TEST REPORT FIRES-FR-201-09-AUNE

Cable bearing system BAKS with cables business TELE-FONIKA KABLE

Reg. No. 041/S-159

The Experts on Fire Safety

TEST REPORT

FIRES-FR-201-09-AUNE

Tested property:	Function in fire
Test method:	DIN 4102 – 12:1998-11
Date of issue:	20. 01. 2010
Name of the product:	Cable bearing system BAKS with cables business TELE-FONIKA KABLE
Manufacturer:	BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland - producer of construction
	TELE-FONIKA KABLE Sp. z o.o., Spólka Komandytovo – Akcyjna, ul. Wielicka 114, 30-663 Kraków, Poland – producer of cables
Sponsor:	BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland
Task No.:	PR-09-0494
Specimen received:	09. 12. 2009
Date of the test:	17. 12. 2009

Technician responsible for the technical side of this report: Miroslav Hudák

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1. INTRODUCTION

This test report contains the results of test carried out by testing laboratory of FIRES, s.r.o. in Batizovce. The purpose of the test was acquirement of information for product classification.

Representative from the sponsor's side witnessing the test:

Mr. Jacek Kliczek	BAKS Kazimierz Sielski
Mr. Slawomir Matysiak	BAKS Kazimierz Sielski
Mr. Mariusz Tokarski	TELE-FONIKA KABLE Sp. z o.o.
Mr. Zbigniew Eichler	TELE-FONIKA KABLE Sp. z o.o.
Mr. István Kohajda	VLG Kábelkereskedlmi Kft
Mr. Károly Bakó	VLG Kábelkereskedlmi Kft

test directed by	Ing. Štefan Rástocký
test carried out by	Miroslav Hudák
operator	Bc. Marek Gorlický

2. MEASURING EQUIPMENT

Identification number	Measuring equipment	Note
F 90 004	Vertical test furnace for fire resistance testing	-
F 69 005	PLC system for data acquisition and control TECOMAT NS 950	-
F 40 008	SW Control Web 2000	-
F 40 009	Control and communication software to PLC TECOMAT NS 950	-
F 40 010	Visual and calculating software to PLC TECOMAT NS 950	-
F 40 011	Driver Tecomat – CW 2000 (SW)	-
F 69 009	PLC system for data acquisition and climate control TECOMAT TC 604	-
F 60 001 - F 60 009	Sensors of temperature and relative air humidity	climatic conditions measuring
F 71 008, F 71 009	Transducer of differential pressure (–50 to + 150) Pa	pressure inside the test furnace
F 08 521 - F 08 528	Plate thermometers	temperature inside the test furnace, according to EN 1363-1
F 08 701	Sheathed thermocouple type K Ø 3 mm	ambient temperature
F 54 020	Digital calliper (0 to 200) mm	-
F 54 059	Racking meter	-
F 57 007	Digital stop-watch	-
F 96 015	Test signal panel	-

3. PREPARATION OF THE SPECIMEN

Testing laboratory didn't take off individual components of the specimen. Components take-off and its delivering to the testing laboratory were carried out by the test sponsor. Assembling of the supporting system into the test furnace and mounting of cables and weights into the supporting system was carried out by workers businesses BAKS Kazimierz Sielski and TELE-FONIKA KABLE Sp. z o.o..

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMEN STRUCTURE

Test specimen comprised from cable bearing system BAKS Kazimierz Sielski – cable trays, cable ladders, cable clips UDF and UKO1 with accessories and power and communication non-halogen cables business TELE-FONIKA KABLE Sp. z o.o..

Cables:	NHXH 4x1,5 FE 180 E90	(8 x)
	NHXH 4x50 FE 180 E90	(8 x)
	NHXCH 4x1,5/1,5 FE 180 E90	(8 x)
	NHXCH 4x50/25 FE 180 E90	(8 x)
	FLAME-X 950 2x1,0 + ECC	(8 x)
	FLAME-X 950 4x4,0 + ECC	(8 x)
	FLAME-X 950 Enhanced 2x1,0 + ECC	(8 x)
	FLAME-X 950 Enhanced 4x4,0 + ECC	(8 x)
	JE-H(St)H Bd 1x2x0,8 FE 180/E90	(8 x)

The length of cables was 5 m, 3,5 m from that was exposed to fire. Cables were fixed to the steel sheet trays and to ladders in the points of allowed bending radius by steel clips (type BRA according to the cable diameter).

Loadbearing system consisted of four sets of cable tracks 4,5 m long and of ceiling installation (steel members made of galvanized steel). Length of trays exposed to fire was 3,5 m.

Suspension track No. 1
Suspension was made by three hangers (type WPCO 800) which were fixed to ceiling by two dowels (type PSRO M10x90) in spacing of 1500 mm. Two booms (type WUON 400) were fixed by screws (type SM M8x30) at each hanger. Holders (type UPWO) were fixed at the end of booms. Booms were fixed through these holders by threaded bar (type PGM10/1x600) with washers and nuts M10 to ceiling holder (type WPPOV) which was fixed to ceiling by dowel (type PSRO M10x90). Trays (type KCOP 300H60/3F, steel sheet thickness 1,5 mm) were fixed at booms and jointed together by two junctions (type LPOPH60N) and by sheet (type BLO 400N) with screws M6 (type SGN M6x12).

Suspension track No. 2
Suspension was made by three hangers (type WPCO 800) which were fixed to ceiling by two dowels (type PSRO M10x90) in spacing of 1500 mm. Two booms (type WMCO 400) were fixed by screws (type SM M8x30) at each hanger. Holders (type UPWO) were fixed at the end of booms. Booms were fixed through these holders by threaded bar (type PGM10/1x600) with washers and nuts M10 to ceiling holder (type WPPOV) which was fixed to ceiling by dowel (type PSRO M10x90). Trays (type KCOP 400H60/3N, steel sheet thickness 1,5 mm) were fixed at upper booms and jointed together by two junctions (type LPOPH60N) and by sheet (type BLO 400N) with screws M6 (type SGN M6x12). Ladders (type DGOP 400H60/3N, steel sheet thickness 1,5 mm, spacing of transoms 150 mm) were fixed at under booms by clips (type ZMO) and jointed together by junction (type LDOCH60N) with screws M8 (type SGN M8x14).

Suspension track No. 3
Suspension was made by three hangers (type WPCO 800) which were fixed to ceiling by two dowels (type PSRO M10x90) in spacing of 1500 mm. Two booms (type WUON 400) were fixed by screws (type SM M8x30) at each hanger. Holders (type UPWO) were fixed at the end of booms. Booms were fixed through these holders by threaded bar (type PGM10/1x600) with washers and nuts M10 to ceiling holder (type WPPOV) which was fixed to ceiling by dowel (type PSRO M10x90). Trays (type KCOP 400H60/3N, steel sheet thickness 1,5 mm) were fixed at booms and jointed together by two junctions (type LPOPH60N) and by sheet (type BLO 400N) with screws M6 (type SGN M6x12).

Ceiling installation
Was made by ceiling ledges (type SDOP 1000) which were fixed to ceiling by dowels (type PSRO M8x70) in spacing of 600 mm, cables were fixed to ledges by clips (type UKO1) in spacing of 600 mm and clips (type UDF) which were fixed to ceiling by dowels (type PSRO M6x40) in spacing of 600 mm. Cable clips were depending on the diameter of cables.

Trays were loaded with 10 kg/m and ladders were loaded with 20 kg/m.
Types of individual components are from catalogue BAKS.
Cable penetration through the wall of test furnace was sealed by mineral wool Rockwool.
Loading with steel chain were used as the equivalent load.

More detailed information about construction of specimen is shown in the drawings which form an integral part of this test report. Drawings were delivered by sponsor.

All the information about technical specifications of used materials and semi-products, information about their type sign were delivered by sponsor. This information was not subject of the inspection of specimen. Parameters which were checked are quoted in paragraph 4.3.

4.2 DESCRIPTION OF SPECIMEN FIXATION

The test specimen was fixed on the ceiling of the test furnace which was created from concrete panels made of common shocked concrete of class B 20, 150 mm thick.
The type of specimen fixation into the test furnace is visible in drawing documentation and it was selected by the sponsor.

4.3 INSPECTION OF SPECIMEN

Before and after the function in fire test, conformity of drawings and test specimen was checked. Specimen corresponded to the drawings which create the appendix of this test report. Inspection of specimen consisted of visual review of the test specimen, used materials as well as size verification (number and cross sections of conductors, thickness, measurements of cables and trays) and also the way of specimen fixation to supporting construction was subject of inspection.

4.4 CLIMATIC CONDITIONING OF SPECIMEN

Test specimen was stored in the climatic hall of testing laboratory and was conditioned according to EN 1363-1 under the following climatic conditions:

Ambient air temperature [°C]

mean	22,7
standard deviation	0,5

Relative air humidity [%]

mean	48,7
standard deviation	3,4

The humidity equilibrium state of test specimen was not determined. The test specimen did not comprise hygroscopic material.

5. CARRYING OUT OF THE TEST

5.1 TEST GENERALLY

The test was carried out in horizontal test furnace with dimensions (3500 x 3000 x 2750) mm (length x width x height).

5.2 CONDITIONS OF THE TEST

Conditions in the test furnace (temperature – standard temperature/time curve, pressure, content of O_2) as well as in the testing room (ambient temperature) corresponded to EN 1363-1 and 4102-2 during the test. Detailed information is shown in appendices of this report, or in Quality records of the testing laboratory.

Values characterizing environment in the testing room directly before the test:

Date of the test	**Relative air humidity [%]**	**Ambient air temperature [°C]**
17. 12. 2009	29,2	10,4

5.3 RESULTS OF THE TEST

Measured values are stated in appendices of this test report.

5.4 EVALUATION OF THE TEST

Specimens	Time to first failure/interruption of conductor
Specimens 1, 2: cables NHXCH 4x1,5/1,5 FE 180 E90	90 minutes no failure / interruption
Specimens 3, 4: cables NHXCH 4x50/25 FE 180 E90	90 minutes no failure / interruption
Specimen 5: cable NHXH 4x1,5 FE 180 E90	90 minutes no failure / interruption
Specimen 6: cable NHXH 4x1,5 FE 180 E90	51 minutes
Specimens 7, 8: cables NHXH 4x50 FE 180 E90	90 minutes no failure / interruption
Specimens 9, 10: cables NHXCH 4x50/25 FE 180 E90	90 minutes no failure / interruption
Specimens 11, 12: cables NHXH 4x50 FE 180 E90	90 minutes no failure / interruption
Specimen 13: cables FLAME-X 950 4x4,0 + ECC	90 minutes no failure / interruption
Specimen 14: cable FLAME-X 950 2x1,0 + ECC	80 minutes
Specimen 15: cable FLAME-X 950 2x1,0 + ECC	82 minutes
Specimens 16, 17: cables FLAME-X 950 Enhanced 4x4,0 + ECC	90 minutes no failure / interruption
Specimens 18, 19: cables FLAME-X 950 Enhanced 2x1,0 + ECC	90 minutes no failure / interruption
Specimens 20, 21: cables NHXCH 4x1,5/1,5 FE 180 E90	90 minutes no failure / interruption
Specimens 22, 23: cables NHXH 4x1,5 FE 180 E90	90 minutes no failure / interruption
Specimens 24, 25: cables NHXCH 4x50/25 FE 180 E90	90 minutes no failure / interruption
Specimens 26, 27: cables NHXH 4x50 FE 180 E90	90 minutes no failure / interruption
Specimen 28: cables FLAME-X 950 4x4,0 + ECC	28 minutes
Specimen 29: cables FLAME-X 950 2x1,0 + ECC	73 minutes
Specimen 30: cables FLAME-X 950 Enhanced 4x4,0 + ECC	90 minutes no failure / interruption
Specimen 31: cables FLAME-X 950 Enhanced 2x1,0 + ECC	88 minutes
Specimen 32: cables FLAME-X 950 4x4,0 + ECC	90 minutes no failure / interruption
Specimen 33: cables FLAME-X 950 2x1,0 + ECC	68 minutes
Specimen 34: cables FLAME-X 950 Enhanced 4x4,0 + ECC	90 minutes no failure / interruption
Specimen 35: cables FLAME-X 950 Enhanced 2x1,0 + ECC	90 minutes no failure / interruption
Specimens 36, 37: cables NHXCH 4x1,5/1,5 FE 180 E90	90 minutes no failure / interruption
Specimens 38, 39: cables NHXH 4x1,5 FE 180 E90	90 minutes no failure / interruption
Specimens 40, 41: cables NHXCH 4x1,5/1,5 FE 180 E90	90 minutes no failure / interruption
Specimens 42, 43: cables NHXCH 4x50/25 FE 180 E90	90 minutes no failure / interruption
Specimens 44, 45: cables NHXH 4x1,5 FE 180 E90	90 minutes no failure / interruption
Specimens 46, 47: cables NHXH 4x50 FE 180 E90	90 minutes no failure / interruption
Specimen 48: cables FLAME-X 950 4x4,0 + ECC	90 minutes no failure / interruption
Specimen 49: cables FLAME-X 950 2x1,0 + ECC	83 minutes
Specimen 50: cables FLAME-X 950 Enhanced 4x4,0 + ECC	90 minutes no failure / interruption
Specimen 51: cables FLAME-X 950 Enhanced 2x1,0 + ECC	90 minutes no failure / interruption
Specimen 52: cables JE-H(St)H Bd 1x2x0,8 FE 180/E90	90 minutes no failure / interruption
Specimen 53: cables JE-H(St)H Bd 1x2x0,8 FE 180/E90	90 minutes no failure / interruption
Specimen 54: cables JE-H(St)H Bd 1x2x0,8 FE 180/E90	90 minutes no failure / interruption
Specimen 55: cables JE-H(St)H Bd 1x2x0,8 FE 180/E90	90 minutes no failure / interruption

The fire test was discontinued in 101st minute at the 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 – S55 were tested by one-phase voltage supply 1 x 110V with LED diodes 3V /0,03W.

6. CLOSING

§ This report details the method of construction, the test conditions and results obtained when the specific element of construction described herein was following the procedure outlined in EN 1363-1, and where appropriate DIN 4102-2. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

§ Because of the nature of the fire resistance testing and consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

§ The test results refer only to the tested subjects. This test report is not an approval of the tested product by the test laboratory or the accreditation body overseeing the laboratory's activities. The test was carried out on testing equipment that is the property of FIRES, s.r.o., Batizovce. Without the written permission of the test laboratory this test report may be copied and/or distributed only as the whole. Any modifications of the test report can be made only by the fire resistance test laboratory FIRES, s.r.o., Batizovce.

Issued by:

Ing. Štefan Rástocký
leader of the testing laboratory

SKÚŠOBNÉ LABORATÓRIUM • PRÜFLABORATORIUM • TESTING LABORATORY
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-1-

Responsible for the technical side of the test report:

Miroslav Hudák
technician of the testing laboratory

7. NORMATIVE REFERENCES

STN EN 1363-1: 2001	Fire resistance tests. Part 1: General requirements
DIN 4102 – 2:1977-09	Fire behaviour of building materials and elements - requirements and testing
DIN 4102 – 12:1998-11	Fire resistance of electric cable systems required to maintain circuit integrity

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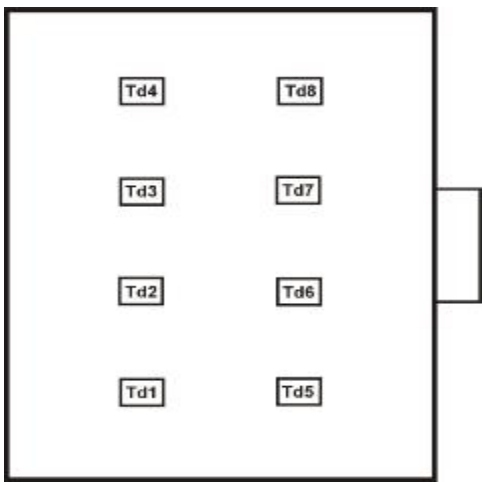
Measured values inside the test furnace

