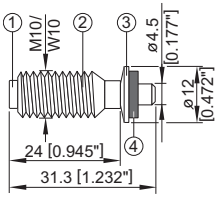
# X-BT stainless steel threaded studs

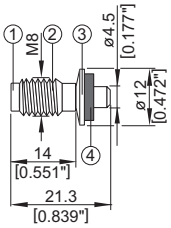
## Product data

### Dimensions

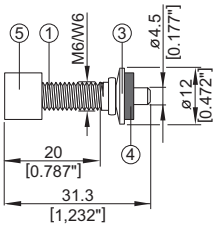
X-BT W10-24-6 SN12-R
X-BT M10-24-6 SN12-R




X-BT M8-15-6 SN12-R




X-BT W6-24-6 SN12-R
X-BT M6-24-6 SN12-R




## General information

### Material specifications

① Shank:

| | |
|---|---|
| CR 500 (CrNiMo alloy) S31803 (1.4462) | equivalent to A4 / AISI grade 316 material |
| N 08926 (1.4529) [1] | Available on request |
| ② Threaded sleeve: | S 31600 (X2CrNiMo 17132) |
| ③ SN12-R washers: | S 31635 (X5CrNiMo 17-12-2+2H) |
| ④ Sealing washers: | Elastomer, black * |

* Resistant to UV, salt water, water, ozone, oils, etc.

[1]) For High Corrosion Resistance HCR material inquire at Hilti

Designation according to Unified Numbering System (UNS)

### Recommended fastening tools

DX 351-BT / BTG

See **X-BT fastener program** in the next pages and **Tools and equipment** chapter for more details.

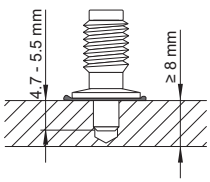
### Approvals

ICC ESR-2347 (USA), ABS, LR, UL, DNV, BV 23498/A1, GL 12272-10HH, Russian Maritime Register

## Applications

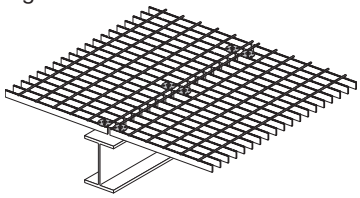
### Examples

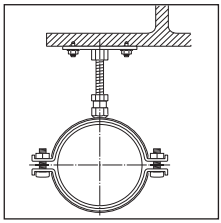
Threaded stud applications especially for:



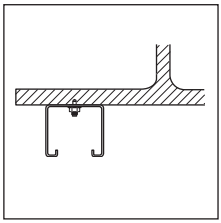

- High strength steel
- Coated steel structures
- Through penetration of base steel is not allowed

Grating with **X-FCM-R**

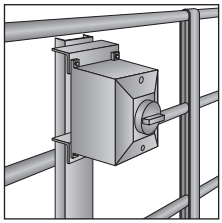




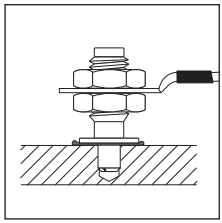
Base plates



Installation rails



Junction box, etc.

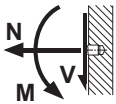


Earthing / Bonding

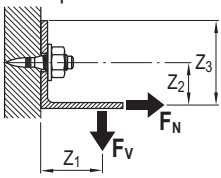
## Load data

### Recommended loads – Steel

| Steel grade: Europe, USA | | S235, A36 | S355, Grade 50 and stronger steel |
|---|---|---|---|
| Tension, | $N_{rec}$ [kN/lb] | 1.8 / 405 | 2.3 / 517 |
| Shear, | $V_{rec}$ [kN/lb] | 2.6 / 584 | 3.4 / 764 |
| Moment, | $M_{rec}$ [Nm/lbft] | 8.2 / 6 | 8.2 / 6 |
| Torque, | $T_{rec}$ [Nm/lbft] | 8 / 5.9 | 8 / 5.9 |




Example:




### Recommended loads – cast iron *

| | | |
|---|---|---|
| Tension, | $N_{rec}$ [kN/lb] | 0.5 / 115 |
| Shear, | $V_{rec}$ [kN/lb] | 0.75 / 170 |
| Moment, | $M_{rec}$ [Nm/lbft] | 8.2 / 6 |

**Conditions for recommended loads:**

- Global factor of safety for static pull-out > 3 (based on 5% fractile value)
- Minimum edge distance = 6 mm ['/4"].
- Effect of base metal vibration and stress considered.
- Redundancy (multiple fastening) must be provided.
- The recommended loads in the table refer to the resistance of the individual fastening and may not be the same as the loads $F_N$ and $F_V$ acting on the fastened part.
  Note: If relevant, prying forces need to be considered in design, see example. Moment acting on fastener shank only in case of a gap between base and fastened material.

