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CLASSIFICATION REPORT OF CIRCUIT INTEGRITY MAINTENANCE OF CABLE ROUTES UNDER FIRE CONDITIONS

Subject of classification:	*Circuit integrity maintenance of cable systems under fire conditions according to ČSN 73 0895, Article 11 and 13*
Report No.:	***PK9-03-18-911-E-3***
Product name:	***X-FB and FB single cable clips and X-DFB and DFB double cable clips***
Sponsor:	***Hilti ČR spol. s r.o.*** *Uhříněveská 734* *252 43 Průhonice* *Czech Republic*
Prepared by:	*PAVUS, a.s.* *Accredited certification body for product certification No. 3041* *– accreditation issued by Czech Accreditation Institute, p. s. c.,* *– Certificate of Accreditation No. 16/2024* *Prosecká 412/74* *190 00 Prague 9* *Czech Republic* *Order No. Z220230470*
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1 INTRODUCTION

1.1 This classification report defines the circuit integrity maintenance of cable routes under fire conditions – *X-FB and FB single cable clips and X-DFB and DFB double cable clips* in accordance with the procedures specified in ČSN 73 0895:2016

1.2 This classification report consists of 13 pages and may only be used or reproduced in its entirety.

1.3 This classification report supersedes and cancels classification report No. PK9-03-18-911-C-2 from 2022-07-14.

2 DETAILS OF CLASSIFIED PRODUCT

2.1 General

The subject of the classification of cable routes with circuit integrity maintenance under fire conditions are X-FB and FB single cable clips and X-DFB and DFB double cable clips with cables manufactured by PRAKAB PRAŽSKÁ KABELOVNA, s.r.o. and NKT s.r.o.

These are standard cable support structures.

2.2 Description

2.2.1 X-FB single cable clips and X-DFB double cable clips

X-FB and X-DFB clips are made of 1 mm thick galvanized sheet metal (zinc layer min. 5 µm) and a width of 15 mm. They are fitted with plastic turbines. The clips are designed for attaching cables to the ceiling, wall, steel profile or sheet metal using nails or self-tapping screws.

Note: If self-tapping screws are used, the clips are not fitted with plastic turbines – see 5.4.4 of this document.

Types of tested X-FB clips: X-FB 8 MX to X-FB 40 MX

Types of tested X-DFB clips: X-DFB 16 MX to X-DFB 28 MX

- Fixing during the test:

  In concrete

  – nails X-GHP 18 – Test report [1] route No. 1, 3, 4

  On the bottom flange of the rolled steel profile HEA 180 (profiles suspended from MQ-41/3 beam with beam clamps MQT-M12)

  – nails X-EGN 14 – Test report [1] route No. 7

  In galvanized sheet metal 0.5 mm thick (sheet metal attached to IPE 100 beam suspended from the MQ-41/3 beam using beam clamps MQT-M12)

  — self-tapping screws S-MS01Z 4,8x20 – Test report [3] route No. 5

- Spacing of clips 300 mm.
- Load from inserted cables.
- Standard cable supporting constructions.

2.2.2 FB single cable clips

FB clips are made of galvanized sheet metal 1 mm thick (zinc layer min. 5 µm) and 15 mm wide. The screw holes are round and are not fitted with a plastic turbine. The fasteners are intended for fixing the cables to the ceiling or to the wall with a screw.

Types of tested FB clips: FB 16 to FB 35

- Fixing during the test:
  In concrete
  — HUS 6x35 screw anchor – Test report [3], route No. 1
- Spacing of clips 300 mm.
- Load from inserted cables.
- Standard cable supporting constructions.

For technical documentation on the cable clips tested and the fixing devices used, see the test reports [1,3] in Article 3 of this document.

2.3 Cables used in the tests

2.3.1 Test report No. FIRES-FR-178-11-AUNS [1]

Cable manufacturer PRAŽSKÁ KABELOVNA, s.r.o.

0.6/1 kV power cables with circuit integrity maintenance:

- PRAFlaDur® 90 (N)HXH-J 4x1,5 RE FE180/P90-R... (6x – acc. to TP PRAKAB 04/08)
- PRAFlaDur® 90 (N)HXH-J 5x10 RE FE180/P90-R... (6x – acc. to TP PRAKAB 04/08)
- PRAFlaDur® 90 (N)HXH-J 4x35 RE FE180/P90-R... (2x – acc. to TP PRAKAB 04/08)
- PRAFlaDur® 90 (N)HXH-J 4x50 RE FE180/P90-R... (4x – acc. to TP PRAKAB 04/08)

Communication cables with circuit integrity maintenance:

- PRAFlaGuard® F SSKFH-V180 1x2x0,8 P90-R... (6x – acc. to TP PRAKAB 05/01 – 5. vyd.)

Cable manufacturer NKT s.r.o.

