



# X-P DATA SHEET

**Nail for fastening to concrete  
and steel**



## X-P Nail for fastening to concrete and steel

### Product data

#### Product description

X-P MX



- Designed for fastening on tough concrete and steel.
- Long conical nail tip designed for best drivability in tough concrete.
- High hardness for best penetration in tough concrete.
- High load performance on tough concrete.

X-P P8



#### Dimensions for nails

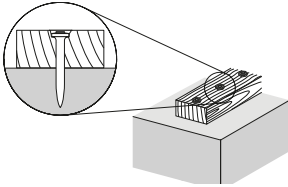
Technical drawing	Designation	Shank length $L_s$	Head length $L_h$	Shank diameter $d_s$	Head diameter $d_h$
	X-P 22	22 mm	2.4 mm	4 mm	8.2 mm
	X-P 27	27 mm			
	X-P 34	34 mm			
	X-P 40	40 mm			
	X-P 47	47 mm			
	X-P 52	52 mm			
	X-P 57	57 mm			
	X-P 62	62 mm			
	X-P 72	72 mm			

#### Material specification and material properties for nails

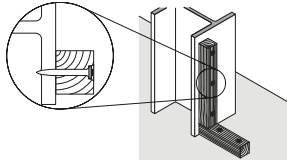
Designation	Element	Material	Coating	Minimum coating thickness	Hardness
X-P	Nail	Carbon steel	Zinc	5 $\mu\text{m}$	59 HRC

## Applications

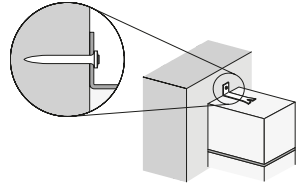
### Fastening wood to concrete



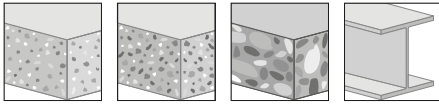
### Fastening wood to steel



### Fastening steel to concrete



## Base materials



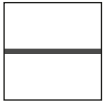
Soft  
concrete

Medium  
concrete

Tough  
concrete

Steel

## Load conditions



Static/  
quasi static

## Environmental conditions




Dry indoor

-  For more details, please refer to following technical document: Hilti Corrosion Handbook.

### Approvals/certificates

Authority	Approval/certificate no.	Date of issue	Country of issue
IBMB	19210-2017	11/2017	Germany
IBMB	19211-2017	11/2017	Germany
IBMB	19212-2017	11/2017	Germany
IBMB	4927/2020	11/2019	Germany
ICC-ES ESR	2269	02/2019	USA
Rom. Ministry ICECCON	AT 016-01/420-2020	03/2020	Romania
VHT	PZ-809-15-Hilti-171027	10/2017	Germany

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

### Fastener program

#### Item no. and description

Designation	Item no.	Description
X-P 22 MX	2150380	Collated nail
X-P 27 MX	2150381	
X-P 34 MX	2150382	
X-P 40 MX	2150383	
X-P 47 MX	2173900	
X-P 52 MX	2173901	
X-P 57 MX	2173902	
X-P 62 MX	2173903	
X-P 72 MX	2173904	
X-P 22 P8	2150366	
X-P 27 P8	2150367	
X-P 34 P8	2150368	
X-P 40 P8	2150369	
X-P 47 P8	2173875	
X-P 52 P8	2173876	
X-P 57 P8	2173877	
X-P 62 P8	2173878	
X-P 72 P8	2173879	

## X-P Nail for fastening wood to concrete

### Application recommendation

#### Fastened material properties and fastener positioning in fastened material

	Fastened material	Wood
	Fastened material thickness $t_f$	15–50 mm (soft/medium concrete)
	Fastened material thickness $t_f$	15–40 mm (tough concrete)
	Edge distance $c_{1,min}$	250 mm
	Edge distance $c_{2,min}$	20 mm
	Fastener spacing $s_{1,min}$	500 mm

- Edge distances and fastener spacing are recommendations to avoid splitting.

#### Base material properties and fastener positioning in base material

	Base material	Concrete
	Base material thickness $h_{min}$	80 mm
	Edge distance $c_{1,min}$ , $c_{2,min}$	70 mm
	Fastener spacing $s_{1,min}$ , $s_{2,min}$	100 mm

#### Fastener shank length recommendation

	For standard fastening:	$L_s = h_{ET} + t_f$
	For flush fastening:	$L_s = h_{ET} + t_f - 3 \text{ mm}$

## 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
$\geq 14$ mm	0.10	–	0.10	–
$\geq 18$ mm	0.20	–	0.20	–
$\geq 20$ mm	0.30	–	0.30	–
$\geq 25$ mm	0.40	0.10 kN	0.40	0.10 kN

- Redundancy of fastening points is required.
- Minimum number of fastening points for safety relevant fastenings:  $\geq 5$ .
- For more details in relation to base material properties, please refer to the chapter **Fastener selection guide** in the Direct Fastening Technology Manual (DFTM).

### Stick rate estimation

	Designation	Soft/medium concrete	Tough concrete
		X-P	84–92 %

- The stick rate indicates the percentage of nails that were driven correctly to carry a load.
- Stick rate can vary from the above values depending on job site conditions.

