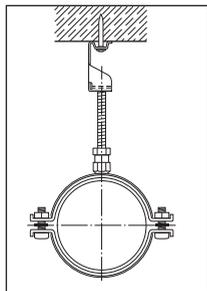


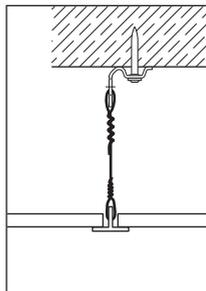
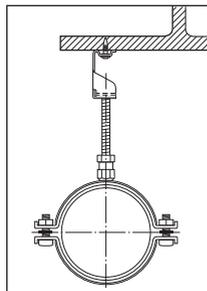


## Applications

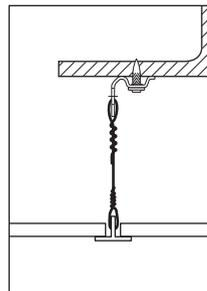
### Examples



Threaded rod attachments to concrete and steel



Wire attachments to concrete and steel



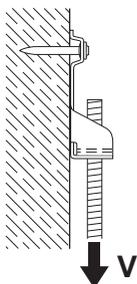
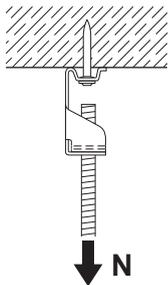
## Load data

### Design data

#### Recommended loads

#### Concrete (DX-Kwik with pre-drilling) or steel

##### X-HS

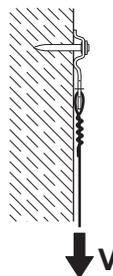
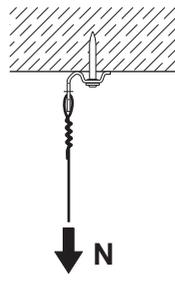


Fastener designation	$N_{rec} = V_{rec}$ [kN]	Base material
<b>X-HS __ DKH 48</b>	0.9	Concrete
<b>X-HS __ U19</b>	0.9	Steel
<b>X-CC DKH 48</b>	0.9	Concrete
<b>X-CC U16</b>	0.9	Steel

#### Conditions:

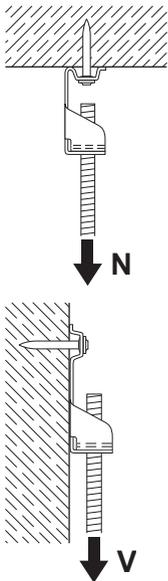
- Predominantly static loading.
- Concrete C20/25–C50/60
- Strength of fastened material is not limiting.
- Observance of all application limitations and recommendations (especially pre-drilling requirements).

##### X-CC



## Concrete (DX Standard without pre-drilling)

### X-HS



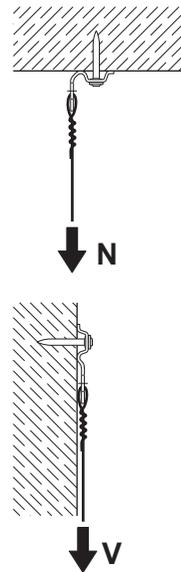
Fastener designation	$N_{rec}$ [kN]	$V_{rec}$ [kN]	$h_{ET}$ [mm]
<b>X-HS_U32</b>	0.4	0.4	27
<b>X-HS_U27</b>	0.3	0.3	22
<b>X-HS_U22</b>	0.2	0.2	18
<b>X-CC_U27</b>	0.2*	0.3	22
<b>X-CC_U22</b>	0.15*	0.2	18

\*) eccentric loading considered

### Conditions:

- Minimum 5 fastenings per fastened unit (normal weight concrete).
- All visible failures must be replaced.
- With lightweight concrete base material and appropriate washers, greater loading may be possible, please contact Hilti.
- Predominantly static loading.
- Observance of all application limitations and recommendations.

### X-CC



## Test data

**Important note:** test data are for information only and cannot be used for design. These data are examples and do not represent the whole range of applications and load cases.

Design data for Hilti standard nails in concrete are based on a specific statistical evaluation method taking into consideration high variation coefficients. The evaluation procedure is described in the **Direct Fastening Principles and Technique** section of this manual.

For more detailed information please contact Hilti.

Fastener	Mean ultimate tensile loads $N_{u,m}$ [kN]	Embedment depth $h_{ET}$ [mm]	Variation coefficient [%]	Concrete strength at 28 days $f_{cc}$ [N/mm <sup>2</sup> ]	Failure mode
<b>X-HS_U22 P8 S15</b>	1.79	17.9	27.3	47.4	Pull-out
<b>X-HS_U27 P8 S15</b>	2.28	22.6	47.8	47.4	Pull-out

## Application requirements

### Thickness of base material

Concrete

#### DX-Kwik

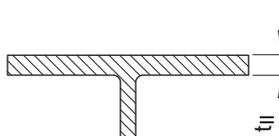
(with pre-drilling)  $h_{\min} = 100 \text{ mm}$

#### DX Standard

(w/o pre-drilling)  $h_{\min} = 80 \text{ mm}$

Steel

$t_{II} \geq 4 \text{ mm}$



### Spacing and edge distances

Minimum spacing and edge distances: See corresponding nail data sheet of X-U and X-DKH.

