Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

# European Technical Assessment

# ETA-16/0301 of 8 June 2021

English translation prepared by DIBt - Original version in German language

**General Part**

| | |
|---|---|
| Technical Assessment Body issuing the European Technical Assessment: | Deutsches Institut für Bautechnik |
| Trade name of the construction product | Electrical cable fastener |
| Product family to which the construction product belongs | Power-actuated fastener for multiple use in concrete for non-structural applications |
| Manufacturer | Hilti AG<br>Feldkircherstraße 100<br>9494 Schaan<br>FÜRSTENTUM LIECHTENSTEIN |
| Manufacturing plant | Hilti AG, Herstellwerke |
| This European Technical Assessment contains | 19 pages including 3 annexes which form an integral part of this assessment |
| This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of | EAD 330083-02-0601, Edition 03/2018 |
| This version replaces | ETA-16/0301 issued on 8 May 2019 |



Deutsches Institut für Bautechnik
Kolonnenstraße 30 B | 10829 Berlin | GERMANY | Phone: +49 30 78730-0 | Fax: +49 30 78730-320 | Email: dibt@dibt.de | www.dibt.de

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## Specific Part

### 1 Technical description of the product

The electric cable fastener consists of the power-actuated fastener (Hilti X-P 20 B3 MX, Hilti X-P 24 B3 MX, Hilti X-P 20 G3 MX or Hilti X-P 24 G3 MX) made of galvanized steel and the fixture according to Annex A1 made of galvanized steel or polyamide. The power-actuated fasteners are driven in the concrete by using a mechanical fastening tool (Hilti BX3-ME) or a gas-actuated fastening tool (Hilti GX3-ME). They are anchored in the concrete by sintering and mechanical interlock.

The product description is given in Annex A.

### 2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the fastener is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fastener of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

### 3 Performance of the product and references to the methods used for its assessment

### 3.1 Mechanical resistance and stability (BWR 1)

| Essential characteristic | Performance |
|---|---|
| Maximum service loads in non-cracked and cracked concrete | See Annex C1 to C4 |
| Number of fixing points – $n_1$ | $10 \leq n_1 \leq 100$ |
| Uniform span between the fixing points | ≤ 1,0 m |
| Acceptable gaps (number of failure next to each other) for local failure | See Annex C1 to C4 |
| Acceptable gaps (number of failure next to each other) for serviceability limit state | See Annex C1 to C4 |
| Durability | See Annex B1 |

### 3.2 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|---|---|
| Reaction to fire of fasteners and fixtures made of metal | Class A1 |
| Reaction to fire of fixtures made of polyamide | No performance assessed. |
| Resistance to fire | No performance assessed. |

## 4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No. 330083-02-0601, the applicable European legal act is: 1997/463/EC (EU).

The system to be applied is: 2+

## 5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 8 June 2021 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

*beglaubigt:*
Baderschneider

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## Electrical cable fastener consists of the fixture and a power-actuated fastener

### Fixture

| X-EKB 4/8 MX | X-ECT MX | X-ECH MX |
|---|---|---|
|  |  |  |
| **X-EKB 16 MX**  | |  |
| **X-EKS MX** | **X-EKSC MX** | **X-FB MX** |
|  |  |  |
| **X-DFB MX** | **X-ECC MX** | **X-EHS MX** |
|  |  |  |

### Power-actuated-fastener X-P 20 B3, X-P 24 B3 and X-P 20 G3, X-P 24 G3

| Electrical cable fasteners | Annex A1 |
|---|---|
| Product description: Products | |

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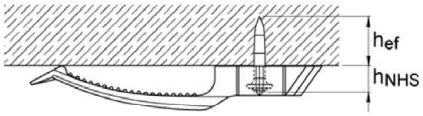
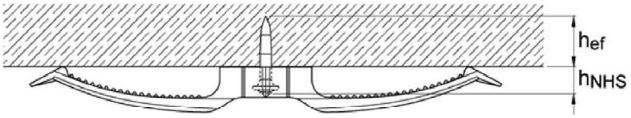
## Electrical cable fasteners