### System recommendation

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

#### System recommendation for fastening collated nails with powder-actuated tools

Designation	Powder-actuated tool							Base material		
	DX 6 MX	DX 5 MX	DX 460 MX					Soft concrete	Medium concrete	Tough concrete
X-P 34 MX to X-P 72 MX	■	□	□					■	■	■

■ = recommended □ = feasible

#### System recommendation for fastening single nails with powder-actuated tools

Designation	Powder-actuated tool							Base material		
	DX 6 F8	DX 5 F8	DX 460 F8	DX 460 F8	DX351 F8	DX 2		Soft concrete	Medium concrete	Tough concrete
X-P 34 P8 to X-P 72 P8	■	□	□	□				■	■	■
X-P 34 P8 to X-P 47 P8					□			■	■	□
X-P 34 P8 to X-P 62 P8						■		■	■	□

■ = recommended □ = feasible

### Cartridge recommendation

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 351 F8 <sup>1)</sup> , DX 2 <sup>1)</sup>
	Cartridge type: 6.8/11 M	Cartridge type: 6.8/11 M
Soft/medium concrete	titanium ■ (1-8)	green ■, yellow ■, red ■
Tough concrete	titanium ■ (4-8), black ■ (6-8)	red ■, black ■

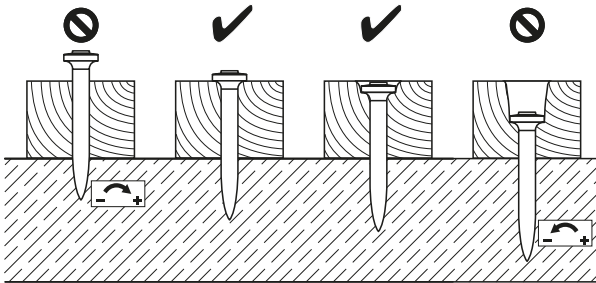
<sup>1)</sup> Black cartridges do not apply for this tool.



- 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.

### Quality assurance

#### Setting depth control and power tool adjustment



- Visible setting failures must be replaced with a new fastener, not in the same hole.
- These are abbreviated instructions which may vary by application.
- Always review/follow the instructions accompanying the product.



## X-P Nail for fastening wood to steel

### Application recommendation

#### Fastened material properties and fastener positioning in fastened material

	Fastened material	Wood
	Fastened material thickness $t_f$	15–50 mm
	Edge distance $c_{1,min}$	250 mm
	Edge distance $c_{2,min}$	20 mm
	Fastener spacing $s_{1,min}$	500 mm

- Edge distances and fastener spacing are recommendations to avoid splitting.

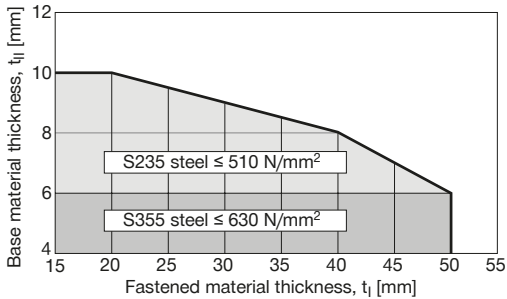
#### Base material properties and fastener positioning in base material

	Base material	Steel
	Base material thickness $t_{II}$	4–10 mm
	Edge distance $c_{1,min}$	15 mm
	Fastener spacing $s_{1,min}$	20 mm

#### Fastener shank length recommendation

	For standard fastening:	$L_s = t_I + t_{II} + 6 \text{ mm}$
	For flush fastening:	$L_s = t_I + t_{II} + 3 \text{ mm}$
	Penetration of nail point through base material:	$p_p \geq 6 \text{ mm}$

### Application limitation for fastening on steel



- For X-P 22 P8 to X-P 62 P8
- On higher steel grades, fastening with single nails (P8) may yield better results (e.g. less shear breaks) than fastening with collated nails (MX) due to better nail guidance.

### Performance data

#### Recommended resistance under tension and shear load

Designation	Tension load $N_{rec}$		Shear load $V_{rec}$	
X-P	0.40 kN		0.60 kN	

### System recommendation

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

#### System recommendation for fastening collated nails with powder-actuated tools

Designation	Powder-actuated tool							Base material		
	DX 6 MX	DX 5 MX	DX 460 MX					S235	S275	S355
X-P 34 MX to X-P 62 MX	■	□	□					■	■	■

■ = recommended □ = feasible

### System recommendation for fastening single nails with powder-actuated tools

Designation	Powder-actuated tool						Base material		
	DX 6 F8	DX 5 F8	DX 460 F8	DX351 F8	DX 2		S235	S275	S355
X-P 34 P8 to X-P 62 P8	■	□	□				■	■	■
X-P 34 P8 to X-P 47 P8				□			■	■	□
X-P 34 P8 to X-P 47 P8					■		■	■	□

