TEST REPORT FIRES-FR-151-08-AUNE

Cable bearing system BAKS with cables

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FIRES
The Experts on Fire Safety

SNAS
Reg. No. 041/S-159

Testing laboratory No. 041/S-159 accredited by
Slovak national accreditation service

TEST REPORT

Test report number: **FIRES-FR-151-08-AUNE**
Tested property: Function in fire
Test method: DIN 4102 – 12:1998-11

Date of issue: **27. 08. 2008**

Name of the product: Cable bearing system BAKS with cables

Manufacturer: **BAKS Kazimierz Sielski,** ul. Jagodne 5,
05-480 Karczew, Poland - producer of construction

TECHNOKABEL S.A., Nasielska 55,
04-343 Warszawa, Poland – producer of cables
Spelsberg elektro sp. z o.o., Aleja Mlodych 26-28,
41-106 Siemianowice Ślaskie, Poland – producer of boxes

Sponsor: **BAKS Kazimierz Sielski,** ul. Jagodne 5, 05-480 Karczew, Poland

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Task No.: PR-08-0297
Specimen received: 14. 07. 2008
Date of the fire test: 24. 07. 2008
Technician responsible for the technical side of this report: Miroslav Hudák

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Test reports:	5	Copy No.:	2

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1. INTRODUCTION

This test report contains the results of the test carried out at the testing laboratory of FIRES s.r.o. in Batizovce. The purpose of the test was product classification. The test specimen was cable bearing system BAKS with power and communication non-halogen cables with circuit integrity maintenance. Persons witnessing the test:

Representatives of the sponsor: Mr. Kliczek (BAKS)
Mr. Stawikowski (BAKS)
Mr. Kwiatkowski (TECHNOKABEL)
Mr. Stradomski (TECHNOKABEL)
Mr. Martinkowski (Spelsberg)

Test directed by: Mr. Štefan Rástocký
Test carried out by: Mr. Miroslav Hudák
Operator: Mr. Alexander Reľovský

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Fires s.r.o. Batizovce is full member of EGOLF also, more information www.egolf.org.uk.

2. MEASURING EQUIPMENT

Identification number	Measuring equipment	Note
F 90 002	Horizontal test furnace for fire testing	-
F 69 005	PLC system for data acquisition and control TECOMAT NS 950	-
F 40 008	Software 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 (software)	-
F 71 008, F 71 009	Transducer of differential pressure (from -50 to +150) Pa	pressure inside the test furnace
F 06 501, F 06 502, F 06 503, F 06 504 F 06 505, F 06 506, F 06 507, F 06 508	Plate thermometers	temperature inside the test furnace, according to EN 1363-1 a DIN 4102-2
F 06 701	Sheathed thermocouple type K ϕ 3 mm	ambient temperature
F 69 009	PLC system for data acquisition and climate control TECOMAT TC 604	climatic conditions
F 60 001 – F 60 009	Temperature and relative air humidity sensors	climatic conditions
F 54 057	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 was carried out by workers of the test sponsor. Mounting of cables and weights into the supporting system was carried out by workers businesses BAKS, TECHNOKABEL and Spelsberg.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMEN STRUCTURE

Test specimen comprised from cable bearing systems BAKS with accessories – trays, ladders, wire trays, clips UDF, UEF and clips OBO BETTERMANN and power and communication non-halogen cables business TECHNOKABEL S. A. and terminal boxes Spelsberg.

Cables:	NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	(5 x)
	NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	(5 x)
	NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	(5 x)
	NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	(5 x)
	NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	(5 x)
	NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	(5 x)
	NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	(5 x)
	NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	(5 x)
	HTKSH 1x2x1,0 FE180 PH90/E30-E90 with box WKE 2,3	(2 x)
	HTKSH 1x2x1,0 FE180 PH90/E30-E90	(6 x)
	HTKSHekw 1x2x1,0 FE180 PH90/E30-E90 with box WKE 2,3	(2 x)
	HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	(6 x)
	JE-H(St)H 1x2x0,8 FE180/P90/E30-E90	(4 x)

Suspension track No. 1: was made by three hangers (type WPCO 400) which were fixed to ceiling by two dowels (type PSRO M10x80) in spacing of 1200 mm. Booms (type WMCO 400) were fixed by screws (type SM M10 x 20) at each hanger. Holders (type UPWO) were fixed at the end of booms. Booms were fixed through these holders by threaded bar M10 with washers and nuts M10 to ceiling holder (type USOV) which was fixed to ceiling by dowel (type PSRO M10x80). Ladders (type DUOP 400H60/3, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) were jointed together by junction (type LDOCH60N) with screws M8 (type SGN M8x14) and fixed to booms with screws M8 (type SGN M8x14). Load-bearing system was loaded with 20 kg/m.
Suspension track No. 2: was made of three consoles combined of three horizontal supports (type CWOP40H40/05) and two threaded bar (type PGM10/1x800) with washers and nuts M10 and two hangers (type USOV) which were fixed to ceiling by dowels (type PSRO M10x80) in spacing of 1200 mm. Ladders (type DGOP 400H60/3, steel sheet thickness 1,5 mm, spacing of transoms 150 mm) were fixed at upper support and were loaded with 20 kg/m. Wire trays (type KDSO 400H60/3) were fixed at other supports and were loaded with 10 kg/m.
Suspension track No. 3: was made by three hangers (type WPCO 800) which were fixed to ceiling by two dowels (type PSRO M10x80) in spacing of 1200 mm. Booms (type WMCO 400) were fixed by screws (type SM M10 x 20) at each hanger. Holders (type UPWO) were fixed at the end of booms. Booms were fixed through these holders by threaded bar M10 with washers and nuts M10 to ceiling holder (type USOV) which was fixed to ceiling by dowel (type PSRO M10x80). Ladders (type DGOP 400H60/3, steel sheet thickness 1,5 mm, spacing of transoms 150 mm) were fixed at central booms with screws M8 (type SGN M8x14) and were loaded with 20 kg/m. Trays (type KCOP 400H60/3, steel sheet thickness 1,5 mm) were jointed together by two junctions (type LPOPH60N)

and by sheet (type BLO400N) with screws M6 (type SGN M6x12) and fixed at other booms with screws M6 (type SGN M6x12).
Suspension track No. 4: was made of three consoles combined of three horizontal supports (type CWOP40H40/05) and two threaded bar (type PGM10/1x800) with washers and nuts M10 and two hangers (type USOV) which were fixed to ceiling by dowels (type PSRO M10x80) in spacing of 1200 mm. Ladders (type DGOP 400H60/3, steel sheet thickness 1,5 mm, spacing of transoms 150 mm) were fixed at central support and were loaded with 20 kg/m. Trays (type KCOP 400H60/3) were fixed at other supports and were loaded with 10 kg/m.
Ceiling installation: was made by cable clips (type UEF, UDF) and clips OBO (type 1015). Cable clips depending on the diameter of cable were fixed to ceiling by dowels (type SRO M6x30) and dowels (type FDN 6/5 6x35 Fischer) in spacing of 600 mm.
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 specimen construction is shown in the drawings which form the appendix of this test report. Drawings were delivered by the sponsor of the test.

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

4.2 DESCRIPTION OF THE 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 SPECIMEN INSPECTION

Before and after the fire testing, conformity of the test specimen with drawing was checked. The specimen corresponded to the drawing which create appendix of this report.
Specimen inspection consisted of visual review of the test specimen as well as size verification (number and cross sections of conductors, thickness, measurements of cables and trays).

4.4 CLIMATIC CONDITIONING

Test specimens were stored in the climatic hall and conditioned according to EN 1363-1 under the following climatic conditions:

Relative air humidity [%]		**Ambient air temperature [°C]**	
mean	standard deviation	mean	standard deviation
48,4	3,5	23,9	0,5

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

5. CARRYING OUT THE TEST

5.1 TEST CONDITIONS

Conditions in the test furnace (temperature, pressure, content O_2 content) as well as conditions in the testing room (ambient temperature) corresponded to EN 1363-1 and DIN 4102-2 during the whole test. Detailed information is shown in appendices of this report or in quality records of the testing laboratory.

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

Date of fire test	Relative air humidity [%]	Ambient air temperature [°C]
24. 07. 2008	66,8	19,9

5.2 TEST RESULTS

The measured values are shown in tables that form an integral part of this test report.

5.3 EVALUATION OF THE TEST

SPECIMENS	Time to first failure/interruption of conductor
Specimen 1: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	**17 minutes**
Specimen 2: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	**77 minutes**
Specimen 3: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	**79 minutes**
Specimen 4: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	**64 minutes**
Specimen 5: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	**90 minutes no failure/interruption**
Specimen 6: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	**90 minutes no failure/interruption**
Specimen 7: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	**90 minutes no failure/interruption**
Specimen 8: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	**68 minutes**
Specimen 9: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	**90 minutes no failure/interruption**
Specimen 10: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 11: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 12: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	**37 minutes**
Specimen 13: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	**58 minutes**
Specimen 14: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	**58 minutes**
Specimen 15: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	**65 minutes**
Specimen 16: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	**63 minutes**
Specimen 17: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	**90 minutes no failure/interruption**
Specimen 18: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 19: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 20: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	**90 minutes no failure/interruption**
Specimen 21: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	**26 minutes**
Specimen 22: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 23: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 24: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	**31 minutes**
Specimen 25: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	**23 minutes**
Specimen 26: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	**90 minutes no failure/interruption**
Specimen 27: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	**20 minutes**
Specimen 28: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	**34 minutes**
Specimen 29: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	**90 minutes no failure/interruption**
Specimen 30: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 31: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 32: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	**90 minutes no failure/interruption**
Specimen 33: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	**25 minutes**
Specimen 34: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 35: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	**90 minutes no failure/interruption**

SPECIMENS	Time to first failure/interruption of conductor
Specimen 36: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	**75 minutes**
Specimen 37: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	**90 minutes no failure/interruption**
Specimen 38: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	**76 minutes**
Specimen 39: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	**18 minutes**
Specimen 40: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	**64 minutes**
Specimen 52A: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimen 52B: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	**73 minutes**
Specimens 53A,B: cables HTKSH 1x2x1,0 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimen 54A: cable HTKSH 1x2x1,0 FE180 PH90/E30-E90 with box WKE 3	**90 minutes no failure/interruption**
Specimen 54B: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90 with box WKE 3	**74 minutes**
Specimen 55A: cable JE-H(St)H 1x2x0,8 FE180/P90/E30-E90	**88 minutes**
Specimen 55B: cable JE-H(St)H 1x2x0,8 FE180/P90/E30-E90	**77 minutes**
Specimen 56A: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	**83 minutes**
Specimen 56B: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimens 57A,B: cables HTKSH 1x2x1,0 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimen 58A: cable JE-H(St)H 1x2x0,8 FE180/P90/E30-E90	**77 minutes**
Specimen 58B: cable JE-H(St)H 1x2x0,8 FE180/P90/E30-E90	**84 minutes**
Specimens 59A,B: cables HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimens 60A,B: cables HTKSH 1x2x1,0 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimen 61A: cable HTKSH 1x2x1,0 FE180 PH90/E30-E90 with box WKE 2	**90 minutes no failure/interruption**
Specimen 61B: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90 with box WKE 2	**90 minutes no failure/interruption**

The fire test was discontinued in 96th minute at the request of sponsor.

Specimens S1 – S40 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Specimens S52 – S61 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 DIN 4102 – 12:1998-11. Any significant deviation with respect to size, constructional details, loads, stresses, edges 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 Ltd. 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 Ltd. Batizovce.

Report checked by: Ing. Štefan Rástocký
Translated by: Ing. Marek Rusnák

Issued by:

Ing. Štefan Rástocký
leader of the testing laboratory

SKÚŠOBNÉ LABORATÓRIUM • PRÜFLABORATORIUM • TESTING LABORATORY
FIRES
The Experts on Fire Safety
-1-

Responsible for the technical side of this report:

Miroslav Hudák
technician of the testing laboratory

7. NORMATIVE REFERENCES

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
STN EN 1363-1:2001	Fire resistance tests – Part 1: General requirements

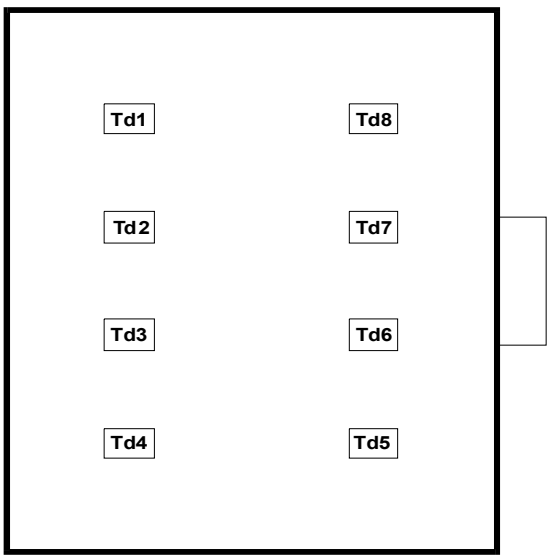
8. LIST OF APPENDICES

Measured values inside the test furnace

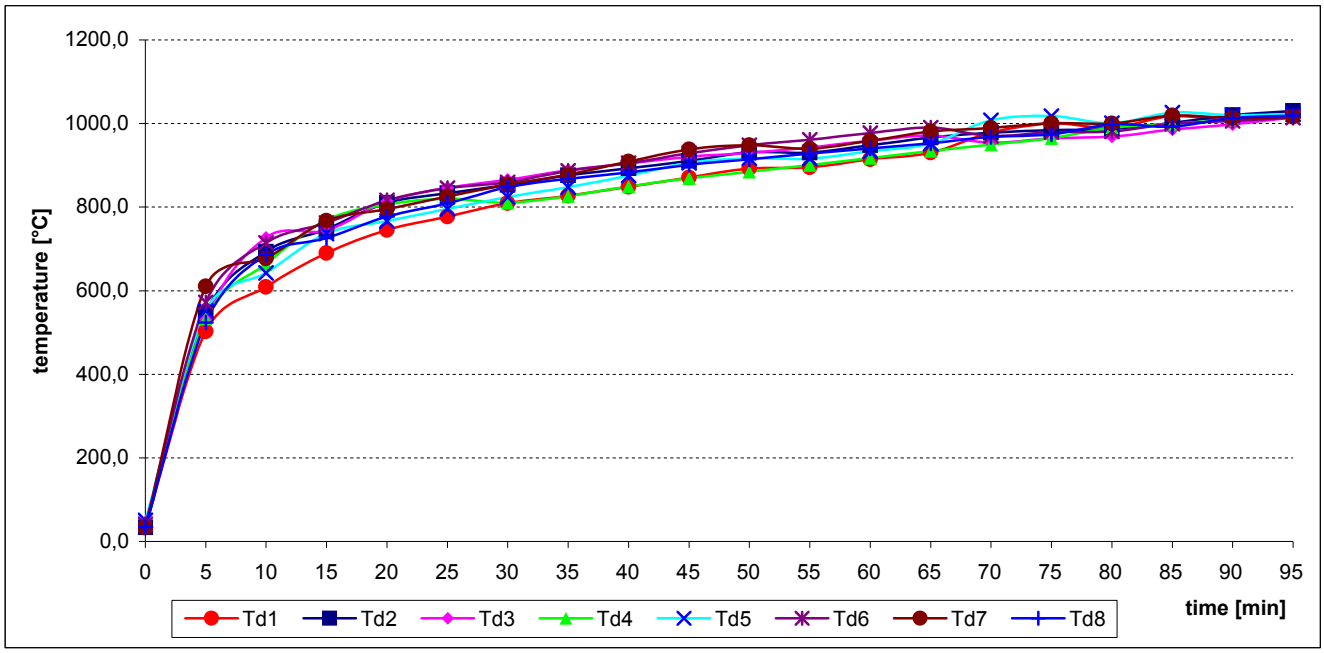
Time t [min]	Temperature [°C]											Deviation d_e [%]	Pressure p [Pa]
	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To		
0	37,2	33,8	44,7	41,0	50,2	41,6	32,8	34,5	39,5	20,0	21,0	0,0	4,7
5	502,6	546,2	531,8	532,8	552,5	572,3	610,4	524,0	546,6	576,2	21,1	-9,5	14,3
10	608,6	692,9	726,5	664,1	642,4	714,2	676,8	686,5	676,5	678,3	20,8	-4,3	15,0
15	690,2	747,5	744,6	769,1	736,7	761,9	767,2	726,0	742,9	738,5	19,8	-2,4	10,7
20	745,1	810,2	814,0	806,2	766,3	816,7	795,1	777,3	791,4	781,3	19,1	-1,5	14,3
25	776,9	833,4	845,9	819,9	795,3	845,8	825,7	808,9	819,0	814,6	18,5	-1,0	15,0
30	809,4	853,0	865,7	810,5	824,3	859,0	853,5	847,5	840,4	841,8	18,2	-0,8	15,9
35	827,2	875,9	888,6	826,6	848,0	887,1	877,9	867,8	862,4	864,8	18,0	-0,7	13,7
40	848,6	892,9	904,1	849,4	875,4	905,4	909,1	882,9	883,5	884,7	17,7	-0,6	14,3
45	870,8	910,3	920,7	869,3	906,1	929,1	938,3	901,4	905,8	902,3	17,5	-0,6	15,4
50	892,4	931,0	929,5	884,2	916,4	948,0	948,2	914,2	920,5	918,1	17,6	-0,4	14,4
55	894,9	930,5	942,4	900,6	915,6	960,7	940,0	928,2	926,6	932,3	17,6	-0,4	14,7
60	914,3	947,9	958,5	917,1	933,7	977,3	958,7	940,1	943,5	945,3	17,8	-0,4	16,1
65	930,6	966,2	971,1	933,9	952,1	990,1	981,1	952,4	959,7	957,3	18,0	-0,4	14,1
70	977,8	977,8	954,0	949,3	1008,0	970,0	989,1	968,1	974,3	968,4	18,3	-0,3	13,8
75	1000,0	983,8	965,1	964,7	1018,0	979,8	1001,0	974,3	985,8	978,7	18,4	-0,2	14,3
80	990,3	986,9	968,7	989,9	1001,0	980,9	1000,0	997,6	989,4	988,4	18,9	-0,2	14,2
85	1018,0	1002,0	985,6	999,1	1026,0	999,0	1019,0	992,3	1005,1	997,4	19,1	-0,1	14,6
90	1006,0	1020,0	997,7	1009,0	1020,0	1006,0	1013,0	1013,0	1010,6	1005,9	19,9	-0,1	14,0
95	1019,0	1030,0	1015,0	1019,0	1022,0	1014,0	1016,0	1019,0	1019,3	1014,0	20,3	0,0	14,1