### Installed condition

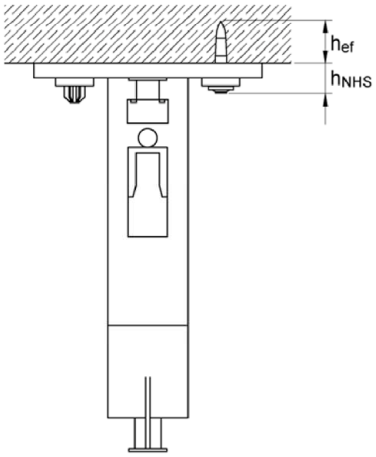
**X-EKB 4/8 MX**



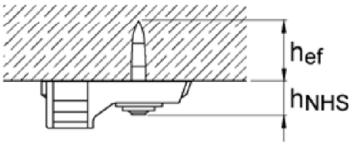

**X-EKB 16 MX**



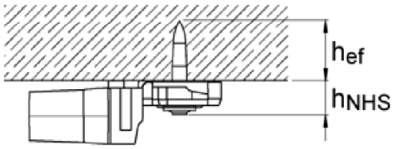

**X-ECH MX**



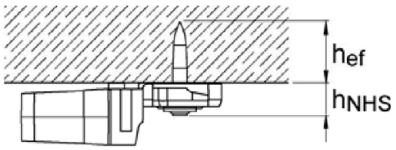

**X-ECT MX**



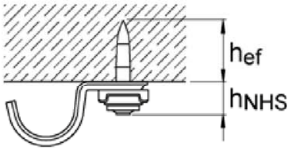

**X-EKS MX**



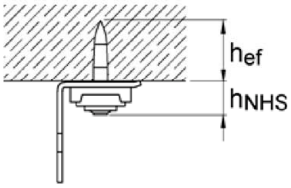

**X-EKSC MX**



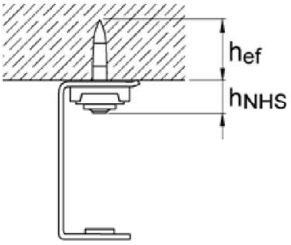

**X-FB MX**



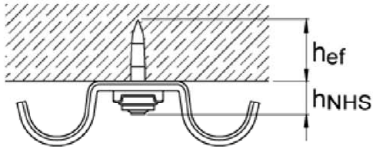

**X-ECC MX**




**X-EHS MX**




**X-DFB MX**




| Electrical cable fasteners | Annex A2 |
|---|---|
| Product description: Installed condition | |

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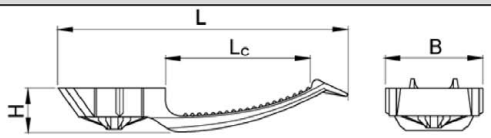
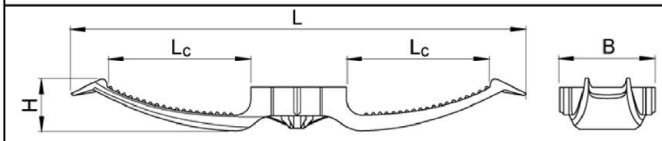
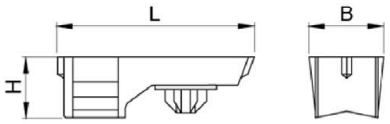
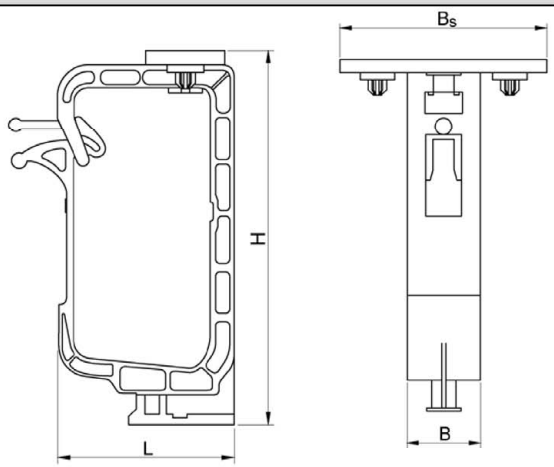
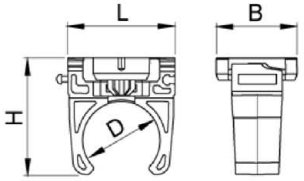
## Electrical cable fasteners: dimensions and materials

