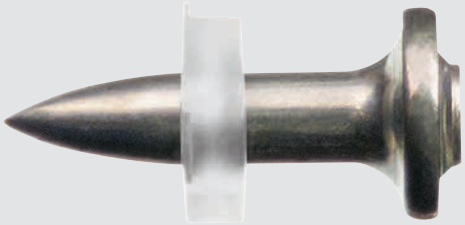
# X-R
# DATA SHEET

## Stainless steel nail for fastening to steel



October 2021

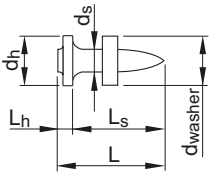
# X-R Stainless steel nail

## Product data

### Product description

| | |
|---|---|
| X-R 14 P8  | • Stainless steel nail<br>• Corrosion-resistant<br>• Designed for fastening on steel<br>• Engineered for high-quality, reliable fastening<br>• Suitable for universal use |

### Dimensions for nails

| Technical drawing | Product | Shank length $L_s$ | Head height $L_h$ | Shank diameter $d_s$ | Head diameter $d_h$ | Head diameter $d_{washer1}$ |
|---|---|---|---|---|---|---|
|   | X-R 14 P8 | 14 mm | 2.4 mm | 3.7 mm | 8.0 mm | 8.0 mm |

### Material specification and material properties for stainless steel parts

| Product type | Element | Material | Tensile strength $R_m$ | Hardness |
|---|---|---|---|---|
| X-R P8 | Nails | Stainless steel | 2000 MPa | 57 HRC |

### Material specification and material properties for plastic parts

| Product type | Element | Material | | |
|---|---|---|---|---|
| X-R P8 | Plastic washer | Polyethylene (PE) | | |

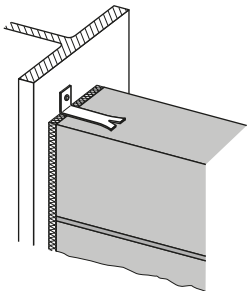
## Approvals and certificates

| Authority | Approval / certificate | Date of issue | Expiry date | Short description |
|---|---|---|---|---|
| American Bureau of Shipping (ABS) | 21-2146145-PDA | 08/21 | 08/26 | – Fastening to steel for shipbuilding<br>– Fastening to steel for off-shore<br>– Fastening to steel for on-shore |
| Lloyd's register (LR) | LR 97/00078(E4) | 01/19 | 01/24 | – Fastening to steel for shipbuilding<br>– Fastening to steel for off-shore<br>– Fastening to steel for on-shore |
| ICC-ES | ESR-1663 | 03/21 | 03/23 | – General purpose |

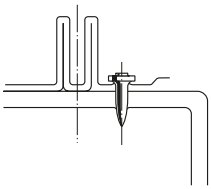
• Information presented in this product data sheet is based on Hilti Technical Data. For the specific application please refer to the corresponding approval/certificate.

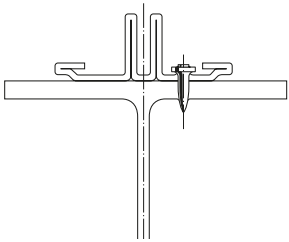
## Applications

### Fastening wall ties

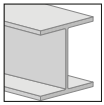


### Fastening glas facade



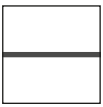


### Base materials



Steel

## Load conditions



Static / quasi static

## Environmental conditions

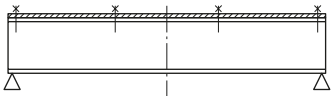
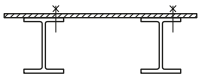
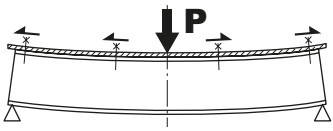
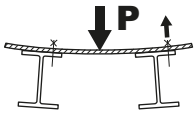
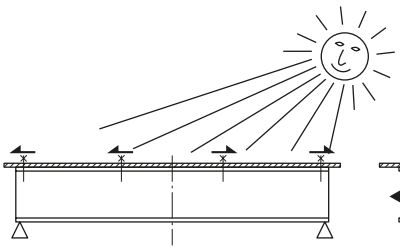
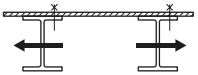
| Environmental condition | | Product type |
|---|---|---|
| | | X-R P8 |
|  | Dry indoor | ■ |
|  | Indoor with temporary condensation | ■ |
|  | Outdoor with low pollution | ■ |
|   | Outdoor with moderate concentration of pollutants | ■ |
|   | Coastal areas | ■ |
|  | Outdoor, areas with heavy industrial pollution | ■ |
|  | Close proximity to roads | ■ |
|  | Special application, e.g. swimming pool | □ |
|  | Special application, e.g. tunneling | □ |