0.6/1 kV power cables with circuit integrity maintenance:

- NOPOVIC 1-CXKH-V 5x1,5 Sample T1 RE (NHXH 5x 1,5RE) (2x – acc. to TP-NKT-04/09)
- NOPOVIC 1-CXKH-V 4x4 RE (NHXH 4x4 RE) (2x – acc. to TP-NKT-04/09)
- NOPOVIC 1-CXKH-V 4x50 RM Varianta 6-14 (NHXH 4x50 RM) (2x – acc. to TP-NKT-04/09)
- NOPOVIC 1-CXKH-V 4x1,5 RE Sample T9 (NHXH-O 4x1,5 RE) (8x – acc. to TP-NKT-04/09)
- NOPOVIC 1-CXKH-V 4x1,5 RE Sample T4 (NHXH 4x1,5 RE) (4x – acc. to TP-NKT-04/09)
- NOPOVIC 1-CXKH-V 4x50 RM Sample 11 (NHXH 4x50 RM) (2x – acc. to TP-NKT-04/09)

2.3.2 Test report No. Pr-22-2.017 [3]

Cable manufacturer PRAKAB PRAŽSKÁ KABELOVNA, s.r.o.

0.6/1 kV power cables with circuit integrity maintenance:
- PRAFlaDur 90 4x50 RM
- PRAFlaDur 90 4x10 RE
- PRAFlaDur 90 4x1,5 RE

Communication cables with circuit integrity maintenance:
- PRAFlaGuard F 1x2x0,8

Note: Only cables on classified routes are listed.

3 TEST REPORTS / EXTENDED APPLICATION REPORTS AND TEST RESULTS IN SUPPORT OF THE CLASSIFICATION

3.1 Test reports / extended application reports and other documents

Document No.	Name of laboratory Address Accreditation No.	Name of sponsor	Report ref. No. Date of issue	Test standard
[1]	*FIRES, s.r.o., Osloboditeľov 282, 059 35 Batizovce Acr. No. 041/S-159*	*Hilti ČR spol. s r.o., Uhříněveská 734, 252 43 Průhonice*	*FIRES-FR-178-11-AUNS 2011-10-24*	*ZP-27/2008*
[2]	*ÉMI – Special laboratory for fire safety Diószegi út 37 Budapest Hungary Akr. No. NAT-1-1110/2010*	*Hilti (Hungária) Szolgáltató Kft. 1037 Budapest*	*M-767/2010 2010-11-29*	*MSZ EN 1363-1: 2000*
[3]	*PAVUS a.s. Testing laboratory Veselí nad Lužnicí AZL č. 1026*	*Hilti ČR spol. s r.o., Uhříněveská 734, 252 43 Průhonice*	*Pr-22-2.017 2022-05-05*	*ČSN 73 0895*
[4]	*PAVUS, a.s. Prosecká 412/74 Praha 9*	*Hilti ČR spol. s r.o., Uhříněveská 734, 252 43 Průhonice, Praha*	*Verification of test results and opinion on the functionality of cable support structures - cable routes in case of fire according to ZP-27/2008 Order No. Z220160116 2016-04-26*	*ZP-27/2008*
[5]	*FIRES, s.r.o., Osloboditeľov 282, 059 35 Batizovce*	*Hilti ČR spol. s r.o., Uhříněveská 734, 252 43 Průhonice*	*FIRES-JR-095-16-NURS Vydanie 2 2017-08-18*	*ČSN 73 0895*
[6]	*FIRES, s.r.o., Osloboditeľov 282, 059 35 Batizovce*		*FIRES-JR-095-16-NURS Vydanie 3 2019-01-29*	*ČSN 73 0895*
[7]	*HILTI Corporation 9494 Schaan Lichtenstein*		*Equivalence of X-P17 a X-GHP18 2016-06-28*	
[8]	*FIRES, s.r.o., Osloboditeľov 282, 059 35 Batizovce*	*HILTI Corporation Feldkircherstrasse100, P.O.Box 333 9494 Schaan Lichtenstein*	*FIRES-FR-214-23-NUNE 2023-10-23*	*ČSN EN 1363-1*
[9]	*IBMB, Braunschweig, Germany*	*HILTI Entwicklungsgesellschaft mbH, Hiltistrasse 6, Kaufering*	*Expert opinion - Assessment of HILTI screw anchors No. 2100/759/17-CM 2018-02-16*	*EN 1363-1*
[10]			*Letter No. 3825/2023*	

3.2 Test results

3.2.1 Results of test No. FIRES-FR-178-11-AUNS, see [1]

The cable routes were tested at the standard temperature/time curve. See [1] for the test description and results.

3.2.2 Results of test No. Pr-22-2.017, see [3]

The cable routes were tested at the standard temperature/time curve. See [3] for the test description and results.

3.2.3 Results of test No. FIRES-FR-214-23-NUNE, see [8]

During the test, the cable clips FB5, FB25, DFB6 and DFB13 were tested at the standard temperature/time curve only with mechanical loading according to EN 1363-1. For an overview of the loading of the individual clips and the test behaviour, see Article 5.4 of this document.

The clips were fixed into the YTONG panel ceiling using M6 threaded rods. Weights were attached to the clips using wires. None of the clips or weights were released during the test.

4 CLASSIFICATION AND FIELD OF APPLICATION

4.1 Reference of classification

This classification has been made in accordance with Article 5.2 of ČSN 73 0895:2016.

4.2 Classification

The classification of the circuit integrity maintenance of cable routes formed by **X-FB and FB single cable clips and X-DFB double cable clips** with cables according to Article 2.3 is given in the following tables.

