



PAVUS[®]
FIRE TESTING INSTITUTE

Order number:

Z220250434

PAVUS, a.s.

FIRE CLASSIFICATION APPROVAL

No. PKO-25-088

for product

Cable routes with maintained functionality in fire – Single cable clips X-FB and FB and double cable clips X-DFB and DFB

Classification according to DIN 4102-12

Sponsor: **HILTI ČR spol. s r.o.**
V parku 2325/16
148 00 Prague 4
Czech Republic

Normative documents:

DIN 4102-12:1998-11 Brandverhalten von Baustoffen und Bauteilen – Teil 12: Funktionserhalt von elektrischen Kabelanlagen; Anforderungen und Prüfungen

ČSN EN 1363-1 Fire resistance tests – Part 1: General requirements

ČSN 73 0895 Fire protection of buildings – Circuit integrity maintenance of cable systems under fire conditions – Requirements, testing, classification Px-R, PHx-R and application of the test results

Fire classification approval consists of 8 pages of text and 4 pages of Annex

Copies in total: 2
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This Fire Classification Approval has been prepared on the basis of contract No. Z220250434 concluded between the client, HILTI ČR spol. s r.o., and the processor, PAVUS, a. s.

The subject of the Fire Classification Approval is the classification of the maintained functionality in fire of the products Single cable clips X-FB and FB and double cable clips X-DFB and DFB in accordance with the procedures specified in DIN 4102-12.

1 TECHNICAL DESCRIPTION OF THE PRODUCT

The subject of classification of cable routes with maintained functionality in fire is *Single cable clips X-FB and FB and double cable clips X-DFB and DFB* installed with cables manufactured by PRAKAB PRAŽSKÁ KABELOVNA, s.r.o., NKT s.r.o. and Kablo Vrchlabi s.r.o.

These are standard cable support constructions with a maximum mounting distance of 300 mm between individual clips.

1.1 Supporting constructions

1.1.1 Single cable clips X-FB and double cable clips X-DFB

The X-FB and X-DFB clips are made of galvanized sheet metal with a thickness of 0.8 mm and a width of 17.7 mm. The holes for fastening are round. The clips are designed for attaching cables to concrete ceilings, walls, or steel profiles using collated nails.

- Types of tested clips:
 - X-FB 8 MX to X-FB 40 MX (size according to the tested cable)
 - X-DFB 16 MX to X-DFB 20 MX (size according to the tested cable)
- Attachment to the substrate during the test:
 - into concrete (ceiling installation) using collated nails X-P 17 B4 MX
 - on the bottom flange of the HE-A 100 steel profile using collated nails X-S 14 B4 MX
- Clips spacing 600 mm and 300 mm.
- Load from inserted cables.

1.1.2 Single cable clips FB and double cable clips DFB

FB clips are made of galvanized metal sheet with a thickness of 1 mm and a width of 17.5 mm. The holes for fastening are round. The clips are designed to be fastened to sheet metal using self-tapping screws.

- Types of tested clips:
 - FB 8 – FB 25 (size according to the tested cable)
 - DFB 13
- Attachment to the substrate during the test:
 - into galvanized sheet metal with a thickness of 0.5 mm using self-tapping screws S-MSO1Z 4,8×20.
- Clips spacing 300 mm.
- Load from inserted cables.

For technical documentation on the tested cable clips and fasteners, see the test report [1] in Chapter 3 of this document.

A description of the tested clips and fasteners is provided in the Annex to this document.

1.2 Cables used in the test

Producer PRAKAB PRAŽSKÁ KABELOVNA, s.r.o.

power cables 0,6/1 kV with integrated fire functionality:

- PRAFlaDur 90 4x50 RM
- PRAFlaDur 90 4x1,5 RE
- PRAFlaDur 4x50 RM
- PRAFlaDur 4x1,5 RE

communication cables with integrated fire functionality:

- PRAFlaGuard F 1x2x0,8

Producer NKT s.r.o.

power cables 0,6/1 kV with integrated fire functionality:

- NOPOVIC 1-CXKH-V 4x50 RM
- NOPOVIC 1-CXKH-V 4x10 RE
- NOPOVIC 1-CXKH-V 4x6 RE
- NOPOVIC 1-CXKH-V 4x1,5 RE

Producer Kablo Vrchlabi s.r.o.

power cables 0,6/1 kV with integrated fire functionality:

