CLASSIFICATION OF FUNCTIONAL RESISTANCE
FIRES-CR-226-16-AUPE

Power and communication cables of Technokabel S.A. at cable supporting system BAKS

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Reg. No. 041/S-159

The Experts on Fire Safety

CLASSIFICATION OF FUNCTIONAL RESISTANCE IN FIRE IN ACCORDANCE WITH DIN 4102-12: 1998-11

with direct field of application

FIRES-CR-226-16-AUPE

Name of the product: Power and communication cables of Technokabel S.A. at cable supporting system BAKS

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Task No.: PR-16-0411

Date of issue: 09. 12. 2016

Reports: 5
Copy No.: 3

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1. INTRODUCTION

This classification report defines the functional resistance in fire classification assigned to element Power and communication cables of Technokabel S.A. at cable supporting system BAKS in accordance with the procedures given in DIN 4102-12: 1998-11.

Test was carried out according to standard STN 92 0205 and meets requirements of DIN 4102-12: 1998-11. Basic deviation in process and carrying out of test between these standards is in measuring and in control of temperature in the test furnace. According to STN 92 0205, plate thermometers according to EN 1363-1 are used. According to DIN 4102-12: 1998-11, common thermocouples of construction which was used for this measurement till issue of EN 1363-1 are used. Measurement by plate thermometers acc. to EN 1363-1 can be considered as stricter method of temperature control in test furnace in compare with thermocouples used till issue of EN 1363-1. Therefore, it is possible to use results of test according to STN 92 0205 for classification of tested cables according to DIN 4102-12: 1998-11, but not conversely. Identified deviation results in stricter course of test and it can lead to reduced classification of tested cables what is accepted as enhanced security in practice.

2. DETAILS OF CLASSIFIED PRODUCT

2.1 GENERAL

The element, Power and communication cables of Technokabel S.A. at cable supporting system BAKS, is defined as a cable supporting system with cables with circuit integrity maintenance classes.

2.2 PRODUCT DESCRIPTION

Product comprise of power and communication halogen free cables of company Technokabel S.A. at cable supporting system of company BAKS Kazimierz Sielski – cable trays, mesh trays, ladders, cable clamps with accessories (consoles, brackets, supports, hangers, etc.).

Cable supporting system:

Cable tray KFJ
Cable tray is made of steel sheet thickness 1,0 mm. Height of side wall is 60 mm and maximum tested width of cable tray is 400 mm. Trays are fixed together by integrated coupling. Maximum tested loading is 12kg.m^{-1}. Tested tray is KFJ400H60.

Cable tray KBJ
Cable tray is made of steel sheet thickness 1,0 mm without perforation. Height of side wall is 60 mm and maximum tested width of cable tray is 400 mm. Trays are fixed together by nut bolts SGKM6x12. Maximum tested loading is 20kg.m^{-1}. Tested tray is KBJ400H60.

Cable tray KBP
Cable tray is made of steel sheet thickness 1,5 mm without perforation. Height of side wall is 60 mm and maximum tested width of cable tray is 600 mm. Trays are fixed together by two junctions LPP/LPOPH60 with nut bolts SGKM6x12 on sides and by junction BL/BLO with nut bolts SGKM6x12 on the bottom. Maximum tested loading is 25kg.m^{-1}. Tested tray is KBP600H60.

Cable tray KGJ/KGOJ
Cable tray is made of steel sheet thickness 1,0 mm. Height of side wall is 60 mm and maximum tested width of cable tray is 400 mm. Trays are fixed together by nut bolts SGKM6x12. Maximum tested loading is 20kg.m^{-1}. Tested tray is KGJ/KGOJ400H60.

Cable tray KCP/KCOP
Cable tray is made of steel sheet thickness 1,5 mm. Height of side wall is 60 mm and maximum tested width of cable tray is 400 mm. Trays are fixed together by two junctions LPP/LPOPH60 with nut bolts SGKM6x12 on sides and by junction BL/BLO with nut bolts SGKM6x12 on the bottom. Maximum tested loading is 20kg.m^{-1}. Tested tray is KCP/KCOP400H60

Cable mesh tray KDSZ
Cable mesh tray is made of steel wire ∅ 4,5 mm. Height of side wall is 60 mm and maximum tested width of cable mesh tray is 400 mm. Mesh trays are fixed together by integrated coupling. Maximum tested loading is 20kg.m^{-1}. Tested mesh tray is KDSZ400H60.