Note: The classification of the route with a single cable, given in column 4 of the following tables, can also be used.

4.2.1 X-FB single cable clips

Standard cable routes

Test report No.	Type of tested cable	Cable route	Classification of cable route with single cable type	Classification for number of cores, diameter/cross section of cable	Classification of cable route
[1]	PRAFlaDur® 90 v(N)HXH-J 4x1,5 RE FE180/P90-R...	X-FB 8 MX to X-FB 40 MX. Ceiling mounting with X-GHP 18 nails. Spacing of clips 300 mm. **Track 1**	**P90-R**	$n \times \geq 1{,}5\ mm^2$ $n \geq 1$	**P90-R**
	PRAFlaDur® 90 (N)HXH-J 5x10 RE FE180/P90-R...		**P90-R**		
	PRAFlaDur® 90 (N)HXH-J 4x50 RE FE180/P90-R...		**P90-R**		
	PRAFlaGuard® F SSKFH-V180 1x2x0,8 P90-R...		**P90-R**	$n \times 2 \times \geq 0{,}8$ mm $n \geq 1$	**P90-R**
[1]	NOPOVIC 1-CXKH-V 4x1,5 RE sample T4 (NHXH 4x1,5 RE)	X-FB 16 MX to X-FB 40 MX. Ceiling mounting with X-GHP 18 nails. Spacing of clips 300 mm. **Track 3**	**P90-R**	$n \times \geq 1{,}5\ mm^2$ $n \geq 1$	**P90-R**
	NOPOVIC 1-CXKH-V-0 4x1,5 RE Sample T9 (NHXH-O 4x1,5 RE)		**P90-R**		
	NOPOVIC 1-CXKH-V 4 x 50 RM sample 11 (NHXH 4x50 RM)		**P90-R**		

[1]	NOPOVIC 1-CXKH-V 5x1,5 RE sample T1 (NHXH 5x 1,5RE)	X-FB 16 MX to X-FB 40 MX. Ceiling mounting with X-GHP 18 nails. Spacing of clips 300 mm. **Track 4**	**P90-R**	n x ≥ 1,5 mm² n ≥ 1	**P90-R**
	NOPOVIC 1-CXKH-V-0 4x1,5 RE Sample T9 (NHXH-O 4x1,5 RE)		**P90-R**		
	NOPOVIC 1-CXKH-V 4 x 50 RM Varianta 6-14 (NHXH 4x50 RM)		**P90-R**		
[1]	PRAFlaDur® 90 (N)HXH-J 4x1,5 RE FE180/P90-R...	X-FB 8 MX to X-FB 40 MX. Mounting on HEA 180 steel profile with X-EGN 14 nails. Spacing of clips 300 mm. **Track 7**	**P90-R**	n x ≥ 1,5 mm² n ≥ 1	**P45-R**
	PRAFlaDur® 90 (N)HXH-J 5x10 RE FE180/P90-R...		–		
	PRAFlaDur® 90 (N)HXH-J 4x50 RE FE180/P90-R...		**P45-R**		
	PRAFlaGuard® F SSKFH-V180 1x2x0,8 P90-R...		**P90-R**	n x 2 x ≥ 0,8 mm n ≥ 1	**P90-R**
[3]	PRAFlaDur 90 4x1,5 RE	X-FB 8 MX to X-FB 20 MX. Mounting on 0.5 mm thick sheet metal using S-MS01Z 4.8x20 screws. Spacing of clips 300 mm. **Assembly 5**	**P30-R**	n x ≥ 1,5-10 mm² n ≥ 1	**P30-R**
	PRAFlaDur 90 4x10 RE		**P60-R**		
	PRAFlaGuard F 1x2x0,8		**P45-R**	n x 2 x ≥ 0,8 mm n ≥ 1	**P45-R**

4.2.2 X-DFB double cable clips

Standard cable routes

Test report No.	Type of tested cable	Cable route	Classification of cable route with single cable type	Classification for number of cores, diameter/cross section of cable	Classification of cable route
[1]	PRAFlaDur® 90 (N)HXH-J 4x1,5 RE FE180/P90-R...	X-DFB 16 MX to X-DFB 28 MX. Ceiling mounting with X-GHP 18 nails. Spacing of clips 300 mm. **Track 1**	**P90-R**	n x ≥ 1,5-35 mm² n ≥ 1	**P90-R**
	PRAFlaDur® 90 (N)HXH-J 5x10 RE FE180/P90-R...		**P90-R**		
	PRAFlaDur® 90 (N)HXH-J 4x35 RE FE180/P90-R...		**P90-R**		
	PRAFlaGuard® F SSKFH-V180 1x2x0,8 P90-R...		**P90-R**	n x 2 x ≥ 0,8 mm n ≥ 1	**P90-R**
[1]	NOPOVIC 1-CXKH-V 4x1,5 RE Sample T4 (NHXH 4x1,5 RE)	X-DFB 16 MX and X-DFB 22 MX. Ceiling mounting with X-GHP 18 nails. Spacing of clips 300 mm. **Track 3**	**P90-R**	n x = 1,5 mm² n ≥ 1	**P90-R**
	NOPOVIC 1-CXKH-V-0 4x1,5 RE Sample T9 (NHXH-O 4x1,5 RE)		**P90-R**	n x = 1,5 mm² n ≥ 1	**P90-R**
[1]	NOPOVIC 1-CXKH-V-0 4x1,5 RE Sample T9 (NHXH-O 4x1,5 RE)	X-DFB 16 MX and X-DFB 22 MX. Ceiling mounting with X-GHP 18 nails. Spacing of clips 300 mm. **Track 4**	**P90-R**	n x ≥ 1,5-4 mm² n ≥ 1	**P90-R**
	NOPOVIC 1-CXKH-V 4x4 RE (NHXH 4x4 RE)		**P90-R**		