### Table 1: Fixture

| | Designation | Dimensions [mm] / Material [-] | | | |
|---|---|---|---|---|---|
| **X-EKB MX** | | L | $L_c$ | B | H |
|   | X-EKB 4 MX | 96.4 | 48 | 21.3 | 13.5 |
| | X-EKB 8 MX | 139.6 | 96.6 | 21.3 | 17 |
|   | X-EKB 16 MX | 237.6 | 96.6 | 21.3 | 17 |
| | All sizes | Polyamide PA 6.6, light grey | | | |
| **X-ECT MX** | | L | B | H | |
|   | X-ECT MX | 37.4 | 21.3 | 12.5 | |
| | X-ECT 40 MX (with pre-mounted cable tie) | 37.4 | 21.3 | 12.5 | |
| | | Polyamide PA 6.6, light grey | | | |
| **X-ECH MX** | | L | B | $B_S$ | H |
|   | X-ECH 15 MX | 48.5 | 27.5 | 78 | 93 |
| | X-ECH 30 MX | 59 | 27.5 | 78 | 128 |
| | All sizes | Polyamide PA 6.6, light grey | | | |
| **X-EKS MX** | | L | B | H | D |
|   | X-EKS 16 MX | 33 | 26 | 28 | 14.5 |
| | X-EKS 19 MX | 33 | 26 | 31.5 | 18.5 |
| | X-EKS 20 MX | 33 | 26 | 32.5 | 19.5 |
| | X-EKS 25 MX | 34 | 26 | 37 | 24.5 |
| | X-EKS 32 MX | 40.5 | 26 | 42.5 | 30.5 |
| | X-EKS 40 MX | 49.5 | 26 | 50.5 | 38.5 |
| | All sizes | Polyamide PA 6.6, light grey | | | |

| **Electrical cable fasteners** | **Annex A3** |
|---|---|
| Product description: Dimensions and materials | |

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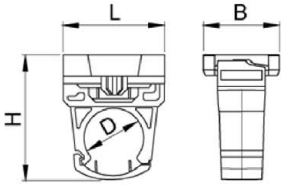
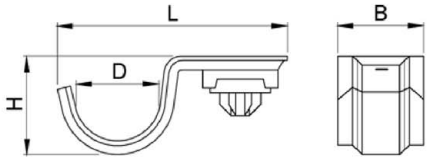
## Electrical cable fasteners: dimensions and materials

### Table 1: Fixture (continued)

| | Designation | Dimensions [mm] / Material [-] | | | |
|---|---|---|---|---|---|
| **X-EKSC MX** | | L | B | H | D |
|  | X-EKSC 16 MX | 33 | 26 | 31.5 | 15.7 |
| | X-EKSC 20 MX | 33 | 26 | 37 | 19.5 |
| | X-EKSC 25 MX | 34 | 26 | 42 | 24.5 |
| | X-EKSC 32 MX | 40.5 | 26 | 46.5 | 30.5 |
| | X-EKSC 40 MX | 49.5 | 26 | 54.5 | 38.5 |
| | All sizes | Polyamide PA 6.6, light grey | | | |
| **X-FB MX** | | L | B | H | D |
|  | X-FB 5 MX | 28 | 17.5 | 7 | 5 |
| | X-FB 6 MX | 29 | 17.5 | 8 | 6 |
| | X-FB 7 MX | 30 | 17.5 | 9 | 7 |
| | X-FB 8 MX | 31 | 17.5 | 9.5 | 8 |
| | X-FB 9 MX | 32 | 17.5 | 11 | 9 |
| | X-FB 10 MX | 33 | 17.5 | 11.5 | 10 |
| | X-FB 11 MX | 34 | 17.5 | 12.5 | 11 |
| | X-FB 13 MX | 36 | 17.5 | 14.5 | 13 |
| | X-FB 16 MX | 44 | 17.5 | 17.5 | 16 |
| | X-FB 20 MX | 48 | 17.5 | 21.5 | 20 |
| | X-FB 22 MX | 50 | 17.5 | 23.5 | 22 |
| | X-FB 25 MX | 53 | 17.5 | 28.5 | 25 |
| | X-FB 28 MX | 56 | 17.5 | 29.5 | 28 |
| | X-FB 32 MX | 58 | 17.5 | 33.5 | 32 |
| | X-FB 40 MX | 69 | 17.5 | 41.5 | 40 |
| | All sizes | ≥ 5 µm Galvanized steel | | | |



| **Electrical cable fasteners** | **Annex A4** |
|---|---|
| Product description: Dimensions and materials | |