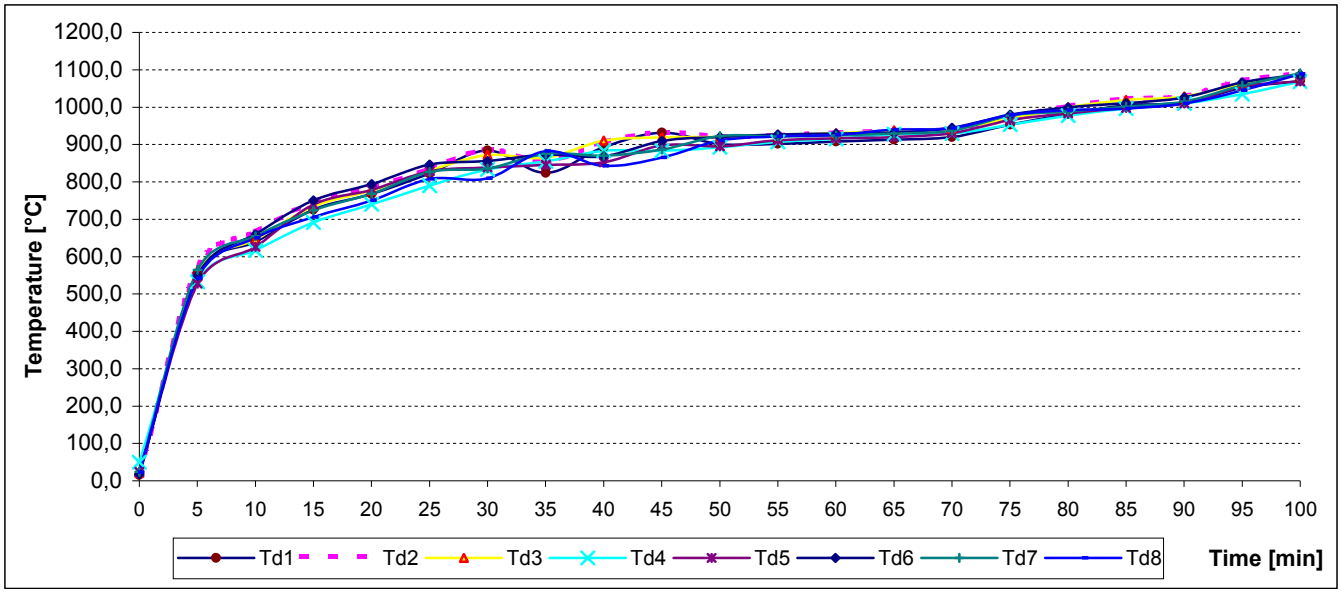
Time	Temperature [°C]											Deviation	Pressure
t [min]	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To	d_e [%]	p [Pa]
0	15,3	15,1	21,0	49,6	23,9	18,4	23,9	23,2	23,8	20,0	10,7	0,0	7,0
5	555,4	572,9	553,9	533,0	527,3	548,7	564,7	541,9	549,7	576,4	11,5	-9,3	13,8
10	639,3	666,0	644,8	617,1	626,3	659,5	654,8	650,0	644,7	678,4	12,0	-6,7	16,9
15	725,5	748,6	733,9	690,8	739,6	750,3	723,9	705,6	727,3	738,6	12,3	-4,9	18,2
20	767,5	786,3	776,9	739,9	778,2	793,7	767,9	750,4	770,1	781,4	12,7	-4,0	19,1
25	822,1	836,4	830,1	789,8	828,3	846,6	826,3	807,9	823,4	814,6	13,0	-3,3	19,4
30	883,7	887,1	871,8	833,0	838,6	855,7	836,3	809,4	852,0	841,8	12,6	-2,5	17,4
35	824,2	854,5	864,5	854,8	845,2	872,5	875,3	881,9	859,1	864,8	12,4	-2,0	18,5
40	892,4	906,9	910,5	883,4	852,5	868,6	869,9	842,4	878,3	884,7	12,4	-1,9	19,0
45	932,2	933,5	919,2	883,2	897,3	909,7	886,4	865,0	903,3	902,3	12,3	-1,7	19,2
50	901,3	921,9	920,0	892,2	895,5	920,1	922,2	910,9	910,5	918,1	12,0	-1,5	18,1
55	901,8	924,7	925,6	907,2	911,0	926,5	921,3	921,4	917,4	932,3	12,7	-1,5	18,2
60	907,8	931,8	930,3	914,4	916,8	929,7	924,6	926,1	922,7	945,3	12,4	-1,5	18,4
65	912,8	937,4	938,3	927,7	919,6	931,8	929,2	939,6	929,6	957,3	12,3	-1,6	19,1
70	920,0	941,4	943,1	929,6	930,5	944,9	937,2	944,0	936,3	968,4	12,1	-1,7	17,3
75	953,7	973,0	968,5	953,2	965,3	979,7	977,7	979,2	968,8	978,7	12,1	-1,8	15,8
80	982,0	1003,0	1000,0	977,3	983,1	999,3	988,2	992,0	990,7	988,4	11,9	-1,7	15,8
85	1005,0	1023,0	1019,0	996,5	997,6	1011,0	1001,0	996,2	1006,4	997,4	11,9	-1,5	13,1
90	1012,0	1030,0	1029,0	1010,0	1010,0	1026,0	1015,0	1010,0	1018,2	1005,9	11,7	-1,4	14,3
95	1052,0	1072,0	1063,0	1035,0	1055,0	1066,0	1058,0	1045,0	1055,9	1014,0	11,9	-1,2	13,1
100	1070,0	1090,0	1085,0	1068,0	1069,0	1087,0	1090,0	1089,0	1081,5	1021,7	11,7	-0,8	14,3

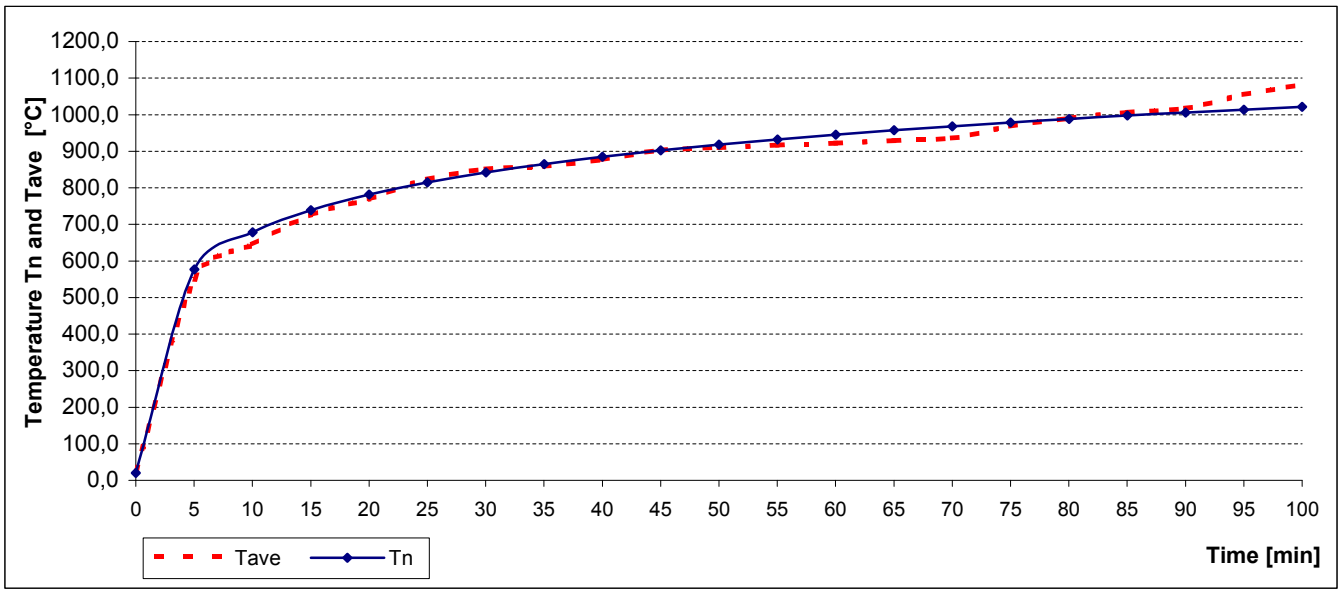
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside the test furnace measured under the ceiling of the test furnace

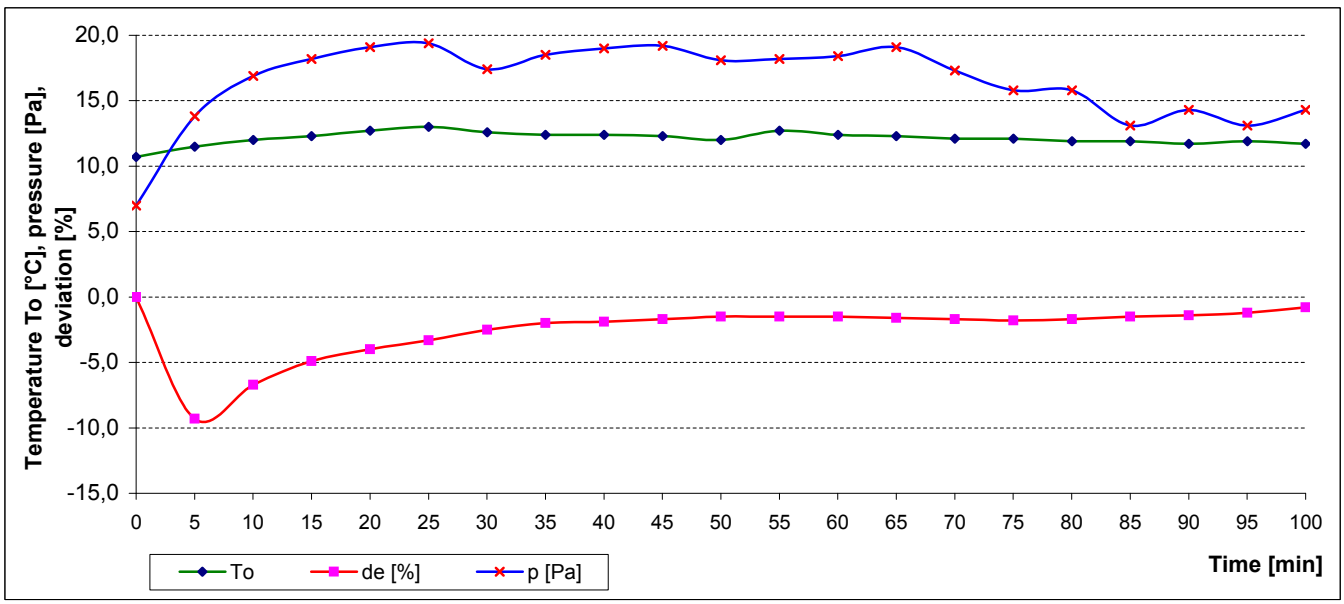
Layout of measuring points in the test furnace:



Measured values inside the test furnace / graph







Measured time of tested specimens from S1 to S10

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S1	1-L1	no failure / interruption
	2-L2	no failure / interruption
	3-L3	no failure / interruption
	4-PEN	no failure / interruption
S2	5-L1	no failure / interruption
	6-L2	no failure / interruption
	7-L3	no failure / interruption
	8-PEN	no failure / interruption
S3	9-L1	no failure / interruption
	10-L2	no failure / interruption
	11-L3	no failure / interruption
	12-PEN	no failure / interruption
S4	13-L1	no failure / interruption
	14-L2	no failure / interruption
	15-L3	no failure / interruption
	16-PEN	no failure / interruption
S5	17-L1	no failure / interruption
	18-L2	no failure / interruption
	19-L3	no failure / interruption
	20-PEN	no failure / interruption
S6	21-L1	51:48
	22-L2	x
	23-L3	x
	24-PEN	x
S7	25-L1	no failure / interruption
	26-L2	no failure / interruption
	27-L3	no failure / interruption
	28-PEN	no failure / interruption
S8	29-L1	no failure / interruption
	30-L2	no failure / interruption
	31-L3	no failure / interruption
	32-PEN	no failure / interruption
S9	33-L1	no failure / interruption
	34-L2	no failure / interruption
	35-L3	no failure / interruption
	36-PEN	no failure / interruption
S10	37-L1	no failure / interruption
	38-L2	no failure / interruption
	39-L3	no failure / interruption
	40-PEN	no failure / interruption

Specimens 1, 2: cables NHXCH 4x1,5/1,5 FE 180 E90
Specimens 3, 4: cables NHXCH 4x50/25 FE 180 E90
Specimens 5, 6: cables NHXH 4x1,5 FE 180 E90
Specimens 7, 8: cables NHXH 4x50 FE 180 E90
Specimens 9, 10: cables NHXCH 4x50/25 FE 180 E90

x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable

Power cables were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Circuit breakers with rating 3 A were used.

Measured time of tested specimens from S11 to S20

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S11	41-L1	no failure / interruption
	42-L2	no failure / interruption
	43-L3	no failure / interruption
	44-PEN	no failure / interruption
S12	45-L1	no failure / interruption
	46-L2	no failure / interruption
	47-L3	no failure / interruption
	48-PEN	no failure / interruption
S13	49-L1	no failure / interruption
	50-L2	no failure / interruption
	51-L3	no failure / interruption
	52-PEN	no failure / interruption
S14	53-L1	80:55
	54-L2	---
	55-L3	---
	56-PEN	x
S15	57-L1	82:30
	58-L2	---
	59-L3	---
	60-PEN	x
S16	61-L1	no failure / interruption
	62-L2	no failure / interruption
	63-L3	no failure / interruption
	64-PEN	no failure / interruption
S17	65-L1	no failure / interruption
	66-L2	no failure / interruption
	67-L3	no failure / interruption
	68-PEN	no failure / interruption
S18	69-L1	no failure / interruption
	70-L2	no failure / interruption
	71-L3	no failure / interruption
	72-PEN	no failure / interruption
S19	73-L1	no failure / interruption
	74-L2	no failure / interruption
	75-L3	no failure / interruption
	76-PEN	no failure / interruption
S20	77-L1	no failure / interruption
	78-L2	no failure / interruption
	79-L3	no failure / interruption
	80-PEN	no failure / interruption

Specimens 11, 12: cables NHXH 4x50 FE 180 E90
Specimen 13: cables FLAME-X 950 4x4,0 + ECC
Specimens 14, 15: cables FLAME-X 950 2x1,0 + ECC
Specimens 16, 17: cables FLAME-X 950 Enhanced 4x4,0 + ECC
Specimens 18, 19: cables FLAME-X 950 Enhanced 2x1,0 + ECC
Specimen 20: cable NHXCH 4x1,5/1,5 FE 180 E90

x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable

Power cables were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Circuit breakers with rating 3 A were used.

Measured time of tested specimens from S21 to S30

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S21	81-L1	no failure / interruption
	82-L2	no failure / interruption
	83-L3	no failure / interruption
	84-PEN	no failure / interruption
S22	85-L1	no failure / interruption
	86-L2	no failure / interruption
	87-L3	no failure / interruption
	88-PEN	no failure / interruption
S23	89-L1	no failure / interruption
	90-L2	no failure / interruption
	91-L3	no failure / interruption
	92-PEN	no failure / interruption
S24	93-L1	no failure / interruption
	94-L2	no failure / interruption
	95-L3	no failure / interruption
	96-PEN	no failure / interruption
S25	97-L1	no failure / interruption
	98-L2	no failure / interruption
	99-L3	no failure / interruption
	100-PEN	no failure / interruption
S26	101-L1	no failure / interruption
	102-L2	no failure / interruption
	103-L3	no failure / interruption
	104-PEN	no failure / interruption
S27	105-L1	no failure / interruption
	106-L2	no failure / interruption
	107-L3	no failure / interruption
	108-PEN	no failure / interruption
S28	109-L1	x
	110-L2	x
	111-L3	28:21
	112-PEN	x
S29	113-L1	73:43
	114-L2	---
	115-L3	---
	116-PEN	x
S30	117-L1	no failure / interruption
	118-L2	no failure / interruption
	119-L3	no failure / interruption
	120-PEN	no failure / interruption

Specimen 21: cable NHXCH 4x1,5/1,5 FE 180 E90
Specimens 22, 23: cables NHXH 4x1,5 FE 180 E90
Specimens 24, 25: cables NHXCH 4x50/25 FE 180 E90
Specimens 26, 27: cables NHXH 4x50 FE 180 E90
Specimen 28: cables FLAME-X 950 4x4,0 + ECC
Specimen 29: cables FLAME-X 950 2x1,0 + ECC
Specimen 30: cables FLAME-X 950 Enhanced 4x4,0 + ECC

x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable

Power cables were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Circuit breakers with rating 3 A were used.

Measured time of tested specimens from S31 to S40

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S31	121-L1	88:43
	122-L2	---
	123-L3	---
	124-PEN	x
S32	125-L1	no failure / interruption
	126-L2	no failure / interruption
	127-L3	no failure / interruption
	128-PEN	no failure / interruption
S33	129-L1	68:19
	130-L2	---
	131-L3	---
	132-PEN	x
S34	133-L1	no failure / interruption
	134-L2	no failure / interruption
	135-L3	no failure / interruption
	136-PEN	no failure / interruption
S35	137-L1	no failure / interruption
	138-L2	no failure / interruption
	139-L3	no failure / interruption
	140-PEN	no failure / interruption
S36	141-L1	no failure / interruption
	142-L2	no failure / interruption
	143-L3	no failure / interruption
	144-PEN	no failure / interruption
S37	145-L1	no failure / interruption
	146-L2	no failure / interruption
	147-L3	no failure / interruption
	148-PEN	no failure / interruption
S38	149-L1	no failure / interruption
	150-L2	no failure / interruption
	151-L3	no failure / interruption
	152-PEN	no failure / interruption
S39	153-L1	no failure / interruption
	154-L2	no failure / interruption
	155-L3	no failure / interruption
	156-PEN	no failure / interruption
S40	157-L1	no failure / interruption
	158-L2	no failure / interruption
	159-L3	no failure / interruption
	160-PEN	no failure / interruption

Specimen 31: cables FLAME-X 950 Enhanced 2x1,0 + ECC
Specimen 32: cables FLAME-X 950 4x4,0 + ECC
Specimen 33: cables FLAME-X 950 2x1,0 + ECC
Specimen 34: cables FLAME-X 950 Enhanced 4x4,0 + ECC
Specimen 35: cables FLAME-X 950 Enhanced 2x1,0 + ECC
Specimens 36, 37: cables NHXCH 4x1,5/1,5 FE 180 E90
Specimens 38, 39: cables NHXH 4x1,5 FE 180 E90
Specimen 40: cable NHXCH 4x1,5/1,5 FE 180 E90

x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable

Power cables were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Circuit breakers with rating 3 A were used.

Measured time of tested specimens from S41 to S51

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S41	161-L1	no failure / interruption
	162-L2	no failure / interruption
	163-L3	no failure / interruption
	164-PEN	no failure / interruption
S42	165-L1	no failure / interruption
	166-L2	no failure / interruption
	167-L3	no failure / interruption
	168-PEN	no failure / interruption
S43	169-L1	no failure / interruption
	170-L2	no failure / interruption
	171-L3	no failure / interruption
	172-PEN	no failure / interruption
S44	173-L1	no failure / interruption
	174-L2	no failure / interruption
	175-L3	no failure / interruption
	176-PEN	no failure / interruption
S45	177-L1	no failure / interruption
	178-L2	no failure / interruption
	179-L3	no failure / interruption
	180-PEN	no failure / interruption
S46	181-L1	no failure / interruption
	182-L2	no failure / interruption
	183-L3	no failure / interruption
	184-PEN	no failure / interruption
S47	185-L1	no failure / interruption
	186-L2	no failure / interruption
	187-L3	no failure / interruption
	188-PEN	no failure / interruption
S48	189-L1	no failure / interruption
	190-L2	no failure / interruption
	191-L3	no failure / interruption
	192-PEN	no failure / interruption
S49	193-L1	83:30
	194-L2	---
	195-L3	---
	196-PEN	x
S50	197-L1	no failure / interruption
	198-L2	no failure / interruption
	199-L3	no failure / interruption
	200-PEN	no failure / interruption
S51	201L1	no failure / interruption
	202-L2	no failure / interruption
	2039-L3	no failure / interruption
	204-PEN	no failure / interruption

Specimen 41: cable NHXCH 4x1,5/1,5 FE 180 E90
Specimens 42, 43: cables NHXCH 4x50/25 FE 180 E90
Specimens 44, 45: cables NHXH 4x1,5 FE 180 E90
Specimens 46, 47: cables NHXH 4x50 FE 180 E90
Specimen 48: cables FLAME-X 950 4x4,0 + ECC
Specimen 49: cables FLAME-X 950 2x1,0 + ECC
Specimen 50: cables FLAME-X 950 Enhanced 4x4,0 + ECC
Specimen 51: cables FLAME-X 950 Enhanced 2x1,0 + ECC

x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable

Power cables were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Circuit breakers with rating 3 A were used.