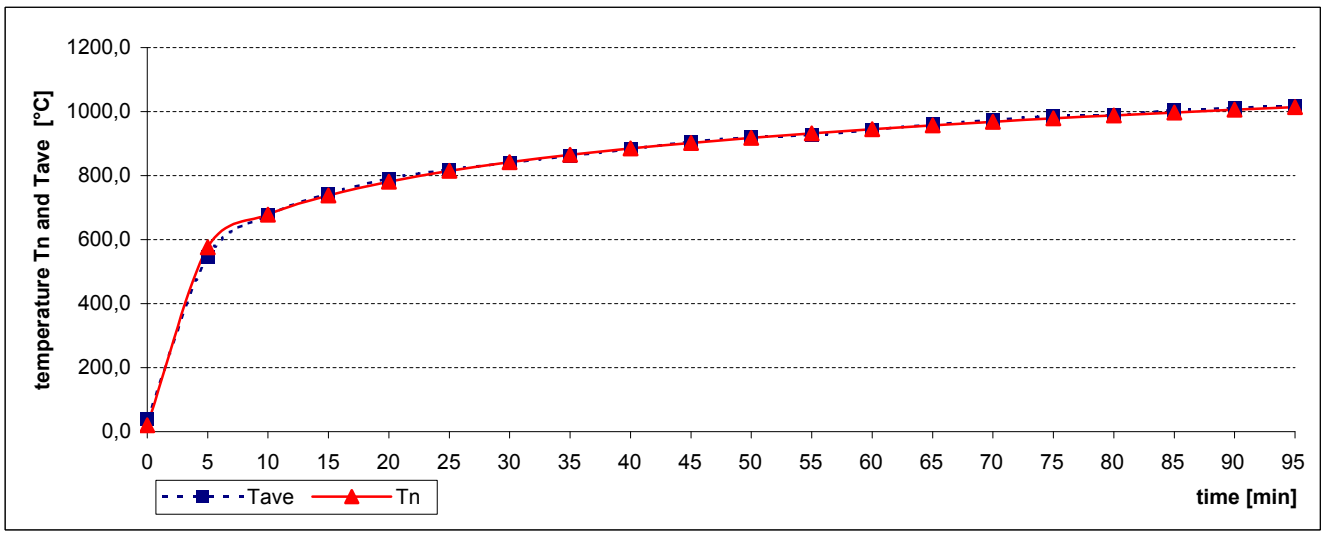
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

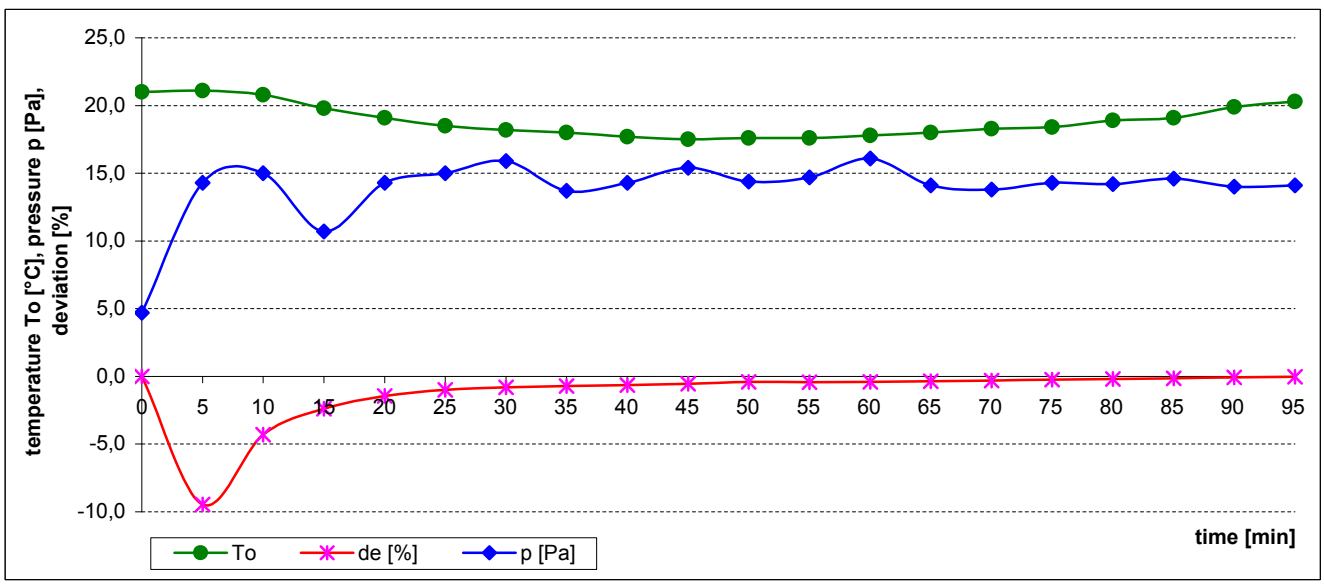
Layout of measuring points in the test furnace:



Measured values inside the test furnace / graph







Measured time of tested specimens from S1 to S8

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S1	1-L1	x
	2-L2	17:36
	3-L3	x
	4-PEN	x
S2	5-L1	x
	6-L2	x
	7-L3	77:31
	8-PEN	x
S3	9-L1	79:50
	10-L2	79:50
	11-L3	79:50
	12-PEN	x
S4	13-L1	x
	14-L2	64:23
	15-L3	64:23
	16-PEN	x
S5	17-L1	no failure / interruption
	18-L2	no failure / interruption
	19-L3	no failure / interruption
	20-PEN	no failure / interruption
S6	21-L1	no failure / interruption
	22-L2	no failure / interruption
	23-L3	no failure / interruption
	24-PEN	no failure / interruption
S7	25-L1	no failure / interruption
	26-L2	no failure / interruption
	27-L3	no failure / interruption
	28-PEN	no failure / interruption
S8	29-L1	x
	30-L2	68:43
	31-L3	68:43
	32-PEN	x

Specimens 1, 5: cables NHXH 4x16 RE FE180 PH30/E30 with box WKE 4
Specimens 2, 6: cables NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2
Specimens 3, 7: cables NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2
Specimens 4, 8: cables NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4

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 S9 to S16

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
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
S11	41-L1	no failure / interruption
	42-L2	no failure / interruption
	43-L3	no failure / interruption
	44-PEN	no failure / interruption
S12	45-L1	x
	46-L2	x
	47-L3	37:43
	48-PEN	x
S13	49-L1	x
	50-L2	58:08
	51-L3	x
	52-PEN	x
S14	53-L1	58:12
	54-L2	58:12
	55-L3	x
	56-PEN	x
S15	57-L1	65:10
	58-L2	x
	59-L3	x
	60-PEN	x
S16	61-L1	63:23
	62-L2	63:23
	63-L3	x
	64-PEN	x

Specimen 9: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4
Specimen 10: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2
Specimen 11: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2
Specimen 12: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4
Specimen 13: cables NHXH 4x16 RE FE180 PH30/E30 with box WKE 4
Specimen 14: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2
Specimen 15: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2
Specimen 16: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4

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 S17 to S24

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
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
S21	81-L1	26:07
	82-L2	x
	83-L3	26:07
	84-PEN	x
S22	85-L1	no failure / interruption
	86-L2	no failure / interruption
	87-L3	no failure / interruption
	88-PEN	no failure / interruption
S 23	89-L1	no failure / interruption
	90-L2	no failure / interruption
	91-L3	no failure / interruption
	92-PEN	no failure / interruption
S24	93-L1	x
	94-L2	31:03
	95-L3	x
	96-PEN	x

Specimens 17, 21: cables NHXH 4x16 RE FE180 PH90/E90 with box WKE 4
Specimens 18, 22: cables NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2
Specimens 19, 23: cables NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2
Specimens 20, 24: cables NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4

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 S25 to S32

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S25	97-L1	x
	98-L2	23:12
	99-L3	23:12
	100-PEN	x
S26	101-L1	no failure / interruption
	102-L2	no failure / interruption
	103-L3	no failure / interruption
	104-PEN	no failure / interruption
S27	105-L1	x
	106-L2	x
	107-L3	20:38
	108-PEN	x
S28	109-L1	x
	110-L2	34:40
	111-L3	x
	112-PEN	x
S29	113-L1	no failure / interruption
	114-L2	no failure / interruption
	115-L3	no failure / interruption
	116-PEN	no failure / interruption
S30	117-L1	no failure / interruption
	118-L2	no failure / interruption
	119-L3	no failure / interruption
	120-PEN	no failure / interruption
S31	121-L1	no failure / interruption
	122-L2	no failure / interruption
	123-L3	no failure / interruption
	124-PEN	no failure / interruption
S32	125-L1	no failure / interruption
	126-L2	no failure / interruption
	127-L3	no failure / interruption
	128-PEN	no failure / interruption

Specimen 25: cables NHXH 4x16 RE FE180 PH30/E30 with box WKE 4
Specimen 26: cables NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2
Specimen 27: cables NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2
Specimen 28: cables NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4
Specimen 29: cables NHXH 4x16 RE FE180 PH90/E90 with box WKE 4
Specimen 30: cables NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2
Specimen 31: cables NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2
Specimen 32: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4

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 S33 to S40

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S33	129-L1	25:26
	130-L2	x
	131-L3	x
	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	75:49
	142-L2	75:49
	143-L3	x
	144-PEN	x
S37	145-L1	no failure / interruption
	146-L2	no failure / interruption
	147-L3	no failure / interruption
	148-PEN	no failure / interruption
S38	149-L1	76:30
	150-L2	76:30
	151-L3	x
	152-PEN	x
S39	153-L1	18:15
	154-L2	x
	155-L3	18:15
	156-PEN	x
S40	157-L1	64:06
	158-L2	x
	159-L3	64:06
	160-PEN	x

Specimen 33: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4
Specimen 34: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2
Specimen 35: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2
Specimen 36: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4
Specimen 37: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4
Specimen 38: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2
Specimen 39: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2
Specimen 40: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4

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 S61

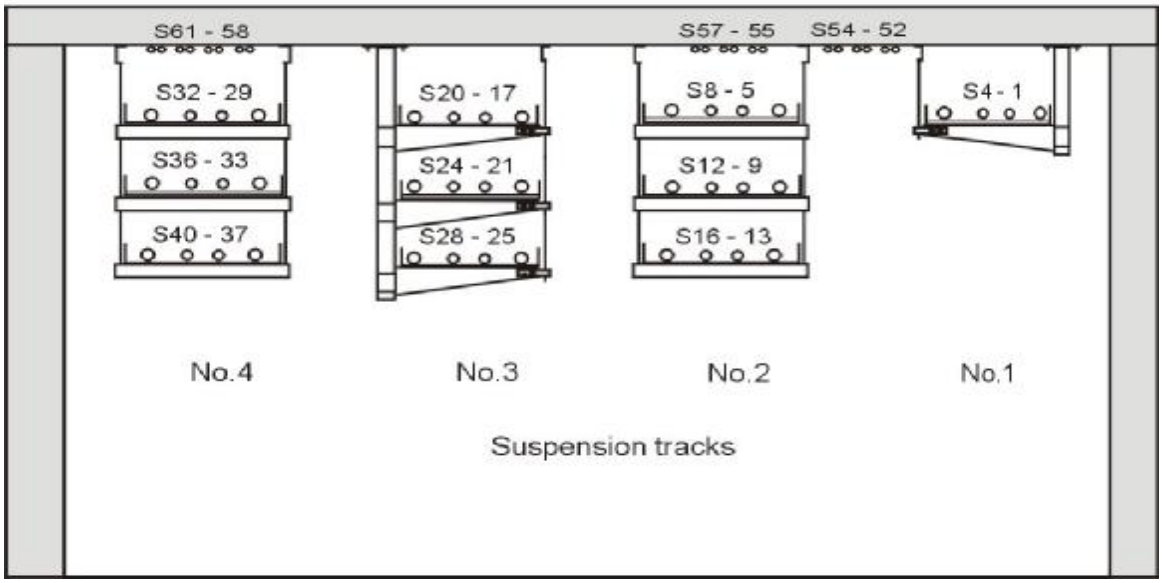
Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S52A	209-L	no failure / interruption
	210-PEN	no failure / interruption
S52B	211-L	73:00
	212-PEN	x
S53A	213-L	no failure / interruption
	214-PEN	no failure / interruption
S53B	215-L	no failure / interruption
	216-PEN	no failure / interruption
S54A	217-L	no failure / interruption
	218-PEN	no failure / interruption
S54B	219-L	74:13
	220-PEN	x
S55A	221-L	88:25
	222-PEN	x
S55B	223-L	77:19
	224-PEN	x
S56A	225-L	83:38
	226-PEN	x
S56B	227-L	no failure / interruption
	228-PEN	no failure / interruption
S57A	229-L	no failure / interruption
	230-PEN	no failure / interruption
S57B	231-L	no failure / interruption
	232-PEN	no failure / interruption
S58A	233-L	77:00
	234-PEN	x
S58B	235-L	84:12
	236-PEN	x
S59A	237-L	no failure / interruption
	238-PEN	no failure / interruption
S59B	239-L	no failure / interruption
	240-PEN	no failure / interruption
S60A	241-L	no failure / interruption
	242-PEN	no failure / interruption
S60B	243-L	no failure / interruption
	244-PEN	no failure / interruption
S61A	245-L	no failure / interruption
	246-PEN	no failure / interruption
S61B	247-L	no failure / interruption
	248-PEN	no failure / interruption

Specimens 52, 56, 59: cables HTKSHekw 1x2x1,0 FE180 PH90/E30-E90
Specimens 53, 57, 60: cables HTKSH 1x2x1,0 FE180 PH90/E30-E90
Specimen 54A: cable HTKSH 1x2x1,0 FE180 PH90/E30-E90 with box WKE 3
Specimen 54B: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90 with box WKE 3
Specimens 55, 58: cables JE-H(St)H 1x2x0,8 FE180/P90/E30-E90
Specimen 61A: cable HTKSH 1x2x1,0 FE180 PH90/E30-E90 with box WKE 2
Specimen 61B: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90 with box WKE 2

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

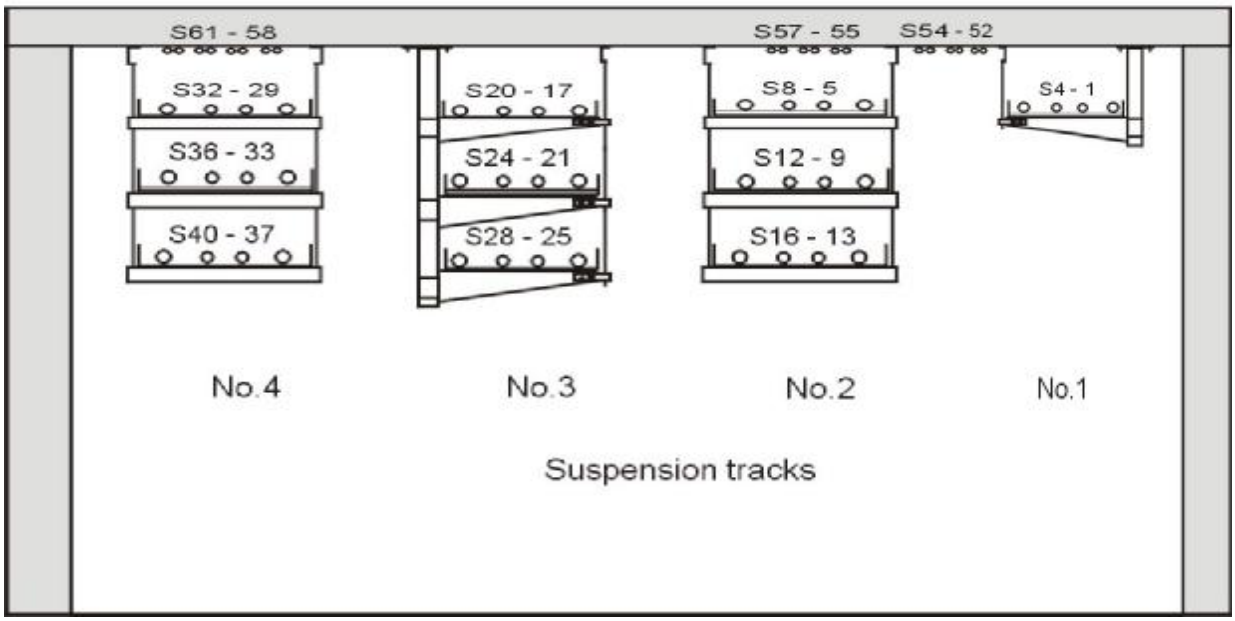
Signal cables were tested by three-phase voltage supply 1 x 110V with LED diods 3V / 0,3W. Circuit breakers with rating 3 A were used.

