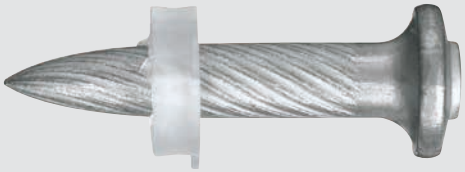
X-U
DATA SHEET

Nail for fastening to concrete and steel



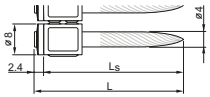
April 2022

X-U Nail for fastening to concrete and steel

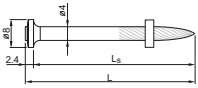
Product data

Dimensions

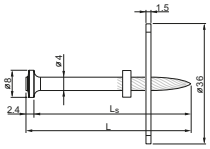
X-U__MX



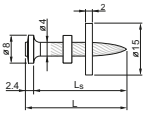
X-U __ P8



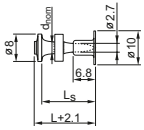
X-U __ P8 S36



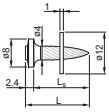
X-U __ P8 S15



X-U 15 P8TH



X-U __ S12



Material specifications

Carbon steel shank:	HRC 58 HRC 59 (X-U 15)
Zinc coating:	5–20 µm

Recommended fastening tools

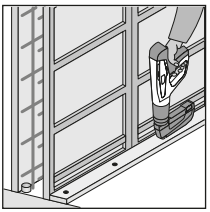
- See fastener program in the next pages.

Approvals

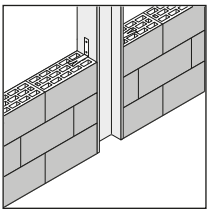
ICC ESR-2269 (USA)
DIBt Z-14.4-517 (Germany), DNV-GL
ABS, LR 97/00077, IBMB 4927/2020

Not all information presented in this product data sheet might be subject to approval / certificate content. Please refer to approval/certificate for further information.

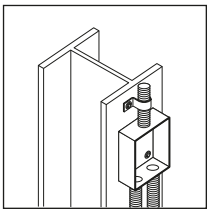
Applications



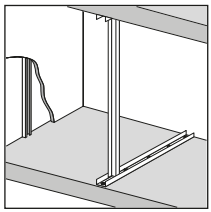
System formwork



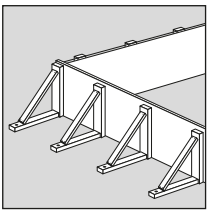
Wall-tie to steel and concrete



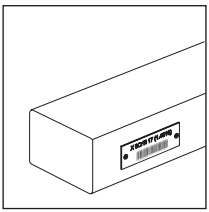
Mechanical and electrical fixtures



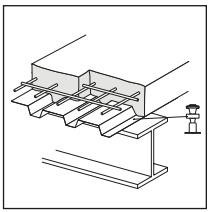
Drywall track to concrete and steel



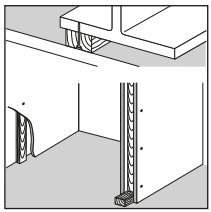
Conventional formwork



Tagging labels



Tacking of metal decks



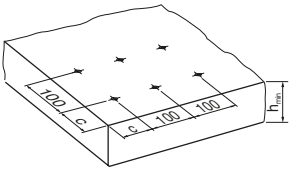
Sill plates / 2x4 wood to concrete and steel

The intended use for safety relevant and permanent applications only comprises fastenings which are not directly exposed to external weather conditions or moist atmospheres.

X-U Nail for fastening to concrete

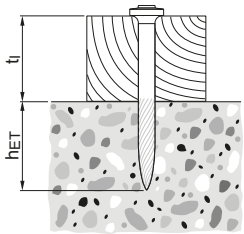
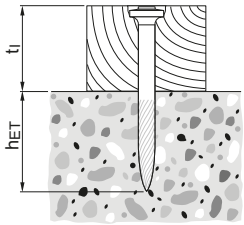
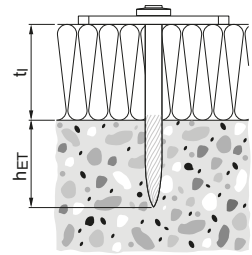
Application recommendation

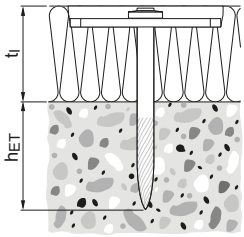
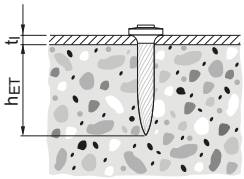
Base material thickness and fastener positioning in base material