Measured time of tested specimens from S52 to S55

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S52A	209-L	no failure / interruption
	210-PEN	no failure / interruption
S52B	211-L	no failure / interruption
	212-PEN	no failure / interruption
S53A	213-L	no failure / interruption
	214-PEN	no failure / interruption
S53B	215-L	no failure / interruption
	216-PEN	no failure / interruption
S54A	217-L	no failure / interruption
	218-PEN	no failure / interruption
S54B	219-L	no failure / interruption
	220-PEN	no failure / interruption
S55A	221-L	no failure / interruption
	222-PEN	no failure / interruption
S55B	223-L	no failure / interruption
	224-PEN	no failure / interruption

Specimens 52: cables JE-H(St)H Bd 1x2x0,8 FE 180/E90
Specimens 53: cables JE-H(St)H Bd 1x2x0,8 FE 180/E90
Specimens 54: cables JE-H(St)H Bd 1x2x0,8 FE 180/E90
Specimens 55: cables JE-H(St)H Bd 1x2x0,8 FE 180/E90

x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable

Signal cables were tested by three-phase voltage supply 1 x 110V with LED diods 3V / 0,03W.
Circuit breakers with rating 3 A were used.

PHOTOS

Photo taken before the test

Photo taken before the test

Photo taken before the test

PHOTOS

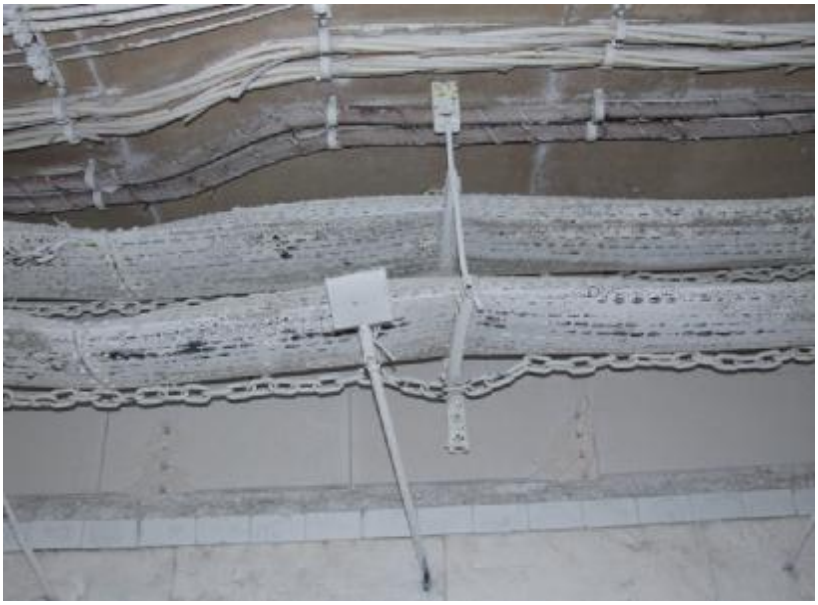


Photo taken after the test

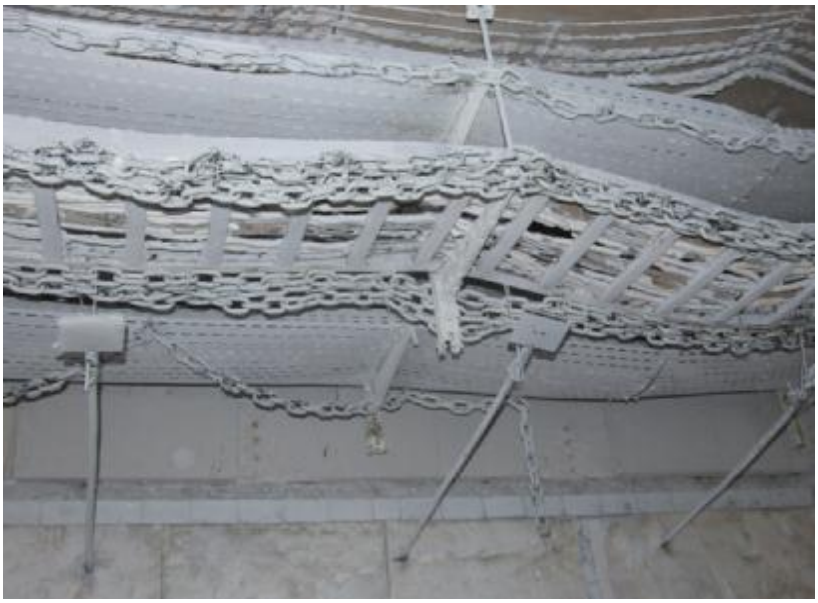
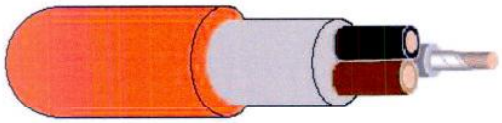


Photo taken after the test

Photo taken after the test

FLAME-X 950
NHXH FE180/E90 0,6/1kV

DIN VDE 0266, DIN 4102-12
RoHS Directive 2002/95/CE, Low-Voltage Directive 2006/95/EC



Halogen- free low smoke fire resistant security power cables

Construction

Conductors:	bare copper conductor, circular solid class 1 (RE) or stranded circular or circular compacted class 2 (RM) according to EN 60228
Primary insulation:	A suitable wrapping of mica tape with a glass cloth
Insulation:	special fire resistant cross-linked compound
Inner covering:	special flame-retardant and halogen-free compound
Sheath:	thermoplastic halogen- free compound type HM4 according to HD 604 S1
Colour of sheath:	orange

Core identification: according to HD 308 S2

	NHXH-O FE180/E90 without protective conductor	**NHXH-J FE180/E90 with protective conductor**
1-core:	black	green-yellow
2-core:	blue, brown	—
3-core:	brown, black, grey	green-yellow, blue, brown
4-core:	blue, brown, black, grey	green-yellow, brown, black, grey
5-core:	blue, brown, black, grey, black	green-yellow, blue, brown, black, grey
more 5-core:	black with numbering	green-yellow, others cores black with numbering

Maximum conductor operating temperature: +90°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: +250°C

Minimum bending radius: 15D - for single core cable; 12D - for multicore cable (D - overall cable diameter)

Maximum permissible tensile stress with cable grip for Cu-conductor: 50 N/mm²

Insulation integrity FE 180: DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21

System integrity E90: DIN 4102-12 (90 min.)

Flame propagation: DIN EN 50266-2-2, VDE 0482-266-2-2, IEC 60332-3-22

Smoke density: DIN EN 61034-2, VDE 0482-1034-2, IEC 61034-2

Gases evolved during combustion: DIN EN 50267-2-2, VDE 0482-267-2-2, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 2,5 µS/mm

Application: Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.

Standard packing: 500 m on drums. Other forms of packing and delivery are available on request.

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Dátum/Date 14.12.2009
Podpis/Signature

Dokument č./Document No. FIRES-FR-201-09-ANNEX

Príloha č./Appendix No. 11

FLAME-X 950
NHXH FE180/E90 0,6/1kV

TF Kable

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm²	mm	kg/km	Ω/km
1 x 1,5RE	8,2	86	12,1
1 x 2,5RE	8,6	101	7,41
1 x 4RE	9,0	120	4,61
1 x 6RE	9,5	144	3,08
1 x 10RE	10,3	191	1,83
1 x 16RM	11,6	263	1,15
1 x 25RM	13,4	376	0,727
1 x 35RM	14,5	478	0,524
1 x 50RM	16,4	628	0,387
1 x 70RM	17,9	842	0,268
1 x 95RM	20,7	1143	0,193
1 x 120RM	22,1	1387	0,153
1 x 150RM	24,6	1703	0,124
1 x 185RM	26,7	2089	0,0991
1 x 240RM	30,0	2685	0,0754
1 x 300RM	32,6	3318	0,0601
1 x 400RM	37,2	4279	0,0470
2 x 1,5RE	15,8	334	12,1
2 x 2,5RE	16,6	380	7,41
2 x 4RE	17,5	441	4,61
2 x 6RE	18,5	514	3,08
2 x 10RE	20,0	649	1,83
2 x 16RM	22,7	874	1,15
2 x 25RM	26,3	1226	0,727
3 x 1,5RE	16,6	369	12,1
3 x 2,5RE	17,5	425	7,41
3 x 4RE	18,4	500	4,61
3 x 6RE	19,5	592	3,08
3 x 10RE	21,2	765	1,83
3 x 16RM	24,0	1042	1,15
3 x 25RM	27,9	1479	0,727
3 x 35RM	30,2	1847	0,524
3 x 50RM	34,9	2480	0,387
3 x 70RM	38,0	3223	0,268
3 x 95RM	43,8	4346	0,193
3 x 120RM	47,2	5263	0,153
3 x 150RM	52,4	6467	0,124
3 x 185RM	57,6	7963	0,0991
3 x 240RM	64,6	10187	0,0754
4 x 1,5RE	18,0	432	12,1
4 x 2,5RE	19,0	502	7,41
4 x 4RE	20,1	597	4,61
4 x 6RE	21,2	711	3,08
4 x 10RE	23,2	929	1,83
4 x 16RM	26,3	1278	1,15
4 x 25RM	30,7	1828	0,727
4 x 35RM	33,4	2311	0,524
4 x 50RM	38,6	3103	0,387
4 x 70RM	42,1	4058	0,268

FLAME-X 950
NHXH FE180/E90 0,6/1kV

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm²	mm	kg/km	Ω/km
4 x 95RM	48,9	5531	0,193
4 x 120RM	52,5	6675	0,153
4 x 150RM	58,6	8236	0,124
4 x 185RM	63,8	10071	0,0991
4 x 240RM	71,9	12936	0,0754
5 x 1,5RE	19,6	507	12,1
5 x 2,5RE	20,6	590	7,41
5 x 4RE	21,8	706	4,61
5 x 6RE	23,2	847	3,08
5 x 10RE	25,3	1115	1,83
5 x 16RM	28,9	1543	1,15
5 x 25RM	33,9	2232	0,727
5 x 35RM	37,2	2850	0,524
5 x 50RM	42,7	3795	0,387
5 x 70RM	46,8	5004	0,268
5 x 95RM	54,2	6786	0,193
5 x 120RM	58,5	8259	0,153
5 x 150RM	65,0	10139	0,124
5 x 185RM	71,1	12444	0,0991
5 x 240RM	80,1	15990	0.0754
7 x 1,5RE	21,2	598	12,1
7 x 2,5RE	22,3	704	7,41
7 x 4RM	24,7	897	4,61
8 x 1,5RE	22,8	664	12,1
10 x 1,5RE	26,6	843	12,1
10 x 1,5RM	27,4	880	12,1
10 x 2,5RE	28,1	996	7,41
12 x 1,5RE	27,4	924	12,1
12 x 2,5RE	29,0	1100	7,41
14 x 1,5RE	28,8	1024	12,1
14 x 2,5RE	30,5	1225	7,41
19 x 1,5RE	32,0	1280	12,1
19 x 2,5RE	34,3	1578	7,41
20 x 1,5RE	33,8	1391	12,1
20 x 1,5RM	34,9	1453	12,1
24 x 1,5RE	38,0	1662	12,1
24 x 2,5RE	40,5	2018	7,41
30 x 1,5RE	40,4	1952	12,1
30 x 2,5RE	42,9	2362	7,41

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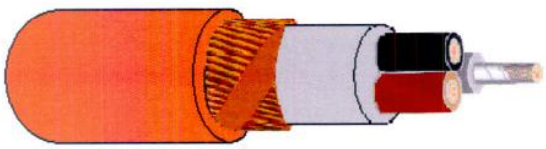
FLAME-X 950

NHXCH FE180/E90 0,6/1kV

DIN VDE 0266
DIN 4102-12



Halogen- free low smoke fire resistant security power cables with copper concentric conductor

Conductors:	bare copper conductor, circular solid class 1 (RE) or stranded circular or circular compacted class 2 (RM) acc. to EN 60228
Primary insulation:	A suitable wrapping of mica tape with a glass cloth
Insulation:	special cross-linked compound
Inner covering:	special flame-retardant and halogen-free compound
Concentric conductor:	inner layer - round copper wires, outer layer - copper tape
Separator:	tape
Sheath:	thermoplastic halogen- free compound type HM4 acc. to DIN VDE 0276-604
Colour of sheath:	orange

Core identification: acc. to HD 308 S2

2-core:	blue, brown
3-core:	brown, black, grey
3 core:*	blue, brown, black
4-core:	blue, brown, black, grey
5-core:	blue, brown, black, grey, black
≥ 7-core:	black with numbering

* For certain application only.

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Dokument č. Document No. FIRES-FR-201-09-ANKE

Príloha č./Appendix No. 14

Maximum conductor operating temperature: +90°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: +250°C

Minimum bending radius: 15 x D - for single core cable; 12 x D - for multicore cable (D is the overall diameter of the cable)

Maximum permissible tensile stress with cable grip for Cu-conductor: 50 N/mm², calculated for the nominal sum of cross-sections of the inner conductors; the cross-section of the concentric conductors not be considered.

Insulation integrity FE 180: DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21

System integrity E90: DIN VDE 4102-12 (90 min.)

Flame propagation: DIN VDE 0482-266-2-2, DIN EN 50266-2-2, IEC 60332-3 -22

Smoke density: DIN VDE 0472-1034-2 , IEC 61034-2

Gases evolved during combustion: VDE 0482-267-2-2, DIN EN 50267-2-2 , IEC 60754-2: pH ≥ 4,3; conductivity ≤ 2,5 µS/mm

Application:	Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.
Standard length cable packing:	500 m on drums. Other forms of packing and delivery are available on request.

FLAME-X 950

NHXCH FE180/E90 0,6/1kV

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm²	mm	kg/km	Ω/km
2 x 1,5 RE/1,5	17,5	393	12,1 / 12,1
2 x 2,5 RE//2,5	18,3	447	7,41 / 7,41
2 x 4 RE/4	19,6	530	4,61 / 4,61
2 x 6 RE/6	20,9	624	3,08 / 3,08
2 x 10 RE/10	22,6	799	1,83 / 1,83
2 x 16 RM/16	25,7	1089	1,15 / 1,15
2 x 25 RM/16	29,4	1450	0,727 / 1,15
2 x 35 RM/16	31,5	1740	0,524 / 1,15
3 x 1,5 RE/1,5	18,4	430	12,1 / 12,1
3 x 2,5 RE/2,5	19,2	494	7,41 / 7,41
3 x 4 RE/4	20,6	592	4,61 / 4,61
3 x 6 RE/6	21,9	704	3,08 / 3,08
3 x 10 RE/10	23,7	916	1,83 / 1,83
3 x 16 RM/16	27,1	1260	1,15 / 1,15
3 x 25 RM/16	31,0	1708	0,727 / 1,15
3 x 35 RM/16	33,3	2082	0,524 / 1,15
3 x 50 RM/25	38,0	2827	0,387 / 0,727
3 x 70 RM/35	41,7	3686	0,268 / 0,524
3 x 95 RM/50	47,6	4958	0,193 / 0,387
3 x 120 RM/70	51,7	6114	0,153 / 0,268
3 x 150 RM/70	56,9	7344	0,124 / 0,268
3 x 185RM/95	62,0	9100	0,0991 / 0,193
4 x 1,5 RE/1,5	19,8	496	12,1 / 12,1
4 x 2,5 RE/2,5	20,7	573	7,41 / 7,41
4 x 4 RE/4	22,1	690	4,61 / 4,61
4 x 6 RE/6	23,4	824	3,08 / 3,08
4 x 10 RE/10	25,7	1084	1,83 / 1,83
4 x 16 RM/16	29,4	1501	1,15 / 1,15
4 x 25 RM/16	34,0	2079	0,727 / 1,15
4 x 35 RM/16	35,9	2549	0,524 / 1,15
4 x 50 RM/25	41,7	3463	0,387 / 0,727
4 x 70 RM/35	45,7	4535	0,268 / 0,524
4 x 95 RM/50	52,8	6170	0,193 / 0,387
4 x 120 RM/70	57,0	7552	0,153 / 0,268
4 x 150 RM/70	63,2	9175	0,124 / 0,268
4 x 185 RM/95	68,5	11270	0,0991 / 0,193
4 x 240 RM/120	76,6	14410	0,0754 / 0,153
5 x 1,5 RE/2,5	21,3	580	12,1 / 7,41
5 x 2,5 RE/2,5	22,4	665	7,41 / 7,41
5 x 4 RE/4	23,9	804	4,61 / 4,61
5 x 6 RE/6	25,3	963	3,08 / 3,08
5 x 10 RE/10	27,8	1274	1,83 / 1,83
5 x 16 RM/16	31,9	1771	1,15 / 1,15
5 x 25 RM/16	36,4	2472	0,727 / 1,15
5 x 35 RM/16	39,9	3119	0,524 / 1,15
5 x 50 RM/25	45,8	4169	0,387 / 0,727
5 x 70 RM/35	50,8	5548	0,268 / 0,524
5 x 95 RM/50	58,2	7471	0,193 / 0,387

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Dátum/Date 14.12.2009

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Dokument č. / Document No. FIRES-FR-201-09-AMLE

Príloha č./Appendix No. 15

(N)HXCH FE180/E90/06-2009/IH

FLAME-X 950

NHXCH FE180/E90 0,6/1kV

TF Kable

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm^2	mm	kg/km	Ω/km
7 x 1,5 RE/2,5	22,9	674	12,1 / 7,41
7 x 2,5 RE/2,5	24,1	783	7,41 / 7,41
7 x 4 RM/4	26,7	998	4,61 / 4,61
10 x 1,5 RE/2,5	28,3	929	12,1 / 7,41
10 x 2,5 RE/4	30,1	1106	7,41 / 4,61
12 x 1,5 RE/2,5	29,2	1012	12,1 / 7,41
12 x 2,5 RE/4	31,0	1212	7,41 / 4,61
16 x 2,5 RE/6	34,5	1528	7,41 / 3,08
19 x 1,5 RE/4	34,2	1415	12,1 / 4,61
19 x 2,5 RE/6	36,6	1741	7,41 / 3,08
21 x 1,5 RE/6	36,0	1545	12,1 / 3,08
21 x 2,5 RE/10	38,6	1935	7,41 / 1,83
24 x 1,5 RE/6	40,3	1836	12,1 / 3,08
24 x 2,5 RE/10	42,8	2235	7,41 / 1,83

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FLAME-X 950

JE-H(St)H...Bd FE180/E90

TF Kable

Adapted to DIN VDE 0815

Halogen- free low smoke fire resistant wiring cables for telecommunication and data processing systems

CONSTRUCTION

Conductors: bare solid copper conductor 0,8 mm

Insulation: special core insulation with mica tape and halogen-free cross-linked compound type HI1 acc. to DIN VDE 0207-23

Pair: two cores twisted to pair and each 4 pairs consist to unit

Separator: polyester tape

Screen: aluminium/polyester laminated tape and solid copper drain wire

Drain wire: solid tinned annealed copper wire 0,8 mm

Sheath: thermoplastic halogen-free, flame retardant compound type HM2 acc. to DIN VDE 0207-24

Colour of sheath: grey, orange or red

Identification of pairs:

Pair no.	a-wire	b-wire
1	blue	red
2	grey	yellow
3	green	brown
4	white	black

Two-pair cables shall be cabled in quad formation and colour coded: blue, yellow, red, grey

TECHNICAL DATA

Operating voltage: peak voltage max. 225V (not for purposes of high current and power installation)

Loop resistance: maximum 73,2 Ω/km

Insulation resistance at temperature 20°C: minimum 100 MΩ x km

Mutual capacitance: maximum 120 nF/km at 800 Hz (this values may be extended at 20% with a make-up up to 4 pairs)

Capacitance unbalance: maximum 200 pF/100 m at 800 Hz (20% of the values, but one value up to 400 pF is allowed)

Test voltage 50 Hz: core/core – 500V; core/screen – 2000V

Temperature range:

flexing:: - 5°C to + 50°C

fixed installation - 30°C to + 70°C

Minimum bending radius: 6 x D (D is the overall diameter of the cable)

Insulation integrity FE 180: DIN VDE 0472-814 (800°C, 180 minutes), IEC 60331

System integrity E90: DIN VDE 4102-12 (90 min.)