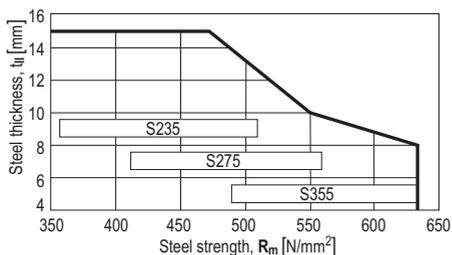
### Corrosion information

These zinc-coated fasteners are not suitable for long-term service outdoors or in otherwise corrosive environments.

For further detailed information on corrosion see relevant chapter in **Direct Fastening Principles and Technique** section.

## Application limits

### Fastening to steel – X-HS U19 with DX351



**Fastener selection**
**Program, technical information**

Base material	Fastener Designation	Shank Ø	Shank length	L [mm]	Tools
		d <sub>s</sub> [mm]	L <sub>s</sub> [mm]		
① Concrete pre-drilled	<b>X-HS _ DKH 48 P8S15</b>	4.0	48	50.0	<b>DX 460-F8</b>
② Concrete	<b>X-HS _ U 32 P8S15</b>	4.0	32	34.4	<b>DX 460-F8,</b>
	<b>X-HS _ U 27 P8S15</b>	4.0	27	29.4	<b>DX 351-F8,</b>
	<b>X-HS _ U 22 P8S15</b>	4.0	22	24.4	<b>DX 36</b>
Steel	<b>X-HS _ U 19 P8S15</b>	4.0	19	21.4	
③ Concrete pre-drilled	<b>X-CC DKH 48 P8S15</b>	4.0	48	50.0	<b>DX 460-F8</b>
③ Concrete	<b>X-CC U 27 P8</b>	4.0	27	29.4	<b>DX 460-F8,</b>
	<b>X-CC U 22 P8</b>	4.0	22	24.4	<b>DX 351-F8,</b>
Steel	<b>X-CC U 16 P8</b>	4.0	16	18.4	<b>DX 36</b>

Type of threading: M = metric; W6, W10 = Whitworth 1/4"; 3/8"

**X-HS order information**

Item no.	Designation	Item no.	Designation
361788	X-HS M6 U32 P8 S15	386214	X-HS M8 U19 P8 S15
386223	X-HS M6 U27 P8 S15	386215	X-HS M10 U19 P8 S15
361789	X-HS M8 U32 P8 S15	386217	X-HS W10 U19 P8 S15
386224	X-HS M8 U27 P8 S15	386218	X-HS M6 U22 P8 S15
361790	X-HS M10 U32 P8 S15	386219	X-HS M8 U22 P8 S15
386225	X-HS M10 U27 P8 S15	386222	X-HS W10 U22 P8 S15
386226	X-HS W6 U27 P8 S15	386216	X-HS W6 U19 P8 S15
386227	X-HS W10 U27 P8 S15	386220	X-HS M10 U22 P8 S15
386213	X-HS M6 U19 P8 S15	386221	X-HS W6 U22 P8 S15

Type of threading: M = metric; W6, W10 = Whitworth 1/4"; 3/8"

**X-CC order information**

Item no.	Designation
386229	X-CC U22 P8
386230	X-CC U27 P8
299937	X-CC DKH P8 S15
386228	X-CC U16 P8

## Cartridge selection

Cartridge recommendation:

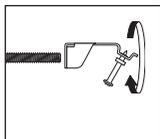
Steel:	<b>6.8/11M red cartridge</b>	$t_{ij} \geq 6 \text{ mm}$
	<b>6.8/11M green cartridge</b>	$t_{ij} < 6 \text{ mm}$
Concrete:	<b>6.8/11M yellow cartridge</b>	on green/fresh and standard concrete
	<b>6.8/11M red cartridge</b>	on precast, old and hard concrete

Tool energy adjustment by setting tests on site.

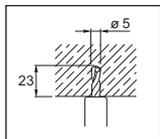
## Fastening quality assurance

### Installation

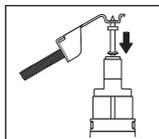
#### X-HS



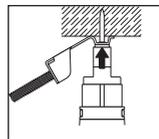
1. Attach the threaded rod to the X-HS before fastening



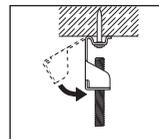
2. For **DKH 48** pre-drill ( $\varnothing 5 \times 23$ )



3. Load the assembly into the tool

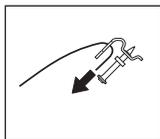


4. Locate the nail, compress the tool, pull the trigger and the fastening is complete

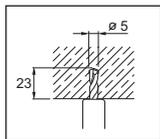


5. Bend the X-HS assembly down to the vertical position

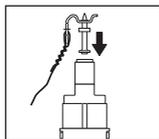
#### X-CC



1. Assemble the wire with the X-CC



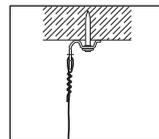
2. For **DKH 48** pre-drill ( $\varnothing 5 \times 23$ )



3. Load the assembly into the tool



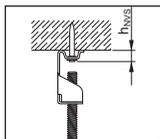
4. Locate the nail, compress the tool, pull the trigger and the fastening is complete



5. Adjust the wire as required

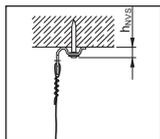
## Quality assurance

#### X-HS



$h_{NVS} = 6-10 \text{ mm}$

#### X-CC



$h_{NVS} = 4-7 \text{ mm}$