- CXKH-V 4x50 RM
- CXKH-V 4x1,5 RE

communication cables with integrated fire functionality:

- JXFE-V 1x2x0,8

2 OVERVIEW OF DOCUMENTS USED

2.1 Technical standards and regulations

- DIN 4102-12:1998-11 Brandverhalten von Baustoffen und Bauteilen – Teil 12: Funktionserhalt von elektrischen Kabelanlagen; Anforderungen und Prüfungen
- ČSN 73 0895 Behaviour of building products and structures in fire. Maintaining the functional resistance of cable systems. Requirements, tests, classification and application of test results
- ČSN EN 1363-1 Fire resistance tests – Part 1: General requirements

2.2 Test protocols and other documents

Document No.	Name of laboratory Address Accreditation No.	Name of sponsor	Report ref. No. Date of issue	Test standard
[1]	PAVUS, a.s. Veselí nad Lužnicí Czech Republic AZL č. 1026	Hilti ČR spol. s r.o. V Parku 2325/16 148 00 Prague Czech Republic	Pr-25-2.138 2025-09-25	ČSN 73 0895 ČSN EN 1363-1

3 TEST RESULTS

Cable routes were tested at the standard temperature/time curve. The test duration was 94 minutes. For overview of the test results see the test report.

Cable routes consisting of X-FB, X-DFB, FB and DFB cable clips were tested according to the procedures specified in ČSN 73 0895. Tests performed according to ČSN 73 0895 meet the requirements of DIN 4102-12. The difference between these standards is mainly in the measurement and control

of temperature in the test furnace. According to ČSN 73 0895, plate thermocouples according to ČSN EN 1363-1 are used. When testing according to DIN 4102-12, standard thermocouples used before the publication of EN 1363-1 are used. Measurements according to EN 1363-1 can be considered a stricter method of temperature control in the test furnace.

In addition to the concrete substrate, the clips were also fixed to steel beams and sheet metal. A description of the supporting constructions and their fixing to the ceiling is given in the test report.

Test of maintained functionality in fire

Table 1 – Test of cable routes with maintained functionality in fire – Overview of clips with relevant nails, screws and tested cables

	Concrete			Clip	Nail/Screw	Dist. mm
Set 1	NKT s.r.o.	NOPOVIC 1-CXKH-V	4x1.5 RE	X-FB 16 MX	X-P 17 B4 MX	300
	NKT s.r.o.	NOPOVIC 1-CXKH-V	4x1.5 RE	X-FB 16 MX	X-P 17 B4 MX	300
	NKT s.r.o.	NOPOVIC 1-CXKH-V	4x6 RE	X-DFB 16 MX	X-P 17 B4 MX	300
	NKT s.r.o.	NOPOVIC 1-CXKH-V	4x10 RE	X-DFB 20 MX	X-P 17 B4 MX	300
	NKT s.r.o.	NOPOVIC 1-CXKH-V	4x50 RM	X-FB 40 MX	X-P 20 B4 MX	300
	NKT s.r.o.	NOPOVIC 1-CXKH-V	4x50 RM	X-FB 40 MX	X-P 20 B4 MX	300
Set 2	Kablo Vrchlábí s.r.o.	JXFE-V FE	1x2x0,8	X-FB 8 MX	X-P 17 B4 MX	300
	Kablo Vrchlábí s.r.o.	JXFE-V FE	1x2x0,8	X-FB 8 MX	X-P 17 B4 MX	300
	Kablo Vrchlábí s.r.o.	1-CXKH-V FE	4x1,5 RE	X-FB 11 MX	X-P 17 B4 MX	300
	Kablo Vrchlábí s.r.o.	1-CXKH-V FE	4x1,5 RE	X-FB 11 MX	X-P 17 B4 MX	300
	Kablo Vrchlábí s.r.o.	1-CXKH-V FE	4x50 RM	X-FB 40 MX	X-P 17 B4 MX	300
	Kablo Vrchlábí s.r.o.	1-CXKH-V FE	4x50 RM	X-FB 40 MX	X-P 17 B4 MX	300
Set 3	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur 90	4x1.5 RE	X-FB 16 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur 90	4x1.5 RE	X-FB 16 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaGuard F	1x2x0.8	X-FB 8 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaGuard F	1x2x0.8	X-FB 8 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur	4x1.5 RE	X-FB 11 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur	4x1.5 RE	X-FB 11 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur	4x50 RM	X-FB 40 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur	4x50 RM	X-FB 40 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur 90	4x50 RM	X-FB 40 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur 90	4x50 RM	X-FB 40 MX	X-P 17 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaGuard F	1x2x0.8	X-FB 8 MX	X-P 17 B4 MX	600
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaGuard F	1x2x0.8	X-FB 8 MX	X-P 17 B4 MX	600
Set 4	Steel Beam + X-S nail			Clip	Nail/Screw	Dist. mm
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur	4x50 RM	X-FB 40 MX	X-S 14 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur	4x50 RM	X-FB 40 MX	X-S 14 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaGuard F	1x2x0.8	X-FB 8 MX	X-S 14 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaGuard F	1x2x0.8	X-FB 8 MX	X-S 14 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur	4x1.5 RE	X-FB 11 MX	X-S 14 B4 MX	300
	PRAKAB Pražská Kabelovna s.r.o.	PRAFlaDur	4x1.5 RE	X-FB 11 MX	X-S 14 B4 MX	300
Set 5	Metal Sheet 0.5mm + S-MS01Z			Clip	Nail/Screw	Dist. mm
	Kablo Vrchlábí s.r.o.	JXFE-V FE	1x2x0,8	FB 8	S-MS01Z 4,8x20	300
	Kablo Vrchlábí s.r.o.	JXFE-V FE	1x2x0,8	FB 8	S-MS01Z 4,8x20	300
	Kablo Vrchlábí s.r.o.	1-CXKH-V FE	4x1,5 RE	DFB 13	S-MS01Z 4,8x20	300
	Kablo Vrchlábí s.r.o.	1-CXKH-V FE	4x1,5 RE	DFB 13	S-MS01Z 4,8x20	300
	NKT s.r.o.	NOPOVIC 1-CXKH-V	4x10 RE	FB 25	S-MS01Z 4,8x20	300
	NKT s.r.o.	NOPOVIC 1-CXKH-V	4x10 RE	FB 25	S-MS01Z 4,8x20	300