Flame retardant: VDE 0482-266-2-4, DIN EN 50266-2-4 (IEC 60332-3 Category C)

Smoke density: VDE 0482-1034-2, DIN EN 61034-2 (IEC 61034-2: light transmittance values > 70%)

Gases evolved during combustion: VDE 0482-267-2-2, DIN EN 50267-2-2(IEC 60754-2: pH ≥ 3,5; conductivity ≤ 100 $\mu S \cdot cm^{-1}$)

Application: Fire resistant, halogen-free static screened installation cables for telecommunication purpose. The static screen prevents strong interference impulse. Suitable for fixed installation everywhere, where in case of fire human life and material assets are to be protected, e.g. in industrial complexes, public buildings, hotels, airports, under ground railway networks, hospitals. Not for purposes of high current and power installation.

Standard length cable packing: 500 m on drums. Other forms of packing and delivery are available on request.

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FIRE RESISTANCE

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Dokument č. Document No. FIRES-FR-201-09-ANKE

Príloha č./Appendix No. 17

FLAME-X 950

JE-H(St)H...Bd FE180/E90

Adapted to DIN VDE 0815

Number pairs and diameter of conductor n x 2 x mm	Approximate overall diameter mm	Approximate net weight of cable kg/km
1 x 2 x 0,8	10,5	105
2 x 2 x 0,8	11,9	151
4 x 2 x 0,8	18,3	277

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Dokument č. / Document No. FIRES-FR-201-09-AWE

Príloha č./Appendix No. 18

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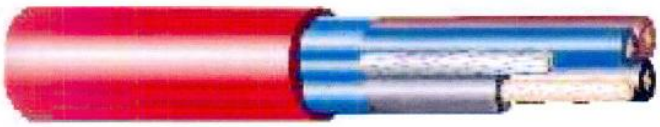
FLAME-X 950

300/500V

TF Kable

Standards: ZN-TF-208
BS 7629

HDGs, HLGs, HLgGs
HDGsekwf, HLGsekwf, HLgGsekwf



Halogen-free low smoke fire resistant cables

Type of FLAME-X 950 cables:

HDGs	cable with solid copper conductors (D), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H)
HLGs	cable with stranded copper conductors (L), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H)
HLgGs	cable with stranded flexible copper conductors (Lg), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H)
HDGsekwf	cable with solid copper conductors (D), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H), with electrostatic screen of aluminium/polyester laminated tape (ekwf)
HLGsekwf	cable with stranded copper conductors (L), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H), with electrostatic screen of aluminium/polyester laminated tape (ekwf)
HLgGsekwf	cable with stranded flexible copper conductors (Lg), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H), with electrostatic screen of aluminium/polyester laminated tape (ekwf)

Construction:

Conductors:	circular copper class 1, circular stranded copper class 2 or circular flexible stranded copper class 5 acc. to EN 60228
Drain wire:	tinned annealed copper wires class 1 or stranded class 2 acc. to EN 60228
Insulation:	special cross-linked heat resistant compound type EI2 FR acc. to EN 50363.1
Optional binder:	non hygroscopic halogen free tape
Screen:	aluminium/polyester laminated tape and drain wire (ekwf)
Outer sheath:	thermoplastic zero halogen low smoke compound acc. to ZN-TF-208
Colour of sheath:	red
Core identification:	acc. to HD 308 S2
Fire resistant:	IEC 60331: 3h at 750°C EN 50200 – **PH 90** (for cables with overall diameter ≤ 20 mm) BS 6387 Category **C** – resistance to fire: 3 h at 950°C Category **W** – resistance to fire with water: 15 min at 650°C plus 15 min with water spray Category **Z** – resistance to fire with mechanical shock: 15 min at 950°C
Flame retardant:	IEC 60332-3-22 Category A, (EN 50266-2-2)
Smoke emission:	IEC 61034-2, BS EN 61034-2: transmittance values > 70%
Gases evolved during combustion:	IEC 60754-1, EN 50267-2-1: < 0,5% acid gas IEC 60754-2, EN 50267-2-2: pH ≥ 4,3; conductivity ≤ 10 μSmm^{-1}
Application:	Installations emergency lighting and evacuation systems, fire and smoke detection systems air-conditioning and alarm systems, automatic elevator doors, computer control rooms, offshore and marine emergency systems, emergency evacuation communicators.

Maximum conductor operating temperature: +90°C
Lowest temperature ambient for fixed installation: -25°C
Lowest installation temperature: -10°C
Maximum short-circuit conductor temperature: +250°C
Minimum bending radius: 6 D (D is the overall diameter of the cable)

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Dokument č./Document No. FIRES - FR-201-09-NAVE
Príloha č./Appendix No. 19

FLAME-X 950

300/500V

TF kable

Number and cross-sectional area of conductor	Approximate overall diameter			Approximate net weight of cables		
	HDGs	HLGs	HLgGs	HDGs	HLGs	HLgGs
n x mm²	mm			kg/km		
2 x 1	6,4	6,9	6,8	50	54	52
2 x 1,5	7,5	8,1	8,0	69	75	72
2 x 2,5	8,9	9,6	9,6	100	109	105
2 x 4	9,8	10,6	10,5	133	144	137
3 x 1	6,8	7,3	7,2	64	70	67
3 x 1,5	7,9	8,6	8,5	90	98	93
3 x 2,5	9,4	10,1	10,1	132	143	137
3 x 4	10,6	11,5	11,3	185	200	189
4 x 1	7,6	8,2	8,0	83	91	86
4 x 1,5	8,9	9,6	9,4	117	127	120
4 x 2,5	10,5	11,3	11,3	171	186	178
4 x 4	11,6	12,6	12,4	235	254	239
5 x 1	8,6	9,3	9,1	109	119	113
5 x 1,5	9,8	10,6	10,4	147	160	152
5 x 2,5	11,6	12,5	12,5	216	235	225
5 x 4	12,8	13,9	13,7	297	321	303
7 x 1	9,3	10,1	9,8	135	148	140
7 x 1,5	10,8	11,7	11,5	190	206	195
7 x 2,5	12,6	13,6	13,6	274	298	284
10 x 1	11,8	12,8	12,5	192	211	199
10 x 1,5	13,6	14,8	14,5	263	287	270
10 x 2,5	16,5	17,9	17,9	407	441	421
12 x 1	12,1	13,2	12,9	220	241	228
12 x 1,5	14,0	15,3	15,0	303	331	311
12 x 2,5	17,0	18,5	18,4	470	510	486
16 x 1	13,4	14,6	14,2	282	310	292
16 x 1,5	16,1	17,5	17,2	415	453	427
16 x 2,5	19,4	21,1	21,0	635	690	659
20 x 1	15,4	16,8	16,3	361	395	373
20 x 1,5	18,4	20,0	19,6	524	571	539
20 x 2,5	21,4	23,3	23,2	765	830	791
24 x 1	17,0	18,6	18,1	424	466	439
24 x 1,5	20,3	22,1	21,7	618	673	634
24 x 2,5	24,4	26,5	26,4	939	1019	972
30 x 1	18,6	20,2	19,7	535	587	553
30 x 1,5	21,4	23,4	23,0	742	808	760
30 x 2,5	25,8	28,0	27,9	1132	1228	1168
37 x 1	19,9	21,7	21,2	638	699	659
37 x 1,5	23,7	25,8	25,3	922	1004	945
37 x 2,5	27,7	30,2	30,1	1360	1476	1402

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Dokument č. / Document No. FIRES-FR-201-09-ANNEX

Príloha č./Appendix No. 20

FLAME-X 950

300/500V

TF Kable

Number and cross-sectional area of conductor	Approximate overall diameter			Approximate net weight of cables		
	HDGsekwf	HLGsekwf	HLgGsekwf	HDGsekwf	HLGsekwf	HLgGsekwf
n x mm²	mm			kg/km		
2 x 1	7,1	7,4	7,3	65	68	65
2 x 1,5	8,2	8,6	8,5	90	94	89
2 x 2,5	9,6	10,1	10,1	130	137	131
2 x 4	10,5	11,1	11,0	177	186	176
3 x 1	7,5	7,9	7,7	81	85	81
3 x 1,5	8,7	9,1	9,0	113	118	112
3 x 2,5	10,1	10,7	10,7	165	174	166
3 x 4	11,3	12,0	11,9	232	244	230
4 x 1	8,5	9,0	8,7	103	109	103
4 x 1,5	9,9	10,6	10,4	143	152	143
4 x 2,5	11,9	12,8	12,8	211	224	214
4 x 4	13,6	14,8	14,6	291	310	291
5 x 1	10,4	10,8	10,6	132	139	129
5 x 1,5	11,6	12,1	12,0	171	181	169
5 x 2,5	13,4	14,0	14,0	244	258	245
5 x 4	14,6	15,4	15,3	326	346	323
7 x 1	11,2	11,7	11,4	161	169	158
7 x 1,5	12,7	13,3	13,1	219	230	215
7 x 2,5	14,5	15,2	15,2	306	324	306
10 x 1	14,0	14,6	14,3	226	238	222
10 x 1,5	15,8	16,6	16,3	300	316	296
10 x 2,5	18,7	19,7	19,7	450	476	453
12 x 1	14,4	15,0	14,7	257	271	253
12 x 1,5	16,3	17,1	16,8	344	363	340
12 x 2,5	19,3	20,3	20,3	518	548	521
16 x 1	15,8	16,6	16,2	327	346	324
16 x 1,5	18,5	19,5	19,2	468	495	465
16 x 2,5	21,8	23,0	23,0	698	740	705
20 x 1	18,0	18,8	18,4	416	439	412
20 x 1,5	21,0	22,0	21,7	589	622	585
20 x 2,5	24,0	25,4	25,3	838	887	844
24 x 1	19,8	20,8	20,3	488	515	483
24 x 1,5	23,1	24,3	23,9	692	730	687
24 x 2,5	27,2	28,7	28,6	1027	1087	1036
30 x 1	21,5	22,5	22,0	612	646	608
30 x 1,5	24,4	25,6	25,3	828	874	822
30 x 2,5	28,7	30,3	30,2	1233	1306	1243
37 x 1	23,0	24,1	23,6	727	768	722
37 x 1,5	26,8	28,2	27,7	1027	1084	1021
37 x 2,5	30,8	32,6	32,5	1479	1566	1489

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Príloha č./Annex No. 21

HDGs, HLGs, HLgGs/04-2009/G

Electrical data

Minimum insulation resistance at temperature 20°C: 100 MΩ·km
Maximum L/R ratio and capacitance:

Nominal area of conductor	Maximum L/R ratio	Capacitance core - core	Capacitance core - screen
mm²	µH/Ω	pF/m	pF/m
1	25	100	175
1,5	40	102	180
2,5	50	115	205

Maximum conductor resistance at temperature 20°C:

Nominal area of conductor	Conductor class 1		Conductor class 2		Conductor class 5	
	Plain wires	Tinned wires	Plain wires	Tinned wires	Plain wires	Tinned wires
mm²	Ω/km		Ω/km		Ω/km	
1	18,1	18,2	18,1	18,2	19,5	20,0
1,5	12,1	12,2	12,1	12,2	13,3	13,7
2,5	7,41	7,56	7,41	7,56	7,98	8,21
4	4,61	4,70	4,61	4,70	4,95	5,09

Current rating

Ambient air temperature: 30°C. Conductor operating temperature: 90°C.
Current rating to IEC 60364-5-523

Cable clipped direct to or lying on a non-metallic surface				
Nominal area of conductor	One twin cable single phase AC or DC		One 3 or 4 core cable, 3 phase	
	Current rating	Volts drop per amp par metre	Current rating	Volts drop per amp par metre
mm²	A	mV/ m	A	mV/ m
1,0	19	46	17	40
1,5	24	31	22	27
2,5	33	19	30	16
4,0	45	12	40	10

Cable in conduit on a wall or ceiling, or in trunking				
Nominal area of conductor	One twin cable single phase AC or DC		One 3 or 4 core cable, 3 phase	
	Current rating	Volts drop per amp par metre	Current rating	Volts drop per amp par metre
mm²	A	mV/ m	A	mV/ m
1,0	14,5	46	13	40
1,5	18,5	31	16,5	26
2,5	25	19	22	16
4,0	33	12	30	10

Rating factors for ambient temperature

Ambient temperature, °C	30	35	40	45	50	55	60	65	70	75	80
Rating factor	1,00	0,96	0,91	0,87	0,82	0,76	0,71	0,65	0,58	0,50	0,41

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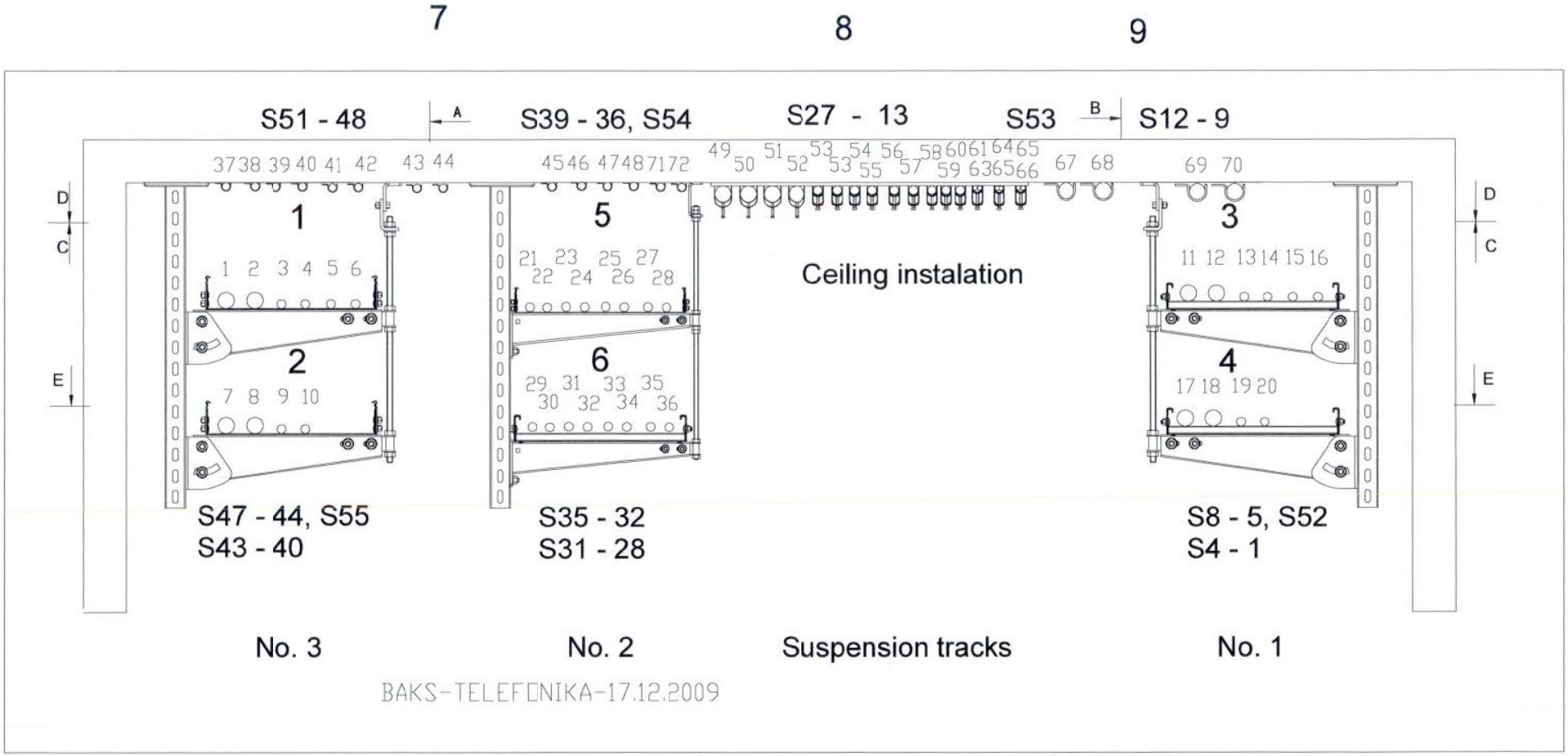

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FIRE RESISTANCE

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Dokument č./Document No. FIRES-FR-201-09-AJUE