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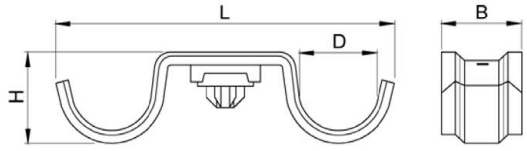
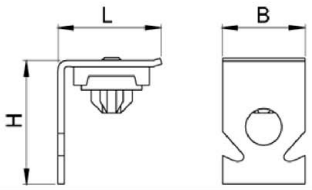
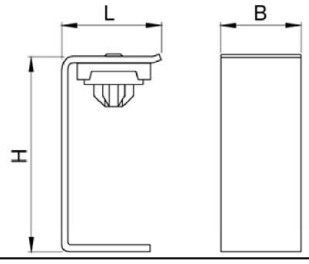
## Electrical cable fasteners: dimensions and materials

### Table 1: Fixture (continued)

| | Designation | Dimensions [mm] / Material [-] | | | |
|---|---|---|---|---|---|
| **X-DFB MX** | | L | B | H | D |
|  | X-DFB 5 MX | 46 | 17.5 | 7 | 5 |
| | X-DFB 6 MX | 48.5 | 17.5 | 8 | 6 |
| | X-DFB 7 MX | 51 | 17.5 | 9 | 7 |
| | X-DFB 8 MX | 53.5 | 17.5 | 9.5 | 8 |
| | X-DFB 9 MX | 55.5 | 17.5 | 11 | 9 |
| | X-DFB 10 MX | 57.5 | 17.5 | 11.5 | 10 |
| | X-DFB 11 MX | 60 | 17.5 | 12.5 | 11 |
| | X-DFB 13 MX | 64 | 17.5 | 14.5 | 13 |
| | X-DFB 16 MX | 70.5 | 17.5 | 17.5 | 16 |
| | X-DFB 20 MX | 80 | 17.5 | 21.5 | 20 |
| | X-DFB 22 MX | 83.5 | 17.5 | 23.5 | 22 |
| | X-DFB 25 MX | 90 | 17.5 | 28.5 | 25 |
| | X-DFB 28 MX | 97 | 17.5 | 29.5 | 28 |
| | All sizes | ≥ 5 µm Galvanized steel | | | |
| **X-ECC MX** | | L | B | H | |
|  | X-ECC MX | 21 | 18 | 25 | |
| | | ≥ 5 µm Galvanized steel | | | |
| **X-EHS MX** | | L | B | H | |
|  | X-EHS M4 MX | 20 | 18 | 38 | |
| | X-EHS M6(W6) MX | 20 | 18 | 38 | |
| | X-EHS M8 MX | 20 | 18 | 38 | |
| | X-EHS W10 MX | 20 | 18 | 38 | |
| | All sizes | ≥ 5 µm Galvanized steel | | | |



| **Electrical cable fasteners** | **Annex A5** |
|---|---|
| Product description: Dimensions and materials | |

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## Table 2: Power-actuated fastener

| Power-actuated fastener | | X-P 20 B3 MX<br>X-P 20 G3 MX | X-P 24 B3 MX<br>X-P 24 G3 MX |
|---|---|---|---|
| Shank length | [mm] | 20 | 24 |
| Total length | [mm] | 21.8 | 25.8 |
| Shank diameter | [mm] | 3 | 3 |
| Head diameter | [mm] | 6.8 | 6.8 |
| Material of nail | [-] | Hardened carbon steel, Rockwell hardness 57.5 HRC | |



| Electrical cable fasteners | Annex A6 |
|---|---|
| Product description: Dimensions and materials | |

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## Specification of intended use

**Anchorages subject to:**

- Dead-loads of uniaxially spanned flexible cables or conduits as well as rigid cables or conduits
  Cables up to an outer diameter of 12 mm are considered flexible (e.g. NYM 3x1.5 or NYM 5x1.5).

**Base materials:**

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C20/25 to C35/45 according to EN 206-1:2000.
- Cracked and non-cracked concrete.