Base material thickness: h_{min} = 80 mm
Edge distance: c ≥ 70 mm
Spacing: s ≥ 100 mm

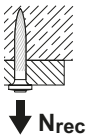
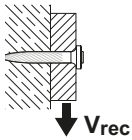
Fastener shank length recommendation

	Fastening type	Fastener shank length	Penetration depth
	Wood to concrete	$L_s = h_{ET} + t_I$ t_I = 15–57 mm	$h_{ET} \geq 14$ mm
	Wood to concrete, head flush with surface	$L_s = h_{ET} + t_I - 3$ mm t_I = 15–57 mm	$h_{ET} \geq 14$ mm
	Insulation to concrete	$L_s = h_{ET} + t_I$	$h_{ET} \geq 14$ mm

	Fastening type	Fastener shank length	Penetration depth
	Insulation to concrete	$L_s = h_{ET} + t_I - 5$ mm	$h_{ET} \geq 14$ mm
	Steel to concrete	$L_s = h_{ET} + t_I$	$h_{ET} \geq 22$ mm

Performance data

Recommended resistance under tension and shear load

Embedment depth h_{ET}	Tension load N_{rec} 		Shear load V_{rec} 	
	Soft/medium concrete	Tough concrete	Soft/medium concrete	Tough concrete
≥ 14 mm	0.1 kN	–	0.1 kN	–
≥ 18 mm	0.2 kN	–	0.2 kN	–
≥ 22 mm	0.3 kN	–	0.3 kN	–
≥ 27 mm	0.4 kN	–	0.4 kN	–

- For safety relevant fastenings sufficient redundancy of the entire system is required: Minimum 5 fastenings per fastened unit.
- All visible failures must be replaced.
- Valid for concrete with strength of $f_{CC} \leq 45$ N/mm².
- Valid for predominantly static loading.
- Failure of the fastened material is not considered in recommended loads.
- To limit penetration of nail and to increase pull-over load, use nails with washers.
- For more details in relation to base material properties, please refer to the chapter **Fastener selection guide** in the Direct Fastening Manual (DFTM).

System recommendation

- For more details, please refer to the chapter **Accessories and consumables compatibility** in the Direct Fastening Technology Manual (DFTM).

Cartridge recommendation for fastening wood to concrete

Base material	Cartridge color (tool power level)	
	Tool type: DX 6 MX DX 6 F8	Tool type: DX 5 MX, DX 460 MX DX 5 F8, DX 460 F8, DX 2
	Cartridge type: 6.8/11 M	Cartridge type: 6.8/11 M
Soft concrete/medium	titanium ■ (1-5)	green ■, yellow ■
Tough concrete	titanium ■ (4-8)	yellow ■, red ■

Cartridge recommendation for fastening steel to concrete

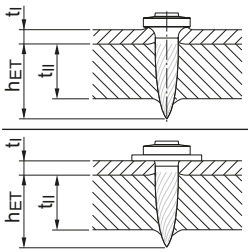
Base material	Cartridge color (tool power level)	
	Tool type: DX 6 MX DX 6 F8	Tool type: DX 5 MX, DX 460 MX, DX 351 MX DX 5 F8, DX 460 F8, DX 2, DX 351 F8
	Cartridge type: 6.8/11 M	Cartridge type: 6.8/11 M
Soft/medium concrete	titanium ■ (1-5)	green ■, yellow ■
Tough concrete	titanium ■ (4-8)	yellow ■, red ■

- Tool power level adjustment by setting tests on site.
- Start tool energy selection with lowest recommended tool power level.
- Correct according requirement from chapter quality assurance.

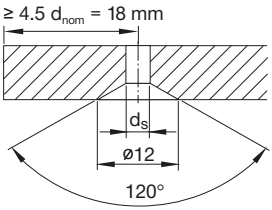
X-U Nail for fastening steel to steel

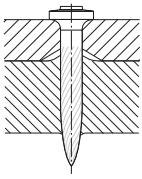
Application recommendation

Fastener shank length recommendation

	Fastening type	Fastener shank length	Penetration depth
	Steel to steel	$L_s = h_{ET} + t_I$ not pre-drilled: $t_I \leq 3$ mm pre-drilled: 3 mm < $t_I \leq 6$ mm	$h_{ET} = 12 \pm 2$ mm

