The following pages are an excerpt from the North American Product Technical Guide, Volume 1: Direct Fastening Technical Guide, Edition 24.

Please refer to the publication in its entirety for complete details on this product including data development, base materials, general suitability, installation, corrosion, and product specifications.

Direct Fastening Technical Guide, Edition 24

To consult directly with a team member regarding our direct fastening products, contact Hilti's team of technical support specialists between the hours of 7:00am - 5:00pm CST.

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3.2.11 STUD FASTENERS FOR ATTACHMENT TO CONCRETE

3.2.11.1 PRODUCT DESCRIPTION

The Hilti threaded stud program is for use with Hilti powder-actuated tools to provide a faster and more reliable solution for making attachments to concrete base materials. Threaded studs are available in standard carbon steel. The X-W6 and W10 threaded studs have varying shank lengths to provide more reliable fastenings to standard and high strength concrete. Thread diameters of 1/4" have thread lengths ranging from 1/2" through 1-1/2". The 3/8" thread diameter has a single thread length of 1-3/16".

X-W6 W10

Listings/Approvals

ICC-ES (International Code Council)
ESR-1663 with LABC/LARC Supplement

FM (Factory Mutual)
W10-30-27P10, W10-30-32P10 and W10-30-42P10 Fasteners for Sprinkler Pipe Hangers

UL (Underwriters Laboratories)
W10-30-32P10 and W10-30-42P10, Fasteners for Sprinkler Pipe Hangers - Up to 2-1/2" diameter pipe

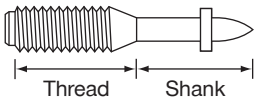
3.2.11.2 Material specifications

Fastener designation	Fastener material	Fastener plating
X-W6	Carbon Steel	5 µm Zinc[1]
W10	Carbon Steel	5 µm Zinc[1]

1 ASTM B633, SC1, Type III. Refer to Section 2.3.3.1 for more information.

3.2.11.3 Technical data

Fastener designation	Thread designation	Thread length in. (mm)	Shank length in. (mm)
X-W6-20-22	UNC 1/4-inch	**3/4** (20)	**7/8** (22)
X-W6-20-27	UNC 1/4-inch	**3/4** (20)	**1** (27)
X-W6-38-27	UNC 1/4-inch	**1-1/2** (38)	**1** (27)
W10-30-27	UNC 3/8-inch	**1-3/16** (30)	**1** (27)
W10-30-32	UNC 3/8-inch	**1-3/16** (30)	**1-1/4** (32)
W10-30-42	UNC 3/8-inch	**1-3/16** (30)	**1-5/8** (42)



Allowable loads in normal weight concrete[1,2]

Description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Concrete compressive strength			
				2000 psi		4000 psi	
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
1/4–20 Threaded stud	X-W6	**0.145** (3.7)	**3/4** (19)	**40** (0.18)	**55** (0.24)	**40** (0.18)	**55** (0.24)
			1 (25)	**85** (0.38)	**195** (0.87)	**110** (0.49)	**225** (1.00)
3/8–16 Threaded stud	W10	**0.205** (5.2)	**1** (25)	**85** (0.38)	**95** (0.42)	**100** (0.44)	**105** (0.47)
			1-1/4 (32)	**175** (0.78)	**345** (1.53)	**200** (0.89)	**380** (1.69)
			1-5/8 (41)	**285** (1.27)	**380** (1.69)	**385** (1.71)	**395** (1.76)

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. 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.

Allowable Loads in Minimum f'_c = 3000 psi Structural Lightweight Concrete[1,4]

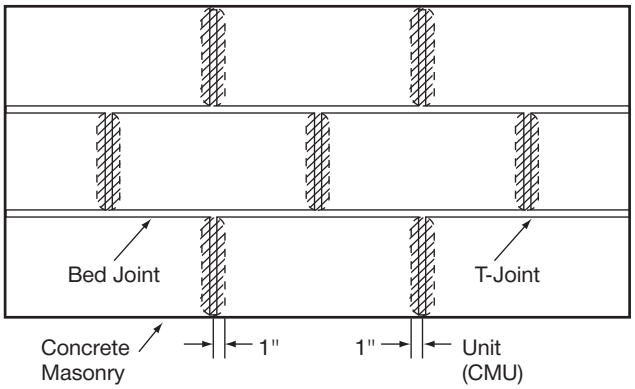
Fastener description	Fastener	Shank dia. in. (mm)	Min. embed. in. (mm)	Fastener location				
				Installed into concrete		Installed through 3" deep metal deck into concrete[2,3]		
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)		Shear lb (kN)
						Upper flute	Lower flute	
1/4–20 Threaded Stud	X-W6	**0.145** (3.7)	**3/4** (20)	**125** (0.56)	**185** (0.82)	**125** (0.56)	**115** (0.54)	**185** (0.82)
			1 (25)	**175** (0.78)	**185** (0.82)	**160** (0.71)	**180** (0.80)	**185** (0.82)
3/8–16 Threaded Stud	W10	**0.205** (5.2)	**1** (25)	**265** (1.18)	**190** (0.85)	**160** (0.71)	–	**185** (0.82)
			1-1/4 (32)	**280** (1.25)	**380** (1.69)	**160** (0.71)	**210** (0.93)	**470** (2.09)
			1-5/8 (41)	**445** (1.98)	**540** (2.40)	**435** (1.93)	**325** (1.45)	**675** (3.00)

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. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
2 The steel deck profile is 3" deep composite floor deck with a thickness of 20 gauge (0.0358"). Figure 1 (Section 3.2.1.6) shows the nominal flute dimensions, fastener locations and load orientations for the deck profile.
3 Structural lightweight concrete fill above top of metal deck shall be a minimum of 3-1/4" deep.
4 Multiple fasteners are recommended for any attachment.