Cable mesh tray KDS/KDSO
Cable mesh tray is made of steel wire ∅ 4,0 mm and ∅ 4,5 mm. Height of side wall is 60 mm and maximum tested width of cable mesh tray is 60 mm. Mesh trays are fixed together by couplings USSN/USSO. Maximum tested loading is 2kg.m^{-1}. Tested mesh tray is KDS/KDSO60H60.

Cable ladder DFP
Cable ladder is made of steel sheet thickness 1,5 mm and spacing of transoms is 300 mm. Height of side wall is 60 mm and maximum tested width of cable ladder is 400 mm. Cable ladders are fixed together by integrated coupling. Maximum tested loading is 12kg.m^{-1}. Tested ladders are DFP300H60 and DFP400H60.

Cable ladder DUP/DUOP
Cable ladder is made of steel sheet thickness 1,5 mm and spacing of transoms is 300 mm. Height of side wall is 60 mm and maximum tested width of cable ladder is 600 mm. Cable ladders are fixed together by two junctions LDC/LDOCH60 and nut bolts SGKM8x14 on sides. Maximum tested loading is 30kg.m^{-1}. Tested ladders are DUP/DUOP400H60 and DUP600H60.

Support
Support CMP41H21 with dimensions (41 x 21) mm is made of steel sheet thickness 1,5 mm.
Support CMP41H41 with dimensions (41 x 41) mm is made of steel sheet thickness 1,5 mm.
Support CWP/CWOP40H40 with dimensions (40 x 40) mm is made of steel sheet thickness 1,5 mm.
Support CTMT40H60 with dimensions (40 x 60) mm is made of steel sheet thickness 3,0 mm.

Collar Æ 110 mm
Collar is combined of two parts made of bent steel sheets with dimensions (300 x 40 x 4) mm. Individual parts are fixed together by two nut bolts SMM10x40. Collar is used for fixing of construction to tubular construction

Bracket WWS/WWSO
Bracket is made from steel sheet thickness 2,0 mm. Tested bracket is WWS/WWSO300 and is used to gripping tray or ladder to ceiling or to wall.

Console WPCB
Console consists of base plate with dimensions (130 x 45 x 5) mm and support with dimensions (50 x 35 x 2) mm. Console is used for gripping of brackets to ceiling.

Spacer BR
Spacer BR55 with dimensions (42 x 140) mm is made of steel sheet 1,5 mm thick and is used as reinforcement in place of fixing of bracket to console.

Cables:
Fire resistant power cables, insulated and sheathed with halogen free compounds, are intended for power supply to fire protection equipment which is to operate in fire conditions (e.g. water pumps in fire extinguishing systems, smoke removing fans).

Fire resistant and halogen free communication cables are intended for installation in alarm, signaling, transmission, sound warning and similar systems, also for data processing systems and for analogue or digital data transmission in industrial electronics and control applications in objects of sharp fire protection requirements, particularly in fire alarm and fire automatic control systems.

Halogen free cables shall be applied in locations where, in case of fire, higher safety for human beings and expensive electronic equipment is required. Functions of the cables are maintained – data are transmitted and power is supplied to equipment which must operate in fire conditions and during fire fighting (e.g. emergency lighting, smoke removing fans). The cables are flame retardant and their smoke emission

is low, emitted fumes are non-toxic and non-corrosive. The cables are suitable for indoor and outdoor installations.

Cables used by test:

Power cables:
NHXH-J FE180 PH90/E90 0.6/1 kV
(N)HXH-J FE180 PH30/E30 0.6/1 kV
(N)HXH-J FE180 PH90/E90 0.6/1 kV
(N)HXCH FE180 PH90/E90 0.6/1 kV
(N)HXCH-J-SERVO FE180 PH90/E90 0.6/1 kV

Communication cables:
HTKSH FE180 PH90/E30-E90 240V
HDGs FE180 PH90/E30-E90 300/500 V
HTKSHekw FE180 PH90/E30-E90 240V

The length of cables was 5,2 m and 4,0 m from that was exposed to fire.

More detailed information about product construction is shown in drawings.