Layout of cables in the test furnace



Specimen 1: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	Specimens placed on the ladders DUOP 400H60/3 (BAKS). Suspension track No.1
Specimen 2: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 3: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 4: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	
Specimen 5: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	Specimens placed on the ladders DGOP 400H60/3 (BAKS). Suspension track No.2
Specimen 6: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 7: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 8: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	
Specimen 9: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	Specimens placed in the wire trays KDSO 400H60/3 (BAKS) Suspension track No.2
Specimen 10: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 11: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 12: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	
Specimen 13: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	Specimens placed in the wire trays KDSO 400H60/3 (BAKS) Suspension track No.2
Specimen 14: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 15: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 16: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	
Specimen 17: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	Specimens placed in the cable trays KCOP 400H60/3 (BAKS). Suspension track No.3
Specimen 18: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 19: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 20: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	
Specimen 21: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	Specimens placed on the ladders DGOP 400H60/3 (BAKS). Suspension track No.3
Specimen 22: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 23: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 24: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	
Specimen 25: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	Specimens placed in the cable trays KCOP 400H60/3 (BAKS). Suspension track No.3
Specimen 26: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 27: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 28: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	
Specimen 29: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	Specimens placed in the cable trays KCOP 400H60/3 (BAKS). Suspension track No.4
Specimen 30: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 31: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 32: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	
Specimen 33: cable NHXH 4x16 RE FE180 PH90/E90 with box WKE 4	Specimens placed on the ladders DGOP 400H60/3 (BAKS). Suspension track No.4
Specimen 34: cable NHXCH 4x1,5/1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 35: cable NHXH 4x1,5 RE FE180 PH90/E90 with box WKE 2	
Specimen 36: cable NHXCH 4x16/16 RE FE180 PH90/E90 with box WKE 4	
Specimen 37: cable NHXH 4x16 RE FE180 PH30/E30 with box WKE 4	Specimens placed in the cable trays KCOP 400H60/3 (BAKS). Suspension track No.4
Specimen 38: cable NHXCH 4x1,5/1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 39: cable NHXH 4x1,5 RE FE180 PH30/E30 with box WKE 2	
Specimen 40: cable NHXCH 4x16/16 RE FE180 PH30/E30 with box WKE 4	

Layout of cables in the test furnace

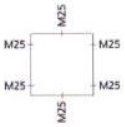
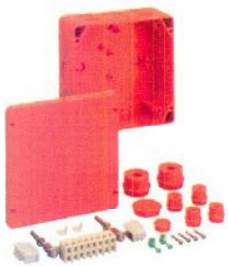


Specimens 52: cables HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	Specimens placed in ceiling clips OBO (BETTERMANN) in spacing of 600 mm
Specimens 53: cables HTKSH 1x2x1,0 FE180 PH90/E30-E90	
Specimen 54A: cable HTKSH 1x2x1,0 FE180 PH90/E30-E90 with box WKE 3	Specimens placed in ceiling clips UDF (BAKS) in spacing of 600 mm
Specimen 54B: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90 with box WKE 3	
Specimens 55: cables JE-H(St)H 1x2x0,8 FE180/P90/E30-E90	Specimens placed in ceiling clips OBO (BETTERMANN) in spacing of 600 mm
Specimens 56: cables HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	
Specimens 57: cables HTKSH 1x2x1,0 FE180 PH90/E30-E90	
Specimens 58: cables JE-H(St)H 1x2x0,8 FE180/P90/E30-E90	Specimens placed in ceiling clips OBO (BETTERMANN) in spacing of 600 mm
Specimens 59: cables HTKSHekw 1x2x1,0 FE180 PH90/E30-E90	
Specimens 60: cables HTKSH 1x2x1,0 FE180 PH90/E30-E90	
Specimen 61A: cable HTKSH 1x2x1,0 FE180 PH90/E30-E90 with box WKE 2	Specimens placed in ceiling clips UEF (BAKS) in spacing of 600 mm
Specimen 61B: cable HTKSHekw 1x2x1,0 FE180 PH90/E30-E90 with box WKE 2	

Photos taken before the test

Photos taken after the termination of the test

Terminal Boxes WKE 2 - 5

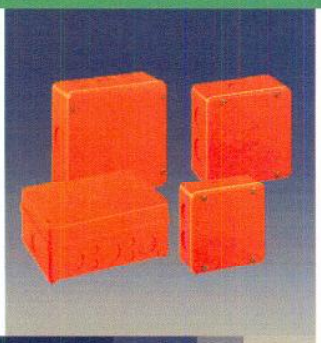
			Order No.	Packing Qty
WKE 2 (5 x 6²) 100 x 100 x 50 mm	IP 54	Terminal box according to E DIN IEC 60998-2-5, U_i = 450 V, with guaranteed flame protection E 30 / E 60 / E 90 in accordance with DIN 4102 part 12		
		**WKE 2 (5 x 6²)** as continuity box 0.5 to 6 mm² and terminal box 0.5 to 1.5 mm², with 5-pole terminal block, Number of conductors per clamping point: 8 x 0.5²/ 4 x 0.75²/ 6 x 1.0²/ 6 x 1.5²/ 2 x 2.5²/ 2 x 4.0²/ 2 x 6.0², made from special high temperature resistant ceramic with wall plug set, IP 54 adapters and M25 blanking plugs, seal range 9 - 18.5 mm	860 202 01	12/1
WKE 3 (5 x 10²) 115 x 115 x 66 mm	IP 54	Terminal box according to E DIN IEC 60998-2-5, U_i = 450 V, with guaranteed flame protection E 30 / E 60 / E 90 in accordance with DIN 4102 part 12		
		**WKE 3 (5 x 10²)** as continuity box 1.0 to 10 mm² and terminal box 1.0 to 4 mm², with 5-pole terminal block, number of conductors per clamping point: 10 x 1.0²/ 8 x 1.5²/ 6 x 2.5²/ 4 x 4.0²/ 2 x 6.0²/ 2 x 10², made from special high temperature resistant ceramic, with wall plug set, IP 54 adapters and blanking plugs M32, seal range 13 - 23 mm, with lead seal set	860 203 01	10/1
WKE 4 (5 x 16²) 165 x 165 x 76 mm	IP 54	Terminal box according to E DIN IEC 60998-2-5, U_i = 450 V, with guaranteed flame protection E 30 / E 60 / E 90 in accordance with DIN 4102 part 12		
		**WKE 4 (5 x 16²)** as continuity box 1.5 to 16 mm² and terminal box 1.5 to 6 mm², with 5-pole terminal block, number of conductors per clamping point: 10 x 1.5² / 8 x 2.5²/ 6 x 4.0 2 / 4 x 6.0²/ 2 x 10²/ 2 x 16², made from special high temperature resistant ceramic, with wall plug set, IP 54 adapters and blanking plugs M20, seal range 17 - 30 mm, with lead seal set	860 204 01	8/1
WKE 4 (8 x 6²) 165 x 165 x 76 mm	IP 54	Terminal box according to E DIN IEC 60998-2-5, U_i = 450 V, with guaranteed flame protection E 30 / E 60 / E 90 in accordance with DIN 4102 part 12		
		**WKE 4 (8 x 6²)** as continuity box 0.5 to 6 mm² and terminal box 0.5 to 1.5 mm², with 8-pole terminal block, Number of conductors per clamping point: 8 x 0.5² / 4 x 0.75² / 6 x 1.0² / 6 x 1.5² / 2 x 2.5² / 2 x 4.0² / 2 x 6.0², made from special high temperature resistant ceramic, with wall plug set IP 54, adapters and M20 blanking plugs, seal range 8 - 13.5 mm and M40, seal range 17-30 mm, with lead seal set	860 214 01	8/1

Terminal Boxes WKE 2 - 5

High degree of safety
Due to thermosetting plastic enclosure (no danger of short-circuit due to metal walls)

Flexible cable entries
Decide on-site which membrane must be opened

Complete range of accessories
All terminal boxes, including terminal, in-feed connectors and fire protection dowels for concrete



- Ingress protection to IP 54
- Real functional maintenance in the classes E30 to E90 according to DIN 4102, part 12
- Halogen-free thermosetting plastic
- Flexible wiring
- Can be sealed
- Self-extinguishing
- Complete product range including accessories
- Testing certificate of the MPA (material-testing institute
- UL 94-V0
- VDE-authorised
- Colour like RAL 2004

Detailed information about the conductors and the manufacturers can be found on the internet in **www.spelsberg.com** or simply request the test report by fax: Phone: +49 (0) 23 55 / 892-146, fax: +49 (0) 23 55 / 892-746

Authorised for use with the following cables:

WKE 2 to WKE 5	E30	E60	E90
Supply cables (n x 1.5², to n x 16²) NHXH FE 180 NHXCH (Nearly all standard cables E30 / E60 / E90 of leading manufacturers)	X 13 pieces	X 7 pieces	X 6 pieces
Control cables (mx 0.8) JE-H(St)H Bd FE 180 (Nearly all standard cables E30 / E60 / E90 of leading manufacturers)	X 8 pieces	X 6 pieces	X 5 pieces

Data 24.07.2008

BAKS –TECHNOKABEL- SPELBERG Badania FIRES Słowacja

F	*T*	*Symbol kaba*		*Pozycja*	*Przekrój kabla*	*Konstrukcja mocowania, odległość, obciążenie*
32	1	**NHXCH FE 180 E90**	**+WKE4**	**1**	**4x 16/16**	**Korytko kablowe KC0P 400H60/... B-400 1.2 m /10kg/m / grubość blachy 1,5 mm Mocowanie na prętach gwintowanych PGM10/..., ceownika CWOP 40H40/05, uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
31	2	**NHXH FE 180 E90**	**+WKE2**		**4x 1,5**	
30	3	**NHXCH FE 180 E90**	**+WKE2**		**4x 1,5/1,5**	
29	4	**NHXH FE 180 E90**	**+WKE4**		**4x 16**	
36	5	**NHXCH FE 180 E90**	**+WKE4**	**2**	**4x 16/16**	**Leiter DGOP 400H60 Drabinka kablowa DGOP 400H60/... B-400/ 1.2 m / 20kg/m / grubość blachy 1,5 mm Mocowanie : PGM10/..., ceownik CWOP 40H40/05, uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
35	6	**NHXH FE 180 E90**	**+WKE2**		**4x 1,5**	
34	7	**NHXCH FE 180 E90**	**+WKE2**		**4x 1,5/1,5**	
33	8	**NHXH FE 180 E90**	**+WKE4**		**4x 16**	
40	9	**NHXCH FE 180 E30**	**+WKE4**	**3**	**4x 16/16**	**Korytko kablowe KC0P 400H60/... B-400 1.2 m /10kg/m / grubość blachy 1,5 mm Mocowanie na prętach gwintowanych PGM10/..., ceownika CWOP 40H40/05, uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
39	10	**NHXH FE 180 E30**	**+WKE2**		**4x 1,5**	
38	11	**NHXCH FE 180 E30**	**+WKE2**		**4x 1,5/1,5**	
37	12	**NHXH FE 180 E30**	**+WKE4**		**4x 16**	
20	13	**NHXCH FE 180 E90**	**+WKE4**	**4**	**4x 16/16**	**Korytko kablowe KC0P 400H60/... B-400 1.2 m /10kg/m / grubość blachy 1,5 mm Mocowanie: wspornik WPCO ...., wysięgnik WMCO 400 , pręt gwintowany PGM10/..., uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
19	14	**NHXH FE 180 E90**	**+WKE2**		**4x 1,5**	
18	15	**NHXCH FE 180 E90**	**+WKE2**		**4x 1,5/1,5**	
17	16	**NHXH FE 180 E90**	**+WKE4**		**4x 16**	
24	17	**NHXCH FE 180 E90**	**+WKE4**	**5**	**4x 16/16**	**Drabinka kablowa DGOP 400H60/... B-400 /1.2 m / 20kg/m grubość blachy 1,5 mm Mocowanie: wspornik WPCO ...., wysięgnik WMCO 400 , pręt gwintowany PGM10/..., uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
23	18	**NHXH FE 180 E90**	**+WKE2**		**4x 1,5**	
22	19	**NHXCH FE 180 E90**	**+WKE2**		**4x 1,5/1,5**	
21	20	**NHXH FE 180 E90**	**+WKE4**		**4x 16**	
28	21	**NHXCH FE 180 E30**	**+WKE4**	**6**	**4x 16/16**	**Korytko kablowe KC0P 400H60/... B-400 1.2 m /10kg/m / grubość blachy 1,5 mm Mocowanie: wspornik WPCO ...., wysięgnik WMCO 400 , pręt gwintowany PGM10/..., uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
27	22	**NHXH FE 180 E30**	**+WKE2**		**4x 1,5**	
26	23	**NHXCH FE 180 E30**	**+WKE2**		**4x 1,5/1,5**	
25	24	**NHXH FE 180 E30**	**+WKE4**		**4x 16**	
8	25	**NHXCH FE 180 E30**	**+WKE4**	**7**	**4x 16/16**	**Leiter DGOP 400H60 Drabinka kablowa DGOP 400H60/... B-400/ 1.2 m / 20kg/m / grubość blachy 1,5 mm Mocowanie : PGM10/..., ceownik CWOP 40H40/05, uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
7	26	**NHXH FE 180 E30**	**+WKE2**		**4x 1,5**	
6	27	**NHXCH FE 180 E30**	**+WKE2**		**4x 1,5/1,5**	
5	28	**NHXH FE 180 E30**	**+WKE4**		**4x 16**	
12	29	**NHXCH FE 180 E90**	**+WKE4**	**8**	**4x 16/16**	**Korytko siatkowe KDS 400H60/... B-400/ 1.2 m / 10kg/m / Ópręta 4,5 mm Mocowanie na prętach gwintowanych PGM10/..., ceownika CWOP 40H40/05, uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
11	30	**NHXH FE 180 E90**	**+WKE2**		**4x 1,5**	
10	31	**NHXCH FE 180 E90**	**+WKE2**		**4x 1,5/1,5**	
9	32	**NHXH FE 180 E90**	**+WKE4**		**4x 16**	
16	33	**NHXCH FE 180 E30**	**+WKE4**	**9**	**4x 16/16**	**Korytko siatkowe KDS 400H60/... B-400/ 1.2 m / 10kg/m / Ópręta 4,5 mm Mocowanie na prętach gwintowanych PGM10/..., ceownika CWOP 40H40/05, uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
15	34	**NHXH FE 180 E30**	**+WKE2**		**4x 1,5**	
14	35	**NHXCH FE 180 E30**	**+WKE2**		**4x 1,5/1,5**	
13	36	**NHXH FE 180 E30**	**+WKE4**		**4x 16**	

F	*T*	*Symbol kaba*		*Pozycja*	*Przekrój kabla*	*Konstrukcja mocowania, odległość, obciążenie*
4	37	**NHXCH FE 180 E30**	**+WKE4**	**10**	**4x 16/16**	**Drabinka kablowa DUOP 400H60/... B-400 /1.2 m / 20kg/m grubość blachy 1,5 mm Mocowanie: wspornik WPCO ...., wysięgnik WMCO 400 , pręt gwintowany PGM10/..., uchwytu UPWO do betonu za pomocą kołków rozporowych PSRO M10x 80**
3	38	**NHXH FE 180 E30**	**+WKE2**		**4x 1,5**	
2	39	**NHXCH FE 180 E30**	**+WKE2**		**4x 1,5/1,5**	
1	40	**NHXH FE 180 E30**	**+WKE4**		**4x 16**	
61B	41	**HTKSH ekw**	**+WKE2**	**11**	**1x2x1**	**Uchwyt kablowy UEF ... Mocowanie do betonu co 0.6m za pomocą kołków rozporowych SRO M6x 30**
61A	42	**HTKSH**			**1x2x1**	
60B	43	**HTKSH**		**12**	**1x2x1**	**Uchwyt kablowy firmy OBO 1015/2 Mocowanie do betonu co 0.6m za pomocą kołków rozporowych FDN 6/5 (6 x 35) firmy FISCHER**
60A	44	**HTKSH**			**1x2x1**	
59B	45	**HTKSH ekw**			**1x2x1**	
59A	46	**HTKSH ekw**			**1x2x1**	
58B	47	**JE-H(St)H.. 1x2x 0.8**			**1x2x 0.8**	
58A	48	**JE-H(St)H.. 1x2x 0.8**			**1x2x 0.8**	
57B	49	**HTKSH**		**13**	**1x2x1**	**Uchwyt kablowy firmy OBO 1015 Mocowanie do betonu co 0.6m za pomocą kołków rozporowych FDN 6/5 (6 x 35) firmy FISCHER**
57A	50	**HTKSH**			**1x2x1**	
56B	51	**HTKSH ekw**			**1x2x1**	
56A	52	**HTKSH ekw**			**1x2x1**	
55B	53	**JE-H(St)H.. 1x2x 0.8**			**1x2x 0.8**	
55A	54	**JE-H(St)H.. 1x2x 0.8**			**1x2x 0.8**	
54B	55	**HTKSH ekw**	**+WKE3**	**14**	**1x2x1**	**Uchwyt kablowy UDF ... Mocowanie do betonu co 0.6m za pomocą kołków rozporowych SRO M6x 30**
54A	56	**HTKSH**			**1x2x1**	
53B	57	**HTKSH**		**15**	**1x2x1**	**Uchwyt kablowy firmy OBO 1015 Mocowanie do betonu co 0.6m za pomocą kołków rozporowych SRO M6x 30**
53A	58	**HTKSH**			**1x2x1**	
52B	59	**HTKSH ekw**			**1x2x1**	
52A	60	**HTKSH ekw**			**1x2x1**	

