 0.44 | | | 0.89 | | 0.89 | n/a |
| | 4-3/4 | (121) | | 0.93 | 0.82 | | | | 0.83 | 0.71 | 0.60 | | | 0.48 | | | 0.97 | | 0.92 | 0.64 |
| | 5 | (127) | | 0.95 | 0.83 | | | | 0.85 | 0.72 | 0.61 | | | 0.52 | | | 1.00 | | 0.94 | 0.66 |
| | 6 | (152) | | 1.00 | 0.90 | | | | 0.92 | 0.77 | 0.63 | | | 0.69 | | | | | 1.00 | 0.72 |
| | 7 | (178) | | | 0.97 | | | | 0.98 | 0.81 | 0.65 | | | 0.86 | | | | | | 0.78 |
| | 8 | (203) | | | 1.00 | | | | 1.00 | 0.85 | 0.67 | | | 1.00 | | | | | | 0.83 |
| | 9 | (229) | | | | | | | | 0.90 | 0.69 | | | | | | | | | 0.88 |
| | 10 | (254) | | | | | | | | 0.94 | 0.72 | | | | | | | | | 0.93 |
| | 11 | (279) | | | | | | | | 0.99 | 0.74 | | | | | | | | | 0.97 |
| | 12 | (305) | | | | | | | | 1.00 | 0.76 | | | | | | | | | 1.00 |
| | 14 | (356) | | | | | | | | | 0.80 | | | | | | | | | |
| | 16 | (406) | | | | | | | | | 0.85 | | | | | | | | | |
| | 18 | (457) | | | | | | | | | 0.89 | | | | | | | | | |
| | 20 | (508) | | | | | | | | | 0.93 | | | | | | | | | |
| | 24 | (610) | | | | | | | | | 1.00 | | | | | | | | | |

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, $f_{AV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, $f_{HV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

## Table 10 - Load adjustment factors for 1/2-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]

| 1/2-in. KH-EZ uncracked concrete | | | Spacing factor in tension $f_{AN}$ | | | Edge distance factor in tension $f_{RN}$ | | | Spacing factor in shear[3] $f_{AV}$ | | | Edge distance in shear ⊥ toward edga $f_{RV}$ | | | Edge distance in shear II to edge $f_{RV}$ | | | Conc. thickness factor in shear[4] $f_{HV}$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Embedment $h_{nom}$ | | in. | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 |
| | | (mm) | (57) | (76) | (108) | (57) | (76) | (108) | (57) | (76) | (108) | (57) | (76) | (108) | (57) | (76) | (108) | (57) | (76) | (108) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-3/4 | (44) | n/a | n/a | n/a | 0.68 | 0.57 | 0.51 | n/a | n/a | n/a | 0.40 | 0.25 | 0.07 | 0.68 | 0.50 | 0.15 | n/a | n/a | n/a |
| | 2 | (51) | n/a | n/a | n/a | 0.75 | 0.62 | 0.54 | n/a | n/a | n/a | 0.48 | 0.31 | 0.09 | 0.75 | 0.61 | 0.18 | n/a | n/a | n/a |
| | 2-1/2 | (64) | n/a | n/a | n/a | 0.91 | 0.71 | 0.60 | n/a | n/a | n/a | 0.68 | 0.43 | 0.13 | 0.91 | 0.71 | 0.25 | n/a | n/a | n/a |
| | 3 | (76) | 0.83 | 0.73 | 0.66 | 1.00 | 0.81 | 0.66 | 0.65 | 0.61 | 0.55 | 0.89 | 0.56 | 0.17 | 1.00 | 0.81 | 0.33 | n/a | n/a | n/a |
| | 3-1/2 | (89) | 0.88 | 0.77 | 0.68 | | 0.93 | 0.73 | 0.68 | 0.63 | 0.56 | 1.00 | 0.71 | 0.21 | | 0.93 | 0.42 | n/a | n/a | n/a |
| | 4 | (102) | 0.94 | 0.81 | 0.71 | | 1.00 | 0.80 | 0.71 | 0.65 | 0.57 | | 0.87 | 0.26 | | 1.00 | 0.52 | n/a | n/a | n/a |
| | 4-1/2 | (114) | 0.99 | 0.85 | 0.73 | | | 0.87 | 0.73 | 0.67 | 0.58 | | 1.00 | 0.31 | | | 0.62 | 0.96 | n/a | n/a |
| | 4-3/4 | (121) | 1.00 | 0.87 | 0.75 | | | 0.91 | 0.74 | 0.68 | 0.58 | | | 0.33 | | | 0.67 | 0.99 | 0.85 | n/a |
| | 5 | (127) | | 0.89 | 0.76 | | | 0.95 | 0.76 | 0.69 | 0.58 | | | 0.36 | | | 0.72 | 1.00 | 0.87 | n/a |
| | 6 | (152) | | 0.96 | 0.81 | | | 1.00 | 0.81 | 0.73 | 0.60 | | | 0.47 | | | 0.95 | | 0.95 | n/a |
| | 6-3/4 | (171) | | 1.00 | 0.85 | | | | 0.85 | 0.76 | 0.61 | | | 0.57 | | | 1.00 | | 1.00 | 0.68 |
| | 7 | (178) | | | 0.86 | | | | 0.86 | 0.77 | 0.62 | | | 0.60 | | | | | | 0.69 |
| | 8 | (203) | | | 0.91 | | | | 0.91 | 0.80 | 0.64 | | | 0.73 | | | | | | 0.73 |
| | 9 | (229) | | | 0.97 | | | | 0.96 | 0.84 | 0.65 | | | 0.87 | | | | | | 0.78 |
| | 10 | (254) | | | 1.00 | | | | 1.00 | 0.88 | 0.67 | | | 1.00 | | | | | | 0.82 |
| | 11 | (279) | | | | | | | | 0.92 | 0.69 | | | | | | | | | 0.86 |
| | 12 | (305) | | | | | | | | 0.95 | 0.70 | | | | | | | | | 0.90 |
| | 14 | (356) | | | | | | | | 1.00 | 0.74 | | | | | | | | | 0.97 |
| | 16 | (406) | | | | | | | | | 0.77 | | | | | | | | | 1.00 |
| | 18 | (457) | | | | | | | | | 0.80 | | | | | | | | | |
| | 20 | (508) | | | | | | | | | 0.84 | | | | | | | | | |
| | > 24 | (610) | | | | | | | | | 0.91 | | | | | | | | | |

## Table 11 - Load adjustment factors for 1/2-in. diameter KWIK HUS-EZ in cracked concrete[1,2]

| 1/2-in. KH-EZ cracked concrete | | | Spacing factor in tension $f_{AN}$ | | | Edge distance factor in tension $f_{RN}$ | | | Spacing factor in shear[3] $f_{AV}$ | | | Edge distance in shear ⊥ toward edge $f_{RV}$ | | | Edge distance in shear II to edge $f_{RV}$ | | | Conc. thickness factor in shear[4] $f_{HV}$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Embedment $h_{nom}$ | | in. | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 | 2-1/4 | 3 | 4-1/4 |
| | | (mm) | (57) | (76) | (108) | (57) | (76) | (108) | (57) | (76) | (108) | (57) | (76) | (108) | (57) | (76) | (108) | (57) | (76) | (108) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-3/4 | (44) | n/a | n/a | n/a | 0.82 | 0.66 | 0.55 | n/a | n/a | n/a | 0.45 | 0.28 | 0.08 | 0.82 | 0.57 | 0.17 | n/a | n/a | n/a |
| | 2 | (51) | n/a | n/a | n/a | 0.90 | 0.72 | 0.58 | n/a | n/a | n/a | 0.55 | 0.35 | 0.10 | 0.90 | 0.70 | 0.21 | n/a | n/a | n/a |
| | 2-1/2 | (64) | n/a | n/a | n/a | 1.00 | 0.83 | 0.65 | n/a | n/a | n/a | 0.77 | 0.49 | 0.14 | 1.00 | 0.83 | 0.29 | n/a | n/a | n/a |
| | 3 | (76) | 0.83 | 0.73 | 0.66 | 1.00 | 0.94 | 0.72 | 0.67 | 0.62 | 0.56 | 1.00 | 0.64 | 0.19 | 1.00 | 0.94 | 0.38 | n/a | n/a | n/a |
| | 3-1/2 | (89) | 0.88 | 0.77 | 0.68 | | 1.00 | 0.79 | 0.70 | 0.64 | 0.56 | | 0.80 | 0.24 | | 1.00 | 0.48 | n/a | n/a | n/a |
| | 4 | (102) | 0.94 | 0.81 | 0.71 | | 1.00 | 0.87 | 0.72 | 0.66 | 0.57 | | 0.98 | 0.29 | | 1.00 | 0.59 | n/a | n/a | n/a |
| | 4-1/2 | (114) | 0.99 | 0.85 | 0.73 | | | 0.95 | 0.75 | 0.69 | 0.58 | | 1.00 | 0.35 | | | 0.70 | 1.00 | n/a | n/a |
| | 4-3/4 | (121) | 1.00 | 0.87 | 0.75 | | | 0.99 | 0.77 | 0.70 | 0.59 | | | 0.38 | | | 0.76 | | 0.88 | n/a |
| | 5 | (127) | | 0.89 | 0.76 | | | 1.00 | 0.78 | 0.71 | 0.59 | | | 0.41 | | | 0.82 | | 0.91 | n/a |
| | 6 | (152) | | 0.96 | 0.81 | | | 1.00 | 0.84 | 0.75 | 0.61 | | | 0.54 | | | 1.00 | | 0.99 | n/a |
| | 6-3/4 | (171) | | 1.00 | 0.85 | | | | 0.88 | 0.78 | 0.62 | | | 0.64 | | | | | 1.00 | 0.70 |
| | 7 | (178) | | | 0.86 | | | | 0.89 | 0.79 | 0.63 | | | 0.68 | | | | | | 0.72 |
| | 8 | (203) | | | 0.91 | | | | 0.95 | 0.83 | 0.65 | | | 0.83 | | | | | | 0.77 |
| | 9 | (229) | | | 0.97 | | | | 1.00 | 0.87 | 0.67 | | | 0.99 | | | | | | 0.81 |
| | 10 | (254) | | | 1.00 | | | | | 0.91 | 0.68 | | | 1.00 | | | | | | 0.86 |
| | 11 | (279) | | | | | | | | 0.95 | 0.70 | | | | | | | | | 0.90 |
| | 12 | (305) | | | | | | | | 0.99 | 0.72 | | | | | | | | | 0.94 |
| | 14 | (356) | | | | | | | | 1.00 | 0.76 | | | | | | | | | 1.00 |
| | 16 | (406) | | | | | | | | | 0.79 | | | | | | | | | |
| | 18 | (457) | | | | | | | | | 0.83 | | | | | | | | | |
| | 20 | (508) | | | | | | | | | 0.87 | | | | | | | | | |
| | > 24 | (610) | | | | | | | | | 0.94 | | | | | | | | | |

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, $f_{AV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, $f_{HV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

**Table 12 - Load adjustment factors for 5/8-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]**

| 5/8-in. KH-EZ uncracked concrete | | | Spacing factor in tension $f_{AN}$ | | Edge distance factor in tension $f_{RN}$ | | Spacing factor in shear[3] $f_{AV}$ | | Edge distance in shear ⊥ toward edge $f_{RV}$ | | Edge distance in shear ll to edge $f_{RV}$ | | Conc. thickness factor in shear[4] $f_{HV}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Embedment $h_{nom}$ | | in. (mm) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-3/4 | (44) | n/a | n/a | 0.62 | 0.51 | n/a | n/a | 0.24 | 0.06 | 0.47 | 0.13 | n/a | n/a |
| | 2 | (51) | n/a | n/a | 0.67 | 0.54 | n/a | n/a | 0.29 | 0.08 | 0.57 | 0.15 | n/a | n/a |
| | 2-1/2 | (64) | n/a | n/a | 0.76 | 0.59 | n/a | n/a | 0.40 | 0.11 | 0.76 | 0.21 | n/a | n/a |
| | 3 | (76) | 0.71 | 0.63 | 0.86 | 0.65 | 0.61 | 0.55 | 0.53 | 0.14 | 0.86 | 0.28 | n/a | n/a |
| | 3-1/2 | (89) | 0.74 | 0.65 | 0.97 | 0.70 | 0.63 | 0.55 | 0.66 | 0.18 | 0.97 | 0.35 | n/a | n/a |
| | 4 | (102) | 0.78 | 0.67 | 1.00 | 0.76 | 0.65 | 0.56 | 0.81 | 0.22 | 1.00 | 0.43 | n/a | n/a |
| | 4-1/2 | (114) | 0.81 | 0.69 | | 0.83 | 0.66 | 0.57 | 0.97 | 0.26 | | 0.52 | n/a | n/a |
| | 5 | (127) | 0.85 | 0.71 | | 0.89 | 0.68 | 0.58 | 1.00 | 0.30 | | 0.60 | 0.85 | n/a |
| | 5-1/2 | (140) | 0.88 | 0.74 | | 0.96 | 0.70 | 0.58 | | 0.35 | | 0.70 | 0.89 | n/a |
| | 6 | (152) | 0.92 | 0.76 | | 1.00 | 0.72 | 0.59 | | 0.40 | | 0.80 | 0.93 | n/a |
| | 7 | (178) | 0.99 | 0.80 | | | 0.75 | 0.61 | | 0.50 | | 1.00 | 1.00 | 0.65 |
| | 8 | (203) | 1.00 | 0.84 | | | 0.79 | 0.62 | | 0.61 | | | | 0.69 |
| | 9 | (229) | | 0.89 | | | 0.83 | 0.64 | | 0.73 | | | | 0.74 |
| | 10 | (254) | | 0.93 | | | 0.86 | 0.65 | | 0.86 | | | | 0.78 |
| | 11 | (279) | | 0.97 | | | 0.90 | 0.67 | | 0.99 | | | | 0.81 |
| | 12 | (305) | | 1.00 | | | 0.94 | 0.68 | | 1.00 | | | | 0.85 |
| | 14 | (356) | | | | | 1.00 | 0.71 | | | | | | 0.92 |
| | 16 | (406) | | | | | | 0.74 | | | | | | 0.98 |
| | 18 | (457) | | | | | | 0.77 | | | | | | 1.00 |
| | 20 | (508) | | | | | | 0.80 | | | | | | |
| | 24 | (610) | | | | | | 0.86 | | | | | | |
| | > 30 | (762) | | | | | | 0.95 | | | | | | |