Allowable Loads in Concrete Masonry Units[1,2,3,4,5,8]

Fastener description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Hollow CMU				Grout filled CMU			
				Face shell[6]		Mortar joint[6]		Face shell[6]		Mortar joint[6]	
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear[7] lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear[7] lb (kN)
1/4-20 Threaded Stud	X-W6	**0.145** (3.7)	**1** (25)	**105** (0.47)	**175** (0.78)	**80** (0.36)	**110** (0.49)	**125** (0.56)	**175** (0.78)	**135** (0.60)	**150** (0.67)

1 The tabulated allowable load values are for the low-velocity fastener only, using a safety factor of 5.0 or higher. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
2 The tabulated allowable load values are for low-velocity fasteners installed in normal weight or lightweight concrete masonry units conforming to ASTM C90.
3 The tabulated allowable load values are for low-velocity fasteners installed in concrete masonry units with mortar conforming to ASTM C270, Type N.
4 The tabulated allowable load values are for low-velocity fasteners installed in concrete masonry units with grout conforming to ASTM C476, as coarse grout.
5 The tabulated allowable 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 joint as shown in the figure to the right.
7 Shear direction can be horizontal or vertical (Bed Joint or T-Joint) along the CMU wall plane.
8 Multiple fasteners are recommended for any attachment.



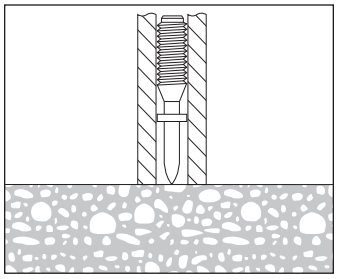
Acceptable locations (NON-SHADED AREAS) for threaded studs in CMU walls

Allowable bending moments for threaded stud fasteners installed in minimum 2,000 psi concrete[1,2]

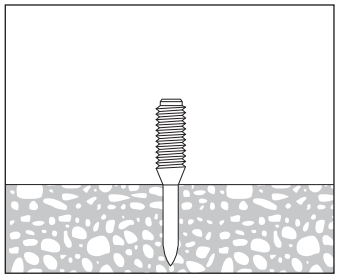
Fastener designation	M_{rec} ft-lb (Nm)
X-W6	**3.6** (4.9)
W10	**10.0** (13.6)

1 Based on a safety factor greater than or equal to 2.0.
2 For more information on bending moments, reference Section 3.2.2.7.

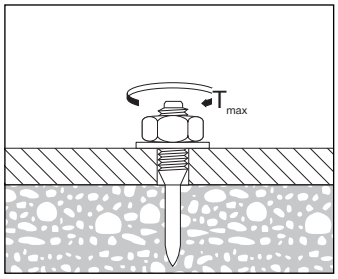
3.2.11.4 INSTALLATION INSTRUCTIONS*



1. Press tip of fastener to concrete base material. Drive fastener with Hilti powder-actuated tool.



2. Ensure proper threaded stud embedment.



3. Make attachment. Do not exceed Maximum Tightening Torque, T_{max}.

* These are abbreviated instructions which may vary by application. **ALWAYS** review/follow the instructions accompanying the product.

Maximum tightening torque, T_{max}, for threaded studs driven into concrete, ft-lb (Nm)

Stud type	
X-W6	W10
3.0 (4.0)	**4.5** (6.0)

3.2.11.5 ORDERING INFORMATION

Fastener description	Shank length in. (mm)	Shank Ø in. (mm)	Thread length in. (mm)	Thread Ø	Guidance washer Ø	Packaging quantity
X-W6-20-22 FP8	**7/8** (22)	**0.145** (3.7)	**3/4** (20)	UNC 1/4-inch	8 mm plastic	100 pcs
X-W6-20-27 FP8	**1** (27)	**0.145** (3.7)	**3/4** (20)	UNC 1/4-inch	8 mm plastic	100 pcs
X-W6-38-27 FP8	**1** (27)	**0.145** (3.7)	**1-1/2** (38)	UNC 1/4-inch	8 mm plastic	100 pcs
W10-30-27 P10	**1** (27)	**0.205** (5.2)	**1-3/16** (30)	UNC 3/8-inch	10 mm plastic	100 pcs
W10-30-32 P10	**1-1/4** (32)	**0.205** (5.2)	**1-3/16** (30)	UNC 3/8-inch	10 mm plastic	100 pcs
W10-30-42 P10	**1-5/8** (42)	**0.205** (5.2)	**1-3/16** (30)	UNC 3/8-inch	10 mm plastic	100 pcs

X-W6

W10*

* W10 threaded stud installation requires a 10mm fastener base plate.