Zestawienie kabli

Lp	Symbol kaba	Średnica kabla	Ciężar kabla	Ilość
1	**NHXCH FE 180 E90 4x 16/16**	**26,0±0,5**	1,34 kg/m	
2	**NHXH FE 180 E90 4x 16**	**24,0**	1,14 kg/m	
3	**NHXCH FE 180 E90 4x 1,5/1,5**	**17mm**	0,39 kg/m	
4	**NHXH FE 180 E90 4x 1,5**	**16mm**	0,35 kg/m	
5	**NHXCH FE 180 E30 4x 16/16**	**25**	1,28 kg/m	
6	**NHXH FE 180 E30 4x 16**	**23**	1,10 kg/m	
7	**NHXCH FE 180 E30 4x 1,5/1,5**	**16**	0,35 kg/m	
8	**NHXH FE 180 E30 4x 1,5**	**15**	0,31 kg/m	
9	**HTKSH 1x2x1**	**8 mm**	0.07 kg/m	
10	**HTKSH ekw1x2x1**	**8 mm**	0.07 kg/m	
11	**JE-H(St)H.. 1x2x 0.8**	**8 mm**	0.07 kg/m	

Zestawienie puszek

Lp	Symbol kaba	ilość
1	**WKE 2**	21
2	**WKE 3**	1
3	**WKE 4**	20

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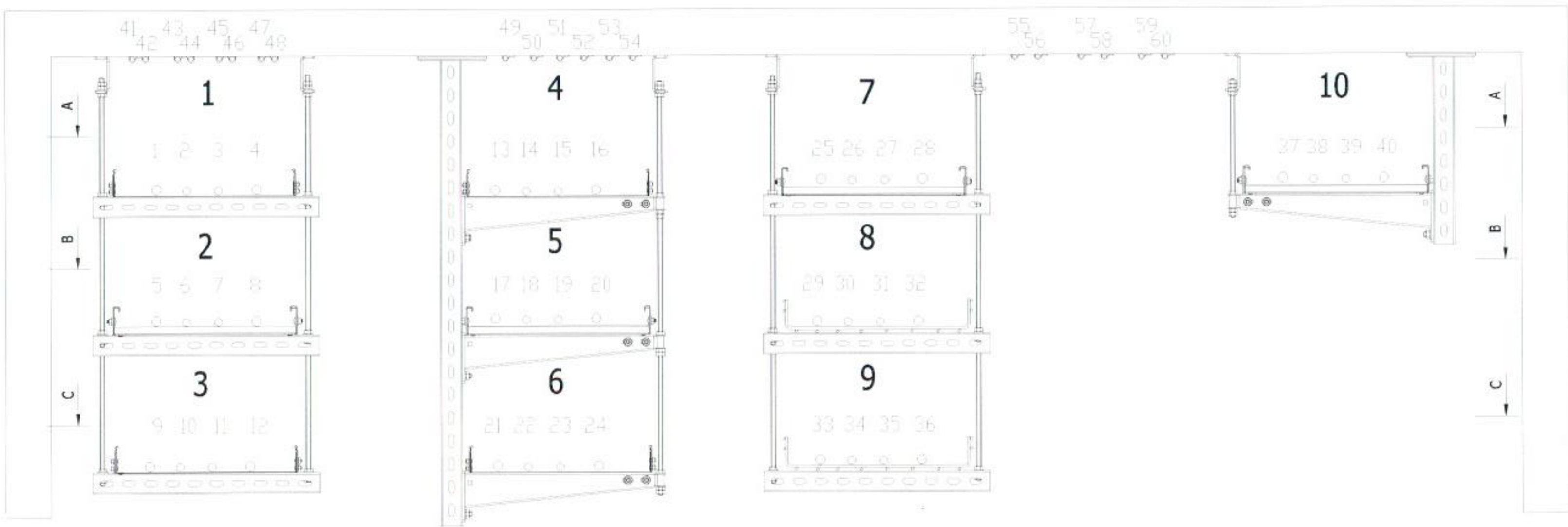
Príloha č./Appendix No. 16



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FIRES
25-07- 2008rok

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Dátum/Date: 24.07.2008

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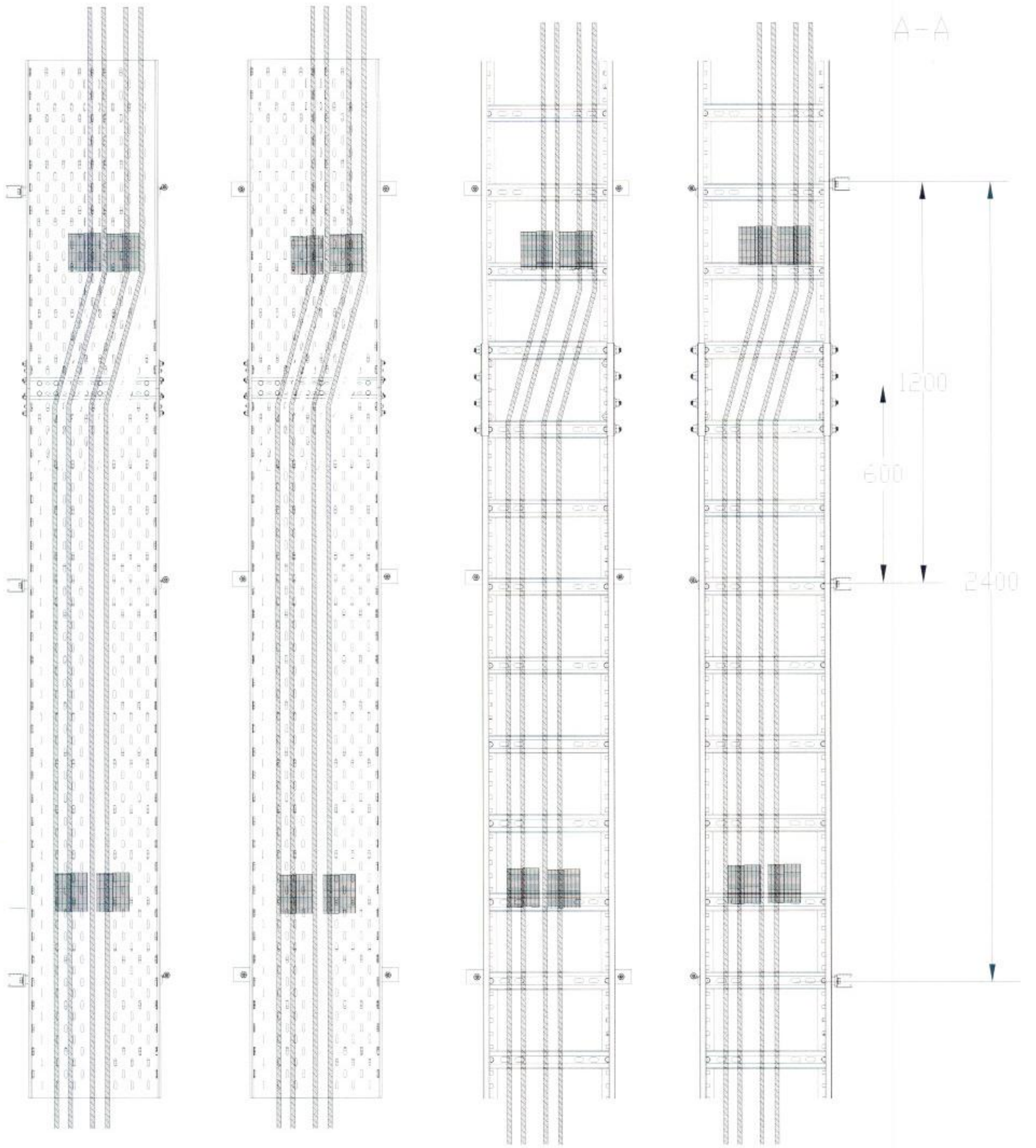
Dokument č. / Document No.: FIRES-FR-151-08-AUNE

Príloha č./Appendix No.: 11

Profesjonalne Systemy Tras Kablowych

Fires 25. 07. 2008

Format A4



Odchyłki wymiarów nietolerowanych	Materiał: Gatunek		Masa [kg]	Podziałka	Format A4
	Nr normy	PN-EN 10327/2005			Arkusz 2
	półfabrykat (nr normy)				Arkuszy 5

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował				Batizowce 24.07. 2008
Rysował				Technokabel-Baks-Spelsberg
Sprawdził				
Zatwierdził				Nr programu maszynowego / Nr zmiany

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Nr rysunku

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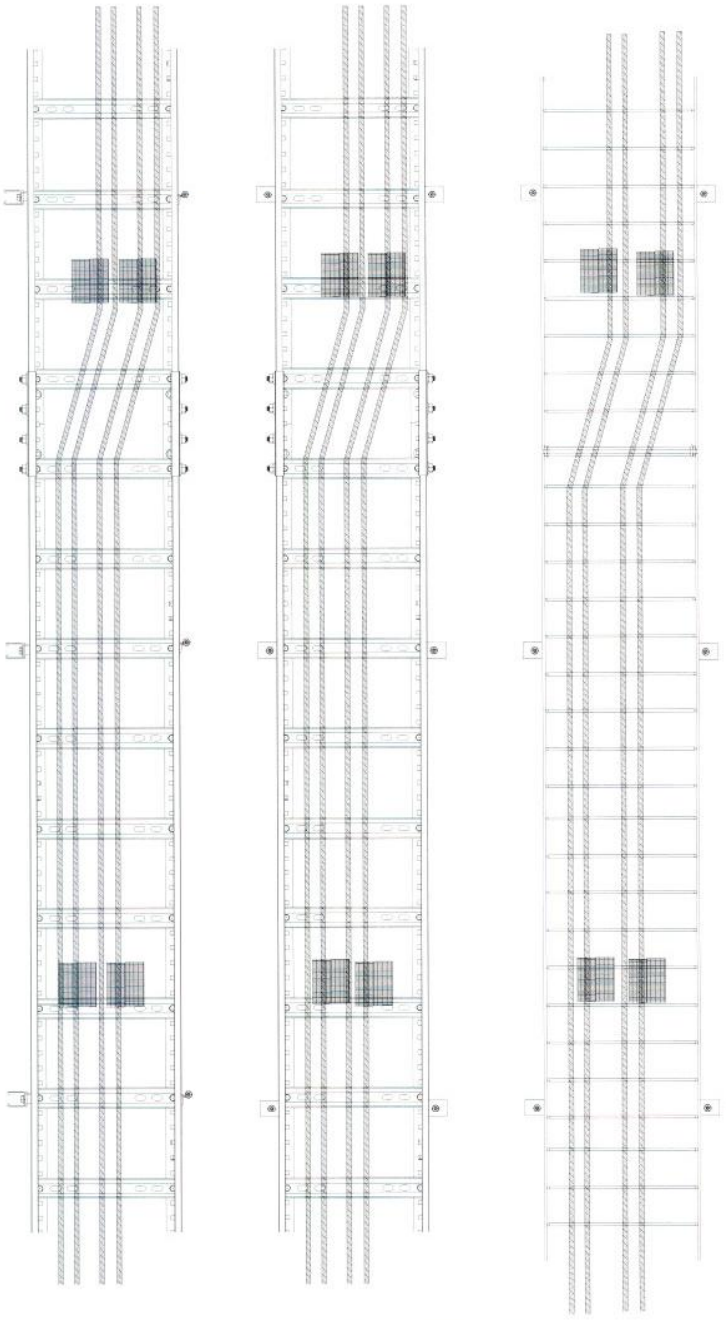
Dátum/Date: 24.04.2008

Podpis/Signature

Dokument č. / Document No.: FIRES-FR-151-08-AUNE

Príloha č./Appendix No.: 18



Dokładność wymiarów metalowych	Gatunek		Masa [kg]	Podziałka	Format A4
	Nr normy	PN-EN 10327:2005			Arkusz 2
	pokrycie (nr normy)				Arkuszy 5

Projektował
Rysował
Sprawdził
Zatwierdził
Nazwisko
Podpis
Data

Nazwa rysunku: Batizowce 24.07.2008 Technokabel-Baks-Spelsberg

Nr programu rysunkowego
Nr rysunku
Nr zmiany

Profesjonalne Systemy Tras Kablowych

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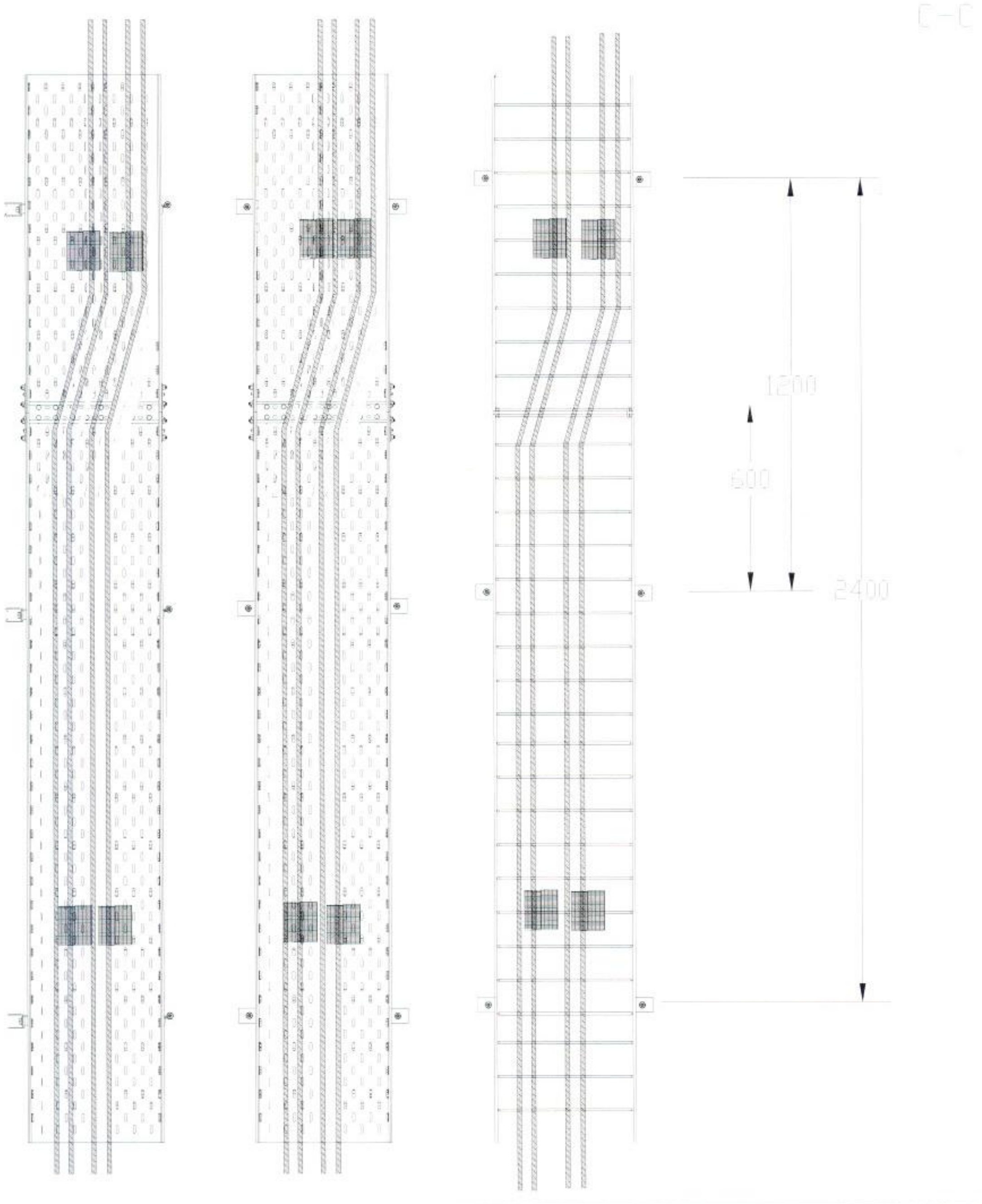
Dokument č. / Document No. FIRES-FR-159-08-AWE