4.2.3 FB single cable clips

Standard cable routes

Test report No.	Type of tested cable	Cable route	Classification of cable route with single cable type	Classification for number of cores, diameter/cross section of cable	Classification of cable route
[3]	PRAFlaDur 90 4x1,5 RE	FB 16 to FB 35. Ceiling mounting with HUS 6x35 mm screw. Spacing of clips 300 mm. **Assembly 1**	**P60-R**	n x ≥ 1,5 mm² n ≥ 1	**P30-R**
	PRAFlaDur 90 4x10 RE		**P90-R**		
	PRAFlaDur 90 4x50 RM		**P30-R**		
	PRAFlaGuard F 1x2x0,8		**P90-R**	n x 2 x ≥ 0,8 mm n ≥ 1	**P90-R**

4.3 Field of direct application

The direct application of the test results is carried out according to Article 8 of ČSN 73 0895:2016.

The above classifications of circuit integrity maintenance of cable routes under fire conditions – **X-FB and FB single cable clips and X-DFB and DFB double cable clips** with cables according to Article 2.3, with circuit integrity maintenance under the standard curve, are valid under the following conditions:

- The functionality of the cable route must not be adversely affected by adjacent building and technological structures, other cable routes, pipeline routes or other technological equipment.
- The results of the tests can only be applied if the cable route is in practice fixed into a building construction that statically allows it during the required time of functionality in case of fire, i.e. if the building construction meets the load capacity criterion R according to EN 13501-2.

  If the cable route is fixed directly to a building construction made of materials such as concrete, bricks, aerated concrete or steel, there may be used only anchoring elements which are suitable with regard to:

  a) the type of material used;
  b) the method of assembly used;
  c) the required thermal stress history;
  d) the time of required circuit integrity maintenance;
  e) mechanical loads from the supporting and fixing structure with cables
- For example, the following can be used to fix the cable route:
  a) screw connections;
  b) riveted joints;
  c) welded joints,
  d) direct mounting joints (insertion).

  The suitability of the fixing for the purpose in question must be demonstrated by a test or supported by a static calculation.
- If the cable route cannot be fixed directly to the building construction, an auxiliary structure can be used for fixing. The design of such an auxiliary structure shall comply with all the principles applicable to the design of a load-bearing and fixing structure capable of resisting the effects of fire within a specified time. The properties of the auxiliary structure may be verified by calculation according to the Eurocodes or by test. All the above conditions apply to the fixing of the auxiliary structure to the building construction.
- When using standardised steel fasteners (screws, nuts or threaded rods), the mechanical stresses in these components must not exceed the values for the thermal stresses considered. For the standard temperature curve according to EN 1363-1, the following maximum permissible values for the maximum mechanical stresses apply:

Type of load	Highest mechanical stress (N.mm^{-2})	
	Time of fire resistance ≤ 60 min	Time of fire resistance > 60 min ≤ 120 min
Tensile stress of all vertically oriented components	9	6
Shear stress of screws of class 4.6 according to EN ISO 898-1	15	10

4.3.1 Cable supporting constructions

- When installing cable routes in an inclined or vertical position, the requirement that the cable route must be effectively fixed at the points where it transitions from a horizontal to another installation must be fulfilled. In non-horizontal arrangements, cables must also be firmly fixed in bends, while maintaining the maximum permissible distance of support points and the smallest permissible bending radius.
- The test results obtained when testing cable routes in horizontal installation can also be applied to the corresponding inclined or vertical (rising) routes, provided that the conditions specified in Article 8.1.11 of ČSN 73 0895 are met. Cable support systems shall be properly supported in the transition area between vertical and horizontal installation.
- Cables in the vertical position shall be installed individually in cable clips spaced not more than 300 mm apart and shall be effectively fixed at least every 3 500 mm to relieve longitudinal strain.
- The maximum anchor spacing is determined by the tested dimension; it can be reduced.
- The cable or line is made without connection elements or with tested specifically described connection elements. The test results for cables without connecting elements can only be applied to cables without connecting elements (e.g. junction boxes, couplers, busbars, etc.).
- The test result of the sample of cable support constructions can also be applied in the case of surface treatment by colour coating or spraying with a layer with a surface weight < 1.0 kg/m^2 or thickness < 1.0 mm in accordance with EN 13501-1. In the case of a greater thickness or specific area weight of this layer, a new test shall be carried out.
- The results of the test for cables on steel constructions with a coating (zinc) cannot be applied to a stainless steel support system, unless it is proven according to ČSN 73 0895 Article 8.2.5 g).