**Use conditions (Environmental conditions):**

- Structures subject to dry internal conditions
- Minimum temperature: -20 °C
- Maximum temperature:
  Fixtures made of steel: +80 °C,
  Fixtures made of plastic: long term temperature +24 °C, short term temperature +40 °C

**Design:**

- Conditions: Both ends of the chain are fixed supports (e.g. fixation in a cable-terminal box or where cables are led through interior rigid walls).

- Design: $F = g \cdot l \leq F_{s,max}$

  with
  $F$ = dead load of the cable or conduit acting on the fixture made of plastic or steel in N
  $g$ = dead load of the cable or conduit in N/m
  $l$ = spacing of the fasteners in m
  $F_{s,max}$ = maximum service load (maximum possible loads) $N_{s,max}$ or $V_{s,max}$ in N according to Annex C1 to C4



| Electrical cable fasteners | Annex B1 |
|---|---|
| Intended use: Specification | |

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## Specification of intended use

Notes:

- A potential influence of an eccentric load introduction into the power-actuated nail is taken into consideration in corresponding published loads shown in Annex C1 to C4.
- For Fixtures made of plastic, the long-term effect due to creep is taken into consideration according to EN ISO 899-1.
- The loads given in Annexes C1 to C4 include the required safety against total failure of the global system according to EN 1990:2002 + A1:2005 + A1:2005/AC:2010 (Reliability class RC2, ultimate limit state, $\beta \geq 3.8$).
- The loads given in Annexes C1 to C4 include the required safety of the serviceability state according to EN 1990:2002 + A1:2005 + A1:2005/AC:2010 (Reliability class RC2, serviceability limit state, $\beta \geq 1.5$).

  The corresponding maximum service loads are valid for potential gaps due to single or maximum 2 fastener failures next to each other (see Annex C1 to C4). The fastener may be used if the cable sagging due to the given gaps have not bad appearance and the designer/user accepts these gaps.
- The loads given in Annexes C1 to C4 include the required safety against local failure according to EN 1990:2002 + A1:2005 + A1:2005/AC:2010 (Reliability class RC1, ultimate limit state, $\beta \geq 3.3$).

  The corresponding maximum service loads are valid for potential gaps due single or maximum 4 fastener failures next to each other (see Annex C1 to C4). The fastener may be used if the cable sagging due to the given gaps do not lead to a risk of use and the designer/user accepts these gaps.

**Installation:**

Fastener installation carried out by appropriately qualified personnel

Damages on the concrete surface, caused by setting defects, have to be repaired according to technical rules, e.g. EN 1504-3:2005. A new fastener is set at a minimum distance away of ≥ 150 mm and ≥ 3 $h_{ef}$ of the edge of the damaged surface.



| | |
|---|---|
| **Electrical cable fasteners** | **Annex B2** |
| Intended Use: Specification | |

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## Table 3: Concrete parameters

| **Power-actuated fastener** | | **X-P 20 B3 MX**<br>**X-P 20 G3 MX** | **X-P 24 B3 MX**<br>**X-P 24 G3 MX** |
|---|---|---|---|
| Minimum concrete strength class | [-] | C20/25 | |
| Maximum concrete strength class | [-] | C35/45 | |
| Minimum thickness of concrete member $h_{min}$ | [mm] | 80 | |

## Table 4: Installation parameters

| **Power-actuated fastener** | **Fixture** | **Embedment depth $h_{ef}$ [mm]** (see Annex A2) | **Total thickness of the fixture $t_{fix}$ [mm]** | **Fastener standoff $h_{NHS}$** (see Annex A2) |
|---|---|---|---|---|
| X-P 20 B3 MX<br>X-P 20 G3 MX | X-EKB MX | 11-16mm | 4 | 6-11 mm |
| | X-ECT MX | 11-16 mm | 4 | 6-11 mm |
| | X-ECH MX | 11-16 mm | 4 | 6-11 mm |
| | X-EKS MX | 11-16 mm | 4 | 6-11 mm |
| | X-EKSC MX | 11-16 mm | 4 | 6-11 mm |
| | X-FB MX | 11-15 mm | 5 | 7-11 mm |
| | X-DFB MX | 11-15 mm | 5 | 7-11 mm |
| | X-ECC MX | 11-15 mm | 4,5 | 7-11 mm |
| | X-EHS MX | 11-15 mm | 4,5 | 7-11 mm |



| **Electrical cable fasteners** | **Annex B3** |
|---|---|
| Intended use: Concrete strength class and installation parameters | |