Príloha č./Appendix No. 19



Odchyłki wymiarów nietolerowanych	Materiał: Gatunek		Masa [kg]	Podziałka	Format A4
	Nr normy	PN-EN 10327:2005			Arkusz 2
	półfabrykat (nr normy)				Arkuszy 5

	Nazwisko	Podpis	Data
Projektował			
Rysował			
Sprawdził			
Zatwierdził			

Nazwa rysunku: Batizowce 24.07. 2008
Technokabel-Baks-Spelsberg

Nr programu maszynowego

Nr rysunku

Nr zmiany

Profesjonalne Systemy
Tras Kablowych

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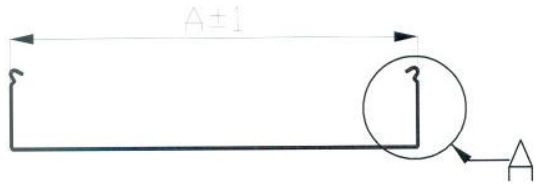
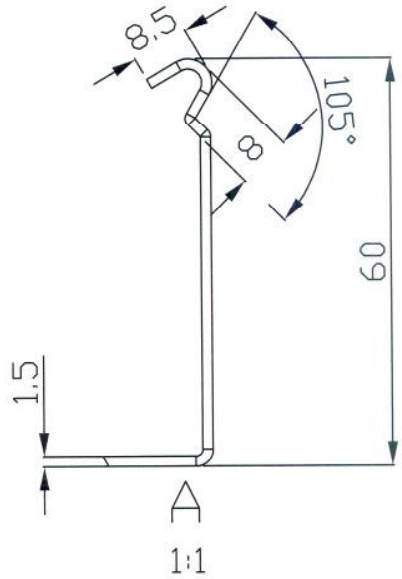
Príloha č./Appendix No.	20

A	Typ	Nr.kat
100	KCOP100H60/3N	862010
200	KCOP200H60/3N	862020
300	KCOP300H60/3N	862030
400	KCOP400H60/3N	862040





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24. 04. 2008
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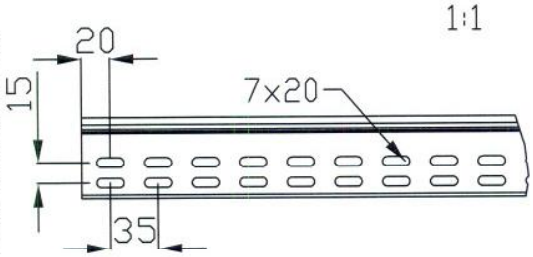
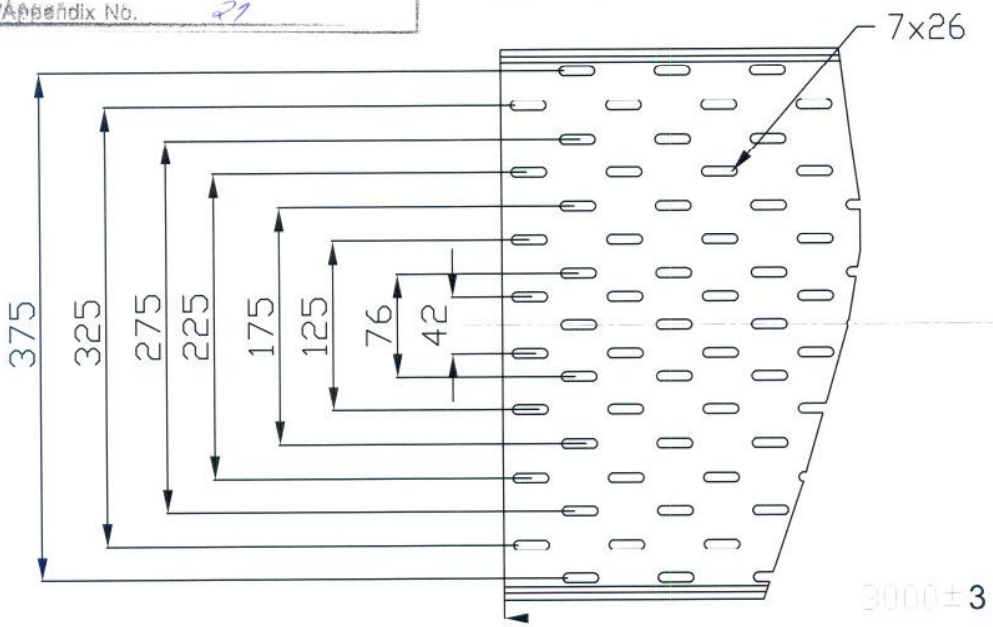
Dokument č.
Document No. FIRES-FR-151-08-ANNE

Príloha č./Appendix No. 21





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	KCOP400H60/3N
Rysował	J.Grochowski		20.10.05	
Sprawdził	T.WŁODARCZYK		20.10.05	Nr programu maszynowego
Zatwierdził	J.KLICZEK		20.10.05	Nr zmiany

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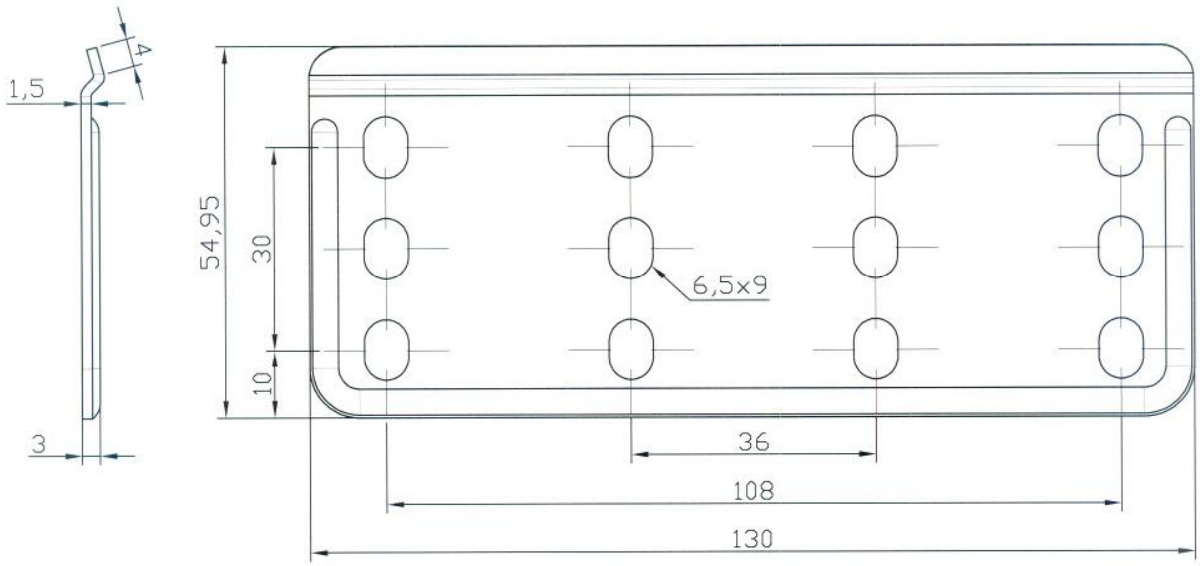
Nr rysunku 862040



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Príloha č./Appendix No. 22

	Odchylka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka 1:1	Format A4
				Nr normy	PN-EN 10327:2005			Arkusz
				półfabrykat (nr normy)				Arkuszy
Projektował	Nazwisko J.GROCHOWSKI	Podpis	Data	20.10.05	Nazwa rysunku LPOPH60N			
Rysował	J.Grochowski			20.10.05				
Sprawdził	T.WŁODARCZYK			20.10.05				
Zatwierdził	J.KLICZEK			20.10.05				Nr zmiany
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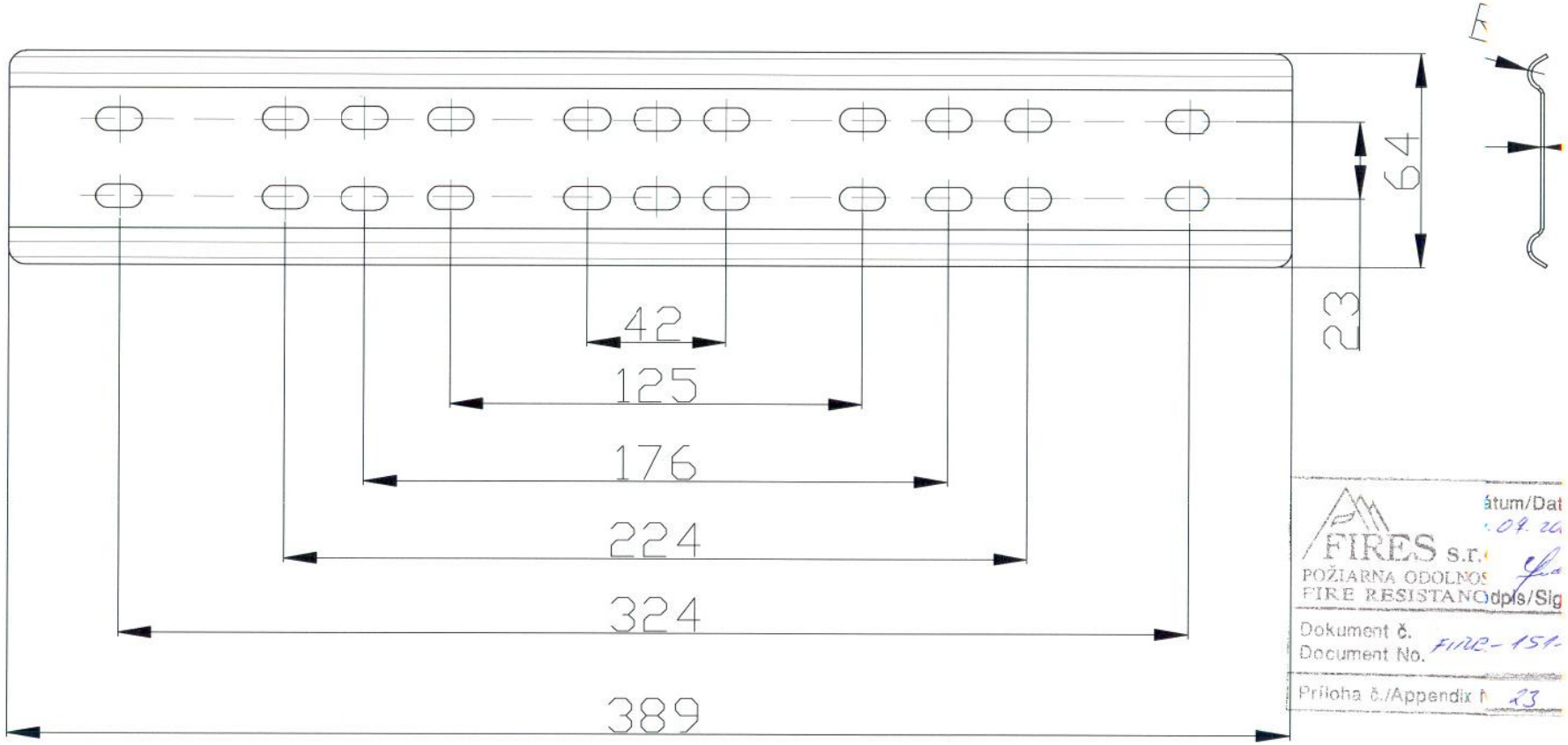

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FIRE RESISTANO

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Document No. FIRE-151-

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Dachyliks wymiarów nietolerowanych			Materiał	Gatunek	Masa (kg)
				Nr normy 27.2005	0,13
				półfabrykat (nr normy)	
Projektował	J.GROCHOVSKI		Data	20.10.05	Nazwa rysunku: L04
Rysował	J.Grochowski			20.10.05	
Sprawdził	T.WŁODARCZYK			20.10.05	łącznik
Zatwierdził	J.KLICZEK			20.10.05	
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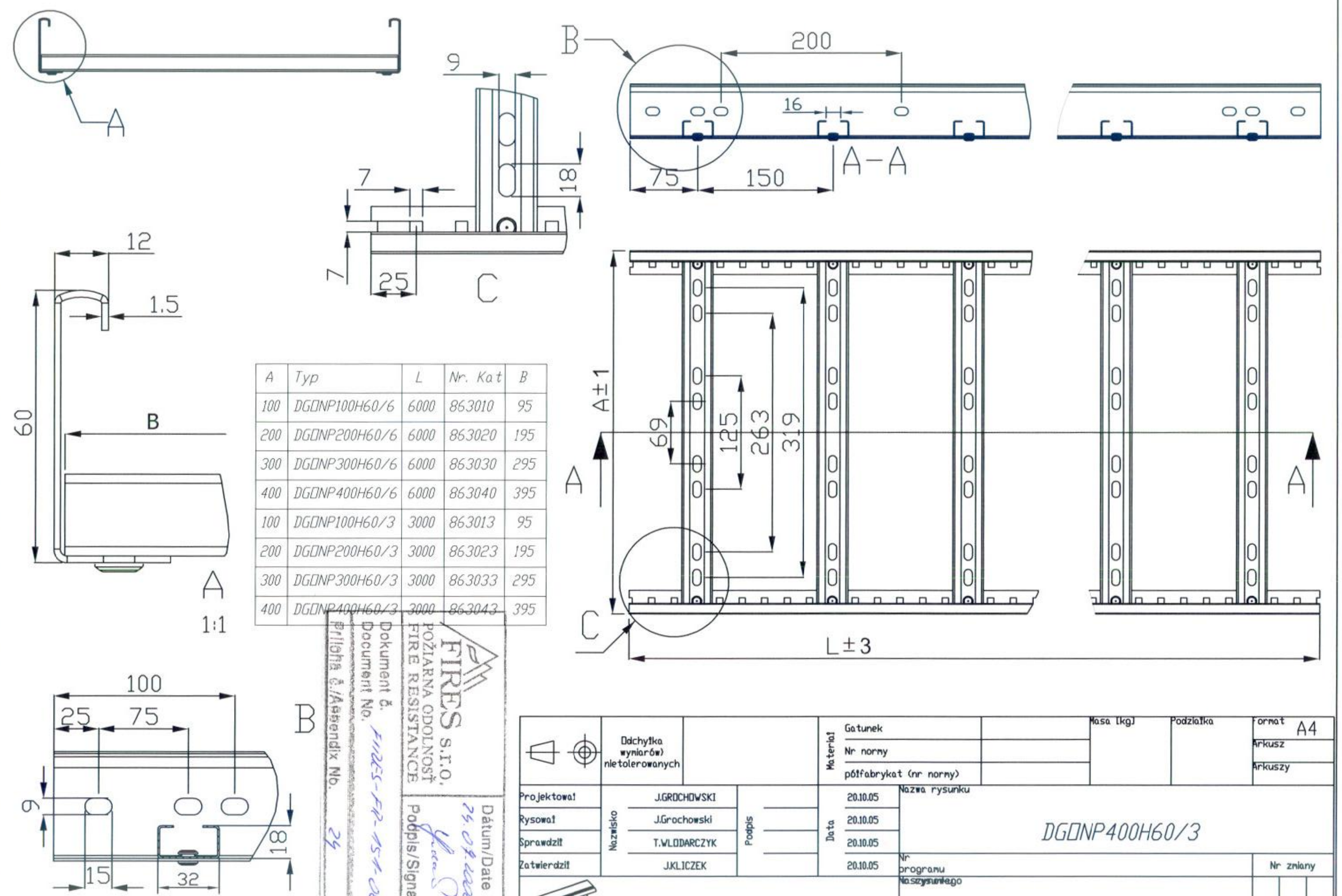

A	Typ	L	Nr. Kat	B
100	DG□NP100H60/6	6000	863010	95
200	DG□NP200H60/6	6000	863020	195
300	DG□NP300H60/6	6000	863030	295
400	DG□NP400H60/6	6000	863040	395
100	DG□NP100H60/3	3000	863013	95
200	DG□NP200H60/3	3000	863023	195
300	DG□NP300H60/3	3000	863033	295
400	DG□NP400H60/3	3000	863043	395

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Príloha č./Appendix No. 24

Odchyłka wymiarów) nietolerowanych		Materiał	Gatunek	
			Nr normy	
			półfabrykat (nr normy)	

	Nazwisko	Podpis	Data
Projektował	J.GROCHOWSKI		20.10.05
Rysował	J.Grochowski		20.10.05
Sprawdził	T.WLODARCZYK		20.10.05
Zatwierdził	J.KLICZEK		20.10.05

Masa [kg] | Podziałka | Format A4 | Arkusz | Arkuszy

Nazwa rysunku: DG□NP400H60/3

Nr programu naszynowego

Nr zmiany

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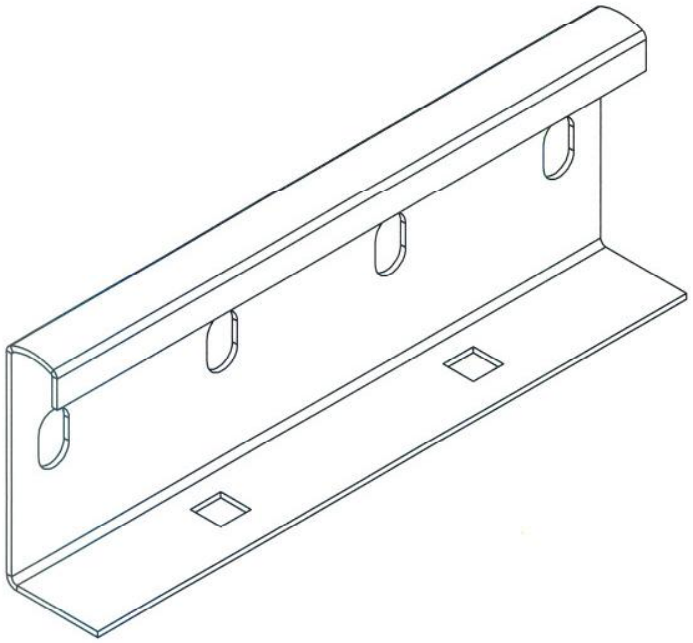