4.3.1.1 Standard constructions

- The results of circuit integrity maintenance tests of cables mounted on a standard cable support construction of one manufacturer are transferable to tested standard cable support constructions of the same type of another manufacturer. The transfer of test results between constructions which differ in some parameter from the standard constructions is not possible.

4.3.2 Cables

4.3.2.1 Cables installation

- The number of cables laid horizontally on the cable support system is limited only by the spatial arrangement, but the maximum load of the type of cable support system specified by the manufacturer must not be exceeded. The manufacturer's provision for the maximum number of cables shall also be respected if there is any.
- Cables must be installed along their entire length in such a way that their minimum bending radius specified by the manufacturer is maintained.

4.3.2.2 Power cables

a) In the case of the use of test specimens according to EN 73 0895 Article 7.2.1.1.1.7, the worst test result of these specimens is directly applied to all dimensions and the tested installation method of the tested cable type.

b) Where cables with a maximum core cross-section of less than 50 mm^2 are used in the test, the worst case result of the tested samples shall be applied to all cable cross-sections within the range of cross-sections tested.

c) The result of the test on cables with five or four cores shall be directly applied to cables of the same type with fewer or more cores.

d) Where only cables of the minimum or maximum cross-section tested pass the test, the test result may be applied only to the type of cable, cross-section and method of installation used in the test.

The test results are valid for all cross-sections of the relevant cable type and relevant installation methods within the scope defined in Article 8.2.1 of ČSN 73 0895:2016. In case of different results obtained on the prescribed cable types, the lower of the results obtained shall apply.

4.3.2.3 Communication and signal cables

The results apply to all cables of a given type with a diameter (cross-section) and number of cores equal to or greater than the test specimen.

5 EXTENDED APPLICATION OF THE TEST RESULTS

5.1 The test results obtained when testing cable routes at higher temperature also apply to cable routes stressed at lower temperature. However, the fire scenario to which the results are applied shall have a temperature at each time of the temperature-time curve lower than the temperature at the same time of the fire scenario used in the test. When comparing fire scenarios, the temperature scenarios may be shifted relative to each other along the time axis.

The results of Pxx-R are also valid for PHxx-R.

5.2 The test results of the X-FB 8 MX to X-FB 40 MX single clips and the X-DFB 16 MX to X-DFB 28 MX double clips can also be applied to smaller diameter clips - the X-FB 5 MX to X-FB 7 MX single clips and the X-DFB 5 MX to X-DFB 11 MX double clips, see [6] Article 3.1 of this document. All these types of clips have the same plate thickness, shape of the reinforcing rib, mounting hole and are attached by identical fastening devices. The test results can be applied if the load of the clips used in the test is not exceeded.

5.3 FB and DFB cable clips

In addition to the circuit integrity maintenance test of the FB cable clips fastened to concrete according to the Test report [3], FB cable clips together with DFB cable clips were tested only with mechanical loading (see the Test report No. FIRES-FR-214-23-NUNE [8]). In this test, the clips were fixed to the YTONG aerated concrete ceiling panels using M6 threaded rods. This test was carried out to compare the load carrying capacity of the FB and DFB clips with the X-FB and X-DFB clips and to enable their interchangeability.

The FB and DFB clips differ from the X-FB and X-DFB clips in the shape of the hole for the fastening device - instead of a square hole with serrated edges, a circular hole with a diameter of 8 mm is used. The FB and DFB clips are also not fitted with a plastic turbine, which is used for fixing to the substrate with nails. The FB and DFB clips are fixed to the substrate with screws.

In the test [8], the following loads were applied to each clip:

Sample No.	Clip type	Load of clip	Duration of the test/damage
S1	FB5	0,48 kg	120 minutes/without damage
S2	FB5	0,85 kg	120 minutes/without damage
S3	FB5	1,63 kg	120 minutes/without damage
S4	FB25	0,49 kg	120 minutes/without damage
S5	FB25	0,85 kg	120 minutes/without damage
S6	FB25	1,54 kg	120 minutes/without damage
S7	DFB6	0,5 kg	120 minutes/without damage
S8	DFB6	1,02 kg	120 minutes/without damage
S9	DFB6	1,67 kg	120 minutes/without damage
S10	DFB13	0,57 kg	120 minutes/without damage
S11	DFB13	1,03 kg	120 minutes/without damage
S12	DFB13	1,7 kg	120 minutes/without damage

Note: The table shows the maximum load in each group of sizes of FB and DFB clips

Comparison of maximum loads for X-FB / X-DFB (see Table 1 in 5.4.2) and FB / DFB:

X-FB (diameter 40 mm)	FB (diameter 25 mm)
0,91 kg	1,54 kg
X-DFB (diameter 28 mm)	**DFB (diameter 13 mm)**
1,32 kg	1,32 kg

It can be concluded that the originally tested X-FB and X-DFB cable clips fixed to the concrete substrate can be replaced by FB and DFB clips, while maintaining all other parameters of the cable routes. For cable routes with FB and DFB clips, the original classification of routes tested with X-FB and X-DFB clips shall apply, see Article 4.2.1 and 4.2.2. Approved fixing devices must be used for fixing the FB and DFB clips.