Test of static load

In addition to testing of maintained functionality in fire, some clips were tested only for static load. The clips were attached to concrete and a steel beam.

Note: In addition to the clips described in clause 2.2, X-M8-TH clips fitted with a plastic turbine were also used for the static load test. For a description of the clip, see the Annex to this document.

Table 2 – Test of statically loaded cable clips

	Static Loads - Concrete	Load - kg	Nail/Screw
a	X-FB 8 MX	0,5	X-P 17 B4 MX
b	X-FB 8 MX	0,5	X-P 17 B4 MX
c	X-FB 8 MX	0,5	X-P 17 B4 MX
d	X-FB 8 MX	1,0	X-P 17 B4 MX
e	X-FB 8 MX	1,0	X-P 17 B4 MX
f	X-FB 8 MX	1,0	X-P 17 B4 MX
g	X-FB 8 MX	1,5	X-P 17 B4 MX
h	X-FB 8 MX	1,5	X-P 17 B4 MX
i	X-FB 8 MX	1,5	X-P 17 B4 MX
j	X-DFB 20 MX	1,5	X-P 17 B4 MX
k	X-DFB 20 MX	1,5	X-P 17 B4 MX
l	X-DFB 20 MX	1,5	X-P 17 B4 MX
m	X-M8 TH	5,2	X-P 17 B4 MX
n	X-M8 TH	5,2	X-P 17 B4 MX
o	X-M8 TH	5,2	X-P 17 B4 MX

	Static Load - Steel Beam	Load - kg	Nail/Screw
p	X-M8 TH	10,0	X-S 14 B4 MX
q	X-M8 TH	10,0	X-S 14 B4 MX
r	X-M8 TH	10,0	X-S 14 B4 MX

The clips marked *p*, *q*, and *r* were pulled out during the test. The atmosphere in the furnace did not clear until the 50th minute of the test, when these clips had already been pulled out of the steel beam, so it is not possible to determine the exact time of failure. The clips marked *n* and *o* were pulled out during the cooling phase.

Results of static load test:

Clip	Substrate	Max. load	Fastener	Load bearing time
X-FB 8 MX	Concrete	1,5 kg	X-P 17 B4 MX	> 93 minutes
X-DFB 20 MX		1,5 kg		> 93 minutes
X-M8 TH		5,2 kg		> 93 minutes

4 CLASSIFICATION

The classification was made in accordance with DIN 4102-12:1998-11.