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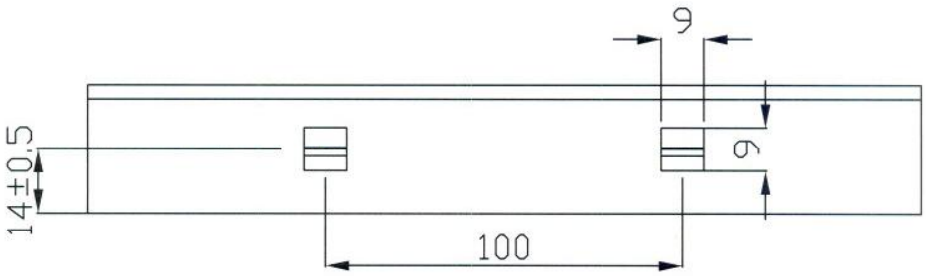
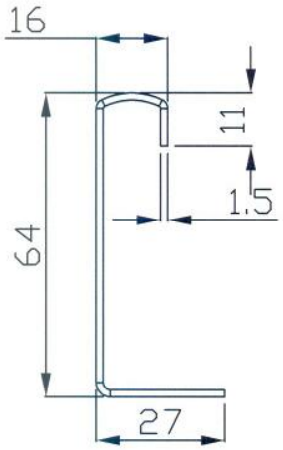
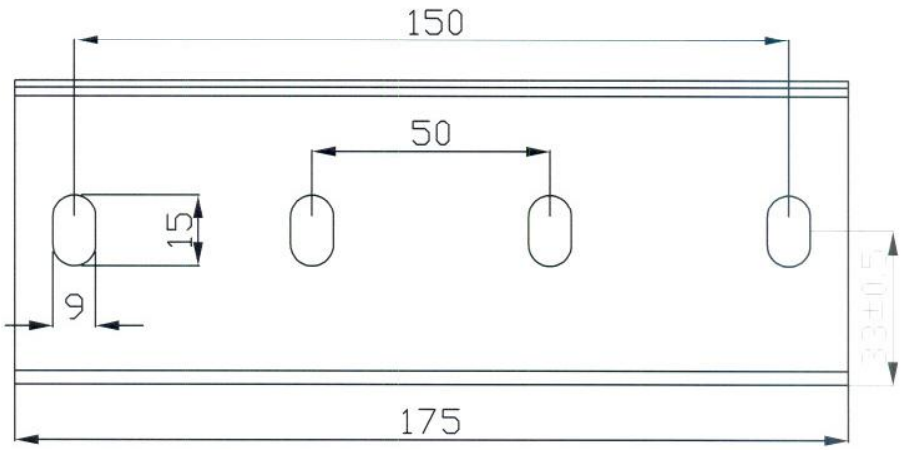
Dokument č.
Document No. FIRES-FR-151-08-AZNE

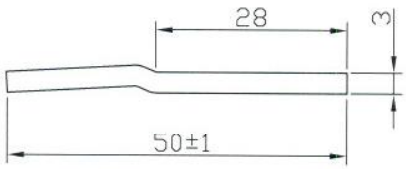
Príloha č./Appendix No. 25

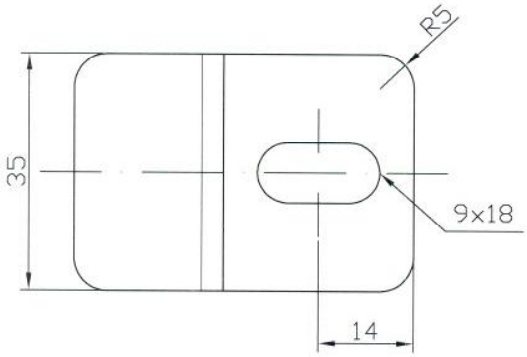






	Odchyłka wymiarów) nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
				Nr normy				Arkusz
				półfabrykat (nr normy)				Arkuszy
Projektował	Nazwisko	J.GROCHOWSKI	Podpis	Data	20.10.05	Nazwa rysunku	LDONCH60	
Rysował		J.Grochowski			20.10.05			
Sprawdził		T.WŁODARCZYK			20.10.05			
Zatwierdził		J.KLICZEK			20.10.05	Nr programu		Nr zmiany
Profesjonalne Systemy Tras Kablowych						Nasz symbol	863000	





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Dátum/Date 24.04.2008

Podpis/Signature

Dokument č. / Document No. FIRES-FR-151-08-ANNEX

Príloha č./Appendix No. 26

	Odchyłka wymiarów nietolerowanych	±0,5	Materiał	Gatunek	-----	Masa [kg]	Podziałka	Format A4
				Nr normy	PN-EN 10327:2005	0,025	1:1	Arkusz --
				półfabrykat (nr normy)	-----			Arkuszy --

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	Tomasz Grudniewski		29.12.04	ZMOE
Rysował	Jakub Rudak		20.02.08	
Sprawdził	Jacek Kliczek		20.02.08	
Zatwierdził	Jacek Kliczek		20.02.08	Nr zmiany

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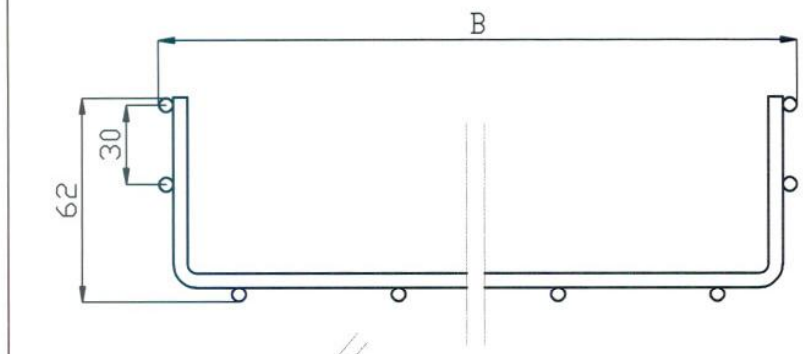
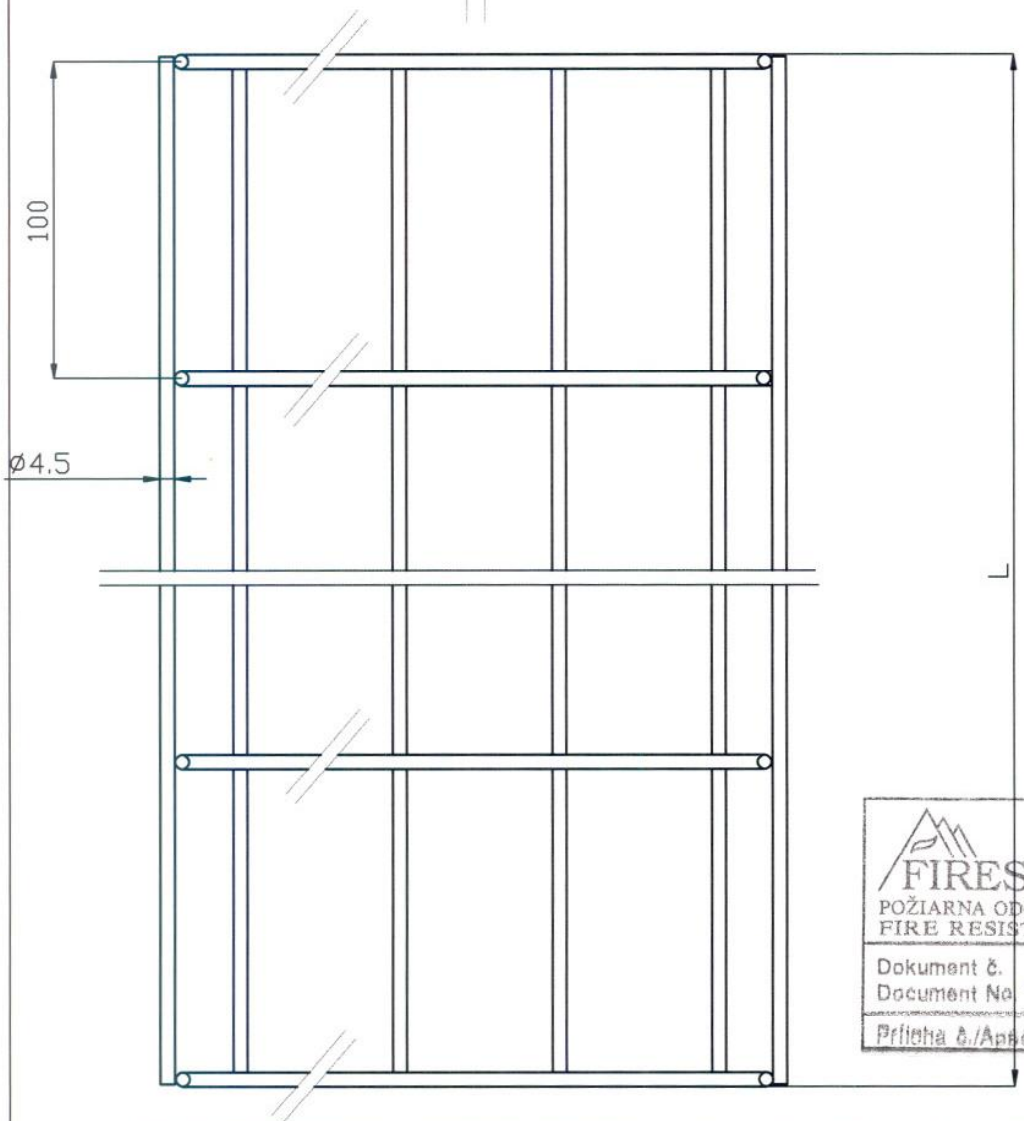
Nr rysunku 802900



SYMBOL	L (mm)	B (mm)
KDS□100H60/3	3000	100
KDS□200H60/3	3000	200
KDS□300H60/3	3000	300
KDS□400H60/3	3000	400



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Dokument č. / Document No. FIRES-FR-151-08-ANNE

Príloha č./Appendix No. 19

	Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
				Nr normy	PN-EN 10327:2005			Arkusz
				półfabrykat (nr normy)				Arkuszy

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	M.Stawikowski		20.10.05	Korytko siatkowe KDS□...H60/...
Rysował	M.Stawikowski		20.10.05	
Sprawdził			20.10.05	
Zatwierdził			20.10.05	Nr zmiany

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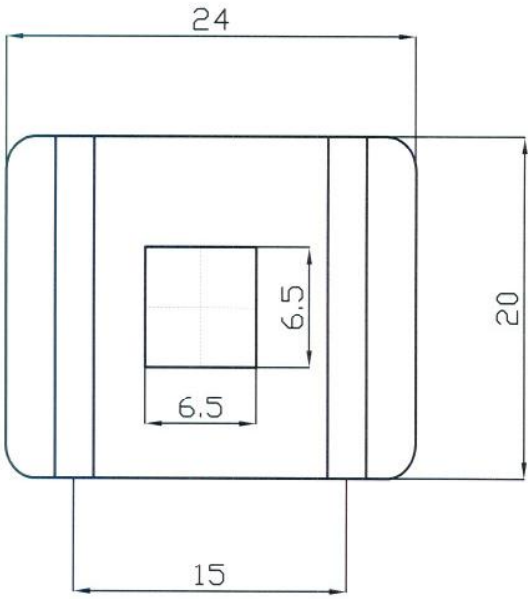
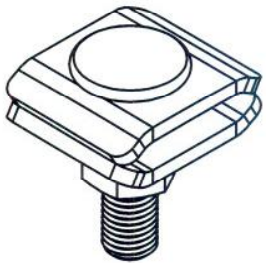
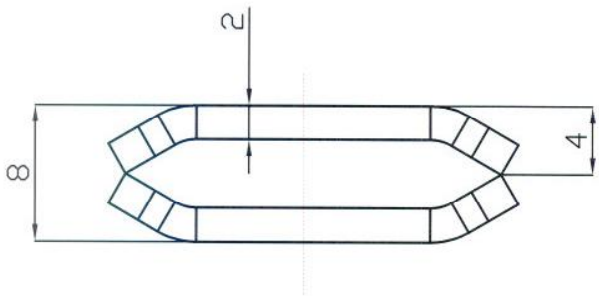
Tras Kablowych

Nr rysunku 1







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Podpis/Signature

Dokument č./Document No. FIRES-FR-154-08-ANNE

Príloha č./Appendix No. 28

Odchyłka wymiarów nietolerowanych		Materiał	Gatunek	St3S	Masa [kg]	Podziałka	Format A4
			Nr normy	PN-EN 10142 + A1 : 1997			Arkusz 1
			półfabrykat (nr normy)				Arkuszy 1

Projektował	M.Stawikowski		10.12.2007	Nazwa rysunku: Ucwyt śrubowy USS□
Rysował	M.Stawikowski			
Sprawdził				Nr programu maszynowego: ---
Zatwierdził				Nr zmiany

Nazwisko | Podpis | Data

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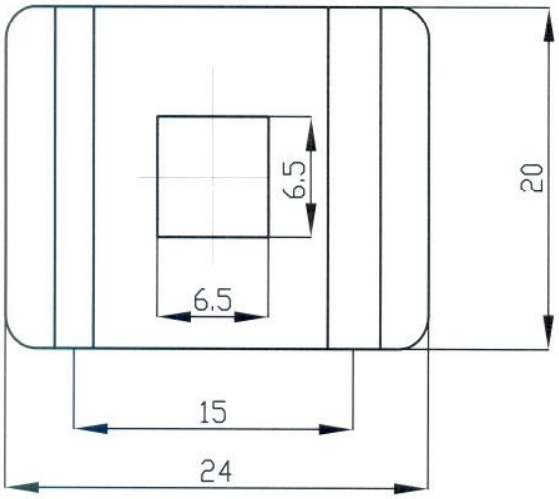
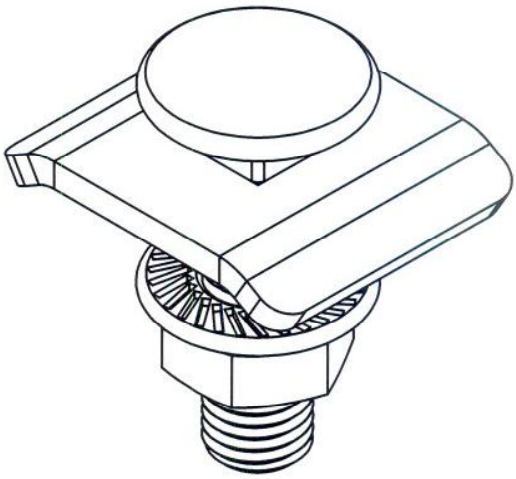
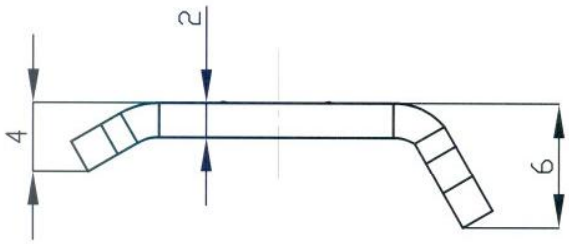
Nr rysunku: 3







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Document No. FIRES-FR-154-08-ANNE

Príloha č./Appendix No. 29

Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
			Nr normy	PN-EN 10327:2005			Arkusz
			półfabrykat (nr normy)				Arkuszy

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	M.Stawikowski		20.10.05	
Rysował	M.Stawikowski		20.10.05	Zacisk śrubowy ZSO
Sprawdził			20.10.05	
Zatwierdził			20.10.05	Nr zmiany

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Tras Kablowych

Nr rysunku
8

OBO BETTERMANN

Fixing clips

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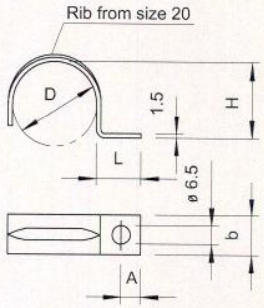
24.09.2008
Podpis/Signature

Dokument č.
Document No. FIRES-FR-159-08-ANNE

Príloha č./Appendix No. 30



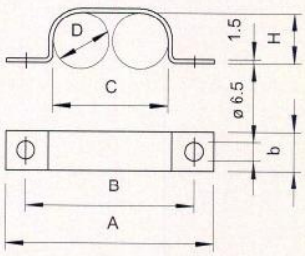
1015

Type	For Ø mm D	Carton qty	Pack qty	Weight kg/100	Ord. no. G
1015	5	2000	100	0.325	1009028
1015	6	2000	100	0.385	1009036
1015	7	2000	100	0.418	1009044
1015	8	2000	100	0.428	1009052
1015	9	2000	100	0.468	1009060
1015	10	2000	100	0.560	1009079
1015	11	2000	100	0.632	1009087
1015	12	2000	100	0.672	1009109
1015	13	2000	100	0.683	1009117
1015	14	1000	100	0.710	1009168
1015	15	1200	100	0.744	1009184
1015	16	1000	100	0.753	1009192
1015	17	1000	100	0.764	1009206
1015	18	1000	100	0.835	1009214
1015	19	1000	100	0.878	1009222
1015	20	1000	100	0.921	1009230
1015	21	1000	100	0.951	1009249
1015	22	1000	100	1.025	1009257
1015	23	1000	100	1.097	1009338
1015	24	1000	100	1.111	1009346
1015	25	1000	100	1.150	1009427
1015	26	1000	100	1.189	1009354
1015	28	1000	100	1.250	1009362

Nom. size D	L mm	H mm	b mm	A mm
5	16	4	12	7
6	16	5	12	7
7	16	6	12	7
8	16	7	12	7
9	16	8	12	7
10	16	9	12	7
11	16	10	14	7
12	16	11	14	7
13	16	12	14	7
14	16	12.5	14	7
15	16	13.5	14	7
16	16	14	14	7
17	16	15	14	7
18	16	16	14	7
19	16	17	14	7
20	16	18	14	7
21	16	19	14	7
22	16	20	14	7
23	16	21	14	7
24	16	22	14	7
25	16	22.5	14	7
26	16	23	14	7
28	16	25	14	7

G Steel, electro-galvanised

Type	For 2xØ mm D	Carton qty	Pack qty	Weight kg/100	Ord. no. G
1015/2	7	2000	100	0.630	1011006
1015/2	8	2000	100	0.720	1011014
1015/2	9	1000	100	0.833	1011022
1015/2	10	1000	100	0.853	1011030
1015/2	12	1000	100	1.108	1011057
1015/2	13	1000	100	1.159	1011065
1015/2	14	1000	100	1.223	1011073
1015/2	20	1000	100	1.547	1011154
1015/2	28	500	50	2.020	1011189



1015/2

Nom. size D	A mm	B mm	C mm	H mm	b mm
2 x 7	44	32	15	6	12
2 x 8	46	34	17	7	12
2 x 9	48	36	19	8	12
2 x 10	54	40	21	9	14
2 x 12	58	44	25	11	14
2 x 13	60	46	27	12	14
2 x 14	62	48	29	12.5	14
2 x 20	74	60	41	18	14
2 x 28	90	76	57	25	14

G Steel, electro-galvanised

VBS_GB_V0_15022001

Please always state the ordering number when ordering.