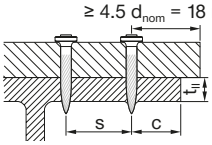
Condition for fastened material thickness: 3 mm < tI ≤ 6 mm





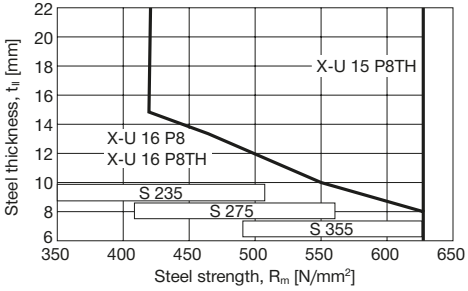
If a gap between the fastened part and the base material is unacceptable, the fastened part needs to be prepared with drilled holes.

Base material properties and fastener positioning in base material



Base material thickness:	$t_{II} \geq 6.0$ mm
Edge distance:	$c \geq 15$ mm
Spacing:	$s \geq 20$ mm
Type:	Rolled shapes

Application limitation



- Steel sheeting with 0.75 mm ≤ $t_I \leq 1.25$ mm
- On higher steel grades, fastening with single nails (P8 or P8TH) may yield better results (e.g. less shear breaks) than fastening with collated nails (MX or MXSP) due to better nail guidance.

Performance data

Recommended resistance under tension and shear load

Fastening of steel sheets and other steel parts with X-U 16 and X-U 19

t_I	X-U _ P8/MX N_{rec}	X-U _ S12 N_{rec}	V_{rec}
0.75 mm	1.0 kN	1.4 kN	1.2 kN
1.00 mm	1.2 kN	1.8 kN	1.8 kN
1.25 mm	1.5 kN	2.2 kN	2.6 kN
≥ 2.00 mm	2.0 kN	2.2 kN	2.6 kN

Tacking of steel sheets with X-U 15

according to ECCS-recommendation N73, „Good Construction Practice for Composite Slabs"

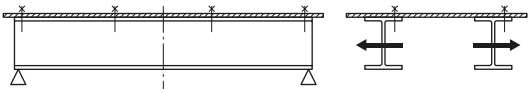
t_I	N_{rec}	V_{rec}
0.75–1.25 mm	0.6 kN	0.8kN

Conditions

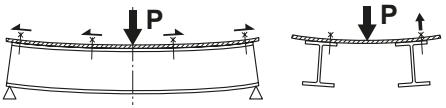
- Valid for steel sheet with minimum tensile strength ≥ 360 N/mm².
- For intermediate sheet thicknesses, use recommended load for next smaller thickness.
- In case of a design based on the characteristic resistance, recommended values have to be multiplied by two: $N_{Rk} = N_{rec} \cdot 2.0$, $V_{Rk} = V_{rec} \cdot 2.0$
- For X-U 16 S12:
  Base material thickness $t_{II,min}$ = 8 mm for $t_I \geq 1.50$ mm
  Base material thickness $t_{II,min}$ = 6 mm for $t_I \leq 1.25$ mm
- Other fastened parts: clips, brackets, etc.
- Redundancy (multiple fastening) must be provided.
- Valid for predominantly static loading

Forces of constraint

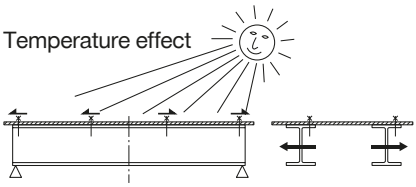
When fastening large pieces of steel, the possibility of shear loadings from forces of constraint should be considered. Avoid exceeding V_{rec} for the fastener shank!



Deflection due to primary loading



Temperature effect



System recommendation

- For more details, please refer to the chapter **Accessories and consumables compatibility** in the Direct Fastening Technology Manual (DFTM).

Cartridge recommendation for X-U 16 P8, X-U 16 P8 TH, X-U 16 MX

Base material		Cartridge color (tool power level)	
		Tool type: DX 6 MX DX 6 F8	Tool type: DX 5 MX, DX 460 MX, DX 351 MX[1)] DX 5 F8, DX 460 F8, DX 351 F8[1)], DX 2[1)]
		Cartridge type: 6.8/11 M	Cartridge type: 6.8/11 M
S235 to S275	$6 \le t_{II} < 10$ mm	titanium ■ (4-8)	red ■
	$10 \le t_{II} \le 20$ mm	titanium ■ (6-8), black ■ (7-8)	red ■, black ■
S355	$6 \le t_{II} \le 8$ mm	titanium ■ (6-8), black ■ (7-8)	red ■, black ■

[1)] Black cartridges do not apply for this tool.