Based on the results of the test described in Chapter 3 of this document, cable routes consisting of single cable clips X-FB and FB and double cable clips X-DFB and DFB with cables according to Clause 1.2 can be classified according to the following tables.

Cable routes consisting of cable clips are considered standard if their mounting distance is max. 300 mm. Cable routes tested with a clip spacing of 600 mm can be considered standard when the spacing is reduced to max. 300 mm.

Note 1: For the use of individual tested cables, the classification of individual cables given in column 4 of the following tables can be used.

4.1 Cable Clips X-FB and X-DFB fixed in concrete

Producer of cables PRAKAB PRAŽSKÁ KABELOVNA, s.r.o.

Test report	Type of tested cable	Cable route	Classification of route with individual cables	Classification valid for number of cores, cross section / core diameter	Classification of cable route
[1]	PRAFlaDur 90 4x1,5 RE	Single clips X-FB 16 MX and X-FB 40 MX. Ceiling mounting using collated nails X-P 17 B4 MX. Clip spacing 300 mm. Set 3	E 90	$n \times \geq 1,5 \text{ mm}^2$ $n \geq 1$	E 30
	PRAFlaDur 90 4x50 RM		E 30		
	PRAFlaDur 4x1,5 RE	Single clips X-FB 11 MX and X-FB 40 MX. Ceiling mounting using collated nails X-P 17 B4 MX. Clip spacing 300 mm. Set 3	E 90	$n \times \geq 1,5 \text{ mm}^2$ $n \geq 1$	E 90
	PRAFlaDur 4x50 RM		E 90		
	PRAFlaGuard F 1x2x0,8	Single clips X-FB 8 MX. Ceiling mounting using collated nails X-P 17 B4 MX. Clip spacing 300 mm. Set 3	E 90	$n \times 2 \times \geq 0,8 \text{ mm}$ $n \geq 1$	E 90
	PRAFlaGuard F 1x2x0,8	Single clips X-FB 8 MX. Ceiling mounting using collated nails X-P 17 B4 MX. Clip spacing 600 mm. Set 3	E 90	$n \times 2 \times \geq 0,8 \text{ mm}$ $n \geq 1$	E 90

Producer of cables NKT s.r.o.

Test report	Type of tested cable	Cable route	Classification of route with individual cables	Classification valid for number of cores, cross section / core diameter	Classification of cable route
[1]	NOPOVIC 1-CXKH-V 4x1,5 RE	Single clips X-FB 16 MX and X-FB 40 MX. Ceiling mounting using collated nails X-P 17 B4 MX and X-P 20 B4 MX. Clip spacing 300 mm. Set 1	E 90	$n \times \geq 1,5 \text{ mm}^2$ $n \geq 1$	E 60
	NOPOVIC 1-CXKH-V 4x50 RM		E 60		
	NOPOVIC 1-CXKH-V 4x6 RE	Double clips X-DFB 16 MX and X-DFB 20 MX. Ceiling mounting using collated nails X-P 17 B4 MX. Clip spacing 300 mm. Set 1	E 90	$n \times = 6-10 \text{ mm}^2$ $n \geq 1$	E 90
	NOPOVIC 1-CXKH-V 4x10 RE		E 90		

Producer of cables Kablo Vrchlábí s.r.o.

Test report	Type of tested cable	Cable route	Classification of route with individual cables	Classification valid for number of cores, cross section / core diameter	Classification of cable route
[1]	CXKH-V 4x1,5 RE	Single clips X-FB 8 MX, X-FB 11 MX and X-FB 40 MX. Ceiling mounting using collated nail X-P 17 B4 MX. Clip spacing 300 mm. Set 2	E 90	$n \times \geq 1,5 \text{ mm}^2$ $n \geq 1$	E 60
	CXKH-V 4x50 RM		E 60		
	JXFE-V 1x2x0,8		E 90	$n \times 2 \times \geq 0,8 \text{ mm}$ $n \geq 1$	E 90

4.2 X-FB cable clips fixed to a steel beam

Producer of cables PRAKAB PRAŽSKÁ KABELOVNA, s.r.o.