**Table 13 - Load adjustment factors for 5/8-in. diameter KWIK HUS-EZ in cracked concrete[1,2]**

| 5/8-in. KH-EZ cracked concrete | | | Spacing factor in tension $f_{AN}$ | | Edge distance factor in tension $f_{RN}$ | | Spacing factor in shear[3] $f_{AV}$ | | Edge distance in shear ⊥ toward edge $f_{RV}$ | | Edge distance in shear ll to edge $f_{RV}$ | | Conc. thickness factor in shear[4] $f_{HV}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Embedment $h_{nom}$ | | in. (mm) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) | 3-1/4 (83) | 5 (127) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-3/4 | (44) | n/a | n/a | 0.63 | 0.51 | n/a | n/a | 0.27 | 0.07 | 0.53 | 0.14 | n/a | n/a |
| | 2 | (51) | n/a | n/a | 0.68 | 0.54 | n/a | n/a | 0.33 | 0.09 | 0.65 | 0.17 | n/a | n/a |
| | 2-1/2 | (64) | n/a | n/a | 0.77 | 0.59 | n/a | n/a | 0.46 | 0.12 | 0.77 | 0.24 | n/a | n/a |
| | 3 | (76) | 0.71 | 0.63 | 0.87 | 0.65 | 0.62 | 0.55 | 0.60 | 0.16 | 0.87 | 0.32 | n/a | n/a |
| | 3-1/2 | (89) | 0.74 | 0.65 | 0.98 | 0.70 | 0.64 | 0.56 | 0.75 | 0.20 | 0.98 | 0.40 | n/a | n/a |
| | 4 | (102) | 0.78 | 0.67 | 1.00 | 0.76 | 0.66 | 0.57 | 0.92 | 0.25 | 1.00 | 0.49 | n/a | n/a |
| | 4-1/2 | (114) | 0.81 | 0.69 | | 0.83 | 0.68 | 0.57 | 1.00 | 0.29 | | 0.59 | n/a | n/a |
| | 5 | (127) | 0.85 | 0.71 | | 0.89 | 0.70 | 0.58 | | 0.34 | | 0.69 | 0.89 | n/a |
| | 5-1/2 | (140) | 0.88 | 0.74 | | 0.96 | 0.72 | 0.59 | | 0.40 | | 0.79 | 0.93 | n/a |
| | 6 | (152) | 0.92 | 0.76 | | 1.00 | 0.74 | 0.60 | | 0.45 | | 0.90 | 0.97 | n/a |
| | 7 | (178) | 0.99 | 0.80 | | | 0.78 | 0.61 | | 0.57 | | 1.00 | 1.00 | 0.68 |
| | 8 | (203) | 1.00 | 0.84 | | | 0.82 | 0.63 | | 0.69 | | | | 0.72 |
| | 9 | (229) | | 0.89 | | | 0.86 | 0.65 | | 0.83 | | | | 0.77 |
| | 10 | (254) | | 0.93 | | | 0.89 | 0.66 | | 0.97 | | | | 0.81 |
| | 11 | (279) | | 0.97 | | | 0.93 | 0.68 | | 1.00 | | | | 0.85 |
| | 12 | (305) | | 1.00 | | | 0.97 | 0.70 | | | | | | 0.89 |
| | 14 | (356) | | | | | 1.00 | 0.73 | | | | | | 0.96 |
| | 16 | (406) | | | | | | 0.76 | | | | | | 1.00 |
| | 18 | (457) | | | | | | 0.79 | | | | | | |
| | 20 | (508) | | | | | | 0.83 | | | | | | |
| | 24 | (610) | | | | | | 0.89 | | | | | | |
| | > 30 | (762) | | | | | | 0.99 | | | | | | |

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, $f_{AV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, $f_{HV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

**Table 14 - Load adjustment factors for 3/4-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]**

| 3/4-in. KH-EZ uncracked concrete | | | Spacing factor in tension $f_{AN}$ | | Edge distance factor in tension $f_{RN}$ | | Spacing factor in shear[3] $f_{AV}$ | | Edge distance in shear ⊥ toward edge $f_{RV}$ | | Edge distance in shear ∥ to edge $f_{RV}$ | | Conc. thickness factor in shear[4] $f_{HV}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Embedment $h_{nom}$ | | in. (mm) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-3/4 | (44) | n/a | n/a | 0.57 | 0.48 | n/a | n/a | 0.10 | 0.05 | 0.19 | 0.10 | n/a | n/a |
| | 2 | (51) | n/a | n/a | 0.61 | 0.50 | n/a | n/a | 0.12 | 0.06 | 0.23 | 0.12 | n/a | n/a |
| | 2-1/2 | (64) | n/a | n/a | 0.68 | 0.54 | n/a | n/a | 0.16 | 0.08 | 0.33 | 0.17 | n/a | n/a |
| | 3 | (76) | 0.67 | 0.60 | 0.76 | 0.58 | 0.56 | 0.54 | 0.21 | 0.11 | 0.43 | 0.22 | n/a | n/a |
| | 3-1/2 | (89) | 0.70 | 0.62 | 0.84 | 0.62 | 0.57 | 0.55 | 0.27 | 0.14 | 0.54 | 0.28 | n/a | n/a |
| | 4 | (102) | 0.73 | 0.64 | 0.93 | 0.67 | 0.58 | 0.55 | 0.33 | 0.17 | 0.66 | 0.34 | n/a | n/a |
| | 4-1/2 | (114) | 0.76 | 0.65 | 1.00 | 0.72 | 0.59 | 0.56 | 0.39 | 0.20 | 0.79 | 0.41 | n/a | n/a |
| | 5 | (127) | 0.79 | 0.67 | | 0.76 | 0.60 | 0.56 | 0.46 | 0.24 | 0.92 | 0.48 | n/a | n/a |
| | 5-1/2 | (140) | 0.81 | 0.69 | | 0.81 | 0.61 | 0.57 | 0.53 | 0.28 | 1.00 | 0.55 | n/a | n/a |
| | 6 | (152) | 0.84 | 0.71 | | 0.86 | 0.62 | 0.58 | 0.61 | 0.31 | | 0.63 | 0.69 | n/a |
| | 7 | (178) | 0.90 | 0.74 | | 0.97 | 0.64 | 0.59 | 0.77 | 0.40 | | 0.79 | 0.75 | n/a |
| | 8 | (203) | 0.96 | 0.78 | | 1.00 | 0.66 | 0.60 | 0.94 | 0.48 | | 0.97 | 0.80 | n/a |
| | 8-1/8 | (206) | 0.96 | 0.78 | | | 0.66 | 0.60 | 0.96 | 0.50 | | 0.99 | 0.80 | 0.65 |
| | 9 | (229) | 1.00 | 0.81 | | | 0.68 | 0.62 | 1.00 | 0.58 | | 1.00 | 0.85 | 0.68 |
| | 10 | (254) | | 0.84 | | | 0.70 | 0.63 | | 0.68 | | | 0.89 | 0.72 |
| | 11 | (279) | | 0.88 | | | 0.72 | 0.64 | | 0.78 | | | 0.94 | 0.75 |
| | 12 | (305) | | 0.91 | | | 0.74 | 0.65 | | 0.89 | | | 0.98 | 0.79 |
| | 14 | (356) | | 0.98 | | | 0.78 | 0.68 | | 1.00 | | | 1.00 | 0.85 |
| | 16 | (406) | | 1.00 | | | 0.82 | 0.71 | | | | | | 0.91 |
| | 18 | (457) | | | | | 0.86 | 0.73 | | | | | | 0.96 |
| | 20 | (508) | | | | | 0.90 | 0.76 | | | | | | 1.00 |
| | 24 | (610) | | | | | 0.98 | 0.81 | | | | | | |
| | 30 | (762) | | | | | 1.00 | 0.89 | | | | | | |
| | > 36 | (914) | | | | | | 0.96 | | | | | | |

**Table 15 - Load adjustment factors for 3/4-in. diameter KWIK HUS-EZ in cracked concrete[1,2]**

| 3/4-in. KH-EZ cracked concrete | | | Spacing factor in tension $f_{AN}$ | | Edge distance factor in tension $f_{RN}$ | | Spacing factor in shear[3] $f_{AV}$ | | Edge distance in shear ⊥ toward edge $f_{RV}$ | | Edge distance in shear ∥ to edge $f_{RV}$ | | Conc. thickness factor in shear[4] $f_{HV}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Embedment $h_{nom}$ | | in. (mm) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) | 4 (102) | 6-1/4 (159) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-3/4 | (44) | n/a | n/a | 0.57 | 0.48 | n/a | n/a | 0.11 | 0.06 | 0.22 | 0.11 | n/a | n/a |
| | 2 | (51) | n/a | n/a | 0.61 | 0.50 | n/a | n/a | 0.13 | 0.07 | 0.27 | 0.14 | n/a | n/a |
| | 2-1/2 | (64) | n/a | n/a | 0.68 | 0.54 | n/a | n/a | 0.19 | 0.10 | 0.37 | 0.19 | n/a | n/a |
| | 3 | (76) | 0.67 | 0.60 | 0.76 | 0.58 | 0.57 | 0.54 | 0.24 | 0.13 | 0.49 | 0.25 | n/a | n/a |
| | 3-1/2 | (89) | 0.70 | 0.62 | 0.85 | 0.63 | 0.58 | 0.55 | 0.31 | 0.16 | 0.61 | 0.32 | n/a | n/a |
| | 4 | (102) | 0.73 | 0.64 | 0.93 | 0.67 | 0.59 | 0.56 | 0.38 | 0.19 | 0.75 | 0.39 | n/a | n/a |
| | 4-1/2 | (114) | 0.76 | 0.65 | 1.00 | 0.72 | 0.60 | 0.56 | 0.45 | 0.23 | 0.90 | 0.46 | n/a | n/a |
| | 5 | (127) | 0.79 | 0.67 | | 0.77 | 0.61 | 0.57 | 0.52 | 0.27 | 1.00 | 0.54 | n/a | n/a |
| | 5-1/2 | (140) | 0.81 | 0.69 | | 0.81 | 0.62 | 0.58 | 0.60 | 0.31 | | 0.63 | n/a | n/a |
| | 6 | (152) | 0.84 | 0.71 | | 0.87 | 0.63 | 0.58 | 0.69 | 0.36 | | 0.71 | 0.72 | n/a |
| | 7 | (178) | 0.90 | 0.74 | | 0.97 | 0.65 | 0.60 | 0.87 | 0.45 | | 0.90 | 0.78 | n/a |
| | 8 | (203) | 0.96 | 0.78 | | 1.00 | 0.67 | 0.61 | 1.00 | 0.55 | | 1.00 | 0.83 | n/a |
| | 8-1/8 | (206) | 0.96 | 0.78 | | | 0.68 | 0.61 | | 0.56 | | | 0.84 | 0.67 |
| | 9 | (229) | 1.00 | 0.81 | | | 0.70 | 0.63 | | 0.66 | | | 0.88 | 0.71 |
| | 10 | (254) | | 0.84 | | | 0.72 | 0.64 | | 0.77 | | | 0.93 | 0.75 |
| | 11 | (279) | | 0.88 | | | 0.74 | 0.65 | | 0.89 | | | 0.98 | 0.78 |
| | 12 | (305) | | 0.91 | | | 0.76 | 0.67 | | 1.00 | | | 1.00 | 0.82 |
| | 14 | (356) | | 0.98 | | | 0.80 | 0.70 | | | | | | 0.89 |
| | 16 | (406) | | 1.00 | | | 0.85 | 0.72 | | | | | | 0.95 |
| | 18 | (457) | | | | | 0.89 | 0.75 | | | | | | 1.00 |
| | 20 | (508) | | | | | 0.93 | 0.78 | | | | | | |
| | 24 | (610) | | | | | 1.00 | 0.84 | | | | | | |
| | 30 | (762) | | | | | | 0.92 | | | | | | |
| | > 36 | (914) | | | | | | 1.00 | | | | | | |

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, $f_{AV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, $f_{HV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

## Table 16 - Hilti KWIK HUS-EZ in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6,7]

| Nominal anchor diameter | Nominal embedment in. (mm) | Installation in lower flute | | | | Installation in upper flute | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tension - $\phi N_n$ | | Shear - $\phi V_n$ | | Tension - $\phi N_n$ | | Shear - $\phi V_n$ | |
| | | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) |
| 1/4 | 1-5/8 (41) | 545 (2.4) | 595 (2.6) | 725 (3.2) | 725 (3.2) | 670 (3.0) | 730 (3.2) | 725 (3.2) | 725 (3.2) |
| | 2-1/2 (64) | 1,220 (5.4) | 1,410 (6.3) | 1,325 (5.9) | 1,325 (5.9) | 1,275 (5.7) | 1,470 (6.5) | 1,960 (8.7) | 1,960 (8.7) |
| 3/8 | 1-5/8 (41) | 845 (3.8) | 975 (4.3) | 905 (4.0) | 905 (4.0) | 970 (4.3) | 1,120 (5.0) | 2,200 (9.8) | 2,200 (9.8) |
| | 2-1/2 (64) | 1,455 (6.5) | 1,680 (7.5) | 905 (4.0) | 905 (4.0) | 1,900 (8.5) | 2,195 (9.8) | 3,655 (16.3) | 3,655 (16.3) |
| | 3-1/4 (83) | 2,550 (11.3) | 2,945 (13.1) | 2,165 (9.6) | 2,165 (9.6) | n/a | n/a | n/a | n/a |
| 1/2 | 2-1/4 (57) | 850 (3.8) | 980 (4.4) | 965 (4.3) | 965 (4.3) | 905 (4.0) | 1,045 (4.6) | 4,710 (21.0) | 4,710 (21.0) |
| | 3 (76) | 1,990 (8.9) | 2,300 (10.2) | 1,750 (7.8) | 1,750 (7.8) | n/a | n/a | n/a | n/a |
| | 4-1/4 (108) | 3,485 (15.5) | 4,025 (17.9) | 2,155 (9.6) | 2,155 (9.6) | n/a | n/a | n/a | n/a |
| 5/8 | 3-1/4 (83) | 2,715 (12.1) | 3,135 (13.9) | 2,080 (9.3) | 2,080 (9.3) | n/a | n/a | n/a | n/a |
| | 5 (127) | 6,170 (27.4) | 7,125 (31.7) | 2,515 (11.2) | 2,515 (11.2) | n/a | n/a | n/a | n/a |
| 3/4 | 4 (102) | 2,715 (12.1) | 3,135 (13.9) | 2,255 (10.0) | 2,255 (10.0) | n/a | n/a | n/a | n/a |

## Table 17 - Hilti KWIK HUS-EZ in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6]

| Nominal anchor diameter | Nominal embedment in. (mm) | Installation in lower flute | | | | Installation in upper flute | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tension - $\phi N_n$[7] | | Shear - $\phi V_n$[7,8] | | Tension - $\phi N_n$[7] | | Shear - $\phi V_n$[7,8] | |
| | | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) | $f'_c$ = 3,000 psi lb (kN) | $f'_c$ = 4,000 psi lb (kN) |
| 1/4 | 1-5/8 (41) | 280 (1.2) | 305 (1.4) | 725 (3.2) | 725 (3.2) | 340 (1.5) | 370 (1.6) | 725 (3.2) | 725 (3.2) |
| | 2-1/2 (64) | 605 (2.7) | 700 (3.1) | 1,325 (5.9) | 1,325 (5.9) | 635 (2.8) | 735 (3.3) | 1,960 (8.7) | 1,960 (8.7) |
| 3/8 | 1-5/8 (41) | 525 (2.3) | 605 (2.7) | 905 (4.0) | 905 (4.0) | 770 (3.4) | 890 (4.0) | 2,200 (9.8) | 2,200 (9.8) |
| | 2-1/2 (64) | 1,035 (4.6) | 1,195 (5.3) | 905 (4.0) | 905 (4.0) | 1,345 (6.0) | 1,555 (6.9) | 3,655 (16.3) | 3,655 (16.3) |
| | 3-1/4 (83) | 1,805 (8.0) | 2,085 (9.3) | 2,165 (9.6) | 2,165 (9.6) | n/a | n/a | n/a | n/a |
| 1/2 | 2-1/4 (57) | 535 (2.4) | 620 (2.8) | 965 (4.3) | 965 (4.3) | 640 (2.8) | 740 (3.3) | 4,710 (21.0) | 4,710 (21.0) |
| | 3 (76) | 1,255 (5.6) | 1,450 (6.4) | 1,750 (7.8) | 1,750 (7.8) | n/a | n/a | n/a | n/a |
| | 4-1/4 (108) | 2,195 (9.8) | 2,535 (11.3) | 2,155 (9.6) | 2,155 (9.6) | n/a | n/a | n/a | n/a |
| 5/8 | 3-1/4 (83) | 1,710 (7.6) | 1,975 (8.8) | 2,080 (9.3) | 2,080 (9.3) | n/a | n/a | n/a | n/a |
| | 5 (127) | 3,885 (17.3) | 4,485 (20.0) | 2,515 (11.2) | 2,515 (11.2) | n/a | n/a | n/a | n/a |
| 3/4 | 4 (102) | 1,710 (7.6) | 1,975 (8.8) | 2,255 (10.0) | 2,255 (10.0) | n/a | n/a | n/a | n/a |

1 See saction 3.1.8.6 to convert design strength value to ASD valua.

2 Linear interpolation between ambedment depths and concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is 3 x $h_{nom}$ (nominal embedment).