5.4 Fixing devices

5.4.1 Concrete and steel nails

According to the Test report [1] the tested X-FB single clips and X-DFB double clips were fastened to the concrete with the X-GHP 18 nails and to the steel beam with the X-EGN 14 nails:

X-EGN 14 – nail for steel and very hard concrete. Made of HRC 57,5 steel, zinc coating 2-13 µm, the diameter of the nail head is 6.8 mm and the nail diameter is 3 mm.

X-GHP 18 - nail for steel and hard concrete. Made of HRC 57,5 steel, zinc coating 2-13 µm, the diameter of the nail head is 6.8 mm and the nail diameter is 3 mm.

According to the Judgment report [5] the results of the tests with these fixing devices can also be applied to the following nails:

X-GN 20 – nail intended for concrete. Made of steel HRC 53,5, zinc layer 2-13 µm, the diameter of the nail head is 6,8 mm and the diameter of the nail is 3 mm.

X-GN 27 and 32 – nail intended for concrete, blocks and solid brick. Made of steel HRC 53,5, zinc layer 2-13 µm, the diameter of the nail head is 6,8 mm and the diameter of the nail is 3 mm.

X-P 17/20/24 B3 MX (X-P 17/20/24 G3 MX) – nail for steel, concrete, blocks and solid bricks. Made of steel HRC 57,5, zinc layer 2-13 µm, the diameter of the nail head is 6,8 mm and the diameter of the nail is 3 mm.

X-P 30/36 B3 P7 – nail intended for concrete, blocks and solid bricks. Made of steel HRC 57,5, zinc layer 2-13 µm, the diameter of the nail head is 6,8 mm and the diameter of the nail is 3 mm.

X-S 14 B3 (X-S 14 G3) – nail intended for steel and very hard concrete. Made of steel HRC 57,5, zinc layer 2-13 µm, the diameter of the nail head is 6,8 mm and the diameter of the nail is 3 mm.

Note: The G in the stud markings indicates a gas pistol and the B indicates a battery pistol. MX stands for collated nails.

Concrete and steel nails – Conclusion

According to the Judgment report [5] the design of the new nails is the same as that of the tested nails. The change is in the design of the plastic nail container so that a different nail gun can be used. The replacement of the nails will not affect the functionality of the cable routes under fire conditions and therefore the test results and classification of the cable routes according to Article 4 of this report can be applied to the X-FB single clips and X-DFB double clips.

In addition to the specified stud lengths, nails of longer lengths may be used.

5.4.2 Load on X-FB and X-DFB cable clips by inserted cables according to the Test report No. FIRES-FR-178-11-AUNS, [1]

The loads induced by the cables installed in X-FB and X-DFB cable clips according to the Test report [1] of Article 3.1 of this document are given in the following Table 1.

Table 1 - Results of the circuit integrity maintenance test according to the Test report No. FIRES-FR-178-11-AUNS [1]