■ = suitable

□ = requires expert evaluation

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

## Constraint forces

| Technical drawing | Description |
|---|---|
|   | No constraint forces, undisturbed system |
|     | Constraint forces due to primary loading and deflection |
|   | Constraint forces due to temperature effect |

- When fastening large pieces of steel or aluminium, the possibility of shear loading due to forces of constraint must be taken into account in the fastening design. Allowance must be made for movement or, alternatively, forces of constraint must be taken into account in the design and maximum shear force limited by way of $V_{rec}$.

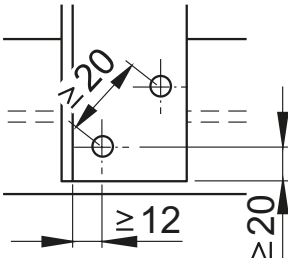
## Fastener program

### Product categorization

| Designation | | Technology | Product identifier | Shank length | Single nail fastening | Item no. |
|---|---|---|---|---|---|---|
| Product family | Steel nail | | | | | |
| Product line | X-R | X | R | | | |
| Product type | X-R P8 | X | R | P8 | | |
| Product | X-R 14 P8 | X | R | 14 | P8 | 2122461 |

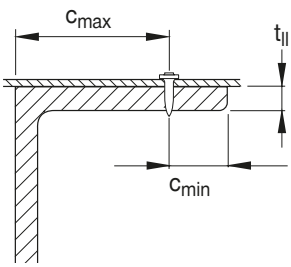
## Application recommendation for fastening to steel

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



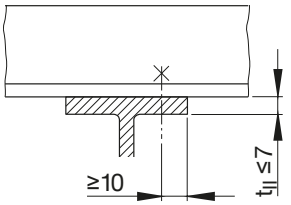

| | | |
|---|---|---|
| Fastened material type | Steel sheet | Aluminum sheet |
| Fastened material | Carbon steel, stainless steel | Aluminum |
| Fastened material tensile strength $R_m$ | ≥ 370 MPa | ≥ 210 MPa |
| Fastened material thickness $t_I$ | 0.75–3 mm | 0.8–2.0 mm |
| Edge distance $c_{min}$ | 12 mm (bordered by formed steel structure) | |
| Edge distance $c_{min}$ | 20 mm | |
| Fastener spacing s | ≥ 20 mm | |

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

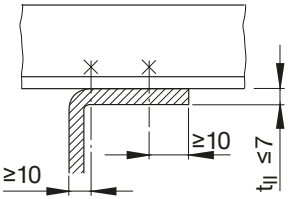



| | |
|---|---|
| Base material | Steel |
| Steel grade according to EN 10025-2 | S235, S275, S355 |
| Base material tensile strength $R_m$ | 370–630 MPa |
| Base material thickness $t_{II}$ | 5–10 mm |
| Edge distance $c_{min}$ | 10 mm |
| Edge distance $c_{max}$ | 8 x $t_{II}$ mm |