Príloha č./Appendix No. 23

BAKS –TELE-FONIKA Badania FIRES Batizowce **Data 2009-12-17**

Nr Baks	*Nr FIRES*	*Pozycja*	*Symbol kabla*	*Konstrukcja mocowania, odległość, obciążenie*	*Uwagi*
1	47	1	NHXH FE 180 E90 4x 50	Korytko KCOP 400H 60/... B-400/ 1.5 m / 10kg/m / grubość blachy 1,5 mm Mocowanie: WPCO..., WUO 400, PGM10/..., uchwytu UPWO, Wieszak WPPOV Ocynk Sendzimira	
2	46		NHXH FE 180 E90 4x 50		
3	45		NHXH FE 180 E90 4x 1,5		
4	44		NHXH FE 180 E90 4x 1,5		
5	55B		JE-H(St)H Bd 1x2x0,8 FE180/E90		
6	55A		JE-H(St)H Bd 1x2x0,8 FE180/E90		
7	43	2	NHXCH FE 180 E90 4x 50/25	Korytko KCOP 400H 60/... B-400/ 1.5 m / 10kg/m / grubość blachy 1,5 mm Mocowanie: WPCO..., WUO 400, PGM10/..., uchwytu UPWO, Wieszak WPPOV Ocynk Sendzimira	
8	42		NHXCH FE 180 E90 4x 50/25		
9	41		NHXCH FE 180 E90 4x 1,50/1,5		
10	40		NHXCH FE 180 E90 4x 1,50/1,5		
11	8	3	NHXH FE 180 E90 4x 50	Korytko KCOP 300H 60/...F B-400/ 1.5 m / 10kg/m / grubość blachy 1,5 mm Mocowanie: WPCO..., WUO 400, PGM10/..., uchwytu UPWO, Wieszak WPPOV Ocynk ogniowy (pozink żarovy)	
12	7		NHXH FE 180 E90 4x 50		
13	6		NHXH FE 180 E90 4x 1,5		
14	5		NHXH FE 180 E90 4x 1,5		
15	52B		JE-H(St)H Bd 1x2x0,8 FE180/E90		
16	52A		JE-H(St)H Bd 1x2x0,8 FE180/E90		
17	4	4	NHXCH FE 180 E90 4x 50/25	Korytko KCOP 300H 60/...F B-400/ 1.5 m / 10kg/m / grubość blachy 1,5 mm Mocowanie: WPCO..., WUO 400, PGM10/..., uchwytu UPWO, Wieszak WPPOV Ocynk ogniowy (pozink żarovy)	
18	3		NHXCH FE 180 E90 4x 50/25		
19	2		NHXCH FE 180 E90 4x 1,50/1,5		
20	1		NHXCH FE 180 E90 4x 1,50/1,5		
21	35	5	FLAME-X 950 2x1,0+ECC E90	Korytko KCOP 400H 60/... B-400/ 1.5 m / 10kg/m / grubość blachy 1,5 mm Mocowanie: WPCO..., WMCO 400, PGM10/..., uchwytu UPWO, Wieszak USOV Kotwy PSRO M10 x 90	
22			FLAME-X 950 2x1,0+ECC E90		
23	34		FLAME-X 950 4x4RM+ECC E90		
24			FLAME-X 950 4x4RM+ECC E90		
25	33		FLAME-X 950 2x1,0+ECC E30		
26			FLAME-X 950 2x1,0+ECC E30		
27	32		FLAME-X 950 4x4RM+ECC E30		
28			FLAME-X 950 4x4RM+ECC E30		
29	31	6	FLAME-X 950 2x1,0+ECC E90	Drabinka 400H 60/... B-400/ 1.5 m / 20kg/m / grubość blachy 1,5 mm Mocowanie: WPCO..., WMCO 400, PGM10/..., uchwytu UPWO, Wieszak USOV Kotwy PSRO M10 x 90	
30			FLAME-X 950 2x1,0+ECC E90		
31	30		FLAME-X 950 4x4RM+ECC E90		
32			FLAME-X 950 4x4RM+ECC E90		
33	29		FLAME-X 950 2x1,0+ECC E30		
34			FLAME-X 950 2x1,0+ECC E30		
35	28		FLAME-X 950 4x4RM+ECC E30		
36			FLAME-X 950 4x4RM+ECC E30		
37	51	7	FLAME-X 950 2x1,0+ECC E90	Uchwyt UDF Śruba PSROM6x 40 Mocowanie co 0.6m	
38			FLAME-X 950 2x1,0+ECC E90		
39	50		FLAME-X 950 4x4RM+ECC E90		
40			FLAME-X 950 4x4RM+ECC E90		

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Nr Baks	*Nr FIRES*	*Pozycja*	*Symbol kabla*	*Konstrukcja mocowania, odległość, obciążenie*	*Uwagi*
41	49	7	FLAME-X 950 2x1,0+ECC E30		
42			FLAME-X 950 2x1,0+ECC E30		
43	48		FLAME-X 950 4x4RM+ECC E30		
44			FLAME-X 950 4x4RM+ECC E30		
45	39		NHXH FE 180 E90 4x 1,5		
46	38		NHXH FE 180 E90 4x 1,5		
47	37		NHXCH FE 180 E90 4x 1,50/1,5		
48	36		NHXCH FE 180 E90 4x 1,50/1,5		
71	54B		JE-H(St)H Bd 1x2x0,8 FE180/E90		
72	54A		JE-H(St)H Bd 1x2x0,8 FE180/E90		
49	27	8	NHXH FE 180 E90 4x 50	Uchwyt kablowy UKO1 + SDOP..... Śruba PSROM8x 70 Mocowanie co 0.6m	
50	26		NHXH FE 180 E90 4x 50		
51	25		NHXCH FE 180 E90 4x 50/25		
52	24		NHXCH FE 180 E90 4x 50/25		
53	23		NHXH FE 180 E90 4x 1,5		
54	22		NHXH FE 180 E90 4x 1,5		
55	21		NHXCH FE 180 E90 4x 1,50/1,5		
56	20		NHXCH FE 180 E90 4x 1,50/1,5		
57	19		FLAME-X 950 2x1,0+ECC E90		
58	18		FLAME-X 950 2x1,0+ECC E90		
59	17		FLAME-X 950 4x4RM+ECC E90		
60	16		FLAME-X 950 4x4RM+ECC E90		
61	15		FLAME-X 950 2x1,0+ECC E30		
62	14		FLAME-X 950 2x1,0+ECC E30		
63	13		FLAME-X 950 4x4RM+ECC E30		
64			FLAME-X 950 4x4RM+ECC E30		
65	53B		JE-H(St)H Bd 1x2x0,8 FE180/E90		
66	53A		JE-H(St)H Bd 1x2x0,8 FE180/E90		
67	12	9	NHXH FE 180 E90 4x 50	Uchwyt UDF Śruba PSROM6x 40 Mocowanie co 0.6m	
68	11		NHXH FE 180 E90 4x 50		
69	10		NHXCH FE 180 E90 4x 50/25		
70	9		NHXCH FE 180 E90 4x 50/25		

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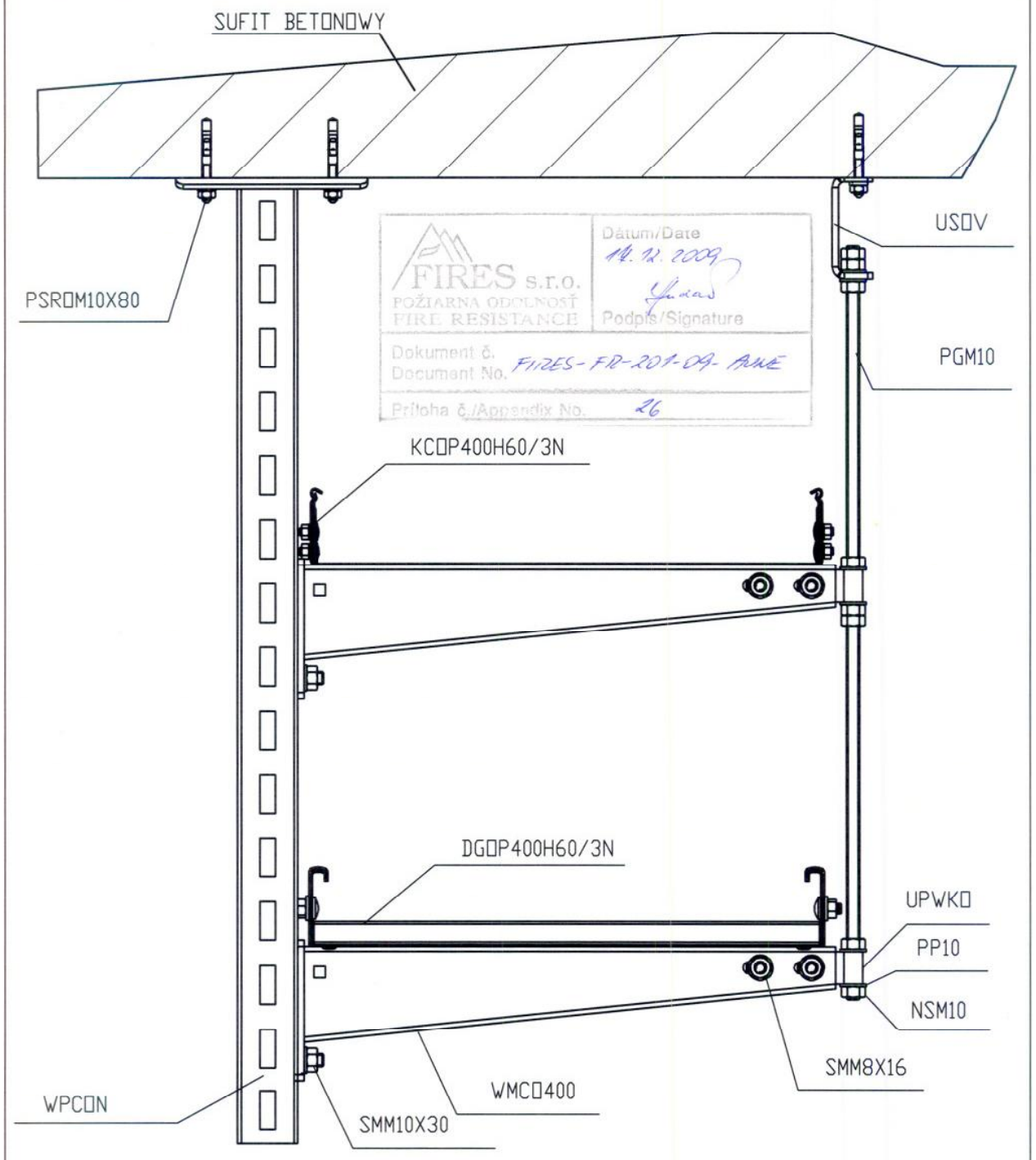
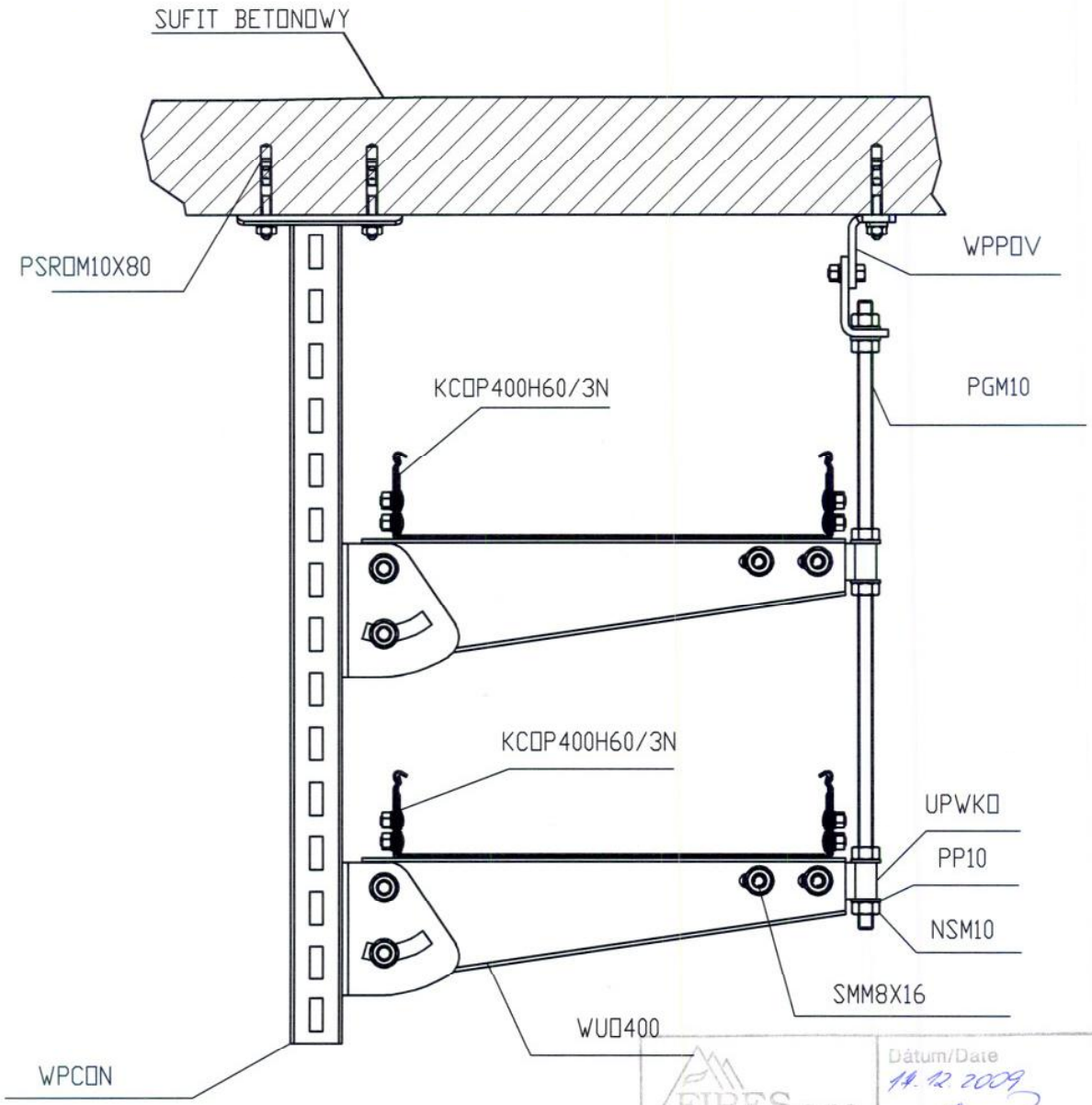
Wymiary kabli

Lp	Cable type	Average O.D.	Cable Weight	
1	NHXCH FE 180 E90 4x 50/25	42,5 mm	3,41 kg/m	
2	NHXCH FE 180 E90 4x 1,5/1,5	16,9 mm	0,404 kg/m	
3	NHXH FE 180 E90 4x 50	41,0 mm	3,39 kg/m	
4	NHXH FE 180 E90 4x 1,5	16,2 mm	0,354 kg/m	
5	JE-H(St)H Bd 1x2x0,8 FE180/E90	9,5 mm	0,103 kg/m	
6	FLAME-X 950 2x1,0+ECC E90	9,1 mm	0,12 kg/m	
7	FLAME-X 950 4x4RM+ECC E90	16,0 mm	0,42 kg/m	
8	FLAME-X 950 2x1,0+ECC E30	8,7mm	0,11 kg/m	
9	FLAME-X 950 4x4RM+ECC E30	14,8 mm	0,38 kg/m	



Odchyłka wymiarów nietolerowanych		Materiał: Gatunek		Masa [kg]	Podziałka 1:4	Format A4	
		Nr normy				Arkusz	
		półfabrykat (nr normy)				Arkuszy	
Projektował				Nazwa rysunku			
Rysował	Nazwisko: P.Okninski	Podpis	Data 09.12.2009	Rys.2 Konstr do badania			
Sprawdził	Jacek Kliczek					Nr zmiany	
Zatwierdził				Nr rysunku			

Profesjonalne Systemy Tras Kablowych



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	Dokładność wymiarów nietolerowanych		Materiał: Gatunek		Masa [kg]	Podziałka 1:4	Format A4
			Nr normy				Arkusz
			półfabrykat (nr normy)				Arkuszy
Projektował	Nazwisko		Podpis	Data	Nazwa rysunku		
Rysował	P.Okniński			09.12.2009	Rys.1 Konstr do badania		
Sprawdził	Jacek Kliczek						
Zatwierdził							Nr zmiany
Profesjonalne Systemy Tras Kablowych					Nr rysunku		

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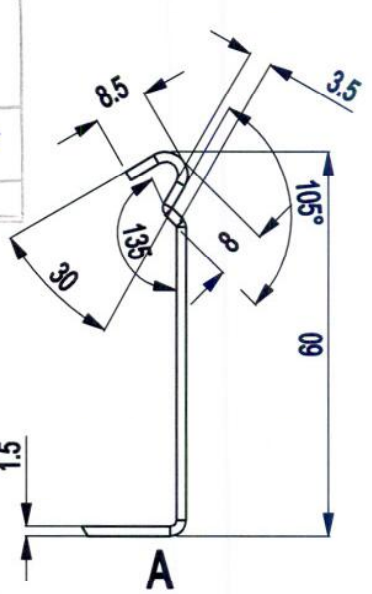
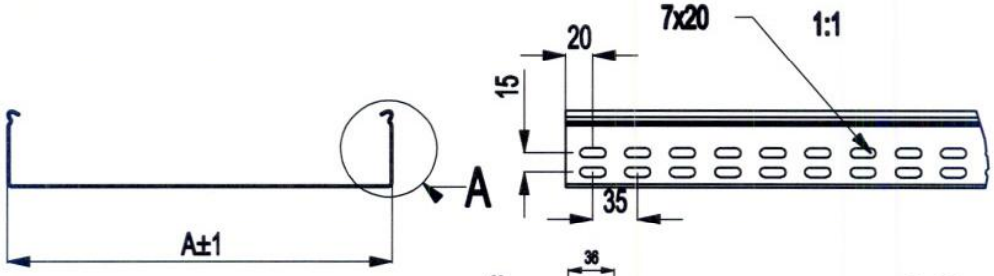
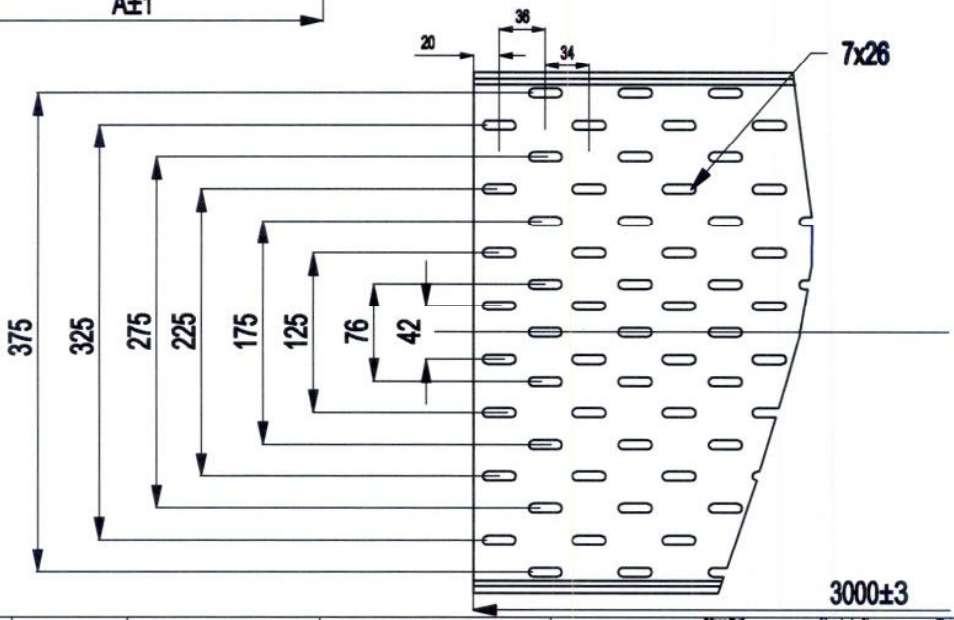
Príloha č./Appendix No. 28