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*Requirements of spheroidal graphite cast iron base material

| Subject | Requirements |
|---|---|
| Cast iron | Spheroidal graphite cast iron according to EN 1563 |
| Strength class | EN-GJS-400 to EN-GJS-600 acording to EN 1563 |
| Chemical analysis and amount of carbon | 3.3–4.0 mass percentage |
| Mictrostructure | Form IV to VI (spherical) according to EN ISO 945-1:2010 |
| Material thickness | Minimum size 7 according to Figure 4 of EN ISO 945-1:2010<br>$t_{II} \geq 20$ mm |

## Design resistance – Steel

| Steel grade: Europe | | S235 | S355 |
|---|---|---|---|
| Tension | $N_{Rd}$ [kN] | 2.9 | 3.7 |
| Shear | $V_{Rd}$ [kN] | 4.16 | 5.4 |
| Moment | $M_{Rd}$ [kN] | 18.4 | 18.4 |

## Design resitence – cast iron *

| | | |
|---|---|---|
| Tension | $N_{RD}$ [kN] | 0.8 |
| Shear | $V_{RD}$ [kN] | 1.2 |
| Moment | $M_{RD}$ [kN] | 13.1 |

## Recommended interaction formula for combined loading

| Combined loading situation | Interaction formula |
|---|---|
| **V–N** (shear and tension) | $\frac{V}{V_{rec}} + \frac{N}{N_{rec}} \le 1.2$ with $\frac{V}{V_{rec}} \le 1.0$ and $\frac{N}{N_{rec}} \le 1.0$ |
| **V–M** (shear and bending) | $\frac{V}{V_{rec}} + \frac{M}{M_{rec}} \le 1.2$ with $\frac{V}{V_{rec}} \le 1.0$ and $\frac{M}{M_{rec}} \le 1.0$ |
| **N–M** (tension and bending) | $\frac{N}{N_{rec}} + \frac{M}{M_{rec}} \le 1.0$ |
| **V–N–M** (shear, tension and bending) | $\frac{V}{V_{rec}} + \frac{N}{N_{rec}} + \frac{M}{M_{rec}} \le 1.0$ |

**Cyclic loading:**
- Anchorage of **X-BT-R** threaded stud in steel base material is not affected by cyclic loading.
- Fatigue strength is governed by fracture of the shank. Inquire at Hilti for test data if high cycle loading has to be considered in the design.

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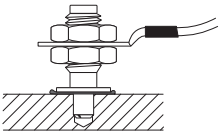
## X-BT for fastenings of earthing and bonding device

**Protective earthing circuits** (According to EN 60439-1 and EN 60204-1)

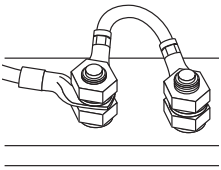
Single point connection



Fasteners
**X-BT M10-24-6 SN12-R,**
**X-BT W10-24-6 SN12-R,**
**X-BT M6-24-6 SN12-R,**
**X-BT W6-24-6 SN12-R**

Maximum connected cable size
**≤ 10 mm² Copper**
**AWG 8**

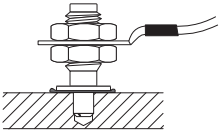
Double point connection



Fasteners
**X-BT M10-24-6 SN12-R,**
**X-BT W10-24-6 SN12-R,**
**X-BT M6-24-6 SN12-R,**
**X-BT W6-24-6 SN12-R**

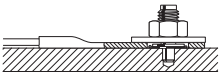
Maximum connected cable size
**≤ 16 mm² Copper**
**AWG 6**

**External lightening protection systems (**According to EN 50164-1)



Fasteners
**X-BT M10-24-6 SN12-R,**
**X-BT W10-24-6 SN12-R ,**
**X-BT M6-24-6 SN12-R,**
**X-BT W6-24-6 SN12-R**

Test class = **N**
$I_{max}$ = **50 kA**
Time = **$t_d$ ≤ 2 ms**



Test class = **H**
$I_{max}$ = **100 kA**
Time = **$t_d$ ≤ 2 ms**

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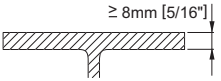
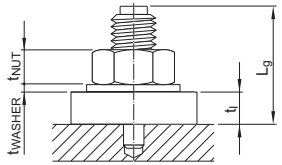
## Application requirements