Cartridge recommendation for X-U 15 P8TH

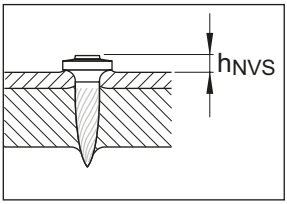
Base material		Cartridge color (tool power level)	
		Tool type: DX 6 F8	Tool type: DX 5 F8, DX 460 F8, DX 351 F8[1)]
		Cartridge type: 6.8/11 M	Cartridge type: 6.8/11 M
S235 to S355	$6 \le t_{II} < 12$ mm	titanium ■ (2-5)	yellow ■
	$12 \le t_{II} \le 20$ mm	titanium ■ (4-8)	red ■

- Tool power level adjustment by setting tests on site.
- Start tool energy selection with lowest recommended tool power level.
- Correct according requirement from chapter quality assurance.

Quality assurance

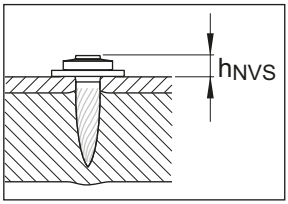
Setting depth control

X-U __ P8/MX



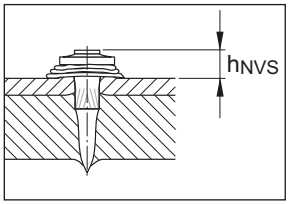
h_{NVS} = 2.5–4.5 mm

X-U __ S12



h_{NVS} = 4.0–5.5 mm

X-U _ P8TH / MXSP



h_{NVS} = 4.0–6.0 mm

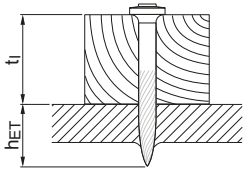
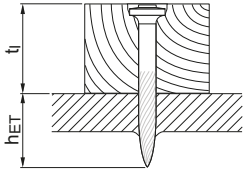
X-U Nail for fastening wood to steel

Application recommendation

Base material properties

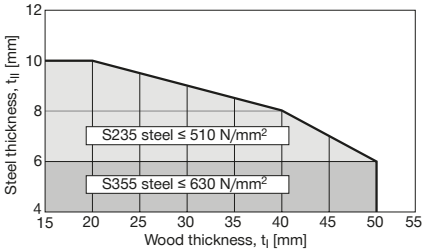
Base material thickness: $t_{II} \geq 4.0$ mm

Fastener shank length recommendation

	Fastening type	Fastener shank length	Penetration depth
	Wood to steel	$L_s = h_{ET} + t_I$ t_I = 15–57 mm	$h_{ET} \geq 8$ mm
	Wood to steel, head flush with surface	$L_s = h_{ET} + t_I - 3$ mm t_I = 15–57 mm	$h_{ET} \geq 8$ mm

Application limitation

For X-U 22 P8 to X-U 62 P8

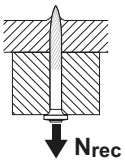


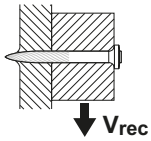
- On higher steel grades, fastening with single nails may yield better results (e.g. less shear breaks) than fastening with collated nails due to better nail guidance.

Performance data

Recommended resistance under tension and shear load

Designation	Tension load N_{rec}	Shear load V_{rec}
X-U	0.3 kN	0.60 kN





Conditions:

- For safety-relevant fastenings sufficient redundancy of the entire system is required.
- In case soft material is fastened, its strength determines the loads.
- To limit penetration of nail and to increase pull-over load, use nails with washers.
- Observance of edge distance and fastener spacing in compliance with recognized standards EN 1995 (see approval).
- With respect to details of fastening wood, chipboard or OSB members to steel base material, it is refered to the German approval DIBt Z-14.4-517.

System recommendation

- For more details, please refer to the chapter **Accessories and consumables compatibility** in the Direct Fastening Technology Manual (DFTM).