4 Tabular values are lightweight concrete and no additional reduction factor is needed.

5 No additional reduction factors for spacing or edge distanca need to ba applied.

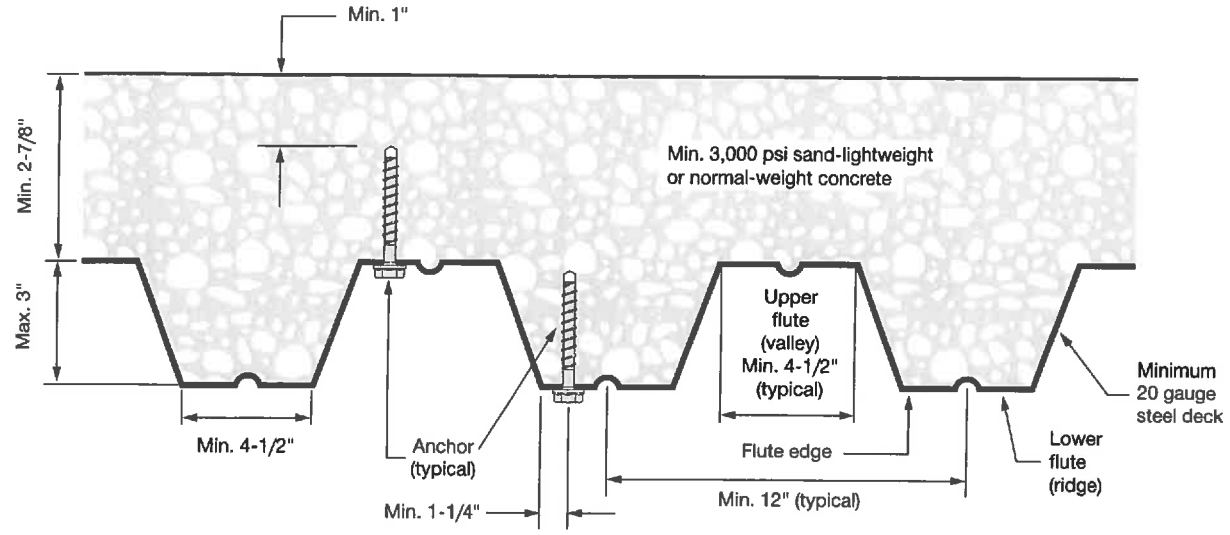
6 Comparison to steel values in table 4 is not required. Values in tables 16 and 17 control.

7 Tabular values ara for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular valuas in tension only by $\alpha_{N,seis}$ = 0.75.
Saa section 3.1.8.7 for additional information on seismic applications.

8 For the following anchor sizes, an additional factor for seismic shear must be applied to the cracked concrate tabular values for seismic conditions:
1/4-inch diameter - $\alpha_{v,seis}$ = 0.75
3/8-inch diameter - $\alpha_{v,seis}$ = 0.60
1/2-inch diameter - $\alpha_{v,seis}$ = 0.60
5/8-inch diametar - $\alpha_{v,seis}$ = 0.60
3/4-inch diameter - $\alpha_{v,seis}$ = 0.70

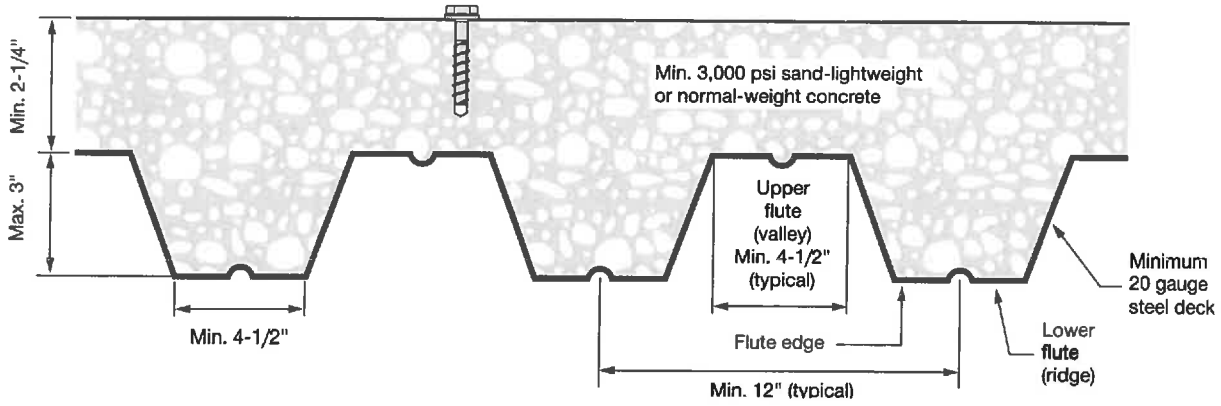
# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

**Figure 3 – Installation of KWIK HUS-EZ (KH-EZ) in soffit of concrete over steel deck floor and roof assemblies[1]**




1 Anchors may be placed in the upper or lower flute of the steel deck profile provided the minimum concrete cover above the drilled hole is satisfied. Anchors in the lower flute may be installed with a maximum 1-inch offset in either direction from the center of the flute. The offset distance may be increased proportionally for profiles with lower flute widths greater than those shown provided the minimum lower flute edge distance is also satisfied.

**Figure 4 – Installation of KWIK HUS-EZ on the top of sand-lightweight concrete over metal floor and roof assemblies**



# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

**Table 18 - Hilti KWIK HUS-EZ in the top of uncracked concrete over metal deck[1,2,3,4,5]**

| Nominal anchor diameter | Nominal embed. depth in. (mm) | Tension - $\phi N_n$ | | Shear - $\phi V_n$ | |
|---|---|---|---|---|---|
| | | $f'_c$ = 3,000 psi (20.7 MPa) lb (kN) | $f'_c$ = 4,000 psi (27.6 MPa) lb (kN) | $f'_c$ = 3,000 psi (20.7 MPa) lb (kN) | $f'_c$ = 4,000 psi (27.6 MPa) lb (kN) |
| 1/4 | 1-5/8 (41) | 620 (2.8) | 675 (3.0) | 1,180 (5.2) | 1,360 (6.0) |
| 3/8 | 1-5/8 (41) | 1,000 (4.4) | 1,155 (5.1) | 1,075 (4.8) | 1,245 (5.5) |

**Table 19 - Hilti KWIK HUS-EZ in the top of cracked concrete over metal deck[1,2,3,4,5]**

| Nominal anchor diameter | Nominal embed. depth in. (mm) | Tension - $\phi N_n$ | | Shear - $\phi V_n$ | |
|---|---|---|---|---|---|
| | | $f'_c$ = 3,000 psi (20.7 MPa) lb (kN) | $f'_c$ = 4,000 psi (27.6 MPa) lb (kN) | $f'_c$ = 3,000 psi (20.7 MPa) lb (kN) | $f'_c$ = 4,000 psi (27.6 MPa) lb (kN) |
| 1/4 | 1-5/8 (41) | 315 (1.4) | 345 (1.5) | 835 (3.7) | 965 (4.3) |
| 3/8 | 1-5/8 (41) | 520 (2.3) | 600 (2.7) | 760 (3.4) | 880 (3.9) |

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in tables 20 and 21 as necessary. Compare to the steel values in table 4. The lesser of the values is to be used for the design.

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λa as follows:

for sand-lightweight, $\lambda_a$ = 0.68; for all-lightweight, $\lambda_a$ = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:

1/4-inch diameter - $\alpha_{N,seis}$ = 0.60
3/8-inch diameter- $\alpha_{N,seis}$ = 0.75.

No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

**Table 20 - Load adjustment factors for KWIK HUS-EZ in the top of uncracked concrete over metal deck[1,2]**

| 1/4-in. and 3/8-in. KH-EZ uncracked concrete over metal deck | | | Spacing factor in tension $f_{AN}$ | | Edge distance factor in tension $f_{RN}$ | | Spacing factor in shear[3] $f_{AV}$ | | Edge distance in shear | | | | Conc. thickness factor in shear[4] $f_{HV}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ⊥ toward edge $f_{RV}$ | | II to edge $f_{RV}$ | | | |
| Anchor diameter $d_a$ | | in. (mm) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) |
| Nominal embed. $h_{nom}$ | | in. (mm) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-3/4 | (44) | n/a | n/a | 0.44 | 0.58 | n/a | n/a | 0.44 | 0.58 | 0.44 | 0.58 | n/a | n/a |
| | 2 | (51) | n/a | n/a | 0.50 | 0.67 | n/a | n/a | 0.50 | 0.67 | 0.50 | 0.67 | n/a | n/a |
| | 2-1/2 | (64) | n/a | n/a | 0.63 | 0.83 | n/a | n/a | 0.63 | 0.83 | 0.63 | 0.83 | 0.78 | 0.83 |
| | 3 | (76) | 0.92 | 0.95 | 0.75 | 1.00 | 0.68 | 0.71 | 0.75 | 1.00 | 0.75 | 1.00 | 0.85 | 0.91 |
| | 3-1/4 | (83) | 0.96 | 0.99 | 0.81 | | 0.70 | 0.72 | 0.81 | | 0.81 | | | |
| | 3-1/2 | (89) | 0.99 | 1.00 | 0.88 | | 0.71 | 0.74 | 0.88 | | 0.88 | | | |
| | 4 | (102) | 1.00 | | 1.00 | | 0.74 | 0.78 | 1.00 | | 1.00 | | | |
| | 4-1/2 | (114) | | | | | 0.77 | 0.81 | | | | | | |
| | 5 | (127) | | | | | 0.80 | 0.84 | | | | | | |
| | 5-1/2 | (140) | | | | | 0.83 | 0.88 | | | | | | |
| | 6 | (152) | | | | | 0.86 | 0.91 | | | | | | |
| | 6-1/2 | (165) | | | | | 0.89 | 0.95 | | | | | | |
| | 7 | (178) | | | | | 0.92 | 0.98 | | | | | | |
| | 7-1/2 | (191) | | | | | 0.95 | 1.00 | | | | | | |
| | 8 | (203) | | | | | 0.98 | | | | | | | |
| | 9 | (229) | | | | | 1.00 | | | | | | | |

**Table 21 - Load adjustment factors for KWIK HUS-EZ in the top of cracked concrete over metal deck[1,2]**

| 1/4-in. and 3/8-in. KH-EZ uncracked concrete over metal deck | | | Spacing factor in tension $f_{AN}$ | | Edge distance factor in tension $f_{RN}$ | | Spacing factor in shear[3] $f_{AV}$ | | Edge distance in shear | | | | Conc. thickness factor in shear[4] $f_{HV}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ⊥ toward edge $f_{RV}$ | | II to edge $f_{RV}$ | | | |
| Anchor diameter $d_a$ | | in. (mm) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) | 1/4 (6.4) | 3/8 (9.5) |
| Nominal embed. $h_{nom}$ | | in. (mm) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) | 1-5/8 (41) |
| Spacing (s)/edge distance ($c_a$)/concrete thickness (h) - in. (mm) | 1-3/4 | (44) | n/a | n/a | 0.99 | 1.00 | n/a | n/a | 0.51 | 0.62 | 0.99 | 1.00 | n/a | n/a |
| | 2 | (51) | n/a | n/a | 1.00 | | n/a | n/a | 0.62 | 0.76 | 1.00 | | n/a | n/a |
| | 2-1/2 | (64) | n/a | n/a | | | n/a | n/a | 0.87 | 1.00 | | | 0.78 | 0.83 |
| | 3 | (76) | 0.92 | 0.95 | | | 0.68 | 0.71 | 1.00 | | | | 0.85 | 0.91 |
| | 3-1/4 | (83) | 0.96 | 0.99 | | | 0.70 | 0.73 | | | | | | |
| | 3-1/2 | (89) | 0.99 | 1.00 | | | 0.71 | 0.74 | | | | | | |
| | 4 | (102) | 1.00 | | | | 0.74 | 0.78 | | | | | | |
| | 4-1/2 | (114) | | | | | 0.77 | 0.81 | | | | | | |
| | 5 | (127) | | | | | 0.80 | 0.85 | | | | | | |
| | 5-1/2 | (140) | | | | | 0.83 | 0.88 | | | | | | |
| | 6 | (152) | | | | | 0.86 | 0.92 | | | | | | |
| | 6-1/2 | (165) | | | | | 0.89 | 0.95 | | | | | | |
| | 7 | (178) | | | | | 0.92 | 0.98 | | | | | | |
| | 7-1/2 | (191) | | | | | 0.95 | 1.00 | | | | | | |
| | 8 | (203) | | | | | 0.98 | | | | | | | |
| | 9 | (229) | | | | | 1.00 | | | | | | | |

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, $f_{AV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, $f_{HV}$, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

☐ - For concrete thickness greater than or equal to 3-1/4-inches, the anchor can be designed using either table 2 or table 3 of this section.

## 3.3.6.3.2 Canadian Limit State design

Limit State Design of anchors is described in the provisions of CSA A23.3-14 Annex D for post-installed anchors tested and assessed in accordance with ACI 355.2 for mechanical anchors and ACI 355.4 for adhesive anchors. This section contains the Limit State Design tables with unfactored characteristic loads that are based on the published loads in ICC Evaluation Services ESR-3027. These tables are followed by factored resistance tables. The factored resitance tables have characteristic design loads that are prefactored by the applicable reduction factors for a single anchor with no anchor-to-anchor spacing or edge distance adjustments for the convenience of the user of this document. All the figures in the previous ACI 318-14 Chapter 17 design section are applicable to Limit State Design and the tables will reference these figures.

For a detailed explanation of the tables developed in accordance with CSA A23.3-14 Annex D, refer to Section 3.1.8. Technical assistance is available by contacting Hilti Canada at (800) 363-4458 or at www.hilti.ca

**Table 22 - Steel resistance for Hilti KWIK HUS-EZ carbon steel screw anchor[1,2]**

| Nominal anchor diameter | Nominal embedment in. (mm) | Tensile $N_{sar}$[3] lb (kN) | Shear $V_{sar}$[4] lb (kN) | Seismic shear $V_{sar,eq}$[5] lb (kN) |
|---|---|---|---|---|
| 1/4 | 1-5/8 (41) to 2-1/2 (64) | 3,370 (15.0) | 855 (3.8) | 770 (3.4) |
| 3/8 | 1-5/8 (41) | 5,475 (24.4) | 2,025 (9.0) | 2,025 (9.0) |
| | 2-1/2 (64) to 3-1/4 (83) | 6,150 (27.4) | 2,865 (12.7) | 1,720 (7.7) |
| 1/2 | 2-1/4 (57) to 4-1/4 (108) | 10,780 (48.0) | 5,110 (22.7) | 3,065 (13.6) |
| 5/8 | 3-1/4 (83) to 5 (127) | 14,405 (64.1) | 6,200 (27.6) | 3,720 (16.5) |
| 3/4 | 4 (102) to 6-1/4 (159) | 19,050 (84.7) | 9,205 (40.9) | 6,385 (28.4) |

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Hilti KWIK HUS-EZ carbon steel screw anchors are to be considered brittle steel elements.

3 Tensile $N_{sar} = A_{se,N}\ \Phi_s\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D.

4 Shear determined by static shear tests with $V_{sar} < A_{se,V}\ \Phi_s\ 0.6\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D.

5 Seismic shear values determined by seismic shear tests with $V_{sar,eq} < A_{se,V}\ \Phi_s\ 0.6\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D. See section 3.1.8.7 for additional information on seismic applications.

# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

## Table 23 - KWIK HUS-EZ design information in accordance with CSA A23.3-14 Annex D[1]

| Design parameter | Symbol | Units | Nominal anchor diameter | | | | | | | | | | | | Ref |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/4 | | 3/8 | | | 1/2 | | | 5/8 | | 3/4 | | A23.3-14 |
| Nominal anchor diameter | $d_a$ | in. (mm) | 1/4 (6.4) | | 3/8 (9.5) | | | 1/2 (12.7) | | | 5/8 (15.9) | | 3/4 (19.1) | | |
| Effective embedment[2] | $h_{ef}$ | in. (mm) | 1.18 (30) | 1.92 (49) | 1.11 (28) | 1.86 (47) | 2.50 (64) | 1.52 (39) | 2.16 (55) | 3.22 (82) | 2.39 (61) | 3.88 (99) | 2.92 (74) | 4.84 (123) | |
| Min. nominal embedment[2] | $h_{nom}$ | in. (mm) | 1-5/8 (41) | 2-1/2 (64) | 1-5/8 (41) | 2-1/2 (64) | 3-1/4 (83) | 2-1/4 (57) | 3 (76) | 4-1/4 (108) | 3-1/4 (83) | 5 (127) | 4 (102) | 6-1/4 (159) | |
| Minimum concrete thickness[3] | $h_{min}$ | in. (mm) | 3-1/4 (82.6) | 4-1/8 (83) | 3-1/4 (105) | 4 (83) | 4-3/4 (121) | 4-1/2 (114) | 4-3/4 (121) | 6-3/4 (171) | 5 (127) | 7 (178) | 6 (152) | 8-1/8 (206) | |
| Critical edge distance | $c_{ac}$ | in. (mm) | 2 (51) | 2.78 (71) | 2.63 (67) | 2.92 (74) | 3.75 (95) | 2.75 (70) | 3.75 (95) | 5.25 (133) | 3.63 (92) | 5.82 (148) | 4.41 (112) | 7.28 (185) | |
| Minimum spacing at critical edge distance | $s_{min,cac}$ | in. (mm) | 1.5 (38) | | 2.25 (57) | | | 3 (76) | | | | | | | |
| Minimum edge distance | $c_{min}$ | in. (mm) | 1.50 (38) | | | | | 1.75 (44) | | | | | | | |
| Minimum anchor spacing at minimum edge distance | for s > | in. (mm) | 3.0 (76) | | | | | | | | 4 (102) | | | | |
| Mininimum hole depth in concrete | $h_0$ | in. (mm) | 2 (51) | 2-7/8 (73) | 1-7/8 (48) | 2-3/4 (70) | 3-1/2 (89) | 2-5/8 (67) | 3-3/8 (86) | 4-5/8 (117) | 3-5/8 (92) | 5-3/8 (137) | 4-3/8 (111) | 6-5/8 (168) | |
| Minimum specified ultimate strength | $f_{uta}$ | psi ($N/mm^2$) | 125,000 (860) | | 106,975 (738) | 120,300 (829) | | 112,540 (776) | | | 90,180 (622) | | 81,600 (563) | | |
| Effective tensile stress area | $A_{se,N}$ | $in^2$ ($mm^2$) | 0.045 (29.0) | | 0.086 (55.5) | | | 0.161 (103.9) | | | 0.268 (172.9) | | 0.392 (252.9) | | |
| Steel embed. material resistance factor for reinforcement | $\phi_s$ | - | 0.85 | | | | | | | | | | | | 8.4.3 |
| Resistance modification factor for tension, steel failure modes[4] | R | - | 0.70 | | | | | | | | | | | | D.5.3 |
| Resistance modification factor for shear, steel failure modes[4] | R | - | 0.65 | | | | | | | | | | | | D.5.3 |
| Factored steel resistance in tension | $N_{sar}$ | lb (kN) | 3,370 (15.0) | | 5,475 (25.0) | 6,150 (25.0) | | 10,780 (50.0) | | | 14,405 (65.0) | | 19,050 (85.0) | | D.6.1.2 |
| Factored steel resistance in shear | $V_{sar}$ | lb (kN) | 1,548 (6.9) | | 3,669 (15.0) | 5,148 (25.0) | | 9,245 (40.0) | | | 11,221 (50.0) | | 16,662 (75.0) | | D.7.1.2 |
| Factored steel resistance in shear, seismic | $V_{sar,eq}$ | lb (kN) | 765 (3.4) | | 2,025 (9.0) | 1,710 (7.6) | | 3,505 (13.6) | | | 3710 (16.5) | | 7,485 (28.4) | | |
| Coeff. for factored conc. breakout resistance, uncracked concrete | $k_{c,uncr}$ | lb | 10 | | | | | | | | | | | | D.6.2.2 |
| Coeff. for factored conc. breakout resistance, cracked concrete | $k_{c,cr}$ | - | 7 | | | | | | | | | | | | D.6.2.2 |
| Modification factor for anchor resistance, tension, uncracked concrete[5] | $\psi_{c,N}$ | - | 1.0 | | | | | | | | | | | | D.6.2.6 |
| Anchor category | - | - | 3 | 1 | | | | | | | | | | | D.5.3 (c) |
| Concrete material resistance factor | $\phi_c$ | - | 0.65 | | | | | | | | | | | | 8.4.2 |
| Resistance modification factor for tension and shear, concrete failure modes, Condition B[6] | R | - | 0.75 | 1.00 | | | | | | | | | | | D.5.3 (c) |
| Factored pullout resistance in 20 MPa uncracked concrete[7] | $N_{pr,uncr}$ | lb (kN) | 675 (3.0) | 1640 (7.3) | NA | | | | | | | | | | D.6.3.2 |
| Factored pullout resistance in 20 MPa cracked concrete[7] | $N_{pr,cr}$ | lb (kN) | 360 (1.6) | 810 (3.6) | 515 (2.3) | NA | | | | | | | | | D.6.3.2 |
| Factored seismic pullout resistance in 20 MPa cracked concrete[7] | $N_{pr,eq}$ | lb (kN) | (290) (1.3) | 810 (3.6) | 515 (2.3) | NA | | | | | | | | | D.6.3.2 |

1 Design information in this table is taken from ICC-ES ESR-3027, dated December, 2015, tables 2 and 3, and converted for use with CSA A23.3-14 Annex D.
2 See figure 1 of this document.
3 For concrete over metal deck applications where the concrete thickness over the top flute is less than $h_{min}$ in this table, see figures 3 and 4 and tables 20 and 21 of this document.
4 The KWIK HUS-EZ is considered a brittle steel element as defined by CSA A23.3-14 Annex D section D.2.
5 For all design cases, $\psi_{c,N}$ = 1.0. The appropriate coefficient for breakout resistance for cracked concrete ($k_{c,cr}$) or uncracked concrete ($k_{c,uncr}$) must be used.
6 For use with the load combinations of CSA A23.3-14 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3-14 section D.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.
7 For all design cases, $y_{c,P}$ = 1.0. NA (not applicable) denotes that this value does not control for design. See section 4.1.4 of ESR-3027 for additional information.

# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

## Table 24 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance with concrete/pullout failure in uncracked concrete[1,2,3,4,5]

| Nominal anchor diameter | Effective embed. in. (mm) | Nominal embed. in. (mm) | Tension - $N_r$ | | | | Shear - $V_r$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 25 MPa (3,625 psi) lb (kN) | $f'_c$ = 30 MPa (4,350 psi) lb (kN) | $f'_c$ = 40 MPa (5,800 psi) lb (kN) | $f'_c$ = 20 MPa (2,900 psi) lb (kN) | $f'_c$ = 25 MPa (3,625 psi) lb (kN) | $f'_c$ = 30 MPa (4,350 psi) lb (kN) | $f'_c$ = 40 MPa (5,800 psi) lb (kN) |
| 1/4 | 1.18 (30) | 1-5/8 (41) | 685 (3.0) | 765 (3.4) | 840 (3.7) | 970 (4.3) | 805 (3.6) | 900 (4.0) | 985 (4.4) | 1,135 (5.1) |
| | 1.92 (49) | 2-1/2 (64) | 1,645 (7.3) | 1,840 (8.2) | 2,015 (9.0) | 2,325 (10.3) | 2,225 (9.9) | 2,490 (11.1) | 2,725 (12.1) | 3,145 (14.0) |
| 3/8 | 1.11 (28) | 1-5/8 (41) | 980 (4.4) | 1,095 (4.9) | 1,200 (5.3) | 1,385 (6.2) | 980 (4.4) | 1,095 (4.9) | 1,200 (5.3) | 1,385 (6.2) |
| | 1.86 (47) | 2-1/2 (64) | 2,120 (9.4) | 2,375 (10.6) | 2,600 (11.6) | 3,000 (13.3) | 2,120 (9.4) | 2,375 (10.6) | 2,600 (11.6) | 3,000 (13.3) |
| | 2.50 (64) | 3-1/4 (83) | 3,305 (14.7) | 3,695 (16.4) | 4,050 (18.0) | 4,675 (20.8) | 6,615 (29.4) | 7,395 (32.9) | 8,100 (36.0) | 9,355 (41.6) |
| 1/2 | 1.52 (39) | 2-1/4 (57) | 1,570 (7.0) | 1,755 (7.8) | 1,920 (8.5) | 2,215 (9.9) | 1,570 (7.0) | 1,755 (7.8) | 1,920 (8.5) | 2,215 (9.9) |
| | 2.16 (55) | 3 (76) | 2,975 (13.2) | 3,325 (14.8) | 3,645 (16.2) | 4,205 (18.7) | 2,975 (13.2) | 3,325 (14.8) | 3,645 (16.2) | 4,205 (18.7) |
| | 3.22 (82) | 4-1/4 (108) | 5,415 (24.1) | 6,055 (26.9) | 6,630 (29.5) | 7,655 (34.1) | 10,825 (48.2) | 12,105 (53.8) | 13,260 (59.0) | 15,310 (68.1) |
| 5/8 | 2.39 (61) | 3-1/4 (83) | 3,460 (15.4) | 3,870 (17.2) | 4,240 (18.9) | 4,895 (21.8) | 3,460 (15.4) | 3,870 (17.2) | 4,240 (18.9) | 4,895 (21.8) |
| | 3.88 (99) | 5 (127) | 7,160 (31.9) | 8,005 (35.6) | 8,770 (39.0) | 10,125 (45.0) | 14,320 (63.7) | 16,010 (71.2) | 17,540 (78.0) | 20,255 (90.1) |
| 3/4 | 2.92 (74) | 4 (102) | 4,675 (20.8) | 5,225 (23.3) | 5,725 (25.5) | 6,610 (29.4) | 9,350 (41.6) | 10,455 (46.5) | 11,450 (50.9) | 13,225 (58.8) |
| | 4.84 (123) | 6-1/4 (159) | 9,975 (44.4) | 11,155 (49.6) | 12,220 (54.4) | 14,110 (62.8) | 19,955 (88.8) | 22,310 (99.2) | 24,435 (108.7) | 28,220 (125.5) |

## Table 25 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance with concrete/pullout failure in cracked concrete[1,2,3,4,5]

| Nominal anchor diameter | Effective embed. in. (mm) | Nominal embed. in. (mm) | Tension - $N_r$ | | | | Shear - $V_r$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 25 MPa (3,625 psi) lb (kN) | $f'_c$ = 30 MPa (4,350 psi) lb (kN) | $f'_c$ = 40 MPa (5,800 psi) lb (kN) | $f'_c$ = 20 MPa (2,900 psi) lb (kN) | $f'_c$ = 25 MPa (3,625 psi) lb (kN) | $f'_c$ = 30 MPa (4,350 psi) lb (kN) | $f'_c$ = 40 MPa (5,800 psi) lb (kN) |
| 1/4 | 1.18 (30) | 1-5/8 (41) | 350 (1.6) | 520 (2.3) | 570 (2.5) | 660 (2.9) | 565 (2.5) | 630 (2.8) | 690 (3.1) | 795 (3.5) |
| | 1.92 (49) | 2-1/2 (64) | 815 (3.6) | 915 (4.1) | 1,000 (4.4) | 1,155 (5.1) | 1,560 (6.9) | 1,740 (7.7) | 1,910 (8.5) | 2,205 (9.8) |
| 3/8 | 1.11 (28) | 1-5/8 (41) | 510 (2.3) | 570 (2.5) | 625 (2.8) | 720 (3.2) | 685 (3.0) | 765 (3.4) | 840 (3.7) | 970 (4.3) |
| | 1.86 (47) | 2-1/2 (64) | 1,485 (6.6) | 1,660 (7.4) | 1,820 (8.1) | 2,100 (9.3) | 2,970 (13.2) | 3,320 (14.8) | 3,640 (16.2) | 4,200 (18.7) |
| | 2.50 (64) | 3-1/4 (83) | 2,315 (10.3) | 2,590 (11.5) | 2,835 (12.6) | 3,275 (14.6) | 2,315 (10.3) | 2,590 (11.5) | 2,835 (12.6) | 3,275 (14.6) |
| 1/2 | 1.52 (39) | 2-1/4 (57) | 1,095 (4.9) | 1,225 (5.5) | 1,345 (6.0) | 1,550 (6.9) | 1,095 (4.9) | 1,225 (5.5) | 1,345 (6.0) | 1,550 (6.9) |
| | 2.16 (55) | 3 (76) | 1,860 (8.3) | 2,080 (9.2) | 2,275 (10.1) | 2,630 (11.7) | 1,860 (8.3) | 2,080 (9.2) | 2,275 (10.1) | 2,630 (11.7) |
| | 3.22 (82) | 4-1/4 (108) | 3,385 (15.1) | 3,785 (16.8) | 4,145 (18.4) | 4,785 (21.3) | 6,765 (30.1) | 7,565 (33.7) | 8,290 (36.9) | 9,570 (42.6) |
| 5/8 | 2.39 (61) | 3-1/4 (83) | 2,165 (9.6) | 2,420 (10.8) | 2,650 (11.8) | 3,060 (13.6) | 2,165 (9.6) | 2,420 (10.8) | 2,650 (11.8) | 3,060 (13.6) |
| | 3.88 (99) | 5 (127) | 4,475 (19.9) | 5,005 (22.3) | 5,480 (24.4) | 6,330 (28.2) | 8,950 (39.8) | 10,005 (44.5) | 10,965 (48.8) | 12,660 (56.3) |
| 3/4 | 2.92 (74) | 4 (102) | 2,920 (13.0) | 3,265 (14.5) | 3,580 (15.9) | 4,130 (18.4) | 5,845 (26.0) | 6,535 (29.1) | 7,155 (31.8) | 8,265 (36.8) |
| | 4.84 (123) | 6-1/4 (159) | 6,235 (27.7) | 6,970 (31.0) | 7,635 (34.0) | 8,820 (39.2) | 12,470 (55.5) | 13,945 (62.0) | 15,275 (67.9) | 17,635 (78.4) |

1 See section 3.1.8.6 to convert factored resistance value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Apply spacing, edge distance, and concrete thickness factors in tables 6 to 15 as necessary. Compare to the steel values in table 24. The lesser of the values is to be used for the design.
4 Tablular values are for normal-weight concrete only. For lightweight concrete multiply design strength by la as follows: for sand-lightweight, $\lambda_a$ = 0.68; for all-lightweight, $\lambda_a$ = 0.60
5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{seis}$ = 0.60
All other sizes - $\alpha_{seis}$ = 0.75
No reduction needed for selsmic shear. See section 3.1.8.7 for additional information on seismic applications.

# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

## Table 26 - Hilti KWIK HUS-EZ in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6,7]

| Nominal anchor diameter | Nominal embedment in. (mm) | Installation in lower flute | | | | Installation in upper flute | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tension - $N_r$ | | Shear - $V_r$ | | Tension - $N_r$ | | Shear - $V_r$ | |
| | | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) |
| 1/4 | 1-5/8 (41) | 580 (2.6) | 710 (3.2) | 665 (3.0) | 665 (3.0) | 715 (3.2) | 875 (3.9) | 665 (3.0) | 665 (3.0) |
| | 2-1/2 (64) | 1,200 (5.3) | 1,470 (6.5) | 1,220 (5.4) | 1,220 (5.4) | 1,255 (5.6) | 1,535 (6.8) | 1,805 (8.0) | 1,805 (8.0) |
| 3/8 | 1-5/8 (41) | 830 (3.7) | 1,020 (4.5) | 835 (3.7) | 835 (3.7) | 950 (4.2) | 1,165 (5.2) | 2,030 (9.0) | 2,030 (9.0) |
| | 2-1/2 (64) | 1,430 (6.4) | 1,755 (7.8) | 835 (3.7) | 835 (3.7) | 1,865 (8.3) | 2,285 (10.2) | 3,365 (15.0) | 3,365 (15.0) |
| | 3-1/4 (83) | 2,505 (11.1) | 3,070 (13.7) | 1,990 (8.9) | 1,990 (8.9) | n/a | n/a | n/a | n/a |
| 1/2 | 2-1/4 (57) | 835 (3.7) | 1,020 (4.5) | 885 (3.9) | 885 (3.9) | 890 (4.0) | 1,090 (4.8) | 4,335 (19.3) | 4,335 (19.3) |
| | 3 (76) | 1,955 (8.7) | 2,395 (10.7) | 1,615 (7.2) | 1,615 (7.2) | n/a | n/a | n/a | n/a |
| | 4-1/4 (108) | 3,425 (15.2) | 4,195 (18.7) | 1,985 (8.8) | 1,985 (8.8) | n/a | n/a | n/a | n/a |
| 5/8 | 3-1/4 (83) | 2,670 (11.9) | 3,270 (14.5) | 1,915 (8.5) | 1,915 (8.5) | n/a | n/a | n/a | n/a |
| | 5 (127) | 6,070 (27.0) | 7,430 (33.1) | 2,315 (10.3) | 2,315 (10.3) | n/a | n/a | n/a | n/a |
| 3/4 | 4 (102) | 2,670 (11.9) | 3,270 (14.5) | 2,075 (9.2) | 2,075 (9.2) | n/a | n/a | n/a | n/a |

## Table 27 - Hilti KWIK HUS-EZ in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6,7,8]

| Nominal anchor diameter | Nominal embedment in. (mm) | Installation in lower flute | | | | Installation in upper flute | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tension - $N_r$ | | Shear - $V_r$ | | Tension - $N_r$ | | Shear - $V_r$ | |
| | | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 20 MPa (2,900psi) lb (kN) |
| 1/4 | 1-5/8 (41) | 295 (1.3) | 365 (1.6) | 500 (2.2) | 500 (2.2) | 365 (1.6) | 445 (2.0) | 520 (2.3) | 520 (2.3) |
| | 2-1/2 (64) | 595 (2.6) | 730 (3.2) | 1,100 (4.9) | 1,100 (4.9) | 625 (2.8) | 765 (3.4) | 1,625 (7.2) | 1,625 (7.2) |
| 3/8 | 1-5/8 (41) | 580 (2.6) | 710 (3.2) | 500 (2.2) | 500 (2.2) | 755 (3.4) | 930 (4.1) | 2,030 (9.0) | 2,030 (9.0) |
| | 2-1/2 (64) | 1,015 (4.5) | 1,245 (5.5) | 500 (2.2) | 500 (2.2) | 1,325 (5.9) | 1,620 (7.2) | 2,015 (9.0) | 2,015 (9.0) |
| | 3-1/4 (83) | 1,775 (7.9) | 2,175 (9.7) | 1,195 (5.3) | 1,195 (5.3) | n/a | n/a | n/a | n/a |
| 1/2 | 2-1/4 (57) | 525 (2.3) | 640 (2.8) | 535 (2.4) | 535 (2.4) | 630 (2.8) | 770 (3.4) | 2,600 (11.6) | 2,600 (11.6) |
| | 3 (76) | 1,235 (5.5) | 1,510 (6.7) | 965 (4.3) | 965 (4.3) | n/a | n/a | n/a | n/a |
| | 4-1/4 (108) | 2,155 (9.6) | 2,640 (11.7) | 1,190 (5.3) | 1,190 (5.3) | n/a | n/a | n/a | n/a |
| 5/8 | 3-1/4 (83) | 1,680 (7.5) | 2,060 (9.2) | 1,150 (5.1) | 1,150 (5.1) | n/a | n/a | n/a | n/a |
| | 5 (127) | 3,820 (17.0) | 4,680 (20.8) | 1,390 (6.2) | 1,390 (6.2) | n/a | n/a | n/a | n/a |
| 3/4 | 4 (102) | 1,680 (7.5) | 2,060 (9.2) | 1,440 (6.4) | 1,440 (6.4) | n/a | n/a | n/a | n/a |

1 See section 3.1.8.6 to convert design strength value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is 3 x $h_{nom}$ (nominal embedment).
4 Tabular values are lightweight concrete and no additional reduction factor is needed.
5 No additional reduction factors for spacing or edge distance need to be applied.
6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension only by $\alpha_{N,seis}$ = 0.75.
See section 3.1.8.7 for additional information on seismic applications.
8 For the following anchor sizes, an additional factor for seismic shear must be applied to the cracked concrete tabular values for seismic conditions:
1/4-inch diameter - $\alpha_{v,seis}$ = 0.75
3/8-inch diameter - $\alpha_{v,seis}$ = 0.60
1/2-inch diameter - $\alpha_{v,seis}$ = 0.60
5/8-inch diameter - $\alpha_{v,seis}$ = 0.60
3/4-inch diameter - $\alpha_{v,seis}$ = 0.70

# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

**Table 28 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance in the top of uncracked concrete over metal deck[1,2,3,4,5]**

| Nominal anchor diameter | Effective embed. in. (mm) | Nominal embed. in. (mm) | Tension - $N_r$ | | Shear - $V_r$ | |
|---|---|---|---|---|---|---|
| | | | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 30 MPa (4,350 psi) lb (kN) | $f'_c$ = 20 MPa (2,900 psi) lb (kN) | $f'_c$ = 30 MPa (4,350 psi) lb (kN) |
| 3/8 | 2 (51) | 2-5/16 (59) | 980 (4.4) | 1,200 (5.3) | 980 (4.4) | 1,200 (5.3) |
| 1/2 | 2 (51) | 2-3/8 (60) | 1,570 (7.0) | 1,920 (8.5) | 1,570 (7.0) | 1,920 (8.5) |

**Table 29 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance in the top of cracked concrete over metal deck[1,2,3,4,5]**

| Nominal anchor diameter | Effective embed. in. (mm) | Nominal embed. in. (mm) | Tension - $N_r$ | | Shear - $V_r$ | |
|---|---|---|---|---|---|---|
| | | | $f'_c$ = 20 MPa (2,900psi) lb (kN) | $f'_c$ = 30 MPa (4,350 psi) lb (kN) | $f'_c$ = 20 MPa (2,900 psi) lb (kN) | $f'_c$ = 30 MPa (4,350 psi) lb (kN) |
| 3/8 | 2 (51) | 2-5/16 (59) | 510 (2.3) | 625 (2.8) | 685 (3.0) | 840 (3.7) |
| 1/2 | 2 (51) | 2-3/8 (60) | 1,095 (4.9) | 1,345 (6.0) | 1,095 (4.9) | 1,345 (6.0) |

1 See Section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in tables 20 and 21 as necessary. Compare to the steel values in table 24. The lesser of the values is to be used for the design.

4 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by $\lambda_a$ as follows:
for sand-lightweight, $\lambda_a$ = 0.68; for all-lightweight, $\lambda_a$ = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-inch diameter - $\alpha_{N,seis}$ = 0.60
3/8-inch diameter- $\alpha_{N,seis}$ = 0.75.
No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

## 3.3.6.3.3 Allowable Stress Design for masonry

**Table 30 – Allowable tension loads for KWIK HUS-EZ installed in grout-filled masonry walls (lb)[1,2,3,4,5]**

| Nominal anchor diameter | Embedment in.[6] | Loads @ $c_{cr}$ and $s_{cr}$ | Spacing | | | Edge distance |
|---|---|---|---|---|---|---|
| | | | Critical - $s_{cr}$ in.[7] | Minimum - $S_{min}$ in.[7] | Load reduction factor at $s_{min}$[8] | Critical - $c_{cr}$ in.[9] |
| 1/4 | 1-5/8[10] | 530 | 4 | 2 | 0.70 | 4 |
| | 2-1/2[11] | 910 | | 4 | 1.00 | |
| 3/8 | 1-5/8[11] | 535 | 4 | 2 | 0.70 | 4 |
| | 2-1/2 | 895 | 6 | 4 | 0.80 | |
| | 3-1/4 | 1,210 | | | | |
| 1/2 | 2-1/4 | 710 | 4 | 2 | 0.60 | 4 |
| | 3 | 1,110 | 8 | 4 | | |
| | 4-1/4 | 1,515 | | | | |
| 5/8 | 3-1/4 | 1,155 | 10 | 4 | 0.60 | 4 |
| | 5 | 1,735 | | | | |
| 3/4 | 4 | 1,680 | 12 | 4 | 0.60 | 4 |
| | 6-1/4 | 2,035 | | | | |

**Table 31 – Allowable shear loads for KWIK HUS-EZ installed in grout-filled masonry walls (lb)[1,2,3,4,5]**

| Nominal anchor diameter | Embedment in.[6] | Load at $c_{cr}$ and $s_{cr}$ | Spacing | | | Edge distance | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Critical - $S_{cr}$ in.[7] | Minimum - $S_{min}$ in.[7] | Load reduction factor at $S_{min}$[8] | Critical - $c_{cr}$ in.[9] | Minimum - $c_{min}$ in.[9] | Load reduction factor at $c_{min}$ | |
| | | | | | | | | perpendicular to edge | parallel to edge |
| 1/4 | 1-5/8 | 675 | 4 | 4 | 1.00 | 4 | 4 | 1.00 | 1.00 |
| | 2-1/2 | 840 | | | | | | 1.00 | 1.00 |
| 3/8 | 1-5/8 | 1,140 | 6 | 4 | 0.94 | 6 | 4 | 0.61 | 1.00 |
| | 2-1/2 | 1,165 | | | | | | 0.70 | 1.00 |
| | 3-1/4 | 1,190 | | | | | | 0.70 | 1.00 |
| 1/2 | 2-1/4 | 1,845 | 8 | 4 | 0.88 | 8 | 4 | 0.50 | 1.00 |
| | 3 | 2,055 | | | | | | 0.45 | 0.94 |
| | 4-1/4 | 2,745 | | | | | | 0.40 | 0.89 |
| 5/8 | 3-1/4 | 3,040 | 10 | 4 | 0.36 | 10 | 4 | 0.36 | 0.82 |
| | 5 | 3,485 | | | | | | 0.34 | 0.92 |
| 3/4 | 4 | 3,040 | 10 | 4 | 0.36 | 10 | 4 | 0.36 | 0.82 |
| | 6-1/4 | 3,485 | | | | | | 0.34 | 0.92 |

1 All values are for anchors installed in fully grouted masonry with minimum masonry prism strength of 1,500 psi. Concrete masonry units may be lightweight, medium-weight or normal-weight.

2 Anchors may not be installed within one inch in any direction of a vertical joint.

3 Linear interpolation of load values between minimum spacing $s_{min}$ and critical spacing $s_{cr}$ and between minimum edge distance $c_{min}$ and critical edge distance $c_{cr}$ is permitted.

4 For combined loading: For 1/4-in. - $\frac{T_{applied}}{T_{allowable}} + \frac{V_{applied}}{V_{allowable}} \leq 1$ For 3/8- through 3/4-in. - $\left(\frac{T_{applied}}{T_{allowable}}\right)^{5/3} + \left(\frac{V_{applied}}{V_{allowable}}\right)^{5/3} \leq 1$

5 See figure 5 for anchor locations.

6 Embedment depth is measured from the outside face of the concrete masonry embedment.

7 Critical spacing $s_{cr}$ is the anchor spacing where full load values may be used. The minimum spacing $s_{min}$ is the minimum spacing for which values are available and installation is recommended. Spacing is measured from the center of one anchor to the center of the adjacent anchor.

8 Load reduction factors are multiplicative, both spacing and edge distance load reduction factors must be considered. Load values for anchors installed at less than $c_{cr}$ or $s_{cr}$ must be multiplied by the appropriate load reduction factor based on actual edge distance (c) or spacing (s).

9 The critical edge distance $c_{cr}$ is the edge distance where full load values may be used. The minimum edge distance $c_{min}$ is the minimum edge distance for which values are available and installation is recommended. For tension, $c_{cr}$ equals $c_{min}$. Edge distance is measured from the center of the anchor to the closest edge.

10 Load values must be reduced by 21% for installations within 1-1/4 inches of the bed joint.

11 Load values must be reduced by 13% for installations within 1-1/4 inches of the bed joint.

# KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

**Table 32 – KWIK HUS-EZ allowable loads installed in top-of-grout-filled concrete masonry walls or horizontal members of wall openings[1,2,3]**

| Nominal anchor diameter | Minimum embedment depth in. | Edge distance[4] in. | Critical spacing[5] in. | Minimum end distance[6] in. | Tension lb | Shear lb | |
|---|---|---|---|---|---|---|---|
| | | | | | | Load direction | |
| | | | | | | Parallel to edge of masonry wall | Perpendicular to edge of masonry wall |
| 1/4 | 1 5/8 | 1 1/2 | 4 | 4 | 205 | 180 | 135 |
| | | 3 3/4 | | | 205 | 275 | 275 |
| | 2 1/2 | 1 1/2 | | | 355 | 345 | 155 |
| | | 3 3/4 | | | 390 | 415 | 330 |
| 3/8 | 1 5/8 | 1 1/2 | 6 | 6 | 245 | 345 | 175 |
| | | 3 3/4 | | | 245 | 345 | 345 |
| | 3 1/4 | 1 1/2 | | | 465 | 490 | 200 |
| | | 3 3/4 | | | 540 | 800 | 625 |
| 1/2 | 2 1/4 | 1 3/4 | 8 | 8 | 390 | 460 | 200 |
| | | 3 3/4 | | | 610 | 525 | 500 |
| | 4 1/4 | 1 3/4 | | | 540 | 885 | 245 |
| | | 3 3/4 | | | 750 | 1275 | 550 |
| 5/8 | 5 | 1 3/4 | 10 | 10 | 975 | 930 | 245 |
| | | 3 3/4 | | | 975 | 2190 | 630 |
| 3/4 | 6 1/4 | 3 3/4 | 12 | 12 | 975 | 2430 | 630 |

**Table 33 – KWIK HUS-EZ allowable loads installed in end-of-wall or vertical members of wall openings[1,2,3]**

| Nominal anchor diameter | Minimum embedment depth in. | Edge distance[4] in. | Critical spacing[5] in. | Minimum end distance[6] in. | Tension lb | Shear lb | |
|---|---|---|---|---|---|---|---|
| | | | | | | Load direction | |
| | | | | | | Parallel to edge of masonry wall | Perpendicular to edge of masonry wall |
| 1/4 | 1 5/8 | 1 1/2 | 4 | 4 | 360 | 525 | 205 |
| | | 3 3/4 | | | 380 | 595 | 585 |
| | 2 1/2 | 1 1/2 | | | 590 | 610 | 225 |
| | | 3 3/4 | | | 755 | 635 | 585 |
| 3/8 | 1 5/8 | 1 1/2 | 6 | 6 | 355 | 725 | 215 |
| | | 3 3/4 | | | 465 | 1010 | 825 |
| | 3 1/4 | 1 1/2 | | | 565 | 875 | 240 |
| | | 3 3/4 | | | 1020 | 1195 | 1050 |
| 1/2 | 2 1/4 | 1 3/4 | 8 | 8 | 500 | 855 | 260 |
| | | 3 3/4 | | | 525 | 1100 | 1050 |
| | 4 1/4 | 1 3/4 | | | 650 | 925 | 280 |
| | | 3 3/4 | | | 1150 | 1240 | 1050 |
| 5/8 | 5 | 3 3/4 | 10 | 10 | 1605 | 2215 | 1050 |
| 3/4 | 6 1/4 | 3 3/4 | 12 | 12 | 1865 | 2550 | 1050 |

1 All values are for anchors installed in fully grouted concrete masonry with minimum masonry prism strength of 1,500 psi. Concrete masonry units may be lightweight, medium-weight or normal-weight conforming to ASTM C90. Allowable loads are calculated using safety factor of 5.

2 See figure 6 and 7 for allowable anchor installation locations on the top of grout-filled concrete masonry walls. Anchors may not be installed within one inch of a vertical joint. See figure 7 for anchor installation locations in end-of-wall and vertical members of wall openings.