3. TEST REPORTS IN SUPPORT OF CLASSIFICATION

3.1 TEST REPORTS

No.	Name of laboratory	Name of sponsor	Test report No.	Date of the test	Test method
[1]	FIRES, s.r.o., Batizovce, SR	Technokabel S.A., Warszawa, PL	FIRES-FR-239-16-AUNE	13. 10. 2016	STN 92 0205: 2014

[1] Test specimens were conditioned according to EN 1363-1 before the fire resistance test

3.2 TEST RESULTS

No./ Test method	Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
[1] STN 92 0205: 2014	1	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV 2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	**14**	43 minutes
	2	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV 2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	3	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV 2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV	**13**	90 minutes no failure / interruption
	4	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**17**	90 minutes no failure / interruption
	5	2 cables (N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV		90 minutes no failure / interruption
	6	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**12**	34 minutes
	7	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	8	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	9	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		57 minutes
	10	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**11**	89 minutes
	11	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	12	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		32 minutes
	13	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		90 minutes no failure / interruption
	14	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**10**	90 minutes no failure / interruption
	15	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	16	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	17	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		90 minutes no failure / interruption
	18	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**9**	53 minutes
	19	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		28 minutes
	20	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	21	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		34 minutes
	22	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	23	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		90 minutes no failure / interruption
	24	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**8**	90 minutes no failure / interruption
	25	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		61 minutes
	26	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	27	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		90 minutes no failure / interruption
	28	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV 2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV	**7**	68 minutes
	29	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**16**	90 minutes no failure / interruption
	30	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	31	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV 2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV	**6**	52 minutes
	32	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**5**	90 minutes no failure / interruption
	33	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	34	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		90 minutes no failure / interruption
	35	2 cables (N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		33 minutes
	36	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	**4**	90 minutes no failure / interruption
	37	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	38	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		90 minutes no failure / interruption
	39	2 cables (N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		90 minutes no failure / interruption

No./ Test method	Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
[1] STN 92 0205: 2014	40	2 cables (N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV	3	32 minutes
	41	2 cables (N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		29 minutes
	42	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	43	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		32 minutes
	44	2 cables (N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV	2	90 minutes no failure / interruption
	45	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		29 minutes
	46	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		81 minutes
	47	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		90 minutes no failure / interruption
	48	2 cables (N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV	1	78 minutes
	49	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		90 minutes no failure / interruption
	50	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		90 minutes no failure / interruption
	51	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		90 minutes no failure / interruption
	52	2 cables HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	15	28 minutes
	53	2 cables HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		63 minutes
	54	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		37 minutes
	55	2 cables HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	14	78 minutes
	56	2 cables HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		88 minutes
	57	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		90 minutes no failure / interruption
	58	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V	13	90 minutes no failure / interruption
	59	2 cables HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	17	90 minutes no failure / interruption
	60	2 cables HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		90 minutes no failure / interruption
	61	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		90 minutes no failure / interruption
	62	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V	12	38 minutes
	63	2 cables HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		28 minutes
	64	2 cables HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V	10	90 minutes no failure / interruption
	65	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		90 minutes no failure / interruption
	66	2 cables HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		90 minutes no failure / interruption
	67	2 cables HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	7	90 minutes no failure / interruption
	68	2 cables HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	16	90 minutes no failure / interruption
	69	2 cables HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		90 minutes no failure / interruption
	70	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		90 minutes no failure / interruption
	71	2 cables HTKSH FE180 PH90/E30-E90 1x2x1.2 mm 240 V	1	90 minutes no failure / interruption

The fire test was terminated in the 92nd minute upon request of test sponsor.

Specimens S1 – S51 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Specimens S52 – S71 were tested by one-phase voltage supply 1 x 110V with LED diodes 3V /0,03W.

Circuit breakers with rating 3 A were used.

4. CLASSIFICATION AND FIELD OF APPLICATION

4.1 REFERENCE OF CLASSIFICATION

This classification has been carried out in accordance with clause 3.2 of DIN 4102-12: 1998-11.

4.2 CLASSIFICATION

The element, **Power and communication cables of Technokabel S.A. at cable supporting system BAKS**, is classified according to the following combinations of performance parameters and classes as appropriate.