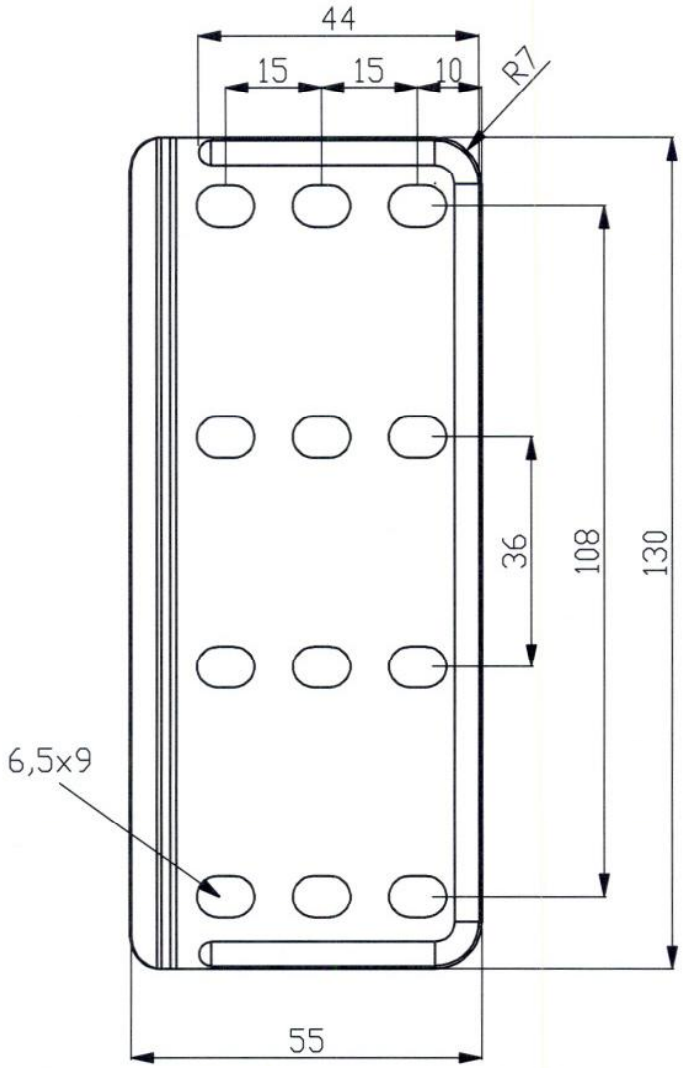
A	Typ
100	KC□P100H60/3N
200	KC□P200H60/3N
300	KC□P300H60/3N
400	KC□P400H60/3N

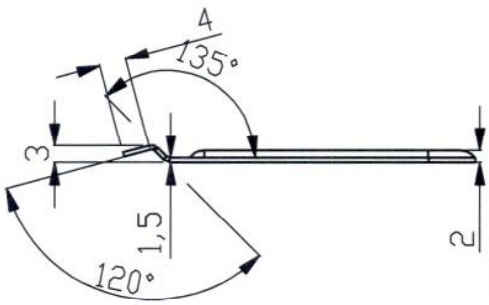






	Odchyłka wymiarów) nietolerowanych		Materiał	Gatunek		Podziałka	A4
				Nr normy	PN-EN 10142+A1:2007	1:5	
				półfabrykat (nr normy)			
Projektował							
Rysował	P.CHOIŃSKI					KC□P.....H60/3N	
Sprawdził							
Zatwierdził	J.KLICZEK			20.07.2009	Nr programu		Nr zmiany
	Profesjonalne Systemy Tras Kablowych						





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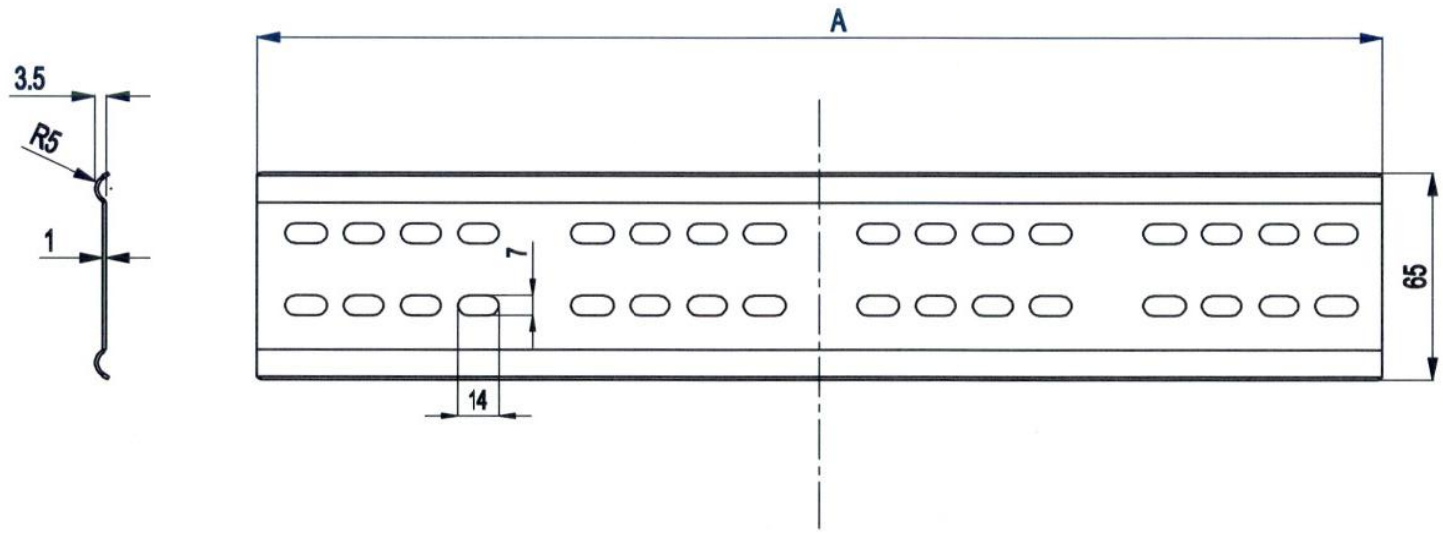
Príloha č./Appendix No. 29

	Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
				Nr normy	PN-EN 10142 + A1 : 1997		1:1	Arkusz
				półfabrykat (nr normy)				Arkuszy

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	J.GROCHOWSKI		20.10.05	LPONPH60
Rysował	J.Grochowski		20.10.05	
Sprawdził	T.WŁODARCZYK		20.10.05	
Zatwierdził	J.KLICZEK		20.10.05	Nr programu / Nr naszego programu: 860700

Nr zmiany

Profesjonalne Systemy Tras Kablowych



A	Typ	Nr.kat	Material
90	BL□100N		
190	BL□200N		
290	BL□300N		
390	BL□400N		

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Príloha č./Appendix No. 30

Odchyłka wymiarów) nietolerowanych

Materiał: Gatunek; Nr normy: PN-EN 10027:2005; półfabrykat (nr normy)

Masa [kg]

Podziałka 1:2

Format A4

Arkusz

Arkuszy

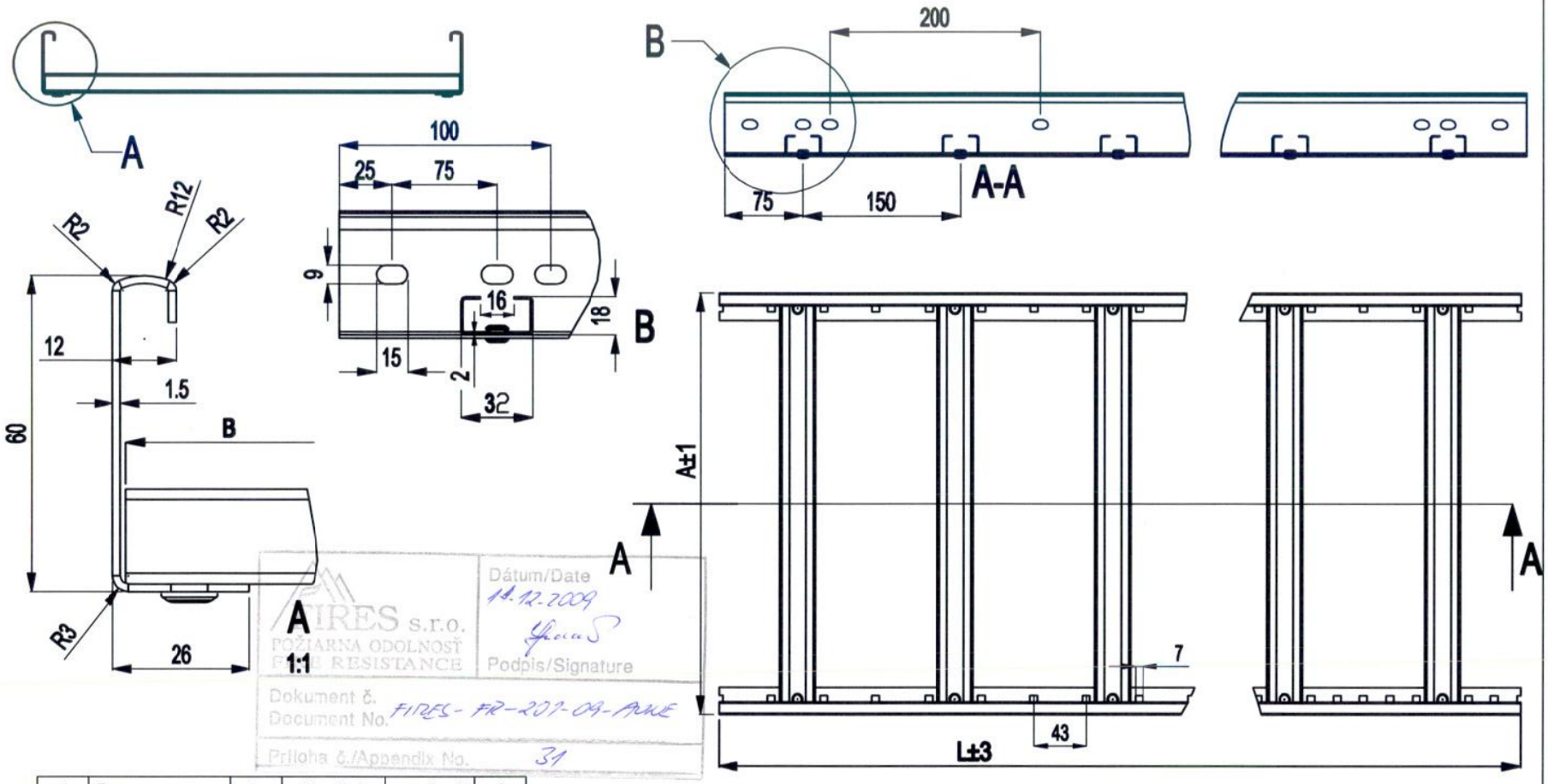
	Nazwisko	Podpis	Data
Projektował			
Rysował	J.Grochowski		
Sprawdził			
Zatwierdził	J.KLICZEK		20.07.2009

Nazwa rysunku: BLO.....N

Nr programu

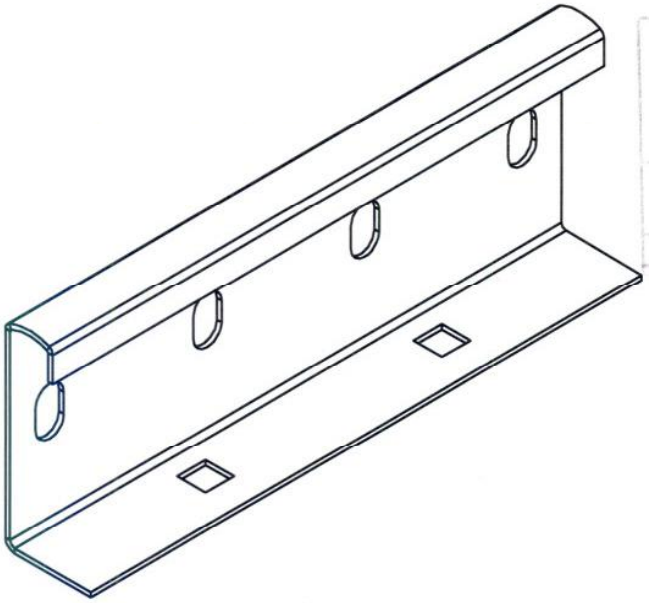
Nr zmiany

Profesjonalne Systemy Tras Kablowych



A	Typ	L	Nr. Kat	material	B
100	DGOP100H60/6N	6000	863010	[illegible]	95
200	DGOP200H60/6N	6000	863020	[illegible]	195
300	DGOP300H60/6N	6000	863030	[illegible]	295
400	DGOP400H60/6N	6000	863040	[illegible]	395
100	DGOP100H60/3N	3000	863013	[illegible]	95
200	DGOP200H60/3N	3000	863023	[illegible]	195
300	DGOP300H60/3N	3000	863033	[illegible]	295
400	DGOP400H60/3N	3000	863043	[illegible]	395

Dokładność wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka 1:5	Format A4
			Nr normy	[illegible]			Arkusz
			półfabrykat (nr normy)				Arkuszy
Projektował							
Rysował	PIOTR OKOŃSKI	Podpis		Data 18.06.2009	Nazwa rysunku DGOP...H60/3N		
Sprawdził							
Zatwierdził	J.KLICZEK						Nr zestawu
BAKS Regionalne Systemy Tras Kablowych					Nr rysunku ---		



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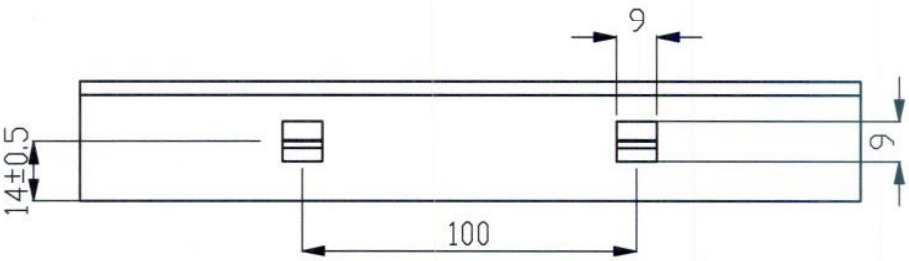
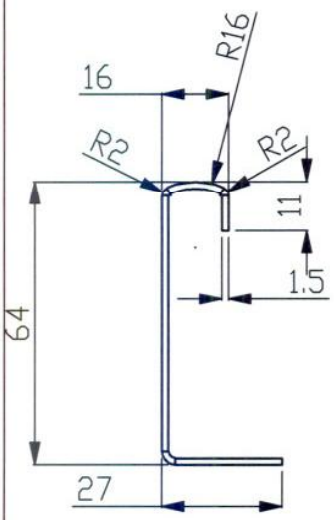
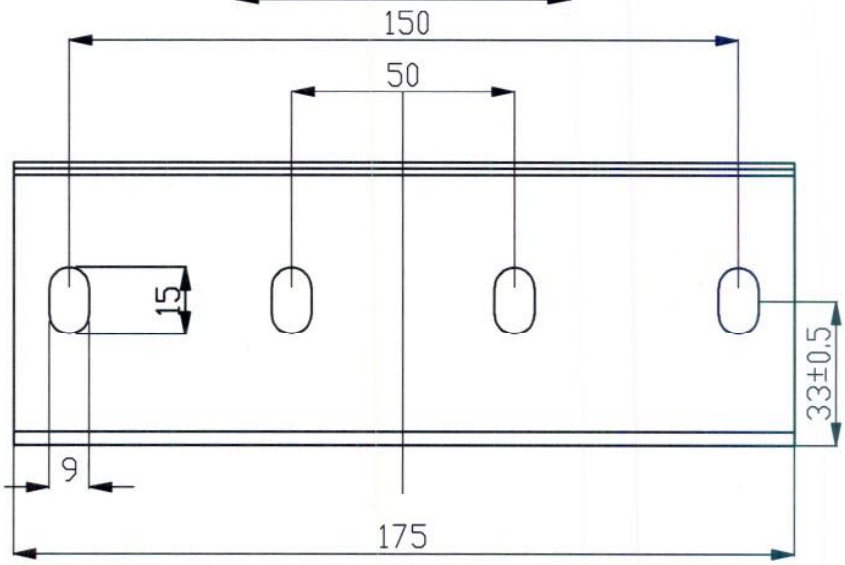
Príloha č./Appendix No. 32





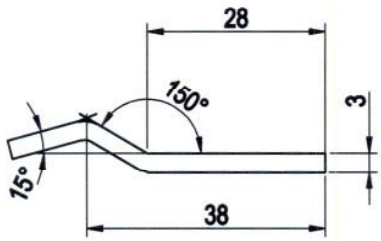


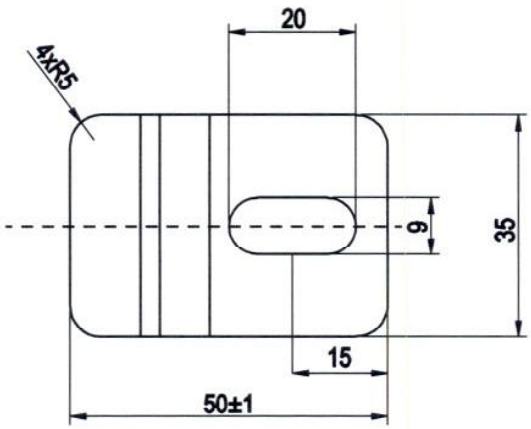
	Odchyłka wymiarów) nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
				Nr normy	PN-EN 10142 + A1 : 1997			Arkusz
				półfabrykat (nr normy)				Arkuszy