Test report	Type of tested cable	Cable route	Classification of route with individual cables	Classification valid for number of cores, cross section / core diameter	Classification of cable route
[1]	PRAFlaDur 4x1,5 RE	Single clips X-FB 8 MX, X-FB 11 MX and X-FB 40 MX. Mounting to steel beams using collated nails X-S 14 B4 MX. Clip spacing 300 mm. Set 4	E 60	$n \times \geq 1,5 \text{ mm}^2$ $n \geq 1$	E 30
	PRAFlaDur 4x50 RM		E 30		
	PRAFlaGuard F 1x2x0,8		E 90	$n \times 2 \times \geq 0,8 \text{ mm}$ $n \geq 1$	E 90

4.3 Cable clips FB and DFB fixed to sheet metal with a thickness of 0.5 mm

Producer of cables Kablo Vrchlabí s.r.o.

Test report	Type of tested cable	Cable route	Classification of route with individual cables	Classification valid for number of cores, cross section / core diameter	Classification of cable route
[1]	CXKH-V 4x1,5 RE	Double clips DFB 13. Mounting into metal sheet with a thickness of 0.5 mm using self-tapping screws S-MSO1Z 4,8x20. Clip spacing 300 mm. Set 5	E 90	$n \times = 1,5 \text{ mm}^2$ $n \geq 1$	E 90
	PRAFlaGuard F 1x2x0,8	Single clips FB 8. Mounting into metal sheet with a thickness 0.5 mm using self-tapping screws S-MSO1Z 4,8x20. Clip spacing 300 mm. Set 5	E 30	$n \times 2 \times \geq 0,8 \text{ mm}$ $n \geq 1$	E 30

Producer of cables NKT s.r.o.

Test report	Type of tested cable	Cable route	Classification of route with individual cables	Classification valid for number of cores, cross section / core diameter	Classification of cable route
[1]	NOPOVIC 1-CXKH-V 4x10 RE	Single clips FB 25. Mounting into metal sheet with a thickness of 0.5 mm using self-tapping screws S-MSO1Z 4,8x20. Clip spacing 300 mm. Set 5	E 90	$n \times = 10 \text{ mm}^2$ $n \geq 1$	E 90

5 DIRECT APPLICATION OF THE TEST RESULTS

The classification of the maintained functionality in fire of cable routes consisting of *Single cable clips X-FB and FB and double cable clips X-DFB and DFB* with cables according to Clause 1.2, specified in Clause 4, applies under the following conditions:

- Surrounding construction elements shall not adversely affect the maintained functionality in fire of the cable systems throughout the classified period.
- The arrangement and test results of a single installation under the ceiling also apply to horizontal installation of cables on the wall.

- If a standard support construction is used in the test, the test results may be applied to other standard supporting constructions of other manufacturers.
- The results of the maintained functionality in fire tests of cable systems installed on a non-standard supporting construction are directly applicable only to the tested cable routes.
- For vertical cable routes, the arrangement and test results for installation under the ceiling with individual clamps apply. For vertical routes, the classification only applies if the cables are effectively supported (the distance between effective fixings is ≤ 3500 mm). An example of effective support is shown in Figure 5 of DIN 4101-12. Other option is using ceiling penetrations with appropriate fire resistance classification.
- In case cables with the smallest nominal cross-section of wires are used in the test and a cross-section of 50 mm^2 or more, the test results are valid for all cross-sections of the relevant cable type and the relevant installation method.
- If only the test specimens with the largest or smallest tested conductor cross-section for the relevant cable type achieve the required time of maintained functionality, the test result are valid only for the tested cables of the relevant type and the relevant installation method.
- For communication cables, the test results are valid for all constructions of the type with a cross-section and number of cores equal to or greater than the test sample.

6 LABELLING OF CABLE ROUTES

The cable route must be permanently marked with a label attached to it and containing the following information:

- a) name of cable support system manufacturer;
- b) cable support system designation;
- c) functional integrity class, classification document number;
- d) year of installation of the cable support system.

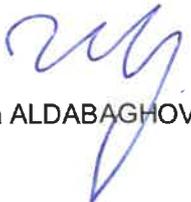
7 VALIDITY OF FIRE CLASSIFICATION APPROVAL

The validity of this Fire Classification Approval is until **2028-12-31**, unless there are any changes to the product and/or to the legislation and technical regulations applicable to the product.

The client may request the issuing organisation to review the effect of changes on the validity of the classification.

This Fire Classification Approval shall be valid only as a whole and each page shall be identified by the fire classification approval number and the page number of the total number of pages. This fire classification approval is not a substitute for type approval or product certification.

Elaborated by:


Zuzana ALDABAGHOVÁ

Reviewed by:


Jiří HARUŠINEC

Approved by:


Jan TRIPES, MBA
Executive director of PAVUS, a.s.