Cable	Type of tested cable, single cross-sections and number of conductors	Arrangement	Classification for type of tested cable (by cross-sections and number of conductors)	Classification for cable
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable tray KFJ400H60. Consoles combined of support CMP41H21 and two threaded rods PGM10. Consoles fixed to construction [1)] by hangers WPPGV/WPPOV, collars and screws SMM10x20. Loading 12kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 1.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
(N)HXCH FE180 PH90/E90 0,6/1 kV	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		**E 60**	n x ≥ 1,5 mm^2 n ≥ 2 **E 60**
	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		**E 90**	
HTKSH FE180 PH90/E30-E90 240V	HTKSH FE180 PH90/E30-E90 1x2x1,2 mm 240 V		**E 90**	n x 2 x ≥ 1,2 mm n ≥ 1 **E 90**
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable ladder DFP400H60. Consoles combined of support CMP41H21 and two threaded rods PGM10. Consoles fixed to construction [1)] by hangers WPPGV/WPPOV, collars and screws SMM10x20. Loading 12kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 2.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 60**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 60**	
(N)HXCH FE180 PH90/E90 0,6/1 kV	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		**E 90**	**Without classification**
	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		**Without classification**	
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable tray KBJ400H60. Consoles combined of support CMP41H21 and two threaded rods PGM8. Consoles fixed to ceiling by anchors TRSOM8. Loading 20kg.m^{-1}. Consoles in spacing of 1500 mm. **Tracks No. 3 and 6.**	**E 30**	n x ≥ 1,5 mm^2 n ≥ 2 **E 30**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
(N)HXH FE180 PH30/E30 0,6/1 kV	(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		**E 30**	**Without classification**
	(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		**Without classification**	
(N)HXCH-J-SERVO FE180 PH90/E90 0,6/1 kV	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		**E 30**	n x ≥ 1,5 mm^2 n ≥ 2 **E 30**
	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 30**	

1) Supporting construction is made of tube segments approx. 500 mm long (Ø 110 mm, wall thickness 1,8 mm). Individual segments are placed transversely and fixed to ceiling by 4pcs of anchors in spacing of 1500 mm

Cable	Type of tested cable, single cross-sections and number of conductors	Arrangement	Classification for type of tested cable (by cross-sections and number of conductors)	Classification for cable
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable tray KFJ400H60. Consoles combined of support CMP41H21 and two threaded rods PGM10. Consoles fixed to construction [2)] by support CWP/CWOP40H40, hangers WPPGV/WPPOV and collars. Loading 12kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 4.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
(N)HXCH FE180 PH90/E90 0,6/1 kV	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		**E 90**	
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable ladder DFP400H60. Consoles combined of support CMP41H21 and two threaded rods PGM10. Consoles fixed to construction [2)] by support CWP/CWOP40H40, hangers WPPGV/WPPOV and collars. Loading 12kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 5.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
(N)HXCH FE180 PH90/E90 0,6/1 kV	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		**E 30**	n x ≥ 1,5 mm^2 n ≥ 2 **E 30**
	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		**E 90**	
(N)HXCH-J-SERVO FE180 PH90/E90 0,6/1 kV	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable ladder DFP300H60. Consoles WPCB, brackets WWS/WWSO300 and spacers BR55. Loading 10kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 7.**	**E 60**	n x ≥ 1,5 mm^2 n ≥ 2 **E 60**
	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 60**	
HTKSH FE180 PH90/E30-E90 240V	HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 90**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 90**
NHXH FE180 PH90/E90 0,6/1 kV	NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable ladder DUP600H60. Consoles combined of supports CMP41H41 and two threaded rods PGM10. Consoles fixed to ceiling by anchors TRSOM10. Loading 30kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 8.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
(N)HXCH-J-SERVO FE180 PH90/E90 0,6/1 kV	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 60**
	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 60**	
NHXH FE180 PH90/E90 0,6/1 kV	NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable tray KBP600H60. Consoles combined of supports CMP41H41 and two threaded rods PGM10. Consoles fixed to ceiling by anchors TRSOM10. Loading 25kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 9.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		**Without classification**	**Without classification**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 30**	
(N)HXCH-J-SERVO FE180 PH90/E90 0,6/1 kV	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		**E 30**	n x ≥ 1,5 mm^2 n ≥ 2 **E 30**
	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	

[2)] Supporting construction is made of tube segments approx. 500 mm long (Ø 110 mm, wall thickness 1,8 mm). Individual segments are placed longitudinal and fixed to ceiling by 4pcs of anchors in spacing of 1500 mm.