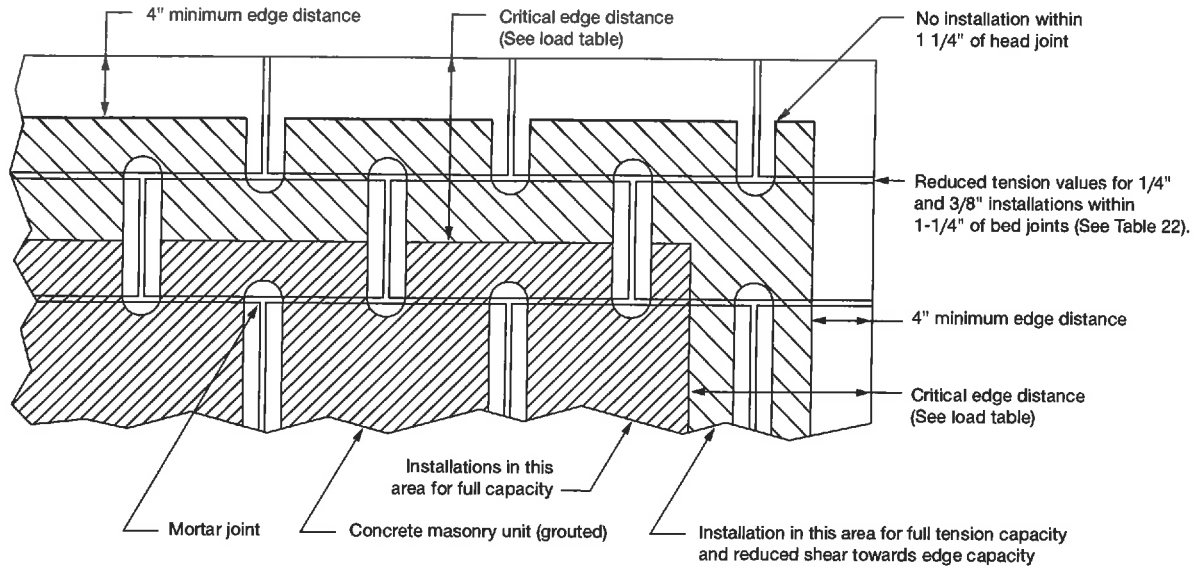
3 Anchors may not be installed within one inch in any direction of a vertical joint.

4 For load values at edge distances between listed values linear interpolation is permitted.

5 Critical spacing equals minimum spacing.

6 Minimum end distance applicable to top-of-wall and end-of-wall and does not apply for wall openings such as windows.

# 3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor




Anchor installation is restricted to non-shaded areas

**Figure 5 – Acceptable locations (shaded areas) for Hilti KWIK HUS-EZ anchors in grout-filled concrete masonry**

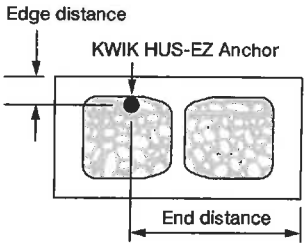



**Figure 6 – Edge and end distances for the KWIK HUS-EZ anchor installed in the top of CMU masonry wall construction**

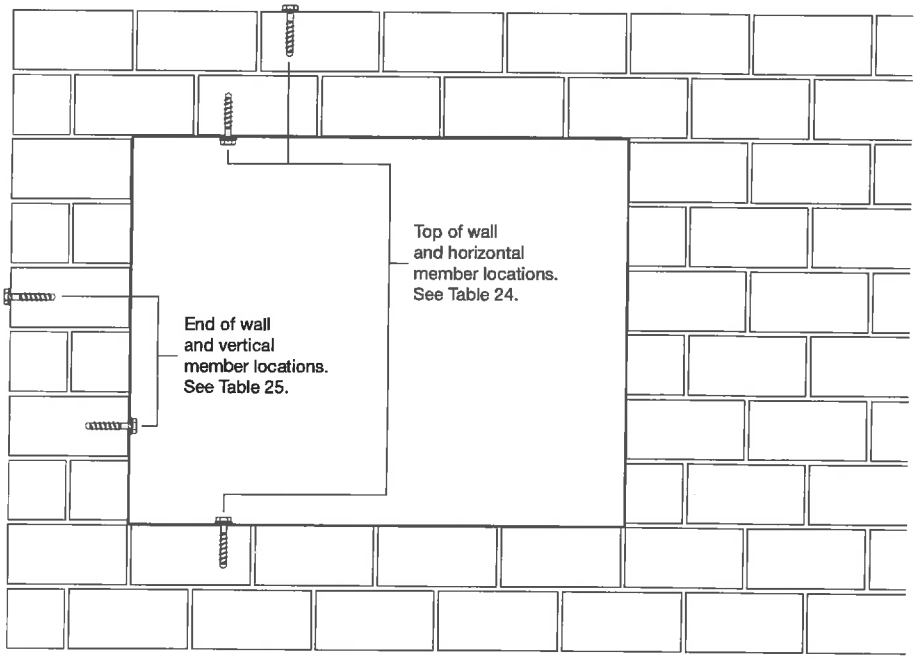



**Figure 7 – Anchor locations in end of wall or wall opening applications**

X-U X-P

**Listings/Approvals**

| | |
|---|---|
| **ICC-ES (International Code Council)** | ESR-2269 |
| **COLA (City of Los Angeles)** | X-U: RR 25675 (X-U Fastener only.) |

# 3.2.3 X-P PREMIUM CONCRETE FASTENERS X-U UNIVERSAL KNURLED SHANK FASTENERS

## 3.2.3.1 Product Description

The Hilti X-P Premium concrete fastener is a hardened fastener with 0.157” shank, optimized for performance in concrete applications, including high strength concrete.

The Hilti X-U universal knurled shank fastener is also a 0.157” shank fastener, designed to cover a wide range of application conditions in steel and concrete. With a fully knurled shank, the X-U fastener is particularly well-suited for steel applications.

To help ensure reliable fastenings, the X-P and X-U fasteners have matched tolerance to all Hilti powder-actuated tools using 8 mm fastener guides and drive pistons through an 8 mm nail head diameter and an 8 mm plastic guidance washer set near the nail tip. The X-U program also includes fasteners with pre-mounted steel washers of 15 mm or 36 mm.

### Product Features: X-P Fasteners

- Conical point, optimized for penetration in standard and tough concretes
- 0.157” shank for optimal tension and shear loads and stick rate
- Comes in 4 lengths, optimized for fastening of sheet metal (up to 16 ga.) to concrete
- Available in single or collated configurations for optimal productivity

### Product Features: X-U Fasteners

- Unique knurling design offering higher pullout strength and anchorage in steel
- A 0.157” shank diameter for high performance in both tension and shear applications
- Full range of fasteners in single or collated configurations to maximize productivity
- Recognized for horizontal wood deck diaphragms subjected to wind or seismic forces (Reference ICC-ES ESR-2269)

## 3.2.3.2 Material Specifications

| Fastener Designation | Fastener Material | Fastener Plating | Fastener Hardness |
|---|---|---|---|
| X-U | Carbon Steel | 5 µm Zinc[1] | 57.5 HRC |
| X-P | Carbon Steel | 5 um Zinc[1] | 59 HRC |

1 ASTM B633, SC 1, Type III.

### 3.2.3.3 Technical Data

**Ultimate Loads in Normal Weight concrete[1, 2]**

| Fastener | Shank Diameter **in.** (mm) | | Minimum Embedment **in.** (mm) | | Concrete compressive Strength | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2000 psi | | | | 4000 psi | | | | 6000 psi | | | | 8000 psi | |
| | | | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | Shear **lb** (kN) |
| **X-U** Universal Fastener | **0.157** | (4.0) | **3/4** | (19) | **570** | (2.5) | **840** | (3.7) | **705** | (3.1) | **765** | (3.4) | **790** | (3.5) | **1020** | (4.5) | - | - |
| | | | **1** | (25) | **855** | (3.8) | **1060** | (4.7) | **995** | (4.4) | **1380** | (6.1) | **1135** | (5.1) | **1630** | (7.3) | - | - |
| | | | **1-1/4** | (32) | **1225** | (5.5) | **1865** | (8.3) | **1500** | (6.7) | **2020** | (9.0) | **1300** | (5.8) | **2325** | (10.3) | - | - |
| | | | **1-1/2** | (38) | **1765** | (7.9) | **2480** | (11.0) | **1965** | (8.7) | **2250** | (10.0) | - | | - | | - | - |
| **X-P** Premium Concrete Fastener | **0.157** | (4.0) | **3/4** | (19) | **535** | (2.4) | **980** | (4.4) | **800** | (3.6) | **1430** | (6.4) | **735** | (3.3) | **1575** | (7.0) | **875** | (3.9) | **1475** | (6.6) |
| | | | **1** | (25) | **880** | (3.9) | **1395** | (6.2) | **1345** | (6.0) | **1710** | (7.6) | **1320** | (5.9) | **2040** | (9.1) | **1400** | (6.2) | **1820** | (8.1) |
| | | | **1-1/4** | (32) | **1535** | (6.8) | **2060** | (9.2) | **1865** | (8.3) | **2210** | (9.8) | **1650** | (7.3) | **2350** | (10.5) | - | - | | |
| | | | **1-1/2** | (38) | **2005** | (8.9) | **2280** | (10.1) | - | | - | | - | | - | | - | - | | |

**Allowable Loads in Normal Weight concrete[1, 2]**

| Fastener | Shank Diameter **in.** (mm) | | Minimum Embedment **in.** (mm) | | Concrete compressive Strength | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2000 psi | | | | 4000 psi | | | | 6000 psi | | | | 8000 psi | |
| | | | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | Shear **lb** (kN) |
| **X-U** Universal Fastener | **0.157** | (4.0) | **3/4** | (19) | **100** | (0.4) | **125** | (0.6) | **100** | (0.4) | **125** | (0.6) | **105** | (0.5) | **205** | (0.9) | - | - |
| | | | **1** | (25) | **165** | (0.7) | **190** | (0.8) | **170** | (0.8) | **225** | (1.0) | **110**[3] | (0.5) | **280**[3] | (1.2) | - | - |
| | | | **1-1/4** | (32) | **240** | (1.1) | **310** | (1.4) | **280** | (1.2) | **310** | (1.4) | **180** | (0.8) | **425** | (1.9) | - | - |
| | | | **1-1/2** | (38) | **275** | (1.2) | **420** | (1.9) | **325** | (1.4) | **420** | (1.9) | - | | - | | - | - |
| **X-P** Premium Concrete Fastener | **0.157** | (4.0) | **3/4** | (19) | **100** | (0.4) | **155** | (0.7) | **100** | (0.4) | **175** | (0.8) | **105** | (0.5) | **205** | (0.9) | **135** | (0.6) | **205** | (0.9) |
| | | | **1** | (25) | **165** | (0.7) | **220** | (1.0) | **180** | (0.8) | **225** | (1.0) | **150** | (0.7) | **300** | (1.3) | **150** | (0.7) | **215** | (1.0) |
| | | | **1-1/4** | (32) | **240** | (1.1) | **310** | (1.4) | **280** | (1.2) | **310** | (1.4) | **180** | (0.8) | **425** | (1.9) | - | - | | |
| | | | **1-1/2** | (38) | **310** | (1.4) | **420** | (1.9) | - | | - | | - | | - | | - | - | | |

1 The tabulated load values are for the low-velocity fasteners only based on testing in accordance with ICC-ES AC 70 and ASTM E1190. Allowable loads are calculated based on a safety factor of at least 5. Some conditions like high wind loads, shock or fatigue may require a different safety factor. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
2 Multiple fasteners are recommended for any attachment.
3 This allowable load value for the X-U fastener also applies to normal weight hollow core concrete slabs with f'c of 6600 psi and minimum face shell thickness of 1-3/8 in.

**Ultimate and Allowable Loads in Normal Weight concrete using DX Kwik[1, 2,3]**

| Fastener | Shank Diameter **in.** (mm) | | Minimum Embedment **in.** (mm) | | Load Type | Concrete compressive Strength | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 4000 psi | | | | 6000 psi | | | |
| | | | | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | |
| X-U 47 P8 with DX Kwik | **0.157** | (4.0) | **1-1/2** | (38) | Ultimate | **1973** | (8.8) | **2235** | (9.9) | **2101** | (9.3) | **2859** | (12.7) |
| | | | | | Allowable | **395** | (1.8) | **405** | (1.8) | **360** | (1.6) | **570** | (2.5) |

1 The tabulated ultimate load values are for the low-velocity fasteners only based on testing in accordance with ICC-ES AC 70 and ASTM E1190. Allowable loads are calculated based on a safety factor of at least 5. Some conditions like high wind loads, shock or fatigue may require a different safety factor. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
2 Multiple fasteners are recommended for any attachment
3 X-U Fastener is installed using the DX Kwik drilled pilot hole installation procedure shown in section 3.2.1.1.10 of the North American Product Technical Guide, Volume 1, Edition 2015.

## Ultimate Loads in Structural 3000 psi Lightweight concrete[1, 4]

| Fastener | Shank Diameter **in.** (mm) | Minimum Embedment **in.** (mm) | Fastener Location | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Installed into Concrete | | | | Installed through Metal Deck into Concrete | | | | | | | | | | | |
| | | | | | | | 3 inch deep Composite Floor Deck[2] | | | | | | 1-1/2 inch deep Composite Floor Deck[3] | | | | | |
| | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | | | Shear **lb** (kN) | | Tension **lb** (kN) | | | | Shear **lb** (kN) | |
| | | | | | | | Upper Flute | | Lower Flute | | | | Upper Flute | | Lower Flute | | | |
| **X-U** Universal Fastener | **0.157** (4.0) | **3/4** (19) | **627** | (2.8) | **747** | (3.3) | **649** | (2.9) | **483** | (2.1) | **1235** | (5.5) | **562** | (2.5) | **777** | (3.5) | **1862** | (8.3) |
| | | **1** (25) | **1037** | (4.6) | **1387** | (6.2) | **1083** | (4.8) | **774** | (3.4) | **1645** | (7.3) | **774** | (3.4) | **878** | (3.9) | **2079** | (9.3) |
| | | **1-1/4** (32) | **1581** | (7.0) | **2173** | (9.7) | **1464** | (6.5) | **848** | (3.8) | **1885** | (8.4) | - | | - | | - | |
| | | **1-1/2** (38) | **2116** | (9.4) | **2524** | (11.2) | **2010** | (8.9) | **1292** | (5.7) | **2155** | (9.6) | - | | - | | - | |
| **X-P** Premium Concrete Fastener | **0.157** (4.0) | **3/4** (19) | **785** | (3.5) | **1005** | (4.5) | **738** | (3.3) | **525** | (2.3) | **1530** | (6.8) | **705** | (3.1) | **840** | (3.7) | **1680**[5] | (74.8) |
| | | **1** (25) | **1245** | (5.5) | **1625** | (7.2) | **1120** | (5.0) | **840** | (3.7) | **1710** | (7.6) | **1310** | (4.8) | **1190** | (5.3) | **1935**[5] | (86.1) |
| | | **1-1/4** (32) | **1720** | (7.7) | **2240** | (10.0) | **1985** | (8.8) | **1295** | (5.8) | **2025** | (9.0) | - | | **1430** | (6.4) | **2675**[5] | (11.9) |
| | | **1-1/2** (38) | **2260** | (10.1) | **2465** | (11.0) | **2335** | (10.4) | **2015** | (9.0) | **1835** | (8.2) | - | | - | | - | |

## Allowable Loads in Structural 3000 psi Lightweight concrete[1, 4]

| Fastener | Shank Diameter **in.** (mm) | Minimum Embedment **in.** (mm) | Fastener Location | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Installed into Concrete | | | | Installed through Metal Deck into Concrete | | | | | | | | | | | |
| | | | | | | | 3 inch deep Composite Floor Deck[2] | | | | | | 1-1/2 inch deep Composite Floor Deck[3] | | | | | |
| | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | | | Shear **lb** (kN) | | Tension **lb** (kN) | | | | Shear **lb** (kN) | |
| | | | | | | | Upper Flute | | Lower Flute | | | | Upper Flute | | Lower Flute | | | |
| **X-U** Universal Fastener | **0.157** (4.0) | **3/4** (19) | **125** | (0.6) | **115** | (0.5) | **130** | (0.6) | **95** | (0.4) | **245** | (1.1) | **95** | (0.4) | **95** | (0.4) | **370** | (1.6) |
| | | **1** (25) | **205** | (0.9) | **260** | (1.2) | **215** | (1.0) | **155** | (0.7) | **330** | (1.5) | **125** | (0.6) | **125** | (0.6) | **415** | (1.8) |
| | | **1-1/4** (32) | **315** | (1.4) | **435** | (1.9) | **295** | (1.3) | **200** | (0.9) | **375** | (1.7) | - | | - | | - | |
| | | **1-1/2** (38) | **425** | (1.9) | **475** | (2.1) | **400** | (1.8) | **260** | (1.2) | **430** | (1.9) | - | | - | | - | |
| **X-P** Premium Concrete Fastener | **0.157** (4.0) | **3/4** (19) | **155** | (0.7) | **165** | (0.7) | **130** | (0.6) | **105** | (0.5) | **285** | (1.3) | **140** | (0.6) | **130** | (0.6) | **335**[5] | (14.9) |
| | | **1** (25) | **225** | (1.0) | **300** | (1.3) | **215** | (1.0) | **165** | (0.7) | **340** | (1.5) | **215** | (1.0) | **215** | (1.0) | **385**[5] | (17.2) |
| | | **1-1/4** (32) | **325** | (1.4) | **445** | (2.0) | **295** | (1.3) | **230** | (1.0) | **375** | (1.7) | - | | **270** | (1.2) | **465**[5] | (2.1) |
| | | **1-1/2** (38) | **425** | (1.9) | **480** | (2.1) | **400** | (1.8) | **330** | (1.5) | **365** | (1.6) | - | | - | | - | |

1 The tabulated load values are for the low-velocity fasteners only based on testing in accordance with ICC-ES AC 70 and ASTM E1190. Allowable loads are calculated based on a safety factor of at least 5. Some conditions like high wind loads, shock or fatigue may require a different safety factor. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.