■ = recommended □ = feasible

### Cartridge recommendation

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 351 F8 <sup>1)</sup> , DX 2 <sup>1)</sup>
		Cartridge type: 6.8/11 M	Cartridge type: 6.8/11 M
S235 to S355	$4 \leq t_{II} < 6 \text{ mm}$	titanium ■ (1-5)	green ■, yellow ■
	$6 \leq t_{II} \leq 10 \text{ mm}$	titanium ■ (4-8), black ■ (6-8)	red ■, black ■

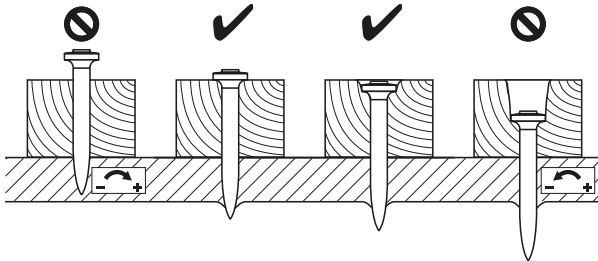
<sup>1)</sup> Black cartridges do not apply for this tool.



- 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.

**Quality assurance**

## Setting depth control



- Visible setting failures must be replaced with a new fastener, not in the same hole.
- These are abbreviated instructions which may vary by application.
- Always review/follow the instructions accompanying the product.

## X-P Nail for fastening steel to concrete

### Application recommendation

#### Fastened material properties and fastener positioning in fastened material

	Fastened material	Steel
	Fastened material thickness $t_f$	0.6–2 mm
	Edge distance $c_{1,min}$ , $c_{2,min}$	20 mm
	Fastener spacing $s_{1,min}$ , $s_{2,min}$	100 mm

#### Base material properties and fastener positioning in base material

	Base material	Concrete
	Base material thickness $h_{min}$	80 mm
	Edge distance $c_{1,min}$ , $c_{2,min}$	70 mm
	Fastener spacing $s_{1,min}$ , $s_{2,min}$	100 mm

#### Fastener shank length recommendation

	For standard fastening:	$L_s = h_{ET} + t_f$

### 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
$\geq 18$ mm	0.20 kN	0.10 kN	0.40 kN	0.20 kN
$\geq 20$ mm	0.30 kN	0.15 kN	0.50 kN	0.30 kN
$\geq 25$ mm	0.40 kN	0.20 kN	0.80 kN	0.40 kN

- Redundancy of fastening points is required.
- Minimum number of fastening points for safety relevant fastenings:  $\geq 5$ .
- For more details in relation to base material properties, please refer to the chapter **Fastener selection guide** in the Direct Fastening Technology Manual (DFTM).

#### Stick rate estimation

	Designation	Soft/medium concrete	Tough concrete
		X-P	84–92 %

- The stick rate indicates the percentage of nails that were driven correctly to carry a load.
- Stick rate can vary from the above values depending on job site conditions.

### System recommendation



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

#### System recommendation for fastening collated nails with powder-actuated tools

Designation	Powder-actuated tool							Base material		
	DX 6 MX	DX 5 MX	DX 460 MX	DX 351 MX				Soft concrete	Medium concrete	Tough concrete
X-P 22 MX to X-P 34 MX	■	□	□	□				■	■	■

■ = recommended □ = feasible

#### System recommendation for fastening single nails with powder-actuated tools

Designation	Powder-actuated tool						Base material			
	DX 6 F8	DX 5 F8	DX 460 F8	DX351 F8	DX 2			Soft concrete	Medium concrete	Tough concrete
X-P 22 P8 to X-P 34 P8	■	□	□	□				■	■	■
X-P 22 P8 to X-P 34 P8					■			■	■	□

■ = recommended □ = feasible

### Cartridge recommendation

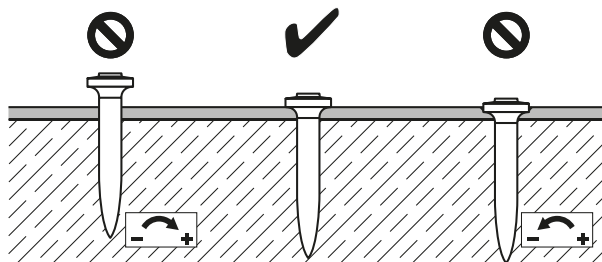
Base material		Cartridge color (tool power level)	
		Tool type: DX 6 MX	Tool type: DX 5 MX, DX 460 MX DX 351 MX <sup>1)</sup>
		DX 6 F8	DX 5 F8, DX 460 F8, DX 351 F8 <sup>1)</sup> , DX 2 <sup>1)</sup>
		Cartridge type: 6.8/11 M	Cartridge type: 6.8/11 M
S235 to S355	4 ≤ tll < 6 mm	titanium ■ (1-5)	green ■, yellow ■
	6 ≤ tll ≤ 10 mm	titanium ■ (4-8), black ■ (6-8)	red ■, black ■
Soft/medium concrete		titanium ■ (1-8)	green ■, yellow ■, red ■
Tough concrete		titanium ■ (4-8), black ■ (6-8)	red ■, black ■

<sup>1)</sup> 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.

### Quality assurance

#### Setting depth control and power tool adjustment



- Visible setting failures must be replaced with a new fastener, not in the same hole.
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