Vzorek	Sestava	Typ kabelu	Příchytka	Typ MX	Čas do přerušení [min]	Zatížení vloženými kabely	
						[kg/upev.bod]	[kg/m]
1	7	PRAFlaDur® 90 (N)HXH-J 4x1,5 RE FE180/P90-R	X-FB	16	120	0,09	0,29
2	7	PRAFlaDur® 90 (N)HXH-J 4x1,5 RE FE180/P90-R	X-FB	16	120	0,09	0,29
3	7	PRAFlaDur® 90 (N)HXH-J 5x10 RE FE180/P90-R	X-FB	22	7	0,29	0,965
4	7	PRAFlaDur® 90 (N)HXH-J 5x10 RE FE180/P90-R	X-FB	22	11	0,29	0,965
5	7	PRAFlaDur® 90 (N)HXH-J 4x50 RE FE180/P90-R	X-FB	40	55	0,91	3,03
6	7	PRAFlaDur® 90 (N)HXH-J 4x50 RE FE180/P90-R	X-FB	40	94	0,91	3,03
13	4	NOPOVIC 1-CXKH-V 4x4 RE (NHXH 4x4 RE)	X-DFB	22	120	0,19	0,309
14	4	NOPOVIC 1-CXKH-V 4x4 RE (NHXH 4x4 RE)	X-DFB	22	120	0,19	0,309
15	4	NOPOVIC 1-CXKH-V-0 4x1,5 RE Vzorek T9 (NHXH-O 4x1,5 RE)	X-DFB	16	120	0,11	0,178
16	4	NOPOVIC 1-CXKH-V-0 4x1,5 RE Vzorek T9 (NHXH-O 4x1,5 RE)	X-DFB	16	120	0,11	0,178
17	4	NOPOVIC 1-CXKH-V 4 x 50 RM Varianta 6-14 (NHXH 4x50 RM)	X-FB	40	120	0,71	2,366
18	4	NOPOVIC 1-CXKH-V 4 x 50 RM Varianta 6-14 (NHXH 4x50 RM)	X-FB	40	120	0,71	2,366
19	4	NOPOVIC 1-CXKH-V-0 4x1,5 RE Vzorek T9 (NHXH-O 4x1,5 RE)	X-FB	22	120	0,05	0,178
20	4	NOPOVIC 1-CXKH-V-0 4x1,5 RE Vzorek T9 (NHXH-O 4x1,5 RE)	X-FB	22	120	0,05	0,178
21	4	NOPOVIC 1-CXKH-V 5x1,5 RE Vzorek T1 (NHXH 5x 1,5RE)	X-FB	16	120	0,06	0,202
22	4	NOPOVIC 1-CXKH-V 5x1,5 RE Vzorek T1 (NHXH 5x 1,5RE)	X-FB	16	115	0,06	0,202
23	3	NOPOVIC 1-CXKH-V-0 4x1,5 RE Vzorek T9 (NHXH-O 4x1,5 RE)	X-DFB	22	120	0,11	0,178
24	3	NOPOVIC 1-CXKH-V-0 4x1,5 RE Vzorek T9 (NHXH-O 4x1,5 RE)	X-DFB	22	120	0,11	0,178
25	3	NOPOVIC 1-CXKH-V 4x1,5 RE Vzorek T4 (NHXH 4x1,5 RE)	X-DFB	16	120	0,11	0,178
26	3	NOPOVIC 1-CXKH-V 4x1,5 RE Vzorek T4 (NHXH 4x1,5 RE)	X-DFB	16	120	0,11	0,178
27	3	NOPOVIC 1-CXKH-V 4 x 50 RM vzorek 11 (NHXH 4x50 RM)	X-FB	40	120	0,71	2,366
28	3	NOPOVIC 1-CXKH-V 4 x 50 RM vzorek 11 (NHXH 4x50 RM)	X-FB	40	120	0,71	2,366
29	3	NOPOVIC 1-CXKH-V-0 4x1,5 RE Vzorek T9 (NHXH-O 4x1,5 RE)	X-FB	22	120	0,05	0,178
30	3	NOPOVIC 1-CXKH-V-0 4x1,5 RE Vzorek T9 (NHXH-O 4x1,5 RE)	X-FB	22	120	0,05	0,178
31	3	NOPOVIC 1-CXKH-V 4x1,5 RE Vzorek T4 (NHXH 4x1,5 RE)	X-FB	16	120	0,05	0,178
32	3	NOPOVIC 1-CXKH-V 4x1,5 RE Vzorek T4 (NHXH 4x1,5 RE)	X-FB	16	120	0,05	0,178
33	2	PRAFlaDur® 90 (N)HXH-J 4x1,5 (Vzorek 1) RE FE180/P90-R	X-DFB	16	120	0,17	0,29
34	2	PRAFlaDur® 90 (N)HXH-J 4x1,5 (Vzorek 1) RE FE180/P90-R	X-DFB	16	120	0,17	0,29
35	2	PRAFlaDur® 90 (N)HXH-J 5x10 (Vzorek 2) RE FE180/P90-R	X-DFB	22	57	0,58	0,965
36	2	PRAFlaDur® 90 (N)HXH-J 5x10 (Vzorek 2) RE FE180/P90-R	X-DFB	22	79	0,58	0,965
37	2	PRAFlaDur® 90 (N)HXH-J 4x35 (Vzorek 2) RE FE180/P90-R	X-DFB	28	61	1,32	2,2
38	2	PRAFlaDur® 90 (N)HXH-J 4x35 (Vzorek 2) RE FE180/P90-R	X-DFB	28	44	1,32	2,2
39	2	PRAFlaDur® 90 (N)HXH-J 4x50 (Vzorek 1) RE FE180/P90-R	X-FB	40	44	0,91	3,03
40	2	PRAFlaDur® 90 (N)HXH-J 4x50 (Vzorek 1) RE FE180/P90-R	X-FB	40	112	0,91	3,03
41	2	PRAFlaDur® 90 (N)HXH-J 5x10 (Vzorek 2) RE FE180/P90-R	X-FB	22	96	0,29	0,965
42	2	PRAFlaDur® 90 (N)HXH-J 5x10 (Vzorek 2) RE FE180/P90-R	X-FB	22	88	0,29	0,965
43	2	PRAFlaDur® 90 (N)HXH-J 4x1,5 (Vzorek 1) RE FE180/P90-R	X-FB	16	120	0,09	0,29
44	2	PRAFlaDur® 90 (N)HXH-J 4x1,5 (Vzorek 1) RE FE180/P90-R	X-FB	16	120	0,09	0,29
45	1	PRAFlaDur® 90 (N)HXH-J 4x1,5 RE FE180/P90-R	X-DFB	16	120	0,17	0,29
46	1	PRAFlaDur® 90 (N)HXH-J 4x1,5 RE FE180/P90-R	X-DFB	16	120	0,17	0,29
47	1	2 kabely PRAFlaDur® 90 (N)HXH-J 5x10 RE FE180/P90-R	X-DFB	22	120	0,58	0,965
48	1	2 kabely PRAFlaDur® 90 (N)HXH-J 4x35 RE FE180/P90-R	X-DFB	28	120	1,32	2,2
49	1	2 kabely PRAFlaDur® 90 (N)HXH-J 4x50 RE FE180/P90-R	X-FB	40	120	0,91	3,03

The maximum load on a X-FB single cable clip caused by inserted cables is 0.91 kg and for the X-DFB double cable clip is 1.32 kg.