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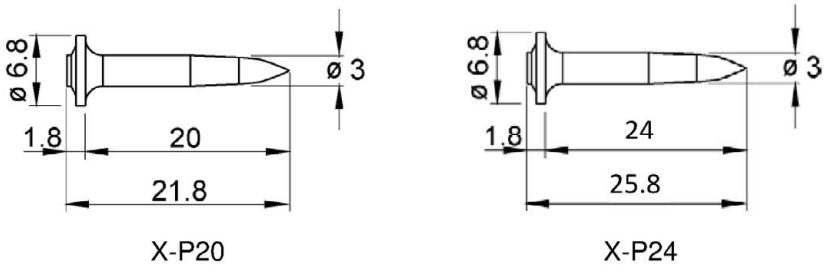
## Power-actuated fastening tools

| Fastening tool BX3-ME with nails X-P20 B3 MX and X-P24 B3 MX | Fastening tool GX3-ME with nails X-P20 G3 MX and X-P24 G3 MX |
|---|---|
|  Fastening tool BX3-ME: fully automatic, mechanical driven |  Fastening tool GX3-ME: fully automatic, gas driven |
|  collated nails X-P20 B3 MX and X-P24 B3 MX |  *collated nails X-P20 G3 MX and X-P24 G3 MX* |




Nails X-P20 and X-P24

| Electrical cable fasteners | Annex B4 |
|---|---|
| Intended use: Power-actuated fastening tool | |

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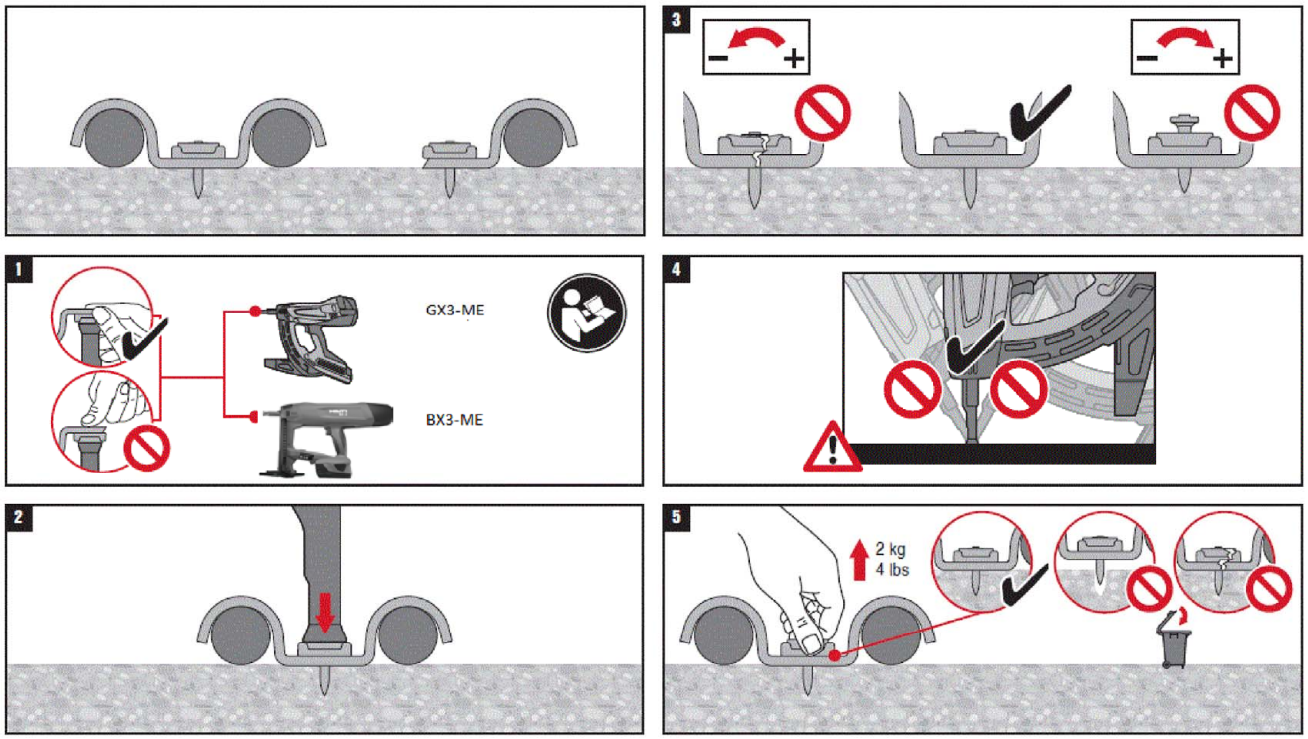
## Instructions for use