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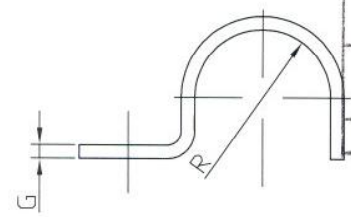
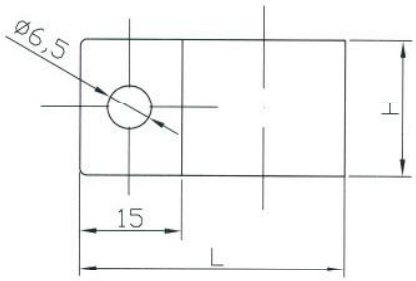
Príloha č./Appendix No. 31





LP	Nazwa wyrobu	Symbol	Nr Katalogowy	R [mm]	L [mm]	H [mm]	G [mm]
20	Uchwyt kabla	UDF 43	405543	21,5	60,0	20,0	2,0
19	Uchwyt kabla	UDF 40	405540	20,0	57,0	20,0	2,0
18	Uchwyt kabla	UDF 37	405537	18,5	54,0	20,0	2,0
17	Uchwyt kabla	UDF 34	405534	17,0	51,0	20,0	2,0
16	Uchwyt kabla	UDF 31	405531	15,5	48,0	20,0	2,0
15	Uchwyt kabla	UDF 28	405528	14,0	45,0	20,0	2,0
14	Uchwyt kabla	UDF 25	405525	12,5	44,0	20,0	2,0
13	Uchwyt kabla	UDF 22	405522	11,0	41,0	14,0	2,0
12	Uchwyt kabla	UDF 20	405520	10,0	39,0	14,0	2,0
11	Uchwyt kabla	UDF 18	405518	9,0	37,0	14,0	2,0
10	Uchwyt kabla	UDF 16	405516	8,0	35,0	14,0	2,0
9	Uchwyt kabla	UDF 15	405515	7,5	34,0	14,0	2,0
8	Uchwyt kabla	UDF 14	405514	7,0	33,0	14,0	1,2
7	Uchwyt kabla	UDF 12	405512	6,0	30,0	14,0	1,2
6	Uchwyt kabla	UDF 10	405510	5,0	28,0	14,0	1,2
5	Uchwyt kabla	UDF 9	405509	4,5	27,0	14,0	1,2
4	Uchwyt kabla	UDF 8	405508	4,0	26,0	14,0	1,2
3	Uchwyt kabla	UDF 7	405507	3,5	25,0	14,0	1,2
2	Uchwyt kabla	UDF 6	405506	3,0	24,0	14,0	1,2
1	Uchwyt kabla	UDF 5	405505	2,5	23,0	14,0	1,2

Odchyłka wymiarów nietolerowanych: ±0,5

Materiał: Gatunek | Nr normy: PN-EN 10327:2005 | półfabrykat (nr normy): -----

Masa [kg]: ---

Podziałka: 1:1

Format: A4 | Arkusz: -- | Arkuszy: --

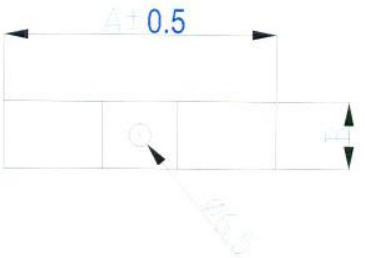
	Nazwisko	Podpis	Data
Projektował	Jacek Grochowski		20.10.05
Rysował	Jakub Rudak		20.02.08
Sprawdził	Jacek Kliczek		20.02.08
Zatwierdził	Jacek Kliczek		20.02.08

Nazwa rysunku: UDF 5-43

Nr zmiany:

Profesjonalne Systemy Tras Kablowych

Nr rysunku: 4055.....



	A	B	C	E	F	G
UEF5	38	14	12	5	R2.5	R3.4
UEF6	40	14	12	6	R3	R2.4
UEF7	42	14	12	7	R3.5	R2.4
UEF8	44	14	12	8	R4	R2.4
UEF9	46	14	12	9	R4.5	R2.4
UEF10	48	14	12	10	R5	R2.4
UEF12	52	14	12	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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Príloha č./Appendix No. 32

Odchyłki wymiarów nietolerowanych

Materiał: Gatunek:
Nr normy: PN-EN 10142 + A1 : 1997
półfabrykat (nr normy):

Masa [kg]: Podziałka: 1:1 Format: A4
Arkusz: 1
Arkuszy: 1

Projektował	JGRZECHOWSKI		2010.04
Rysował	JGRZECHOWSKI		2010.04
Sprawdził	T.WŁODARCZYK		2010.04
Zatwierdził	J.KLICZEK		2010.04

Nazwisko / Podpis / Data

Nazwa rysunku: UEF

Nr programu maszynowego: ---

Nr zmiany:

Nr rysunku: ---

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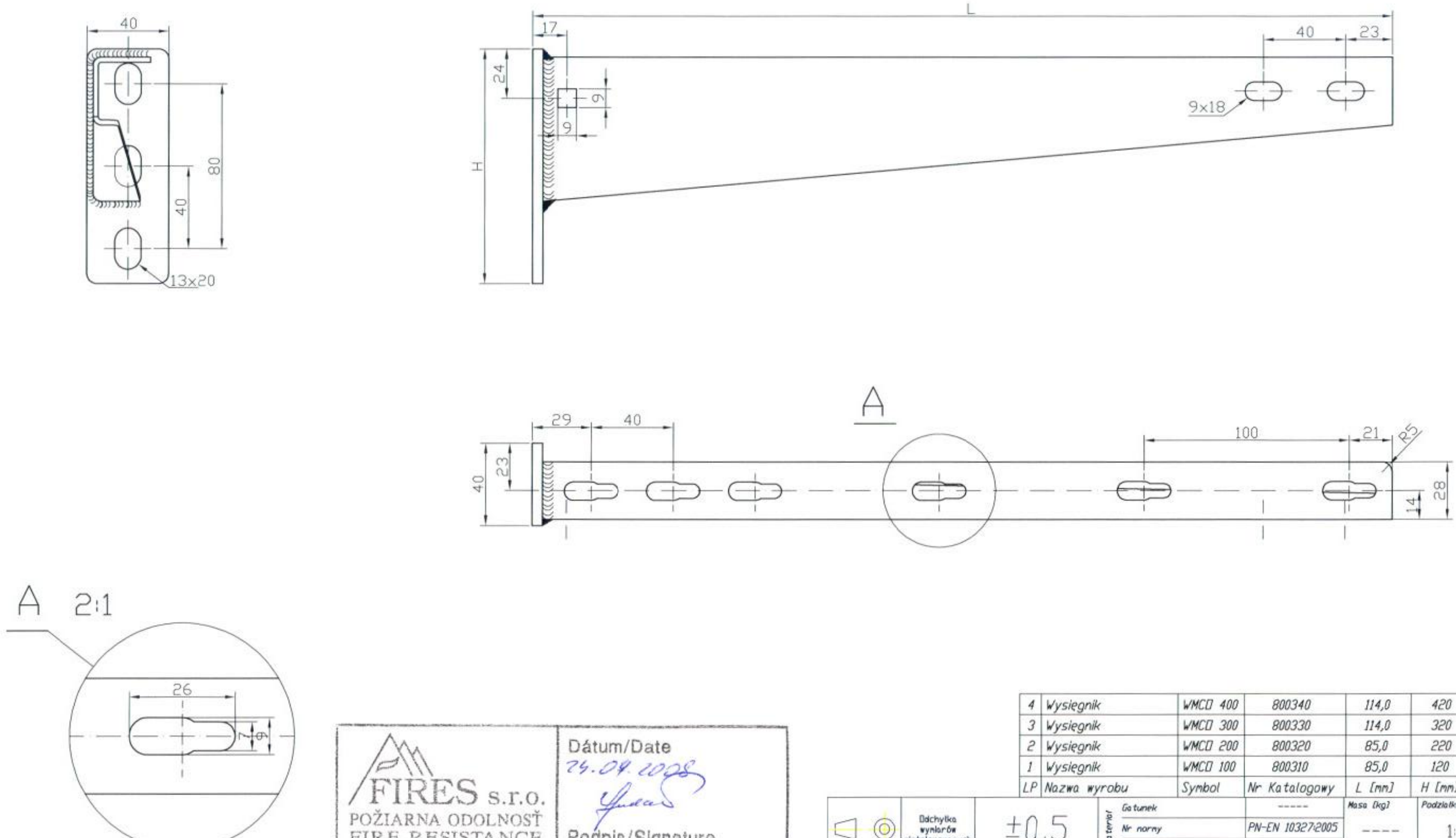

4	Wysięgnik	WMCΠ 400	800340	114,0	420	0,83
3	Wysięgnik	WMCΠ 300	800330	114,0	320	0,43
2	Wysięgnik	WMCΠ 200	800320	85,0	220	0,36
1	Wysięgnik	WMCΠ 100	800310	85,0	120	0,22
LP	Nazwa wyrobu	Symbol	Nr Katalogowy	L [mm]	H [mm]	Masa [kg]

Odchyłka wymiarów nietolerowanych ±0,5	Materiał: Gatunek	-----	Masa [kg] ----	Podziałka 1:1	Format A3
	Nr normy	PN-EN 10327:2005			Arkusz --
	półfabrykat (nr normy)	-----			Arkuszy --

	Nazwisko	Podpis	Data	
Projektował	Tomasz Grudniewski		29.12.04	Nazwa rysunku: WMCΠ...
Rysował	Jakub Rudak		20.02.08	
Sprawdził	Jacek Kliczek		20.02.08	
Zatwierdził	Jacek Kliczek		20.02.08	Nr zmiany

Profesjonalne Systemy Tras Kablowych

Nr rysunku: 802900

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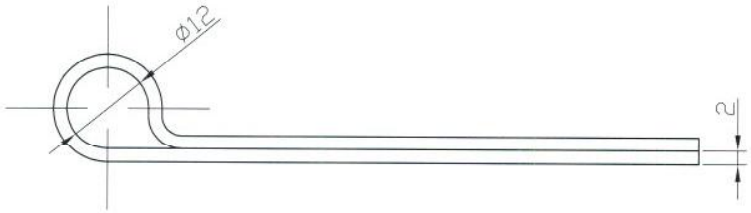
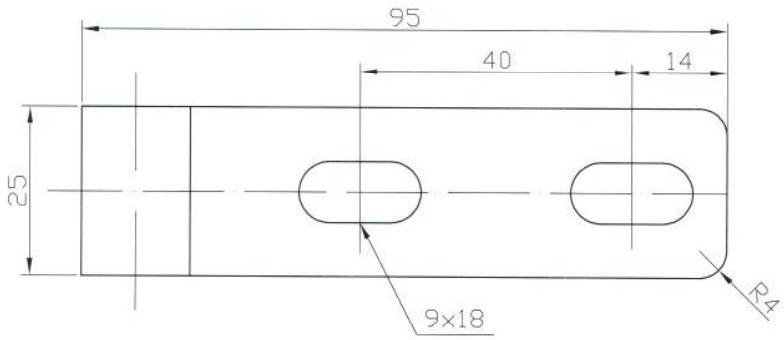
Dátum/Date: 24.04.2008

Podpis/Signature

Dokument č. / Document No. FIRES-FR-151-08-AUNE

Príloha č./Appendix No. 33





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Príloha č./Appendix No. 34

	Odchyłka wymiarów nietolerowanych	±0,5	Materiał	Gatunek	-----	Masa [kg]	Podziałka	Format A4
				Nr normy	PN-EN 10327:2005	---	1:1	Arkusz --
				półfabrykat (nr normy)	-----			Arkuszy --

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	Jacek Grochowski		12.02.04	UPWO
Rysował	Jakub Rudak		20.02.08	
Sprawdził	Jacek Kliczek		20.02.08	
Zatwierdził	Jacek Kliczek		20.02.08	Nr zmiany

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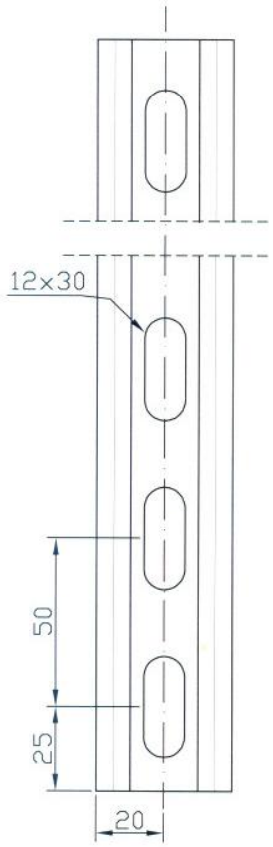
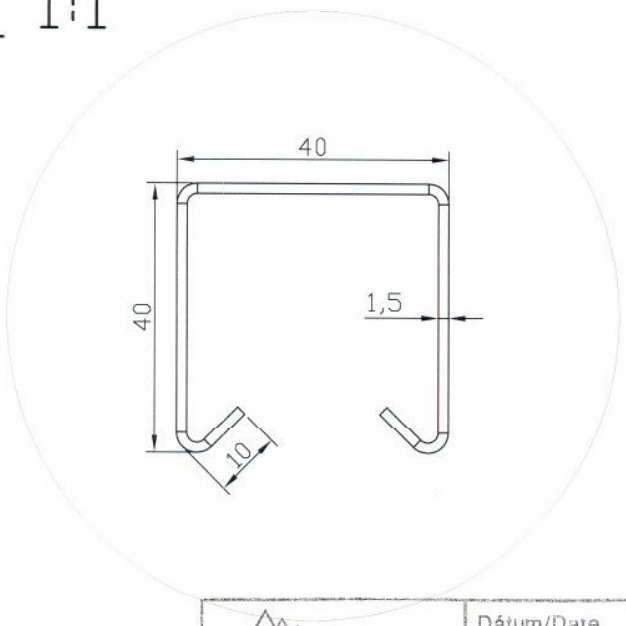
Nr rysunku 803300





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Dátum/Date 29.04.2008

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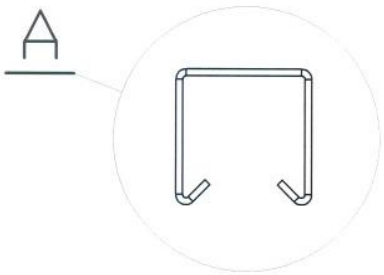
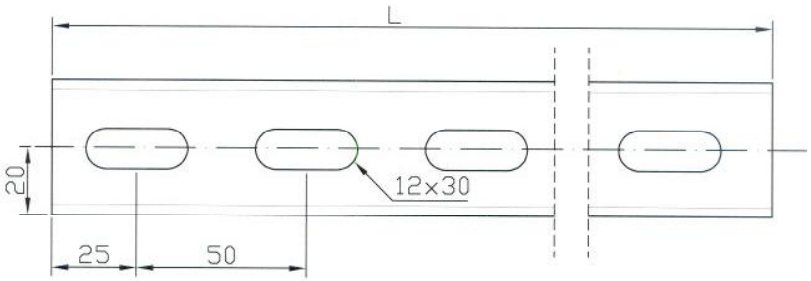
Príloha č./Appendix No. 35