See also the manufacturer's declaration on the maximum load for X-FB single cable clips and X-DFB double cable clips, [7] Article 3.1 of this document.

5.4.3 Classification of loading capacity of fastening devices for X-FB and X-DFB clips under fire conditions

According to the Test report No. M-767/2010, [2] the load capacity of the following fastening devices with X-FB and X-DFB cable clips was tested under fire conditions:

Table 2 – Load carrying capacity of X-FB and X-DFB cable clips

Sample No. (acc. to [2])	Base material	Fixing device	Cable clip type	Load	Load-bearing capacity under fire conditions
28	Sheet metal thickness 2 mm	Self-tapping screw S-MS 01 Z 4,8×20	X-FB 11 MX	2 kg	R 120
29			X-DFB 20 MX	2 kg	R 120
11	Steel beam IPE 20	X-EGN 14 MX, 3×14	X-FB 11 MX	2 kg	R 120
16			X-DFB 20 MX	5 kg	R 120
33	Concrete	X-GN 20 MX, 3×20	X-FB 11 MX	2 kg	R 120
34		X-GN 20 MX, 3×20	X-DFB 20 MX	2 kg	R 120
38		X-GHP 18 MX, 3×18	X-FB 11 MX	5 kg	R 120
39		X-GHP 18 MX, 3×18	X-DFB 20 MX	5 kg	R 120

Self-tapping screw S-MS 01 Z

Based on the evaluation of the above data, it can be concluded that the load capacity of the self-tapping screws S-MS 01 Z under fire conditions, anchored in 2 mm thick sheet metal (rated as R 120) exceeds the time of circuit integrity maintenance of X-FB and X-DFB cable clips fastened to concrete and steel beams with X-GHP and X-EGN nails (see classification in 4.2 of this document). It can be concluded that the test results for standard cable routes consisting of X-FB and X-DFB clips fixed to a steel beam or concrete with X-GHP and X-EGN nails can be applied to X-FB and X-DFB clips fixed with S-MS 01 Z self-tapping screws. The load of the clips must not exceed 2 kg.

When using S-MS 01 Z self-tapping screws for fixing cable clips to sheet metal, the results are applied according to the rules of direct application - only to the cable clips, the load and the circuit functionality maintenance classification according to the tests. The minimum thickness of the sheet metal is 0.5 mm.

5.4.4 In the case of the X-FB and X-DFB cable clips being fixed with screws are used without plastic turbines.

5.4.5 HUS 6 universal fixing screws

According to the Test report No. Pr-22-2.017 [3], the FB clips were fixed to the concrete using the HUS 6x35 universal fixing screw. According to the documents [9,10], HUS 6 screws can also be used in masonry. The screw diameter is 6 mm, the nominal anchorage depth in masonry is min. 44 mm. For the individual fire resistance times, the load capacity of the HUS 6 screws for fixing in masonry is given in the following Table:

Fire resistance (min)	Maximum tensile/shear load of HUS 6 when fixed in masonry (kN)
30	0,75
60	0,55
90	0,40
120	0,30

On the basis of a comparison of these values with the load values given in Article 5.3, it can be concluded that the HUS 6 universal screw can be used for fixing the FB and DFB cable clips to the masonry.

5 ADDITIONAL PROVISIONS

5.5 The manufacturer of cable route support constructions issues an EU declaration of conformity concerning the properties of cable routes and their components according to the relevant European standards harmonised to Directive 2014/35/EU of the European Parliament and of the Council (Government Decree 118/2016 Coll.).

5.6 For electrical cables with circuit integrity maintenance under fire conditions used on cable routes, the following must be provided:

- characteristics assessed according to Government Decree 118/2016 Coll. (Directive 2014/35/EU of the European Parliament and of the Council),
- assessed reaction to fire according to Government Decree 163/2002 Coll. - Product Group 10/15.

In the case of optical cables with circuit integrity maintenance under fire conditions, the reaction to fire must be assessed according to Government Decree 163/2002 Coll. - Product Group 10/15.

Government Decree 163/2002 Coll., group 10/15

No.	Group of products	Conformity assessment procedure
15	Electrical and optical cables:	
	a) with reaction to fire class A_{ca}, $B1_{ca}$, $B2_{ca}$ or C_{ca}	§ 5
	b) with reaction to fire class D_{ca}, E_{ca}, or F_{ca}	§ 7

6 MARKING OF CABLE ROUTE

The contractor shall always mark the cable route in accordance with ČSN 73 0895:2016 by affixing a label in an accessible place and in a permanent manner that contains the following information:

a) the name of the natural or legal person whose personnel installed the system;

b) the designation of the cable storage system as indicated in the classification report (fire classification certificate or certificate);

c) the functionality class, the number of the classification report;

d) the year of installation of the cable storage system.

Where the cable route is long, it is advisable to repeat the marking approximately every 50 m.

7 LIMITATIONS

This classification is valid unless the conditions, under which it was issued, have been changed (i.e., until the materials used, the composition or design of the product or the technical regulations relating to the product change).

The sponsor may request the issuing authority to review the influence of changes on the classification validity.

The validity limitation of this classification report is 5 years from the date of its issue.

This classification document does not represent type approval or certification of the product.

Elaborated by:	*Reviewed by:*	*Approved by:*
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