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	J.GROCHOWSKI		20.10.05	LDONCH60
Rysował	J.Grochowski		20.10.05	
Sprawdził	T.WŁODARCZYK		20.10.05	
Zatwierdził	J.KLICZEK		20.10.05	Nr programu / Nazwa programu

Nr zmiany

Profesjonalne Systemy Tras Kablowych





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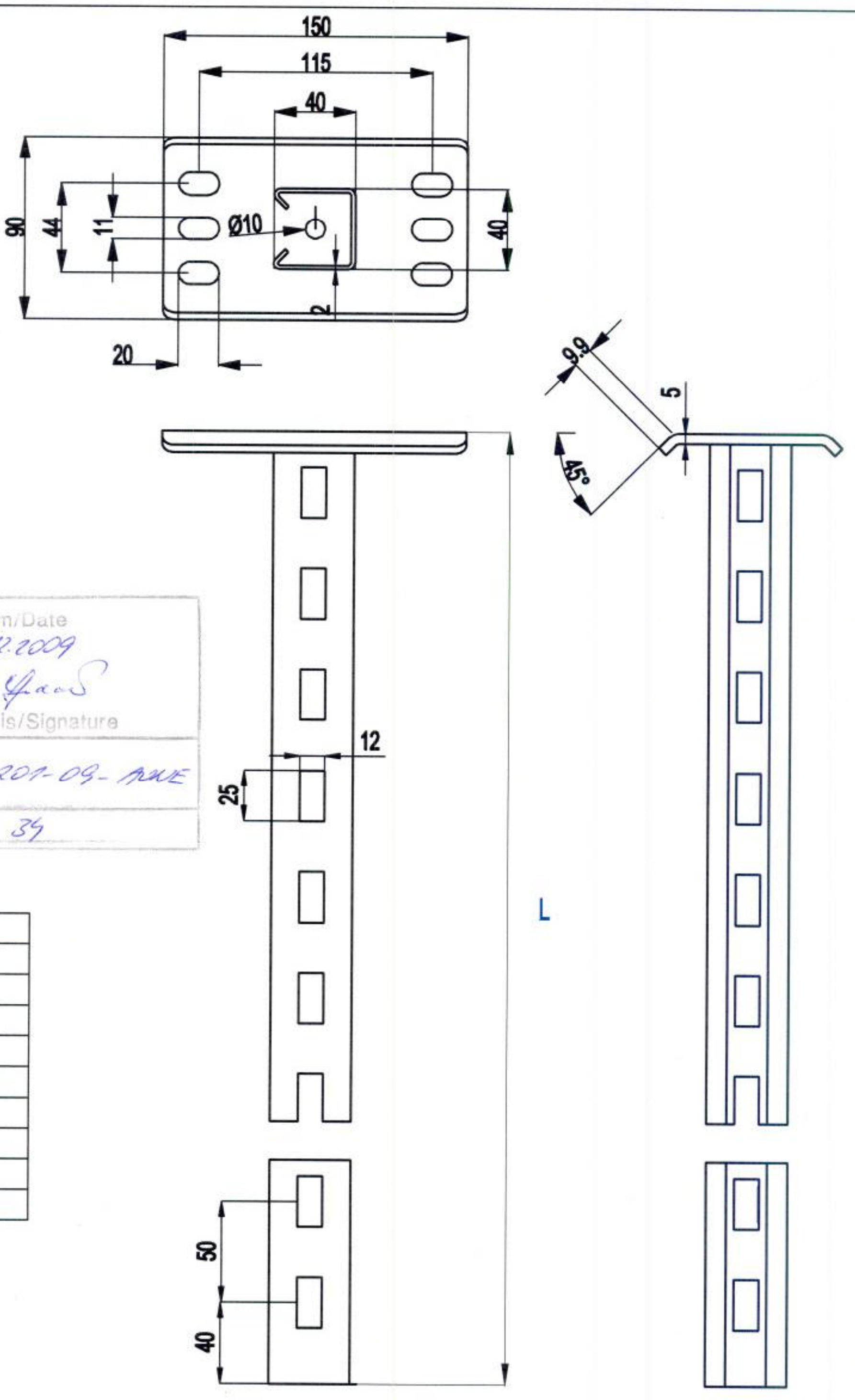
	Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka 1:1	Format A4
				Nr normy				Arkusz 1
				półfabrykat (nr normy)				Arkuszy 1

Projektował	Nazwisko	Podpis	Data	Nazwa rysunku	ZMO
Rysował	P.Okniński		20.07.2009		
Sprawdził	J.Kliczek				
Zatwierdził	J.Kliczek			Nr programu maszynowego —	Nr zmiany
BAKS® Profesjonalne Systemy Tras Kablowych				Nr rysunku	



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Príloha č./Appendix No.: 34

L	Typ	Nr.kat
200	WPC□200N	
300	WPC□300N	
400	WPC□400N	
500	WPC□500N	
600	WPC□600N	
700	WPC□700N	
800	WPC□800N	
900	WPC□900N	
1000	WPC□1000N	

Odchyłka wymiarów) nietolerowanych	Materiał: Gatunek / Nr normy / półfabrykat (nr normy)	Masa [kg]: –	Podziałka: 1:3	Format: A4; Arkusz: 1; Arkuszy: 1

	Nazwisko	Podpis	Data
Projektował	Piotr Okniński		25.03.09
Rysował	Piotr Okniński		25.03.09
Sprawdził	J.Kliczek		25.03.09
Zatwierdził	J.Kliczek		25.03.09

Nazwa rysunku: WPC□

Nr programu maszynowego: –

Nr zmiany

Nr rysunku

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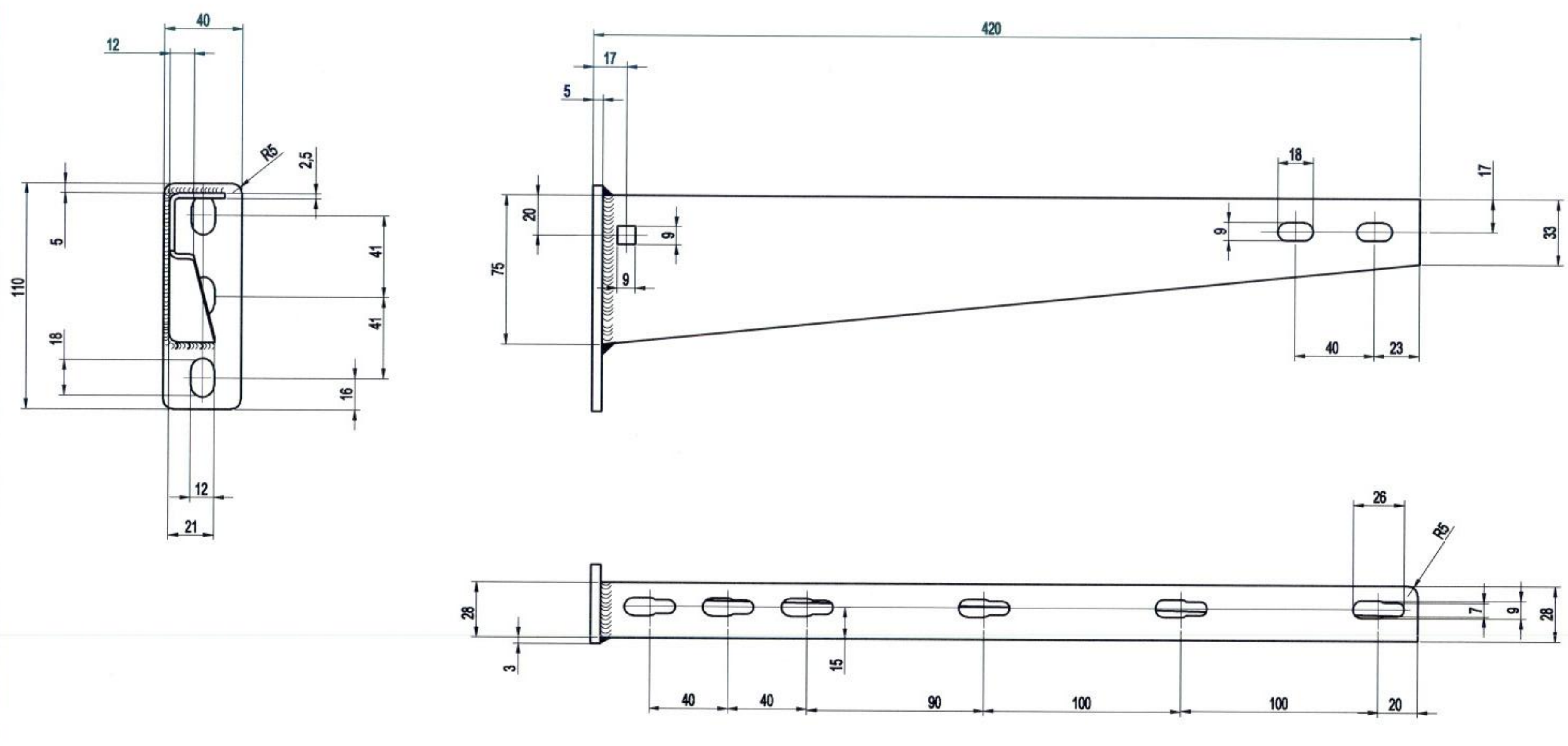

Odchyłka wymiarów nietolerowanych	Materiał	Gatunek	Masa [kg]	Podziałka 1:1	Format A3
		Nr normy			Masa
		półfabrykat (nr normy)			Ilość
Projektował			Nazwa rysunku: WMC☐400		
Rysował	P.Okniński	30.07.2009			
Sprawdził					
Zatwierdził	J.Klicek	30.07.2009	Nr programu		Nr zmiany
BAKS® Profesjonalne Systemy Tras Kablowych			Nr rysunku		

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Podpis/Signature: [signature]

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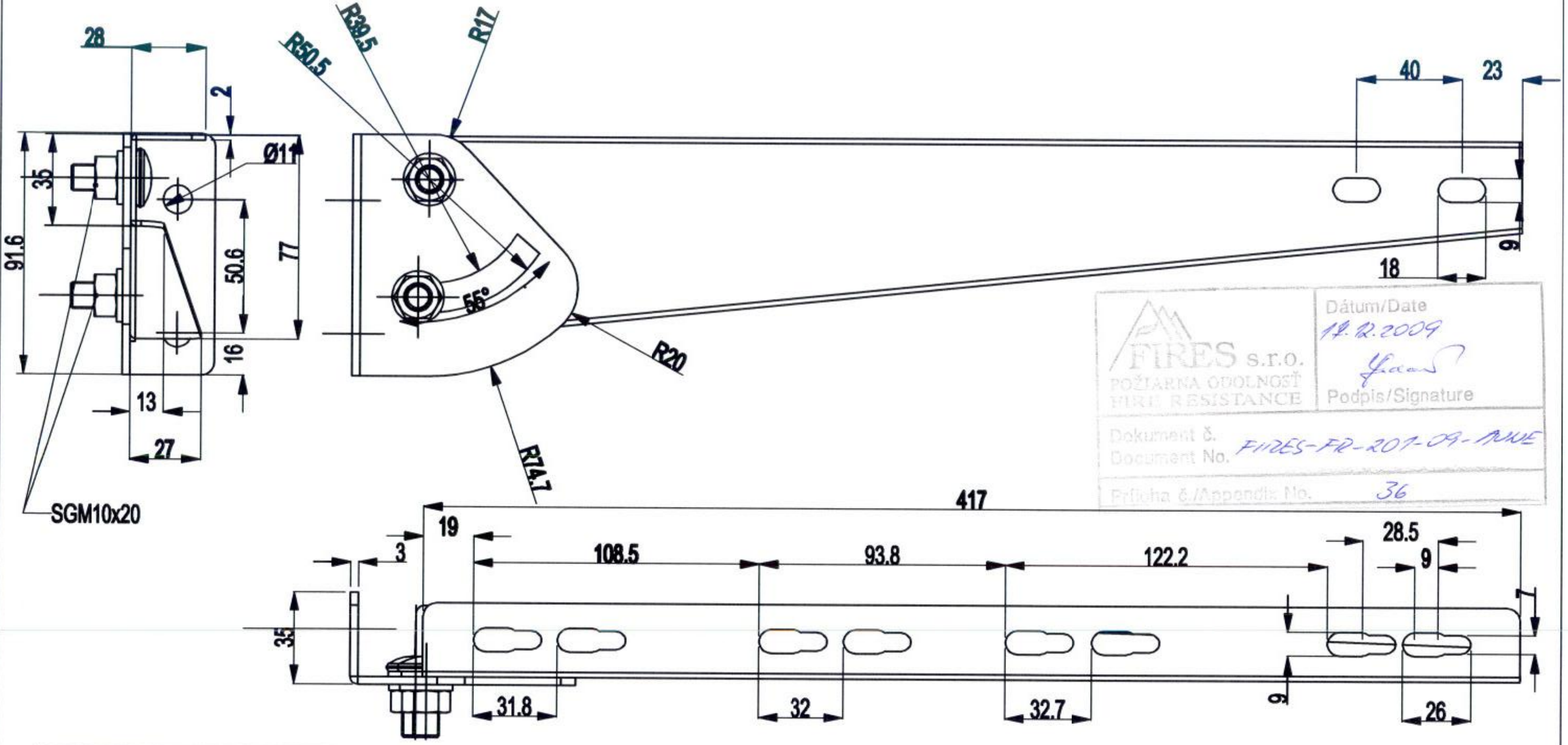
Príloha č./Appendix No. 35



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L	Typ
117	WU□N100
217	WU□N200
317	WU□N300
417	WU□N400

Odchyłka wymiarów nietolerowanych

IT14

Gatunek: DX51D Z 275
Nr normy: PN-EN 10327:2005
półfabrykat (nr normy)

Podziałka: 1:2
Format: A4
Arkusz: 1
Arkuszy: 1

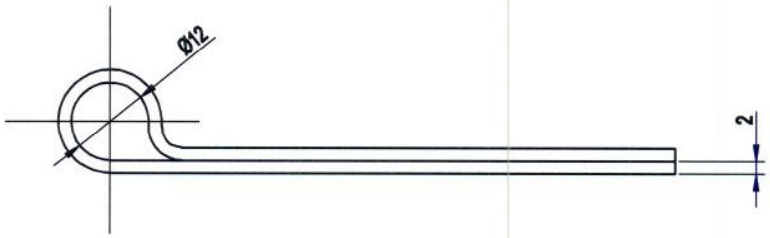
Projektował
Rysował: J.Grochowski
Sprawdził
Zatwierdził
Nazwisko
Podpis
Data: 09-May-07

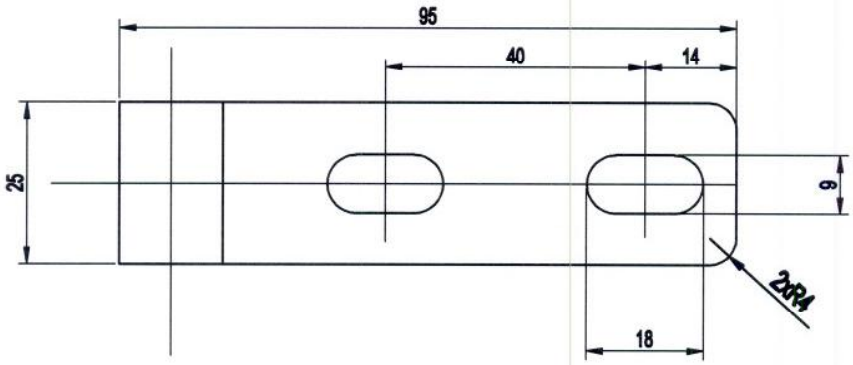
Nazwa rysunku: WU□N400

Nr programu

Nr zmiany

Profesjonalne Systemy
Tras Kablowych





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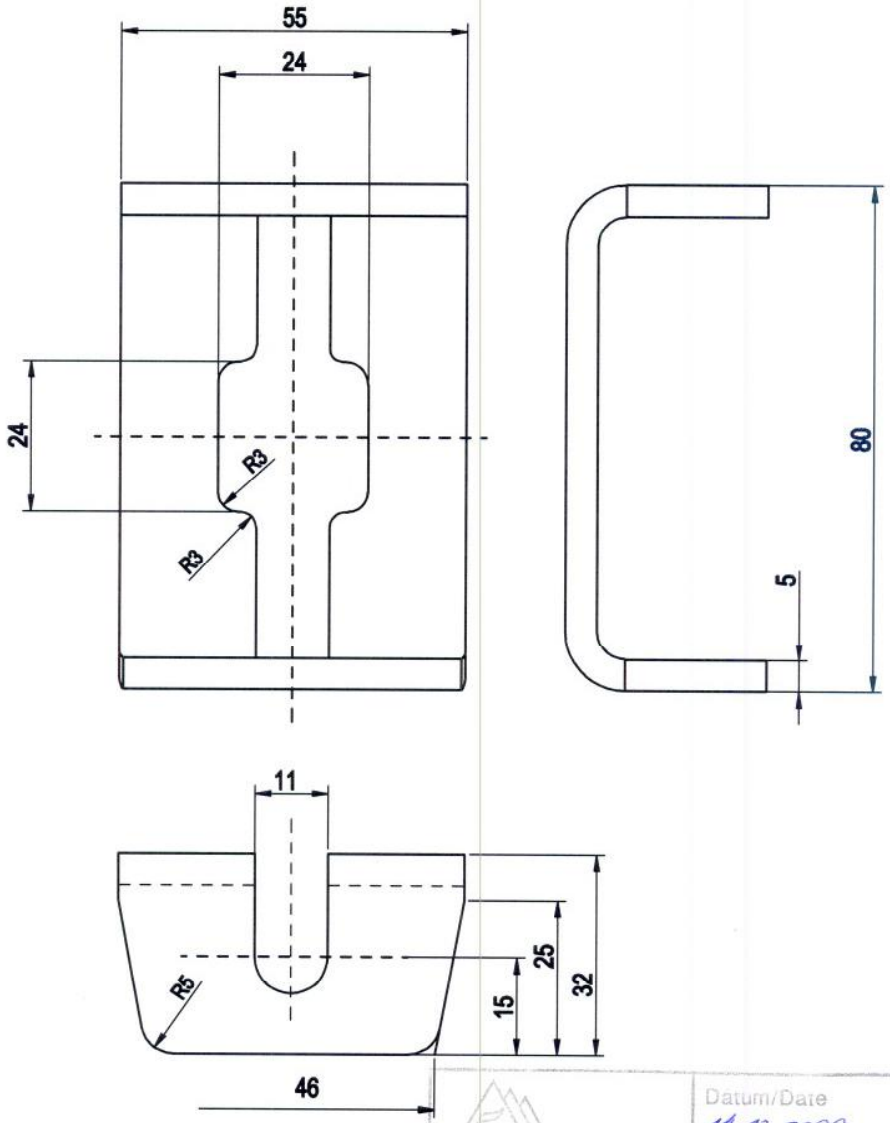
Príloha č./Appendix No. 3