Cable	Type of tested cable, single cross-sections and number of conductors	Arrangement	Classification for type of tested cable (by cross-sections and number of conductors)	Classification for cable
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable ladder DUP/DUOP400H60 fixed to ceiling at upside down position by hangers UTM/UTMO and anchors in spacing of 1500 mm. Loading 20kg.m^{-1}. Cables fixed to ladders by cable clamps UK1/UKO1 in spacing of 600 mm. **Track No. 10.** Fire cladding of cable clamps is made of box with dimensions (500 x 300) mm constructed of: bent steel sheet 0,7 mm thick, mineral wool type R-FRBOARD-1-S, 50 mm thick coated with Protecta® FR Coating. Box is fixed to ceiling by four anchors M8. Cables under cladding are covered by Protecta® FR Coating and cavity inside the box is filled with fire resistant foam RPP-B1.	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
NHXH FE180 PH90/E90 0,6/1 kV	NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
HTKSH FE180 PH90/E30-E90 240V	HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 90**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 90**
HDGs FE180 PH90/E30-E90 300/500V	HDGs FE180 PH90/E30-E90 2x1mm^2 300/500 V		**E 90**	n x ≥ 1,0 mm^2 n ≥ 2 **E 90**
HTKSHekw FE180 PH90/E30-E90 240V	HTKSHekw FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 90**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 90**
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable mesh tray KDSZ400H60. Consoles combined of support CMP41H21 and two threaded rods PGM8 fixed to ceiling by anchors TRSOM8. Loading 20kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 11.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 30**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 30**	
(N)HXCH-J-SERVO FE180 PH90/E90 0,6/1 kV	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		**E 60**	n x ≥ 1,5 mm^2 n ≥ 2 **E 60**
	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable ladder DUP/DUOP400H60. Consoles combined of support CMP41H41 and two threaded rods PGM10 fixed to ceiling in distance (spacing of) 1200 mm. Alternative usage of console combined of two longitudinal supports CTMT40H60 and two transverse supports CMP41H41 fixed together by nut bolts in distance 1200 mm. Ends of longitudinal supports are fixed to ceiling by threaded rods PGM10 at maximum distance (spacing of) 2250 mm. Loading 20kg.m^{-1}. **Track No. 12.**	**E 30**	n x ≥ 1,5 mm^2 n ≥ 2 **E 30**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
NHXH FE180 PH90/E90 0,6/1 kV	NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		**E 30**	n x ≥ 1,5 mm^2 n ≥ 2 **E 30**
	NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
HDGs FE180 PH90/E30-E90 300/500V	HDGs FE180 PH90/E30-E90 2x1mm^2 300/500 V		**E 30**	n x ≥ 1,0 mm^2 n ≥ 2 **E 30**
HTKSHekw FE180 PH90/E30-E90 240V	HTKSHekw FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**Without classification**	**Without classification**
(N)HXCH-J-SERVO FE180 PH90/E90 0,6/1 kV	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable tray KCP/KCOP400H60. Consoles combined of CMP41H41 and two threaded rods PGM10 fixed to ceiling by anchors TRSOM10. Loading 20kg.m^{-1}. Consoles in spacing of 1700 mm. **Track No. 13.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
HDGs FE180 PH90/E30-E90 300/500V	HDGs FE180 PH90/E30-E90 2x1mm^2 300/500 V		**E 90**	n x ≥ 1,0 mm^2 n ≥ 2 **E 90**