2 The steel deck profile for the 3" deep composite floor deck has a minimum thickness of 20 gauge (0.0358") and a minimum Fy = 33 ksi. Lower and upper flute width must be a minimum of 3-7/8". Figure 1 in Section 3.2.1.1.6 shows the nominal flute dimensions, fastener locations and load orientations for the deck profile. Structural lightweight concrete fill above top of steel deck must be minimum 3-1/4".

3 The steel deck profile for the 1-1/2" deep composite floor deck has a minimum thickness of 20 gauge (0.0358") and a minimum Fy = 33 ksi. Lower flute and upper flute widths must be a minimum of 1-3/4" and 3-1/2", respectively. This deck may also be inverted as shown in Figure 3 in Section 3.2.1.1.6. Figures 2 and 3 in Section 3.2.1.1.6 show the nominal flute dimensions, fastener locations and load orientations for the deck profile. Structural lightweight concrete fill above top of steel deck must be minimum 2-1/2".

4 Multiple fasteners are recommended for any attachment.

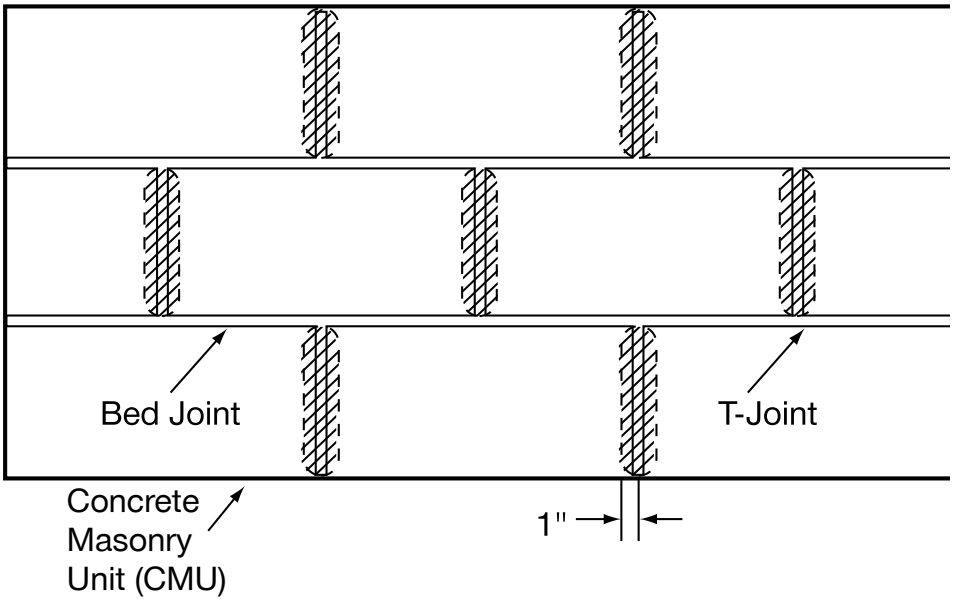
5 For installation in the lower flute only.

**Ultimate and Allowable Loads in Concrete Masonry Units** [1, 2, 3, 4, 5, 10]

| Fastener | Shank Diameter **in.** (mm) | Minimum Embedment **in.** (mm) | Load Type | Hollow CMU | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Face Shell[6] | | | | Mortar Joint[6] | | | |
| | | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear[7] **lb** (kN) | |
| X-U | **0.157** (4.0) | **1** (25) | Ultimate | **449** | (2.0) | **524** | (2.3) | **244** | (1.1) | **483** | (2.1) |
| | | | Allowable | **70** | (.3) | **85** | (.4) | **25** | (.1) | **70** | (.3) |

| Fastener | Shank Diameter **in.** (mm) | Minimum Embedment **in.** (mm) | Load Type | Grout-Filled CMU | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Face Shell[6] | | | | Mortar Joint[6] | | | | Top of Grouted Cell[8] | | | |
| | | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear[7] **lb** (kN) | | Tension **lb** (kN) | | Shear[9] **lb** (kN) | |
| X-U | **0.157** (4.0) | **1** (25) | Ultimate | **1124** | (5.0) | **1093** | (4.9) | **920** | (4.1) | **993** | (4.4) | **935** | (4.2) | **1194** | (5.3) |
| | | | Allowable | **225** | (1.0) | **220** | (1.0) | **150** | (.7) | **190** | (.8) | **165** | (.7) | **240** | (1.1) |

1 The tabulated allowable & ultimate load values are for the low-velocity fasteners only based on testing in accordance with ICC-ES AC 70 and ASTM E1190. Allowable loads are calculated based on a safety factor of at least 5. Some conditions like high wind loads, shock or fatigue may require a different safety factor.
2 The tabulated allowable & ultimate load values are for low-velocity fasteners installed in normal weight or lightweight concrete masonry units conforming to ASTM C90.
3 The tabulated allowable & ultimate load values are for low-velocity fasteners installed in concrete masonry units with mortar conforming to ASTM C270, Type S.
4 The tabulated allowable & ultimate load values are for low-velocity fasteners installed in concrete masonry units with grout conforming to ASTM C476.
5 The tabulated allowable & ultimate load values are for one low-velocity fastener installed in an individual masonry unit cell and at least 4" from the edge of the wall.
6 Fastener can be located anywhere on the face shell or mortar joints as shown in the figure below.
7 Shear load direction can be horizontal or vertical (Bed Joint or T-Joint) along the CMU wall plane.
8 Fastener located in center of grouted cell installed vertically.
9 Shear load can be in any direction in top of grouted cell application.
10 Multiple fasteners are recommended for any attachment.




**Acceptable Locations (NON-SHADED AREAS) for X-U Universal Knurled Shank Fasteners in CMU Walls**

## Ultimate and Allowable Loads in Minimum ASTM A36 ($F_y$ ≥ 36 ksi; $F_u$ ≥ 58 ksi) Steel [1, 2, 4, 5]

| Fastener | Shank Diameter **in.** (mm) | Load Type | Steel Thickness in. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3/16 | | | | 1/4 | | | |
| | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | |
| X-U | **0.157** (4.0) | Ultimate | **2872** | (12.8) | **3939** | (17.5) | **4170** | (18.6) | **3886** | (17.3) |
| | | Allowable | **500**[6] | (2.4) | **720** | (3.2) | **775**[6] | (3.4) | **720** | (3.2) |

| Fastener | Shank Diameter in. (mm) | Load Type | Steel Thickness in. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3/8 | | | | 1/2 | | | | ≥3/4[3] | | | |
| | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | |
| X-U | **0.157** (4.0) | Ultimate | **5688** | (25.3) | **4426** | (19.7) | **4690** | (20.9) | **3761** | (16.7) | **1899** | (8.5) | **2046** | (9.1) |
| | | Allowable | **935** | (4.2) | **720** | (3.2) | **900** | (4.0) | **720** | (3.2) | **350** | (1.6) | **375** | (1.7) |

1 The tabulated ultimate load values are for the low-velocity fasteners only based on testing in accordance with ICC-ES AC 70 and ASTM E1190. Allowable loads are calculated based on a safety factor of at least 5. Some conditions like high wind loads, shock or fatigue may require a different safety factor.
2 Low-velocity fasteners shall be driven to where the point of the fastener penetrates the steel base material, except as noted.
3 Tabulated ultimate load values provided for ≥ 3/4" steel are based upon minimum point penetration of 1/2". If 1/2" point penetration is not achieved, but a point penetration of at least 3/8" is obtained, the tabulated tension value should be reduced by 20% and the tabulated shear value should be reduced by 8%.
4 Multiple fasteners are recommended for any attachment
5 When used for resisting seismic forces, allowable loads are valid as per ICC-ES AC70, Annex A
6 For fastening of cold-formed sheet steel, up to 16 gauge, for static loads only, when designed in accordance with AISI S100-12 (Section E 5.2): The tabulated allowable load may be increased by a factor of 1.25, and the design strength may be taken as the tabulated allowable load multiplied by a factor of 2.0.

## Allowable Tensile Pullover and Shear Bearing Load Capacities for Steel Framing with X-P and X-U Powder-Actuated Fasteners[1,2,3,4]

| Fastener Description | Fastener | Head Diameter **in.** (mm) | Sheet Steel Thickness | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 14 ga. | | | | 16 ga. | | | | 18 ga. | | 20 ga. | |
| | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | Shear **lb** (kN) | Tension **lb** (kN) | Shear **lb** (kN) |
| 0.157" shank with or without plastic washers or MX collation | X-U X-P | **0.322** (8.2) | **825** | (3.67) | **1,085** | (4.83) | **685** | (3.05) | **720** | (3.20 | **490** | (2.18) | **525** (2.34) | **360** (1.60) | **445** (1.98) |

| Fastener Description | Fastener | Head Diameter in. (mm) | Sheet Steel Thickness | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 22 ga. | | | | 24 ga. | | | | 25/26 ga. | |
| | | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | | Shear **lb** (kN) | | Tension **lb** (kN) | Shear **lb** (kN) |
| 0.157" shank with or without plastic washers or MX collation | X-U X-P | **0.322** (8.2) | **300** | (1.33) | **330** | (1.47) | **205** | (0.91) | **255** | (1.13) | **120** (0.53) | **145** (0.64) |

1 Allowable load values are based on a safety factor of 3.0 in accordance with the AISI S100.
2 Allowable pullover capacities of sheet steel should be compared to allowable fastener tensile load capacities in concrete, steel, or masonry to determine controlling resistance load.
3 Allowable shear load bearing capacities of sheet steel should be compared to allowable fastener shear capacities in concrete, steel or masonry to determine controlling resistance load.
4 Data is based on the following minimum sheet steel properties, $F_y$ = 33 ksi, $F_u$ = 45 ksi (ASTM A653 material).

# 3.2.3.4 PERIMETER WALL APPLICATION FASTENERS



### 3.2.3.4.1 Application Description

Perimeter wall applications as part of curtain walls and bypass balloon framing are common in steel and metal framed structures. Cold-formed steel framing and track encompass the outside perimeter of the building. Steel track is fastened directly or with other cold-formed steel components to steel framing members or to concrete slab edges. Insulation and/ or cladding materials are then fastened to the steel track.

**Product Features: X-P Fasteners**

- Conical point, optimized for penetration in standard and tough concretes.
- 0.157” shank for optimal tension and shear performance
- Comes in 4 lengths, optimized for fastening of sheet steel (up to 16 ga) to concrete
- Available in single or collated configurations for optimal productivity

**Product Features: X-U Fasteners**

- Unique knurling design offering higher pullout strength and anchorage in steel
- A 0.157” shank diameter for high performance in both tension and shear applications
- For both X-U and X-P fasteners, full range of fasteners in single or collated configurations to maximize productivity


**Listings/Approvals**

| | |
|---|---|
| **ICC-ES (International Code Council)** | ESR-2269<br>(X-P, X-U and X-U 15)<br>ESR-1663 (DS, EDS) |
| **COLA (City of Los Angeles)** | RR 25675<br>(X-U and X-U 15)<br>RR 25646 (DS, EDS) |

### 3.2.3.4.2 Technical Data

**Perimeter Wall Track Applications**

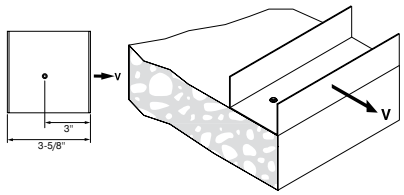



Figure 1: 3-5/8" Track - 1 Fastener

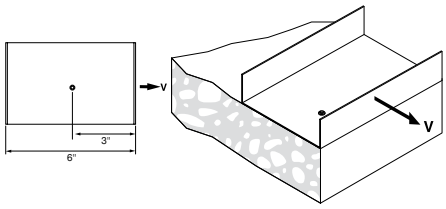



Figure 2: 6" Track - 1 Fastener

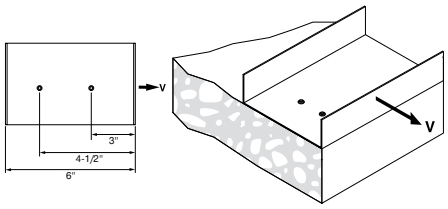



Figure 3: 6" Track - 2 Fasteners

## Ultimate and Allowable Shear Loads for Attachment of Perimeter Track to 4000 psi Normal Weight Concrete[1, 2, 3, 4, 5, 6]

| Fastener Description | Shank Diameter **in.** (mm) | Fastener Length **in.** (mm) | Track Width in.[7] | Number of Fasteners | Ultimate Shear load **lb** (kN) | | Allowable Shear load **lb** (kN) | |
|---|---|---|---|---|---|---|---|---|
| **X-U**[8] Universal Knurled Shank Fasteners and **X-P**[8] Premium Concrete Fastener | **0.157** (4.0) | **1** (27) | 3-5/8 | 1 | **1380** | (6.1) | **225** | (1.0) |
| | | | 6 | 1 | **1380** | (6.1) | **225** | (1.0) |
| | | | | 2 | **3045** | (13.6) | **450** | (2.0) |
| | | **1-1/4** (32) | 3-5/8 | 1 | **2020** | (9.0) | **275** | (1.2) |
| | | | 6 | 1 | **2020** | (9.0) | **275** | (1.2) |
| | | | | 2 | **2760** | (12.3) | **550** | (2.4) |
| **DS**[9] Heavy Duty Fasteners | **0.177** (4.5) | **1** (27) | 3-5/8 | 1 | **1200** | (5.3) | **240** | (1.1) |
| | | | 6 | 1 | **1200** | (5.3) | **240** | (1.1) |
| | | | | 2 | **2750** | (12.2) | **480** | (2.1) |
| | | **1-1/4** (32) | 3-5/8 | 1 | **2125** | (9.5) | **350** | (1.6) |
| | | | 6 | 1 | **2125** | (9.5) | **350** | (1.6) |
| | | | | 2 | - | - | - | - |