Cartridge recommendation for X-U 22 P8 to X-U 62 P8

Base material		Cartridge color (tool power level)	
		Tool type: DX 6 MX DX 6 F8	Tool type: DX 5 MX, DX 460 MX DX 5 F8, DX 460 F8, DX 2[1)]
		Cartridge type: 6.8/11 M	Cartridge type: 6.8/11 M
S235 to S355	$4 \le t_{II} < 6$ mm	titanium ■ (1-5)	green ■, yellow ■
	$6 \le t_{II} \le 10$ mm	titanium ■ (4-8), black ■ (7-8)	yellow ■, red ■, black ■

[1)] Black cartridges do not apply for this tool.

- Tool power level adjustment by setting tests on site.
- Start tool energy selection with lowest recommended tool power level.
- Correct according requirement from chapter quality assurance.

Fastener program

Fastener	Item no.	L_S	Powder-actuated tools					Description
			DX 6 MX, DX 5 MX, DX 460 MX	DX 6 F8, DX 5 F8 DX 460 F8	DX 2	DX 351 MX	DX 351 F8	
X-U 16 MX	237344	16 mm	■			■		Sheet metal on steel
X-U 19 MX	237345	19 mm	■			■		Sheet metal on steel
X-U 22 MX	237346	22 mm	■			■		Wood on concrete/steel
X-U 27 MX	237347	27 mm	■			■		Wood on concrete/steel
X-U 32 MX	237348	32 mm	■					Wood on concrete/steel
X-U 37 MX	237349	37 mm	■					Wood on concrete/steel
X-U 42 MX	237350	42 mm	■					Wood on concrete/steel
X-U 47 MX	237351	47 mm	■					Wood on concrete/steel
X-U 52 MX	237352	52 mm	■					Wood on concrete/steel
X-U 57 MX	237353	57 mm	■					Wood on concrete/steel
X-U 62 MX	237354	62 mm	■					Wood on concrete/steel
X-U 72 MX	237356	72 mm	■					Wood on concrete/steel
X-U 16 P8	237330	16 mm		■	■		■	Sheet metal on steel
X-U 19 P8	237331	19 mm		■	■		■	Sheet metal on steel
X-U 22 P8	237332	22 mm		■	■		■	Wood on concrete/steel
X-U 27 P8	237333	27 mm		■	■		□	Wood on concrete/steel
X-U 32 P8	237334	32 mm		■	■		□	Wood on concrete/steel
X-U 37 P8	237335	37 mm		■	■		□	Wood on concrete/steel
X-U 42 P8	237336	42 mm		■	■		□	Wood on concrete/steel
X-U 47 P8	237337	47 mm		■	■		□	Wood on concrete/steel
X-U 52 P8	237338	52 mm		■	■			Wood on concrete/steel
X-U 57 P8	237339	57 mm		■	■			Wood on concrete/steel
X-U 62 P8	237340	62 mm		■	■			Wood on concrete/steel
X-U 72 P8	237342	72 mm		■	■			Wood on concrete/steel
X-U 16 P8TH	237329	16 mm		■	■		■	Sheet metal on steel, *)
X-U 19 P8TH	385781	19 mm		■	■		■	Sheet metal on steel, *)
X-U 27 P8TH	385782	27 mm		■	■		□	Sheet metal on concrete, *)
X-U 15 MXSP	383466	16 mm	■			□		Sheet metal on steel
X-U 15 P8TH	237328	16 mm		■	□		□	Sheet metal on steel
X-U 27 P8S15	237371	27mm		■	■		□	High pull-over strength
X-U 32 P8S15	237372	32 mm		■	■		□	High pull-over strength

Fastener	Item no.	L_S	Powder-actuated tools					Description
			DX 6 MX, DX 5 MX, DX 460 MX	DX 6 F8, DX 5 F8 DX 460 F8	DX 2	DX 351 MX	DX 351 F8	
X-U 32 P8S36	237374	32 mm		■	■		□	Soft material on concr./steel
X-U 52 P8S36	237376	52 mm		■	■		□	Soft material on concr./steel
X-U 72 P8S36	237379	72 mm		■	■			Soft material on concr./steel

■ = recommended, □ = feasible

*) firm hold down

Fastener	Item no.	L_S	Powder-actuated tools					Description
			DX 460 F8S12	DX 5 F8S12	DX 462 F8S12			
X-U 16 S12	237357	16 mm	■	■	■			High pull-over strength
X-U 19 S12	237358	19 mm	■	■	■			High pull-over strength
X-U 22 S12	237359	22 mm	■	■	■			High pull-over strength
X-U 27 S12	237360	27 mm	■	■	■			High pull-over strength
X-U 32 S12	237361	32 mm	■	■	■			High pull-over strength

■ = recommended, □ = feasible

*) firm hold down