### Thickness of base material




### Thickness of fastened material

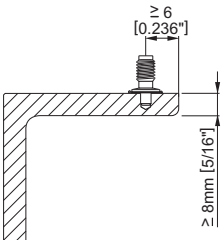



**X-BT M8:** **2.0 ≤ $t_l$ ≤ 7.0 mm**
**X-BT M10 / X-BT W10:** **2.0 ≤ $t_l$ ≤ 15.0 mm**
**X-BT M6 / X-BT W6:** **1.0 ≤ $t_l$ ≤ 14.0 mm**

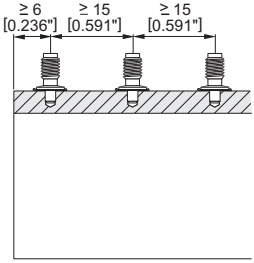
Note:
For X-BT with SN 12R sealing washer $t_l$ ≥ 2.0 mm
For X-BT M6 / W6 with SN 12R sealing washer $t_l$ ≥ 1.0 mm

## Spacing and edge distances

Edge distance: ≥ 6 mm




Spacing: ≥ 15 mm

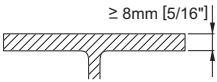



## Corrosion information

The corrosion resistance of Hilti CR500 and S31803 stainless steel material is equivalent to AISI 316 (A4) steel grade.

Studs made of N 08926 (HCR) material with higher corrosion resistance, e.g. for use in road tunnels or swimming pools, are available on special order.

## Application limit




- $t_{II} \geq 8$ mm [$^{5}/_{16}$"] → No through penetration
- No limits with regards to steel strength

## Fastener selection and system recommendation

### Fastener program

| Designation | Item no. | **Tool** Designation |
|---|---|---|
| **X-BT M8-15-6 SN12-R** | **377074** | DX 351-BTG |
| **X-BT M10-24-6 SN12-R** | **377078** | DX 351-BT |
| **X-BT W10-24-6 SN12-R** | **377076** | DX 351-BT |
| **X-BT W10** without washer | **377075** | DX 351-BT |
| **X-BT M6-24-6 SN12-R** | **432266** | DX 351-BT |
| **X-BT W6-24-6 SN12-R** | **432267** | DX 351-BT |

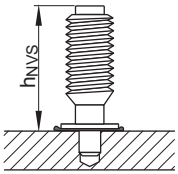
Note: For High Corrosion Resistance HCR material inquire at Hilti

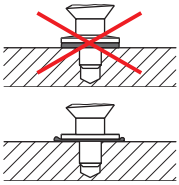
## Cartridge selection and tool energy setting

**6.8/11 M high precision** brown cartridge
Fine adjustment by installation tests on site

## Fastening quality assurance

### Fastening inspection



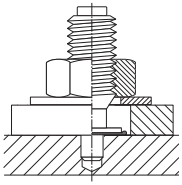



**X-BT M8**
**$h_{NVS}$ = 15.7–16.8 mm**

**X-BT M10 / X-BT W10 and**
**X-BT M6 / X-BT W6**
**$h_{NVS}$ = 25.7–26.8 mm**

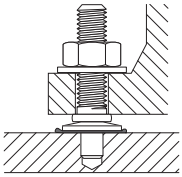
### Installation

**X-BT with washer**

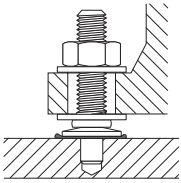


Fastened material hole ∅
≥ 13 mm

**X-BT M6 / X-BT W6**



Fastened material with
pre-drilled hole diameter
< 7 mm



Fastened material with
pre-drilled hole diameter
≥ 7 mm

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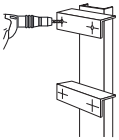
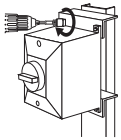
Pre-drill with **TX-BT 4/7** step shank drill bit



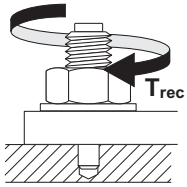
Pre-drill until the shoulder grinds a shiny ring (to ensure proper drilling depth)

**Before fastener installation:**
the drilled hole must be clear of liquids and debris. The area around the drilled hole must be free from liquids and debris.

Tighten using a screwdriver with torque clutch

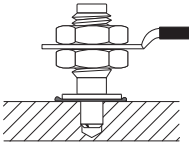


Tightening torque:
$\mathbf{T_{rec}} \leq 8$ Nm (5.9 ft-lb)!




| Hilti screwdriver: | Torque setting: |
|---|---|
| SF 121-A | 11 |
| SF 150-A | 9 |
| SF 180-A | 8 |
| SF 144-A | 9 |
| SF 22A | 9 |

## X-BT for fastenings of earthing and bonding device



Hold the lower nut with a spanner whilst tightening the second nut.
The tightening torque can be in a range of about 20 Nm.

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