1 The tabulated ultimate loads were developed from testing the low-velocity fasteners with 16 gauge (Fy ≥ 33 ksi) steel track. A safety factor greater than or equal to 5.0 was used to determine allowable loads. Steel track members not meeting the specification noted must be investigated in accordance with accepted design criteria
2 Allowable values are for fasteners installed in concrete having the designated compressive strength at the time of installation.
3 Spacing and edge distance constraints are as noted in Figure 1-3 on previous page.
4 Allowable shear load values are for loads applied perpendicular to the edge of the concrete.
5 Multiple fasteners are recommended for any attachment.
6 Minimum edge distance of 3" cannot be decreased. Closer edge distances can result in edge breakout failure of the base material during installation. As a result, fasteners are offset from the center line of the track.
7 SSMA track designation for 3-5/8" track is 362T 150-54 and for 6" track is 600T 150-54.
8 For additional technical data and materials specifications for X-U and X-P fasteners, see Section 3.2.3.2 and 3.2.3.3 of this Technical Guide
9 For additional technical data and materials specifications for DS fasteners, see Hilti North American Product Technical Guide 2015, Volume 1, Section 3.2.2.3

**Ultimate and Allowable Shear Loads for Attachment of Perimeter Track to 3000 psi Light Weight Concrete** [1, 2, 3, 4, 5, 6]

| Fastener Description | Shank Diameter **in.** (mm) | Fastener Length **in.** (mm) | Track Width in.[7] | Number of Fasteners | Ultimate Shear load **lb** (kN) | | Allowable Shear load **lb** (kN) | |
|---|---|---|---|---|---|---|---|---|
| **X-U**[8] Universal Knurled Shank Fasteners and **X-P**[8] Premium Concrete Fastener | **0.157** (4.0) | **1** (27) | 3-5/8 | 1 | **1290** | (5.7) | **260** | (1.2) |
| | | | 6 | 1 | **1290** | (5.7) | **260** | (1.2) |
| | | | | 2 | **2585** | (11.5) | **520** | (2.3) |
| | | **1-1/4** (32) | 3-5/8 | 1 | **2173** | (9.7) | **350** | (1.6) |
| | | | 6 | 1 | **2173** | (9.7) | **350** | (1.6) |
| | | | | 2 | **2885** | (12.8) | **575** | (2.6) |
| | | **1-1/2** (37) | 3-5/8 | 1 | **2524** | (11.2) | **295** | (1.3) |
| | | | 6 | 1 | **2524** | (11.2) | **295** | (1.3) |
| | | | | 2 | **3020** | (13.4) | **605** | (2.7) |
| **DS**[9] Heavy Duty Fasteners | **0.177** (4.5) | **1** (27) | 3-5/8 | 1 | **1020** | (4.5) | **205** | (0.9) |
| | | | 6 | 1 | **1020** | (4.5) | **205** | (0.9) |
| | | | | 2 | **2995** | (13.3) | **600** | (2.7) |
| | | **1-1/4** (32) | 3-5/8 | 1 | **1120** | (5.0) | **225** | (1.0) |
| | | | 6 | 1 | **1120** | (5.0) | **225** | (1.0) |
| | | | | 2 | **2965** | (13.2) | **595** | (2.6) |
| | | **1-1/2** (37) | 3-5/8 | 1 | **1075** | (4.8) | **215** | (1.0) |
| | | | 6 | 1 | **1075** | (4.8) | **215** | (1.0) |
| | | | | 2 | **2955** | (13.1) | **590** | (2.6) |

1 The tabulated ultimate loads were developed from testing the low-velocity fasteners with 16 gauge (Fy ≥ 33 ksi) steel track. A safety factor greater than or equal to 5.0 was used to determine allowable loads. Steel track members not meeting the specification noted must be investigated in accordance with accepted design criteria
2 Allowable values are for fasteners installed in concrete having the designated compressive strength at the time of installation.
3 Spacing and edge distance constraints are as noted in Figure 1-3 on page 7.
4 Allowable shear load values are for loads applied perpendicular to the edge of the concrete.
5 Multiple fasteners are recommended for any attachment.
6 Minimum edge distance of 3" cannot be decreased. Closer edge distances can result in edge breakout failure of the base material during installation. As a result, fasteners are offset from the center line of the track.
7 SSMA track designation for 3-5/8" track is 362T 150-54 and for 6" track is 600T 150-54.
8 For additional technical data and material specifications for X-U and X-P fasteners, see Section 3.2.3.2 and 3.2.3.3 of this Technical Guide Supplement
9 For additional technical data and material specifications for DS fasteners, see Hilti North American Product Technical Guide 2015, Volume 1 Section 3.2.2.3

## Allowable Shear Loads for Attachment of Perimeter Track to Minimum ASTM A36 ($F_y \geq 36$ ksi; $F_u \geq 58$ ksi) Steel, lb (kN)[1,2,3,4]

| Fastener Description | Fastener | Shank Diameter in. (mm) | Number of Fasteners | Steel Thickness (in.) 3/16 lb (kN) | | 1/4 lb (kN) | | 3/8 lb (kN) | | 1/2 lb (kN) | | ≥3/4 lb (kN) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Universal Knurled Shank Fasteners | X-U | 0.157 (4.0) | 1 | 720 | (3.2) | 720 | (3.2) | 720 | (3.2) | 720 | (3.2) | 375[5] | (1.7) |
| | | | 2 | 1440 | (6.4) | 1440 | (6.4) | 1440 | (6.4) | 1440 | (6.4) | 750[5] | (3.3) |
| | X-U 15 | 0.145 (3.7) | 1 | 395 | (1.8) | 395 | (1.8) | 450 | (2.0) | 500[6] | (2.2) | 400[6] | (1.8) |
| | | | 2 | 800 | (3.6) | 790 | (3.5) | 900 | (4.0) | 1000[6] | (4.5) | 800[6] | (3.6) |
| Heavy Duty Fasteners | EDS | 0.177 (4.5) | 1 | 615 | (2.7) | 870 | (3.9) | 870 | (3.9) | 960 | (4.3) | 655[7] | (2.9) |
| | | | 2 | 1230 | (5.5) | 1740 | (7.7) | 1740 | (7.7) | 1920 | (8.5) | 1310[7] | (5.8) |

1 The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Steel members connected to the substrate must be investigated in accordance with accepted design criteria.
2 Low-velocity fasteners shall be driven to where the point of the fastener penetrates the steel base material, except as noted.
3 Multiple fasteners are recommended for increased reliability.
4 The minimum edge distance for fastening into steel is 1/2". Minimum spacing for fastening into steel without reduction in performance is 1".
5 Noted tabulated allowable load values are based upon minimum point penetration of 1/2". If 1/2" point penetration is not achieved, but a point penetration of at least 3/8" is obtained, the tabulated shear load should be reduced by 8 percent.
6 Noted tabulated allowable load values are based upon minimum point penetration of 15/32".
7 Noted tabulated allowable load values are based upon a minimum point penetration of 1/2".

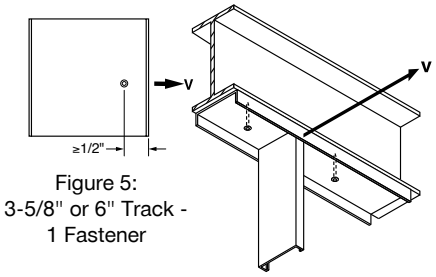


Figure 5:
3-5/8" or 6" Track -
1 Fastener

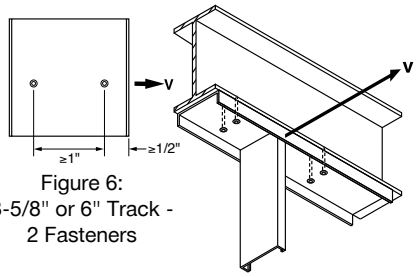
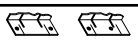


Figure 6:
3-5/8" or 6" Track -
2 Fasteners

## Deflection Slip Clip Applications

### Allowable Loads for Attachment of Cold-Formed Steel Deflection Slip Clips with X-U Universal Powder-Actuated Fasteners[3,4,5,6,7,8,9]

| Clip Type | Fastener | Number of Fasteners | Normal Weight Concrete Allowable Load[1] lb (kN) | | Lightweight Concrete with Pour Stop Allowable Load[2] lb (kN) | | Location of Fasteners |
|---|---|---|---|---|---|---|---|
| Verticlip SLB600 (14 GA.) | X-U 27 | 2 | 160 | (0.7) | 160 | (0.7) |  |
| | | 3 | 245 | (1.1) | 245 | (1.1) |  |
| | | 4 | 330 | (1.5) | 380 | (1.7) |  |
| WSC 950 (16 GA.) | X-U 27 | 2 | 125 | (0.6) | 155 | (0.7) |  |
| | | 3 | 145 | (0.6) | 275 | (1.2) |  |
| | | 4 | 220 | (1.0) | 275 | (1.2) |  |
| WSC 1500 (12 GA.) | X-U 27 | 2 | 90 | (0.4) | 130 | (0.6) |  |
| | | 3 | 185 | (0.8) | 235 | (1.1) |  |
| FCSC (14 GA.) | X-U 27 | 2 | 140 | (0.6) | 170 | (0.8) |  |
| | | 3 | 290 | (1.3) | 320 | (1.4) |  |

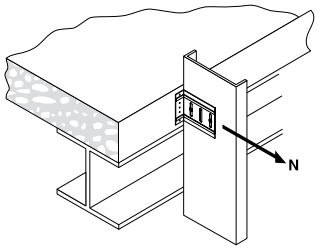


Figure 7:
Normal Weight Concrete

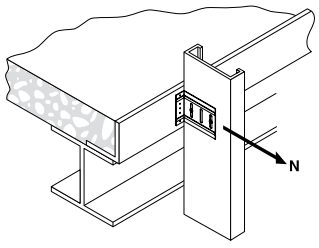


Figure 8:
Lightweight Concrete with Pour Stop

1 Allowable load based on a safety factor of 5.0 in direction shown in Figure 7 above for attachment of deflection slip clip to 4000 psi Normal Weight Concrete Slab.
2 Allowable load based on a safety factor of 5.0 in direction shown in Figure 8 above for attachment of deflection slip clip to 3000 psi Lightweight Concrete Slab with 12 GA. sheet steel pour stop with minimum yield strength Fy = 33 ksi.
3 Testing based on deflection slip clips obtained in February 2007. Subsequent changes by the manufacturer to the deflection slip clip design may affect load values.
4 Allowable load values are for fasteners installed in concrete having the designated compressive strength at the time of installation.
5 Allowable load values are based off of the fixtures tested. Other members connected to the deflection slip clips must be investigated in accordance with accepted design criteria.
6 Spacing of fasteners depends on the design of each deflection slip clip. Fasteners should be installed through the pre-assigned locations in the deflection slip clip.
7 For edge distance and base material thickness requirements, reference Section 3.2.1.1.4.
8 Allowable values are for loads applied perpendicular to the edge of the concrete.
9 Multiple fasteners are recommended for any attachment.

**Allowable Loads for Attachment of Cold-Formed Steel Deflection Slip Clips with X-U Universal Powder-Actuated Fasteners to Minimum ASTM A36 ($F_y \geq 36$ ksi; $F_u \geq 58$ ksi) Steel[1,2,3,4,5,6,7,8]**

| Clip Type | Fastener | Number of Fasteners | Allowable Load lb (kN) | | Location of Fasteners |
|---|---|---|---|---|---|
| Verticlip SLB600 (14 GA.) | X-U 16<br>X-U 19<br>EDS 19<br>EDS 22 | 2 | **740** | (3.3) | |
| | | 3 | **1490** | (6.6) | |
| | | 4 | **2115** | (9.4) | |
| WSC 950 (16 GA.) | X-U 16<br>X-U 19<br>EDS 19<br>EDS 22 | 2 | **510** | (2.3) | |
| | | 3 | **610** | (2.7) | |
| | | 4 | **870** | (3.9) | |
| WSC 1500 (12 GA.) | X-U 16<br>X-U 19<br>EDS 19<br>EDS 22 | 2 | **970** | (4.3) | |
| | | 3 | **1105** | (4.9) | |
| | | 4 | **1300** | (5.8) | |
| FCSC (14 GA.) | X-U 16<br>X-U 19<br>EDS 19<br>EDS 22 | 2 | **715** | (3.2) | |
| | | 3 | **940** | (4.2) | |
| | | 4 | **1055** | (4.7) | |

1 Allowable load based on a variable safety factor in accordance with Section F of AISI S100-12.
2 Testing based on deflection slip clips developed in February 2007. Subsequent changes by the deflection slip clip manufacturer to the clip design may affect load values.
3 Allowable load values are based off of the connections tested. Steel members connected to the deflection slip clips must be investigated in accordance with accepted design criteria.
4 Spacing of fasteners depends on the design of each deflection slip clip. Fasteners should be installed through the pre-assigned locations in the deflection slip clip.
5 For edge distance requirement reference Section 3.2.1.2.2.
6 Allowable load values are for loads applied perpendicular to the edge of the base steel member.
7 Multiple fasteners are recommended for any attachment.
8 Allowable load values are based on testing into 1/4'' ASTM A36 structural steel. Allowable load in other base steel thicknesses can be calculated as single fastener allowable load (Tension) x number of fasteners. Reference Table "Ultimate and Allowable Loads in Minimum ASTM A36 (Fy≥36 ksi; Fu≥58 ksi) Steel" on page 6 for single fastener allowable loads in specific steel thickness. Calculated allowable load should be compared with the relevant allowable load in this table to determine controlling resistance load.

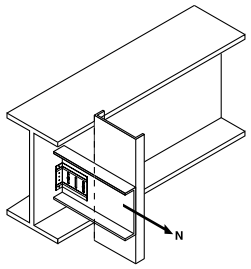


Figure 9: Steel

## 3.2.3.5 ORDERING INFORMATION

| Fastener Description | Shank Length in. (mm) | Shank Ø in. (mm) | Washer Ø | Packaging Qty |
|---|---|---|---|---|
| X-P 22 | 7/8 (22) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs/ box |
| X-P 27 | 1 (27) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs/ box |
| X-P 34 | 1 5/16 (34) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs/ box |
| X-P 40 | 1 9/16 (40) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs/ box |
| X-U 16 | 5/8 (16) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 19 | 3/4 (19) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 22 | 7/8 (22) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 27 | 1 (27) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 32 | 1-1/4 (32) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 37 | 1-1/2 (37) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 42 | 1-5/8 (42) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 47 | 1-7/8 (47) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 52 | 2 (52) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 57 | 2-1/4 (57) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 62 | 2-1/2 (62) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 72 | 2-7/8 (72) | 0.157 (4.0) | Plastic 8 mm or collated | 100 pcs / box |
| X-U 22 P8 S15 | 7/8 (22) | 0.157 (4.0) | Plastic 8 mm & Steel 15 mm | 100 pcs / box |
| X-U 27 P8 S15 | 1 (27) | 0.157 (4.0) | Plastic 8 mm & Steel 15 mm | 100 pcs / box |
| X-U 32 P8 S15 | 1-1/4 (32) | 0.157 (4.0) | Plastic 8 mm & Steel 15 mm | 100 pcs / box |
| X-U 32 P8 S36 | 1-1/4 (32) | 0.157 (4.0) | Plastic 8 mm & Steel 36 mm | 100 pcs / box |
| X-U 72 P8 S36 | 2-7/8 (72) | 0.157 (4.0) | Plastic 8 mm & Steel 36 mm | 100 pcs / box |
| X-U 16 P8 TH | 5/8 (16) | 0.157 (4.0) | 8 mm plastic & metal "tophat" | 100 pcs / box |
| X-U 19 P8 TH | 3/4 (19) | 0.157 (4.0) | 8 mm plastic & metal "tophat" | 100 pcs / box |
| X-U 27 P8 TH | 1 (27) | 0.157 (4.0) | 8 mm plastic & metal "tophat" | 100 pcs / box |

For ordering information on DS and EDS fasteners, please refer to the Hilti product catalog or visit www.us.hiti.com or www.hilti.ca