### Example X-(D)FB MX




### Fastener inspection – fastener stand-off

For the fastener inspection a measurement of the fastener standoff $h_{NHS}$, as shown in Table 4 in Annex B2 has to be done.



| Electrical cable fasteners | Annex B5 |
|---|---|
| Intended use: Instructions for use | |

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## Maximale Gebrauchslasten $F_{S,max}$

Die akzeptierte Lücke entspricht der Anzahl nebeneinander liegender Ausfälle.

| **X-EKB 4 MX mit X-P 20 B3 MX oder X-P 20 G3 MX Nägel** | | |
|---|---|---|
| Anzahl Befestigungspunkte $n_1$ = 100 | | Maximale Gebrauchslast - Zug $N_{S,max}$ [N] |
| | | Flexible Kabel |
| Akzeptierte Lücke für die Gebrauchstauglichkeit β ≥ 1.5 | 1 | 9.0 |
| Akzeptierte Lücke für die lokale Tragfähigkeit β ≥ 3.3 | 1 | 6.2 |
| | 2 | 9.0 |

| **X-EKB 8 MX mit X-P 20 B3 MX oder X-P 20 G3 MX Nägel** | | |
|---|---|---|
| Anzahl Befestigungspunkte $n_1$ = 100 | | Maximale Gebrauchslast - Zug $N_{S,max}$ [N] |
| | | Flexible Kabel |
| Akzeptierte Lücke für die Gebrauchstauglichkeit β ≥ 1.5 | 1 | 14.0 |
| Akzeptierte Lücke für die lokale Tragfähigkeit β ≥ 3.3 | 2 | 12.5 |
| | 3 | 14.0 |

| **X-EKB 16 MX mit X-P 20 B3 MX oder X-P 20 G3 MX Nägel** | | |
|---|---|---|
| Anzahl Befestigungspunkte $n_1$ = 100 | | Maximale Gebrauchslast - Zug $N_{S,max}$ [N] |
| | | Flexible Kabel - symmetrische Belastung |
| Akzeptierte Lücke für die Gebrauchstauglichkeit β ≥ 1.5 | 0 | 12.0 |
| | 1 | 18.0 |
| Akzeptierte Lücke für die lokale Tragfähigkeit β ≥ 3.3 | 1 | 18.0 |

| **X-EKB 16 MX mit X-P 20 B3 MX oder X-P 20 G3 MX Nägel** | | |
|---|---|---|
| Anzahl Befestigungspunkte $n_1$ = 100 | | Maximale Gebrauchslast - Zug $N_{S,max}$ [N] |
| | | Flexible Kabel – asymmetrische Belastung |
| Akzeptierte Lücke für die Gebrauchstauglichkeit β ≥ 1.5 | 1 | 14.0 |
| Akzeptierte Lücke für die lokale Tragfähigkeit β ≥ 3.3 | 2 | 12.5 |
| | 3 | 14.0 |



| **Elektrokabelbefestiger** | **Anhang C1** |
|---|---|
| Leistungen: Gebrauchslasten | |

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## Maximum service loads $F_{S,max}$ (continued)

The acceptable gap corresponds to the number of failures next to each other.

**X-ECT MX with X-P 20 B3 MX or X-P 20 G3 MX nail**

| Number of fixing points $n_1$ = 100 | | Maximum tension and shear service load $N_{S,max} = V_{S,max}$ [N] |
|---|---|---|
| | | Flexible cables or conduits |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 40 |
| | 2 | 55 |
| Acceptable gap for local failure β ≥ 3.3 | 3 | 40 |
| | 4 | 55 |

**X-EKS MX with X-P 20 B3 MX or X-P 20 G3 MX nail**

| Number of fixing points $n_1$ = 100 | | Maximum tension and shear service load $N_{S,max} = V_{S,max}$ [N] | |
|---|---|---|---|
| | | Flexible cables | Rigid cables or conduits |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 0 | 10.5 | 6.5 |
| Acceptable gap for local failure β ≥ 3.3 | 1 | 10.5 | 6.5 |