Cable	Type of tested cable, single cross-sections and number of conductors	Arrangement	Classification for type of tested cable (by cross-sections and number of conductors)	Classification for cable
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable ladder DUP/DUOP400H60. Consoles combined of CMP41H41 and two threaded rods PGM10 fixed to ceiling by anchors TRSOM10. Loading 20kg.m^{-1}. Consoles in spacing of 1700 mm. **Track No. 14.**	**E 30**	n x ≥ 1,5 mm^2 n ≥ 2 **E 30**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 30**	
NHXH FE180 PH90/E90 0,6/1 kV	NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
HTKSH FE180 PH90/E30-E90 240V	HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 60**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 60**
HDGs FE180 PH90/E30-E90 300/500V	HDGs FE180 PH90/E30-E90 2x1mm^2 300/500 V		**E 90**	n x ≥ 1,0 mm^2 n ≥ 2 **E 90**
HTKSHekw FE180 PH90/E30-E90 240V	HTKSHekw FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 60**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 60**
HTKSH FE180 PH90/E30-E90 240V	HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	Cable tray KGJ/KGOJ400H60. Consoles combined of support CMP41H21 and two threaded rods PGM8 fixed to ceiling by anchors TRSOM8. Loading 20kg.m^{-1}. Consoles in spacing of 1500 mm. **Track No. 15.**	**Without classification**	**Without classification**
HDGs FE180 PH90/E30-E90 300/500V	HDGs FE180 PH90/E30-E90 2x1mm^2 300/500 V		**E 30**	n x ≥ 1,0 mm^2 n ≥ 2 **E 30**
HTKSHekw FE180 PH90/E30-E90 240V	HTKSHekw FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 60**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 60**
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Cable mesh tray KDS/KDSO60H60 fixed to ceiling at upside down position by hangers WKS/WKSO60 and anchors in spacing of 1500 mm. Loading 2kg.m^{-1}. Cables fixed to mesh trays by cable clamps UKZ1/UKZO1 in spacing of 600 mm. **Track No. 16.**	**E 90**	n x ≥ 1,5 mm^2 n ≥ 2 **E 90**
	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		**E 90**	
HTKSH FE180 PH90/E30-E90 240V	HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 90**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 90**
HDGs FE180 PH90/E30-E90 300/500V	HDGs FE180 PH90/E30-E90 2x1mm^2 300/500 V		**E 90**	n x ≥ 1,0 mm^2 n ≥ 2 **E 90**
HTKSHekw FE180 PH90/E30-E90 240V	HTKSHekw FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 90**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 90**
(N)HXH FE180 PH90/E90 0,6/1 kV	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	Pipes of stainless steel RU (Ø 32 x 1,5) mm fixed to ceiling with offset 200 mm by clips KSA32E, threaded rods PGM8E and anchors TRSMO8E in spacing of 1400 mm. **Track No. 17.**	**E 90**	n x ≥ 1,5-16 mm^2 n ≥ 2 **E 90**
	(N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV		**E 90**	
HTKSH FE180 PH90/E30-E90 240V	HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 90**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 90**
HDGs FE180 PH90/E30-E90 300/500V	HDGs FE180 PH90/E30-E90 2x1mm^2 300/500 V		**E 90**	n x ≥ 1,0 mm^2 n ≥ 2 **E 90**
HTKSHekw FE180 PH90/E30-E90 240V	HTKSHekw FE180 PH90/E30-E90 1x2x0,8 mm 240 V		**E 90**	n x 2 x ≥ 0,8 mm n ≥ 1 **E 90**

The element, Power and communication cables of Technokabel S.A. at cable supporting system BAKS with circuit integrity maintenance classes are classified to classes according to achieved test results of tested cables at tracks. Other classification is not allowed.

4.3 FIELD OF APPLICATION

This classification is valid for the following end use applications:

General:

- throughout the period during which circuit integrity is to be maintained, neighbouring building components shall not have a negative effect on circuit integrity;
- although testing is only carried out on cables arranged horizontally, test results also apply to cables arranged either diagonally or vertically (e.g. risers), as long as the cable system is supported in transitional areas (i.e. where it switches from a horizontal to a vertical arrangement) in such a manner that the cables will not slip or kink at corners;
- if the standard support construction specified here is used for testing, test results also apply to other types of tested support construction;
- where risers are used, circuit integrity classification only applies if the cable is effectively supported (i.e. with a spacing of supports of 3500 mm or less). Cables may also be stabilized by a seal at penetrations in floors, provided that the sealant material is of a suitable material class, or using clips of proven suitability. The suitability of any design other than that shown in DIN 4102-12, figure 5 may only be assessed by an accredited test laboratory;
- for vertical systems, the test results obtained for cables mounted singly on the ceiling using single clips apply. In practice, brackets of proven suitability may also be used, as long as their spacing is equal to that of the single clips tested;
- results of testing single cables on the ceiling apply also to cables mounted horizontally on walls;
- results of testing bunched cables on a ladder or tray also apply to support construction attached to a wall as shown in DIN 4102-12, figure 6. However, such constructions require proof of suitability by means of a test certificate or other document issued by an accredited testing laboratory.

5. LIMITATIONS

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

The classification is valid provided that the product, field of application and standards and regulations are not changed.

Approved:

Ing. Štefan Rástocký
leader of the testing laboratory

Signed:

Dávid Šubert
technician of the testing laboratory