In Prague on 10th December 2025

PAVUS, a.s.

Prosecká 412/74, 190 00 Praha 9

IČ: 60193174; DIČ: CZ60193174

(4)

ANNEX 1

Cable clips X-FB a X-DFB

Main clips used in concrete (nails X-P 17/20 B4) and in steel beam (nail X-S 14 B4).

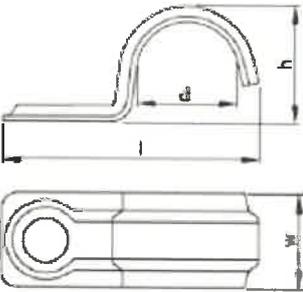
Technical drawing	Element	Element diameter d [mm]	Element width w [mm]	Element length l [mm]	Element height h [mm]	Thickness [mm]
	X-DFB-FE 5 MX	5	17.7	45.2	6.8	3.8
	X-DFB-FE 6 MX	6	17.7	48	7.8	
	X-DFB-FE 7 MX	7	17.7	50.8	8.8	
	X-DFB-FE 8 MX	8	17.7	53	9.3	
	X-DFB-FE 9 MX	9	17.7	55.3	10.8	
	X-DFB-FE 10 MX	10	17.7	57.4	11.3	
	X-DFB-FE 11 MX	11	17.7	59.8	12.3	
	X-DFB-FE 13 MX	13	17.7	64.1	14.3	
	X-DFB-FE 16 MX	16	17.7	70.6	17.3	
	X-DFB-FE 20 MX	20	17.7	77.2	21.3	
	X-DFB-FE 22 MX	22	17.7	81.4	23.3	
	X-DFB-FE 25 MX	25	17.7	87.6	26.3	
	X-DFB-FE 28 MX	28	17.7	93.8	28.3	

Technical drawing	Element	Element diameter d [mm]	Element width w [mm]	Element length l [mm]	Element height h [mm]	Thickness [mm]
	X-FB-FE 5 MX	5	17.7	31.2	6.5	3.8
	X-FB-FE 6 MX	6	17.7	32.4	7.3	
	X-FB-FE 7 MX	7	17.7	33.6	8.3	
	X-FB-FE 8 MX	8	17.7	34.7	9.1	
	X-FB-FE 9 MX	9	17.7	35.8	10.1	
	X-FB-FE 10 MX	10	17.7	36.8	10.6	
	X-FB-FE 11 MX	11	17.7	37.9	11.0	
	X-FB-FE 13 MX	13	17.7	40	13.6	
	X-FB-FE 16 MX	16	17.7	43.2	16.6	
	X-FB-FE 20 MX	20	17.7	47.5	20.6	
	X-FB-FE 22 MX	22	17.7	49.6	22.1	
	X-FB-FE 25 MX	25	17.7	54	25.1	
	X-FB-FE 28 MX	28	17.7	56	28.1	
X-FB-FE 32 MX	32	17.7	61.8	32.1		
X-FB-FE 40 MX	40	17.7	68.4	39.5		



Cable clips FB

4.1 Dimensions

Technical drawing	Element	Diameter d [mm]	Height h [mm]	Length l [mm]	Width w [mm]
	FB 5	5	7	28.3	17.5
	FB 6	6	8	29.4	17.5
	FB 7	7	9	30.4	17.5
	FB 8	8	10	31.3	17.5
	FB 9	9	10	32.3	17.5
	FB 10	10	11	33.3	17.5
	FB 11	11	11.5	34.4	17.5
	FB 13	13	15	36.5	17.5
	FB 16	16	18	39.6	17.5
	FB 20	20	22	43.8	17.5
	FB 25	25	27	49	17.5

4.2 Material properties for carbon steel parts

Element	Component part	Material	Coating	Coating thickness k [µm]
FB	Conduit clip	Carbon steel	Zinc coated	≥5

Cable clips X-M8-TH

(tested only for mechanical loading)

3.1 Dimensions

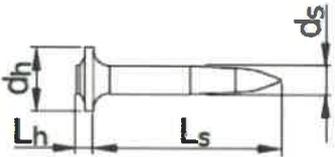
Technical drawing	Element	Element length l [mm]	Element width w [mm]	Element height h [mm]	Stud size	Stud length l _s [mm]
	X-M6-TH				M6	6.5
	X-M8-TH	44	33.3	4.2	M8	10
	X-W6-TH				W6	6.5