**X-EKSC MX with X-P 20 B3 MX or X-P 20 G3 MX nail**

| Number of fixing points $n_1$ = 100 | | Maximum tension and shear service load $N_{S,max} = V_{S,max}$ [N] |
|---|---|---|
| | | Flexible cables |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 55 |
| Acceptable gap for local failure β ≥ 3.3 | 2 | 45 |
| | 3 | 55 |

**X-EKSC MX with X-P 20 B3 MX or X-P 20 G3 MX nail**

| Number of fixing points $n_1$ = 100 | | Maximum tension and shear service load $N_{S,max} = V_{S,max}$ [N] |
|---|---|---|
| | | Rigid cables or conduits |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 32 |
| Acceptable gap for local failure β ≥ 3.3 | 2 | 32 |

| | |
|---|---|
| **Electrical cable fasteners** | **Annex C2** |
| Performances: Service loads | |

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## Maximum service loads $F_{S,max}$ (continued)

The acceptable gap corresponds to the number of failures next to each other.

| **X-ECH MX with X-P 20 B3 MX or X-P 20 G3 MX nail** | | |
|---|---|---|
| Number of fixing points $n_1$ = 100 | | Maximum tension and shear service load $N_{S,max} = V_{S,max}$ [N] |
| | | Flexible cables |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 40 |
| | 2 | 55 |
| Acceptable gap for local failure β ≥ 3.3 | 3 | 40 |
| | 4 | 55 |

| **X-ECC MX with X-P 20 B3 MX or X-P 20 G3 MX nail** | | |
|---|---|---|
| Number of fixing points $n_1$ = 100 | | Maximum tension service load $N_{S,max}$ [N] |
| | | Flexible cables |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 35 |
| | 2 | 50 |
| Acceptable gap for local failure β ≥ 3.3 | 3 | 35 |
| | 4 | 50 |

| **X-ECC MX with X-P 20 B3 MX or X-P 20 G3 MX nail** | | |
|---|---|---|
| Number of fixing points $n_1$ = 100 | | Maximum tension service load $N_{S,max}$ [N] |
| | | Rigid cables or conduits |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 15 |
| | 2 | 30 |
| Acceptable gap for local failure β ≥ 3.3 | 2 | 15 |
| | 4 | 30 |

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## Maximum service loads $F_{S,max}$ (continued)

The acceptable gap corresponds to the number of failures next to each other.

| **X-EHS MX with X-P 20 B3 MX or X-P 20 G3 MX nail** | | |
|---|---|---|
| Number of fixing points $n_1$ = 100 | | Maximum tension service load $N_{S,max}$ [N] |
| | | Flexible cables |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 60 |
| | 2 | 80 |
| Acceptable gap for local failure β ≥ 3.3 | 3 | 60 |
| | 4 | 80 |

| **X-EHS MX with X-P 20 B3 MX or X-P 20 G3 MX nail** | | |
|---|---|---|
| Number of fixing points $n_1$ = 100 | | Maximum tension service load $N_{S,max}$ [N] |
| | | Rigid cables or conduits |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 45 |
| Acceptable gap for local failure β ≥ 3.3 | 3 | 40 |
| | 4 | 45 |

| **X-FB MX and X-DFB MX with X-P 20 B3 MX or X-P 20 G3 MX nail** | | |
|---|---|---|
| Number of fixing points $n_1$ = 100 | | Maximum tension and shear service load $N_{S,max} = V_{S,max}$ [N] |
| | | Flexible cables |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 30 |
| Acceptable gap for local failure β ≥ 3.3 | 2 | 20 |
| | 3 | 30 |

| **X-FB MX and X-DFB MX with X-P 20 B3 MX or X-P 20 G3 MX nail** | | |
|---|---|---|
| Number of fixing points $n_1$ = 100 | | Maximum tension and shear service load $N_{S,max} = V_{S,max}$ [N] |
| | | Rigid cables or conduits |
| Acceptable gap for serviceability limit state β ≥ 1.5 | 1 | 20 |
| Acceptable gap for local failure β ≥ 3.3 | 2 | 20 |



| **Electrical cable fasteners** | **Annex C4** |
|---|---|
| Performances: Service loads | |