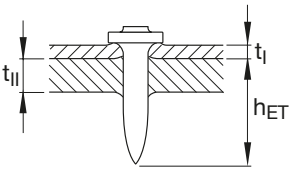
Rolled shape




Cold formed shape



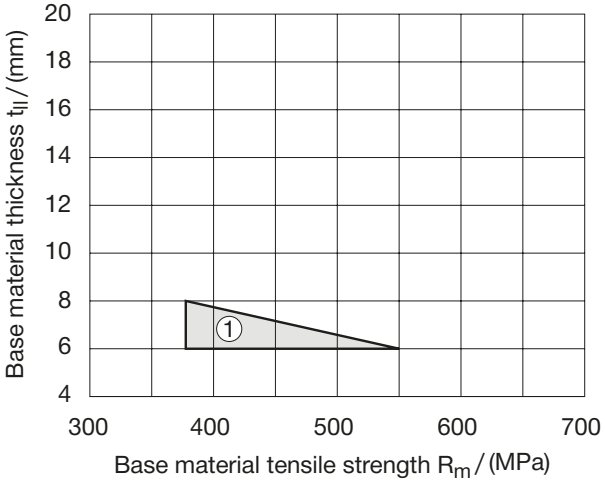
## Fastener shank length recommendation



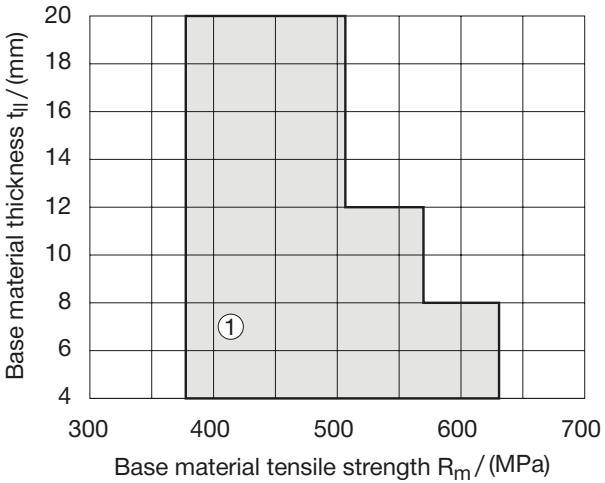

For standard fastening: $L_s = h_{ET} + t_I$

$h_{ET} \geq 9$ mm

## Application limitation for fastening on steel




① X-R 14 P8 with DX 6 F8,
X-R 14 P8 with DX 5 F8




① X-R 14 P8 with DX 450-FA

## Performance data

Recommended resistance under tension load, shear load and bending moment

| Product | Fastened material | Fastened material thickness $t_I$ | Tension load $N_{rec}$ | Shear load $V_{rec}$ | Bending moment $M_{rec}$ |
|---|---|---|---|---|---|
| X-R 14 P8 | Steel sheet | 0.75 mm | 1.0 kN | 1.1 kN | – |
| | | 1.00 mm | 1.2 kN | 1.4 kN | |
| | | 1.25 mm | 1.5 kN | 1.7 kN | |
| | | 2.00 mm | 2.2 kN | 2.0 kN | |
| | | 2.50 mm | 2.2 kN | 2.0 kN | |
| | | 3.00 mm | 2.2 kN | 2.0 kN | |
| | Aluminum sheet | 0.80 mm | 0.4 kN | 0.4 kN | |
| | | 1.00 mm | 0.6 kN | 0.6 kN | |
| | | 1.20 mm | 0.8 kN | 0.9 kN | |
| | | 1.50 mm | 1.1 kN | 1.4 kN | |
| | | 2.00 mm | 1.6 kN | 1.7 kN | |

- Glas facade application: fastened material thickness $t_{I, max}$ = 2.5 mm.
- Fastened material failure is not considered.
- Recommended loads $N_{rec}$ and $V_{rec}$ are suitable for use in working load design concept:
  Characteristic acting load $N_s \leq N_{rec} = N_{Rk}/g_{global}$, with $g_{global} = 3.0$
  Characteristic acting load $V_s \leq V_{rec} = V_{Rk}/g_{global}$, with $g_{global} = 3.0$

## System recommendation

System recommendation for fastening single nails with powder-actuated tools

| Product | Powder-actuated tool | | | | | | | | Base material | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DX 6 F8 | DX 5 F8 | DX 450-FA | | | | | | Steel S235 | Steel S275 | Steel S355 | |
| X-R 14 P8 | ☐ | ☐ | ■ | | | | | | ■ | ■ | ■ | |

■ = recommended

☐ = feasible

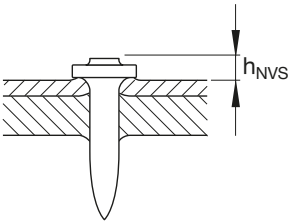
- For more details, please refer to the chapter **Accessories and consumables compatibility** in the Direct Fastening Technology Manual (DFTM).

## Cartridge recommendation

| Base material | | Cartridge color (tool power level) | | |
|---|---|---|---|---|
| | | Tool type: DX 6 F8 | Tool type: DX 5 F8 | Tool type: DX 450-FA |
| | | Cartridge type: 6.8/11 M | Cartridge type: 6.8/11 M | Cartridge type: 6.8/11 M |
| S235–S355 | 4 ≤ $t_{II}$ ≤ 6 mm | | | yellow ■ (1–3) |
| | 6 ≤ $t_{II}$ ≤ 8 mm | titanium ■ (6–8) | red ■ (3–4) | red ■ (2–3) |
| | 8 ≤ $t_{II}$ ≤ 20 mm | | | red ■ (2.5–3) |

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

## Fastener stand-off




$h_{NVS}$ = 3.0–4.5 mm

- 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.