	Odchyłka wymiarów nietolerowanych		Materiał: Gatunek		Masa [kg]	Podziałka 1:1	Format A4
			Nr normy	—	—		Arkusz 1
			półfabrykat (nr normy)				Arkuszy 1
Projektował	J.Grochowski		Data	—	Nazwa rysunku		
Rysował	J.Grochowski			—	UPW□		
Sprawdził	J.Kliczek			—			
Zatwierdził	J.Kliczek			—	Nr programu maszynowego	—	Nr zmiany
BAKS® Profesjonalne Systemy Tras Kablowych					Nr rysunku		



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Dokument č.
Document No. FIRES-PŘ-201-09-ANNEX

Příloha č./Appendix No. 38

Odchyłka wymiarów nietolerowanych		Materiał: Gatunek	OH18N9 1.4301	Masa [kg]	Podziałka	Format	A4
		Nr normy				Arkusz	1
		półfabrykat (nr normy)				Arkuszy	1

Projektował	Nazwisko	Podpis	Data	Nazwa rysunku	USOV-E
Rysował	P.Okniński		20.07.2009		
Sprawdził	J.Kliczek				
Zatwierdził	J.Kliczek		20.07.2009	Nr procesu maszynowego: —	Nr zmiany

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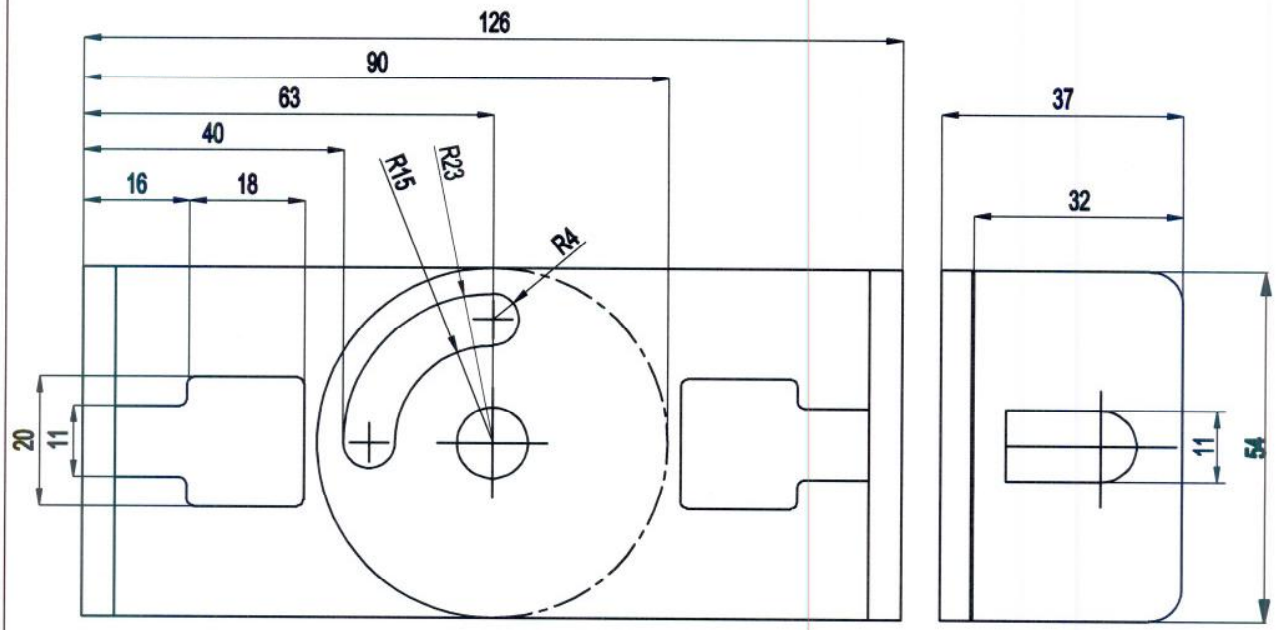
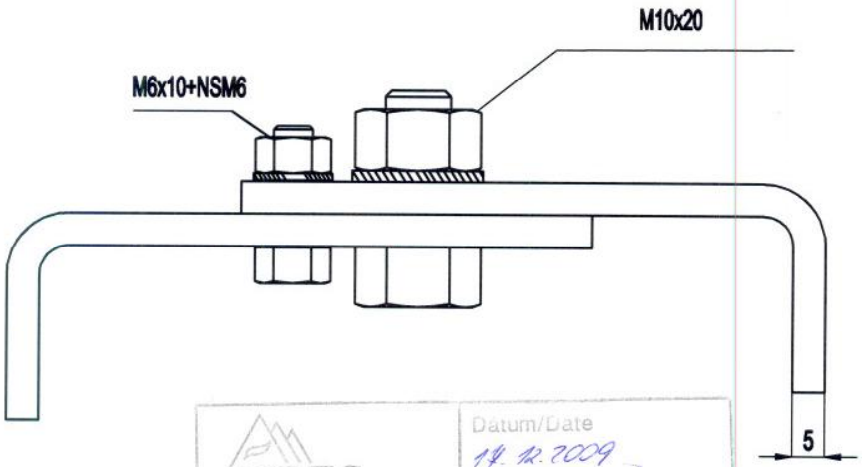
Nr rysunku





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Podpis/Signature

Dokument č. / Document No. FIRES-FR-204-09-ANKIE

Príloha č./Appendix No. 39

Odchyłka wymiarów nietolerowanych		Materiał: Gatunek		Masa [kg]	Podziałka	Format	A4
		Nr normy				Arkusz	1
		półfabrykat (nr normy)				Arkuszy	2
Projektował				Nazwa rysunku			
Rysował	P.Okniński		20.07.2009	WPPOV			
Sprawdził				Nr programu maszynowego	—	Nr zmiany	
Zatwierdził	J.Kliczek		20.07.2009	Nr rysunku			

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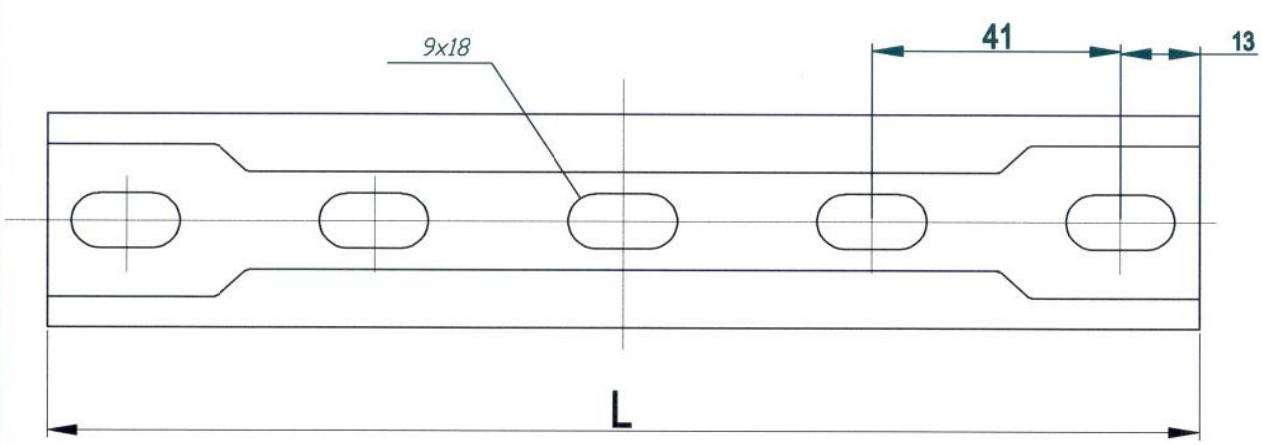

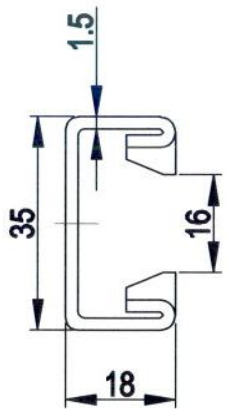

L.p.	Nazwa wyrobu	Symbol	Długość L (mm)	Masa (kg)/szt.	Materiał	Nr katalogowy
8.	Szczebel	SDOP 1000	990	1,30		
7.	Szczebel	SDOP 800	790	1,04		
6.	Szczebel	SDOP 600	590	0,78		
5.	Szczebel	SDOP 500	490	0,65		
4.	Szczebel	SDOP 400	390	0,52		
3.	Szczebel	SDOP 300	290	0,39		
2.	Szczebel	SDOP 200	190	0,26		
1.	Szczebel	SDOP 100	90	0,13		

Odchyłka wymarów nietolerowanych

Materiał: Gatunek —; Nr normy —; półfabrykat (nr normy) —

Masa (kg): —

Podziałka: 1:1

Format: A2

Arkusz

Arkuszy

	Nazwisko	Podpis	Data
Projektował			
Rysował	P.Okniński		23.04.09
Sprawdził			
Zatwierdził			

Nazwa rysunku: SZCZEBEL SDOP

Nr katalogu

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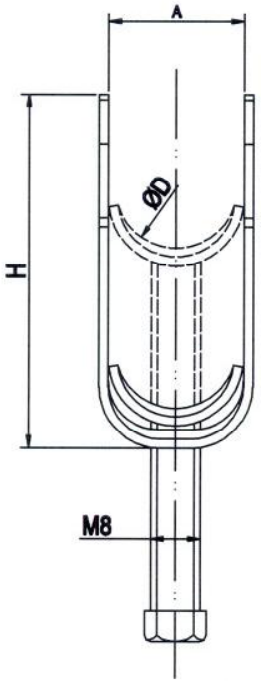
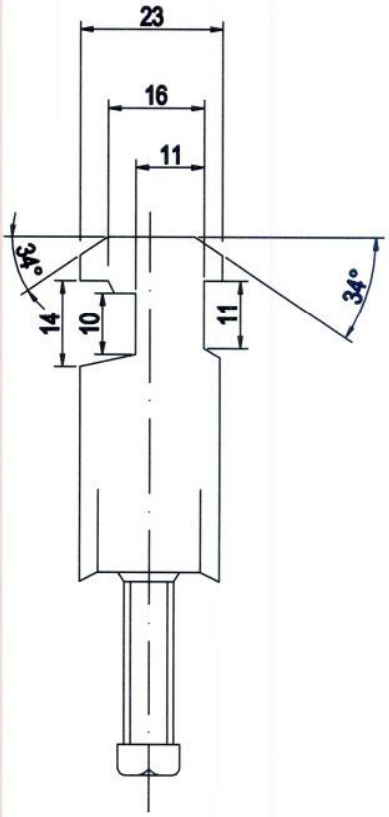
Príloha č./Appendix No. 40





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Podpis/Signature

Dokument č. / Document No. FIRES-FR-201-09-ANNE

Príloha č./Appendix No. 41

UKO1/64-70	72	116	70
UKO1/58-64	66	103	64
UKO1/46-52	54	97	52
UKO1/40-46	48	86	46
UKO1/34-40	42	78	40
UKO1/28-34	36	71	34
UKO1/22-28	30	61	28
UKO1/16-22	24	57	22
SYMBOL	A	H	ØD

Odchyłka wymiarów nietolerowanych

Materiał: Gatunek; Nr normy; półfabrykat (nr normy)

Masa [kg]: —

Podziałka: 1:1

Format: A4

Ilość: 1

Arkuszy: 1

Projektował			
Rysował	P.Dkniński		20.07.2009
Sprawdził			
Zatwierdził	J.Kliczek		20.07.2009

Nazwa rysunku: UKO1

Nr programu maszynowego: —

Nr rysunku:

Nr zmiany:

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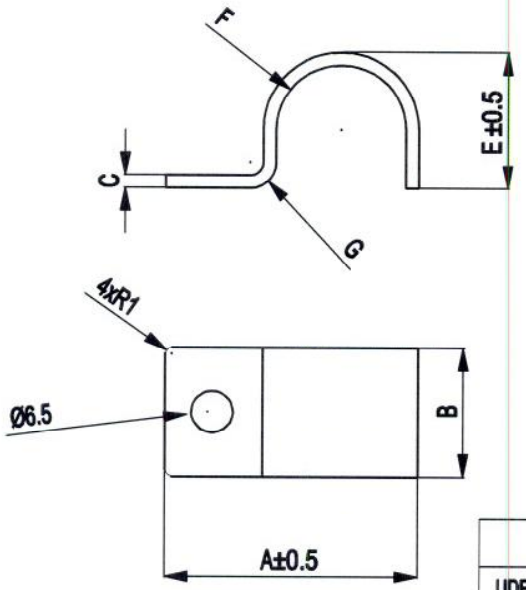

	A	B	C	E	F	G
UDF5	23	14	1.2	5	R2.5	R2.4
UDF6	24	14	1.2	6	R3	R2.4
UDF7	25	14	1.2	7	R3.5	R2.4
UDF8	26	14	1.2	8	R4	R2.4
UDF9	27	14	1.2	9	R4.5	R2.4
UDF10	28	14	1.2	10	R5	R2.4
UDF12	30	14	1.2	12	R6	R2.4
UDF14	33	20	2	15	R7	R4
UDF15	34	20	2	16	R7.5	R4
UDF16	35	20	2	17	R8	R4
UDF18	37	20	2	19	R9	R4
UDF20	39	20	2	21	R10	R4
UDF22	41	20	2	23	R11	R4
UDF25	44	20	2	26	R12.5	R4

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Dátum/Date 14. 12. 2009

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Dokument č. / Document No. FIRES-FR-201-09-ANNEX

Príloha č./Appendix No. 42

Odchyłka wymiarów nieistotnych

Materiał: Gatunek / Nr normy / półfabrykat (nr normy)

Masa [kg]

Podziałka 1:1

Format A4

Arkusz 1

Arkuszy 1

Projektował			
Rysował	P. OKNIŃSKI		20.07.2009
Sprawdził			
Zatwierdził	J.KLICZEK		20.07.2009

Nazwisko / Podpis / Data

Nazwa rysunku: UDF

Nr programu maszynowego: —

Nr zmiany

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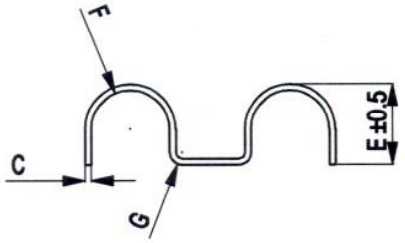
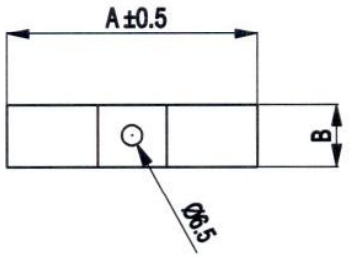
Nr rysunku: —





	A	B	C	E	F	G
UEF5	38	14	1.2	5	R2.5	R2.4
UEF6	40	14	1.2	6	R3	R2.4
UEF7	42	14	1.2	7	R3.5	R2.4
UEF8	44	14	1.2	8	R4	R2.4
UEF9	46	14	1.2	9	R4.5	R2.4
UEF10	48	14	1.2	10	R5	R2.4
UEF12	52	14	1.2	12	R6	R2.4
UEF14	58	20	2	15	R7	R4
UEF15	60	20	2	16	R7.5	R4
UEF16	62	20	2	17	R8	R4
UEF18	66	20	2	19	R9	R4
UEF20	70	20	2	21	R10	R4
UEF22	74	20	2	23	R11	R4
UEF25	80	20	2	26	R12.5	R4

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Dokument č. / Document No. FIRES-FR-201-09-ANNEX

Príloha č./Appendix No. 45

Odchyłka wymiarów(y) nieokreślonych		Materiał: Gatunek		Masa [kg]	Format: A4
		Nr normy	PN-EN 10142+A1:1997		Arkusz: 1
		półwyrób (nr normy)		Podziałka 1:1	Arkuszy: 1

Projektował					
Rysował	Nazwisko P.Olmiński	Podpis	Data 20.07.2009	Nazwa rysunku	UEF
Sprawdził					
Zatwierdził	J.KLICZEK		20.07.2009	Nr programu maszynowego —	Nr zestawu

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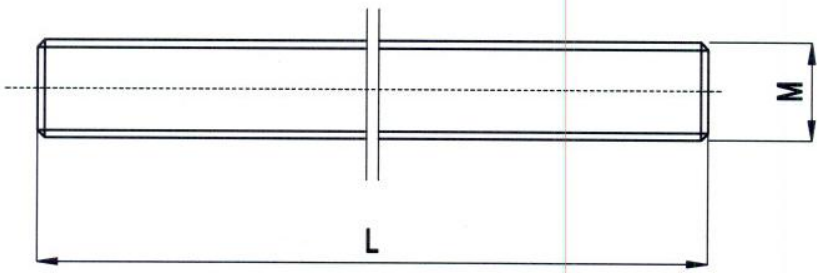
Nr rysunku —



Symbol	L
PGM6/1	1000
PGM6/2	2000
PGM6/3	3000
PGM8/1	1000
PGM8/2	2000
PGM8/3	3000
PGM10/1	1000
PGM10/2	2000
PGM10/3	3000

Odchyłka wymiarów nietolerowanych

Materiał: Gatunek; Nr normy; półfabrykat (nr normy)

Masa kg: —

Podziałka: 1:1

Format: A4

Arkusz: 1

Arkuszy: 1

	Nazwisko	Podpis	Data
Projektował	T.Grudniewski		2004.12.29
Rysował	J.Jasiński		2004.12.29
Sprawdził	J.Kliczek		2004.12.29
Zatwierdził	J.Kliczek		2004.12.29

Nazwa rysunku: PGM10

Nr programu maszynowego: —

Nr rysunku:

Nr zmiany:

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