3.2 Material properties for carbon steel parts

Element	Component part	Material	Coating	Coating thickness t _c [µm]
X-TH	Pipe clamp mount	DC 01	Zinc coated	≥ 5

Collated nails X-P 17 B4 MX

4.1 Dimensions

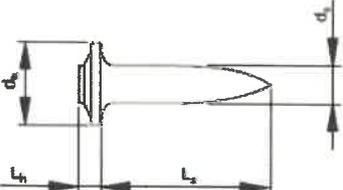
Technical drawing	Fastener	Head length	Shank length	Shank diameter	Head diameter
		L_h [mm]	L_s [mm]	d_s [mm]	d_h [mm]
	X-GHP 16 MX	1.8	16	3	6.8
	X-P 17 B4 MX	1.8	17	3	6.8
	X-P 17 B3 MX	1.8	17	3	6.8
	X-P 17 G3 MX	1.8	17	3	6.8
	X-P 17 G2 MX	1.8	17	3	6.8
	X-GHP 18 MX	1.8	18	3	6.8
	X-P 20 B4 MX	1.8	20	3	6.8
	X-P 20 B3 MX	1.8	20	3	6.8
	X-P 20 G3 MX	1.8	20	3	6.8
	X-P 20 G2 MX	1.8	20	3	6.8
	X-GHP 20 MX	1.8	20	3	6.8
	X-P 24 B4 MX	1.8	24	3	6.8
	X-P 24 B3 MX	1.8	24	3	6.8
	X-GHP 24 MX	1.8	24	3	6.8
	X-P 30 B3 P7	1.8	30	3	6.8
	X-P 36 B3 P7	1.8	36	3	6.8

4.2 Material properties for carbon steel parts

Fastener	Component part	Material	Coating	Coating thickness	Hardness	Corrosivity category
				t_c [μ m]	[HRC]	
X-P B4 MX	Nail	Carbon steel	Zinc coated	≥ 5	57.5	C1
X-P B3 MX	Nail	Carbon steel	Zinc coated	≥ 5	57.5	C1
X-P B3 P7	Nail	Carbon steel	Zinc coated	≥ 5	57.5	C1
X-P G3 MX	Nail	Carbon steel	Zinc coated	≥ 5	57.5	C1
X-P G2 MX	Nail	Carbon steel	Zinc coated	≥ 5	57.5	C1
X-GHP MX	Nail	Carbon steel	Zinc coated	≥ 2	57.5	C1

Collated nails X-S 14 B4 MX

3.1 Dimensions

Technical drawing	Fastener	Head length	Shank length	Shank diameter	Head diameter
		L_h [mm]	L_s [mm]	d_s [mm]	d_h [mm]
	X-S 14 B4 MX	1.8	14	3	6.8
	X-S 14 B3 MX	1.8	14	3	6.8
	X-S 14 G3 MX	1.8	14	3	6.8
	X-EGN 14 MX	1.8	14	3	6.8

3.2 Material properties for carbon steel parts

Fastener	Component part	Material	Coating	Coating thickness	Hardness	Corrosivity category
				t_c [μ m]		
X-S B4 MX	Nail	Carbon steel	Zinc coated	≥ 2	57.5	C1
X-S B3 MX	Nail	Carbon steel	Zinc coated	≥ 2	57.5	C1
X-S G3 MX	Nail	Carbon steel	Zinc coated	≥ 2	57.5	C1
X-EGN MX	Nail	Carbon steel	Zinc coated	≥ 2	57.5	C1



* Corrosivity category of the atmosphere according to EN ISO 9223.

Self-tapping screws S-MS01Z 4.8x20

3.3.1.1 Self-drilling screws for light applications, chip-less

S-MS 01S / S-MS 41S / S-MS 51S

S-MS 01PS / S-MS 31PS

S-MS 01Z / S-MS 41Z / S-MS 51Z



The fastest stainless steel chipless overlapping screw

Ordering description	Screw technology	Drilling capacity range (DC) [mm]	Thickness fastened range (MF) [mm]	Screw diameter (d) [mm]	Screw length (L) [mm]	Washer size [mm]	EPDM thickness [mm]	Screw drive / recess type	Sales quantity [pc]	Item number
Zinc-plated carbon steel self-drilling HEX head screws										
S-MS 01Z 4.8x20	Speedy	1.2 - 2.5	1.2 - 2.5	4.8	20	None	None	Hexagon 8	1 000	385446