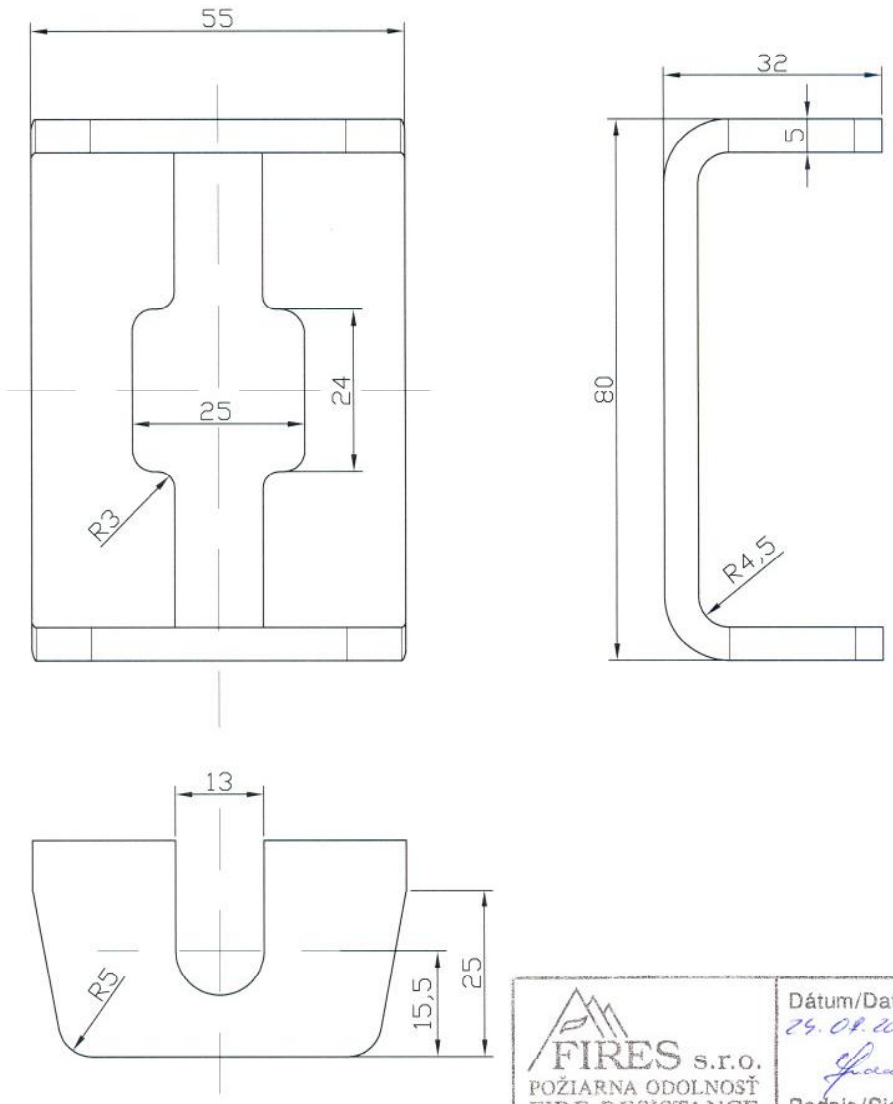
LP	Nazwa wyrobu	Symbol	Nr Katalogowy	L [mm]	Masa [kg]
5	Ceownik wzmocniony	CW□P40H40/ 2	804120	2000	3,50
4	Ceownik wzmocniony	CW□P40H40/05	804105	500	0,88
3	Ceownik wzmocniony	CW□P40H40/04	804104	400	0,70
2	Ceownik wzmocniony	CW□P40H40/03	804103	300	0,53
1	Ceownik wzmocniony	CW□P40H40/02	804102	200	0,35

Odchyłka wymiarów nietolerowanych	Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
		Nr normy	PN-EN 10327:2005	---	1:2	Arkusz --
		półfabrykat (nr normy)	-----			Arkuszy --

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	Jacek Grochowski		20.10.05	CW□P40H40/...N
Rysował	Jakub Rudak		20.02.08	
Sprawdził	Jacek Kliczek		20.02.08	
Zatwierdził	Jacek Kliczek		20.02.08	Nr zmiany

Profesjonalne Systemy Tras Kablowych

Nr rysunku 8041.....



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FIRE RESISTANCE

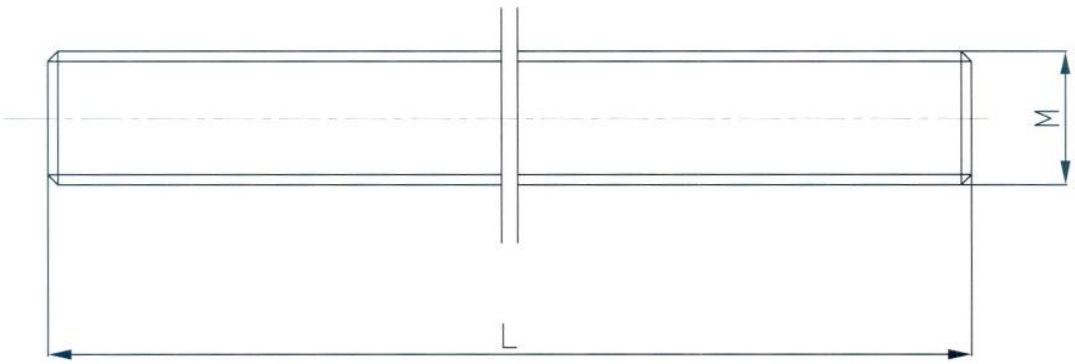
Dátum/Date 29.09.2008

Podpis/Signature

Dokument č. / Document No. FIRES-FR-154-08-ANNEX

Príloha č./Appendix No. 36

	Odchylka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka 1:1	Format A4
				Nr normy	PN-EN 10327:2005			Arkusz
				półfabrykat (nr normy)				Arkuszy
Projektował	Nazwisko J.GROCHOWSKI	Podpis	Data	20.10.05	Nazwa rysunku USOV			
Rysował	J.Grochowski			20.10.05				
Sprawdził	T.WŁODARCZYK			20.10.05				
Zatwierdził	J.KLICZEK			20.10.05				Nr zmiany
BAKS®	Profesjonalne Systemy Tras Kablowych				Nr rysunku 803700			



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FIRE RESISTANCE

Dátum/Date
24. 04. 2008
Podpis/Signature

Dokument č. / Document No. FIRES-FR-159-08-AUNE

Príloha č./Appendix No. 3

M	L
6	2000
8	2000
10	1000

	Odchyłka wymiarów nietolerowanych		Materiał	Gatunek	5,8	Masa [kg]	Podziałka 2:1	Format A4
				Nr normy	----------	---		Arkusz 1
				półfabrykat (nr normy)				Arkuszy 1

	Nazwisko		Podpis		Data	Nazwa rysunku
Projektował		J.GROCHOWSKI			20.10.05	PRĘT GWINTOWANY
Rysował		J.Grochowski			20.10.05	
Sprawdził		T.WŁODARCZYK			20.10.05	
Zatwierdził		J.KLICZEK			20.10.05	Nr programu maszynowego ---

BAKS
Profesjonalne Systemy Tras Kablowych

Nr rysunku
651001

Nr zmiany

Gwóźdź sufitowy FDN

Montaż poprzez uderzenie

Invoice

Date	Invoice #

INFORMACJE OGÓLNE

Gwóźdź sufitowy **FDN** stal ocynkowana

Zastosowanie:
- jako mocowanie wielopunktowych systemów nienośnych w betonie zarysowanym C20/25 do C50/60

Także do:
- Beton B15
- Kamień naturalny o zbitej strukturze
- Cegła pełna
- Bloki pełne wapienno-piaskowe
- Płyt kanałowych ze sprężonego betonu

Do mocowania:
- Listew drewnianych
- Metalowych profili
- Odciągów linowych
- Łańcuchów
- Taśm perforowanych
- Systemów wentylacyjnych
- Drewnianych i metalowych podkonstrukcji
- Sufitów

Bill To:

Moc. dużych obciążeń Kotwy stalowe

P.O. Number	Terms	Rep	Ship	

Quantity	Item Code	Description	Price Each	Amount

OPIS PRODUKTU

- Kotwa wbijana do montażu przelotowego podciągów sufitowych.
- Przez przemieszczenie klina rozprężającego gwóźdź sufitowy rozpiera ją w otworze.

Zalety/Korzyści

- Rozpieranie się gwoździa bezpośrednio w trakcie montażu powoduje tylko minimalne wysunięcia pod wpływem obciążenia.
- Nie są wymagane specjalistyczne narzędzia.
- Prosta, wzrokowa kontrola montażu: gwóźdź rozprężny jest prawidłowo wbity, jeśli ściśle przylega do podłoża.

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Dátum/Date 24-04-2008

Podpis/Signature

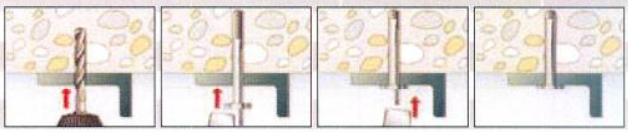
Dokument č. / Document No. FIRES-FR-151-08-ANNE

Príloha č./Appendix No. 38

MONTAŻ

Rodzaj montażu

- Preferowany montaż przelotowy



Instrukcje montażowe

- Podczas wsuwania gwoździa sufitowego do otworu nie uderzać w klin rozprężający.
- Mocować tylko twarde przedmioty.

Total

STANDARDY

Inf. na temat wymagań prawnych dotyczących mocowań znajdują się na str. 26 pod hasłem APROBATY

BEZP. POŻAROWE

Informacje dotyczące ochrony przeciwpożarowej znajdują się na str. 23.

fischer TECHNIKA MOCOWANIA

Invoice

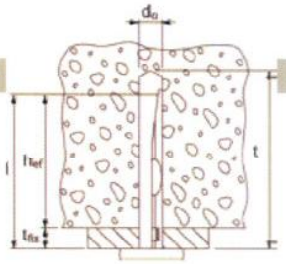
Date | Invoice #

DANE TECHNICZNE

Moc. duzych obciążeń
Kotwy stalowe

Gwóźdź sufitowy **FDN**
stal ocynkowana

Typ	Art.-Nr.	PZ	Aprobata ETA	Wiertło-Ø d_0 [mm]	Min. głębokość otworu t [mm]	Efekt. głębokość kotwienia h_{ef} [mm]	Długość kotwy l [mm]	Max. długość użytkowa t_{fix} [mm]	Ilość w opakowaniu
FDN 6/5 (6 x 35)	**78644**	4	■	6	45	32	39	4,5	100
FDN 6/35 (6 x 65)	**78645**	1	■	6	75	32	69	35	100



Bill To: | Ship To:

P.O. | Terms | Rep | Ship | Via | F.O.B. | Project

OBCIĄŻENIA

Największe obciążenia dopuszczalne[1] pojedynczej kotwy jako mocowanie wielopunktowych nienośnych systemów w betonie normalnym C20/25 do C50/60. Przy wykonywaniu obliczeń należy uwzględnić całość Aprobaty ETA-07/0144.

Quantity | Item Code | Description | Price Each | Amount

Typ kotwy		**FDN 6 galw. ocynk.**
Efektywna głębokość zakotwienia	h_{ef} [mm]	32
Dopuszczalne obciążenie F_{zul}[1] pojedynczego gwoździa bez wpływu warunków brzegowych, tzn. $c \geq c_{cr}$ i $s \geq s_{cr}$		
Beton C20/25 do C50/60	[kN]	0,9
Dopuszczalny moment zginający M_{zul}		
	[Nm]	3,1
Wymiary elementów budowlanych i parametry montażowe		
Charakterystyczny odstęp osiowy	s_{cr} [mm]	200
Charakterystyczna odległość od krawędzi	c_{cr} [mm]	150
Minimalny odstęp osiowy	s_{min} [mm]	130
Minimalna odległość od krawędzi	c_{min} [mm]	100
Minimalna grubość podłoża	h_{min} [mm]	80
Nominalna średnica wiercenia	d_0 [mm]	6
Głębokość otworu	$h_0 \geq$ [mm]	40
Średnica otworu w elemencie mocowanym	$d_f \leq$ [mm]	/

[1] Podano obciążenia wyrywające. Zostały uwzględnione, zawarte w Aprobacie, częściowe materiałowe współczynniki bezpieczeństwa i częściowy współczynnik bezpieczeństwa γ_F = 1,4. Patrz strona 20 „Obciążenia"

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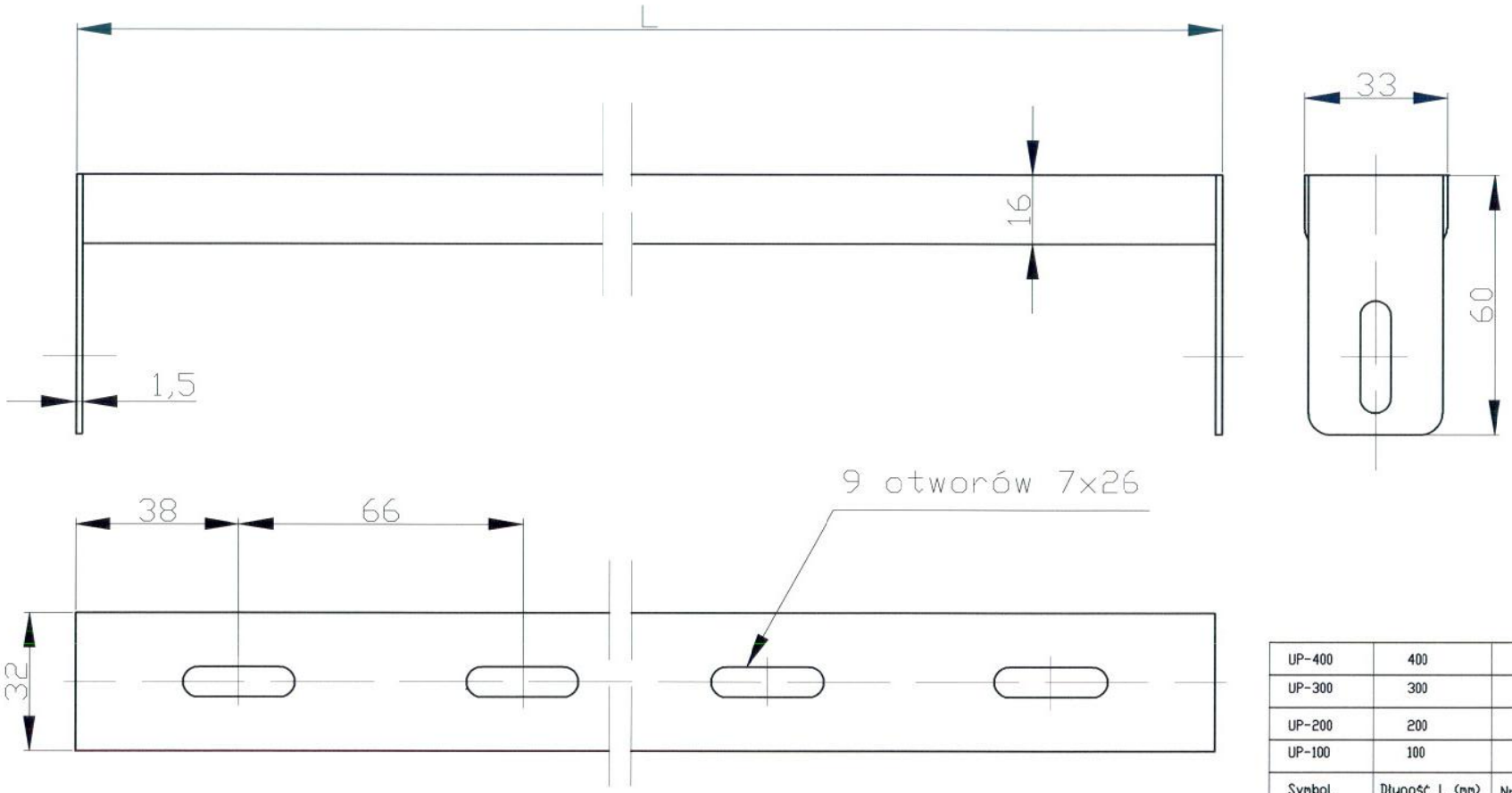
Príloha č./Appendix No. 39

Total



UP-400	400	
UP-300	300	
UP-200	200	
UP-100	100	
Symbol	Długość L (mm)	Nr katalogowy

	Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka 1:1	Format A3
				Nr normy				Arkusz
				półfabrykat (nr normy)				Arkuszy 1

Projektował	Nazwisko	Podpis	Data	Nazwa rysunku	
Rysował	M.Stawikowski		25.07.2008	Uchwyt puszki UP-....	
Sprawdził					
Zatwierdził				Nr programu maszynowego	Nr zmiany

Profesjonalne Systemy Tras Kablowych

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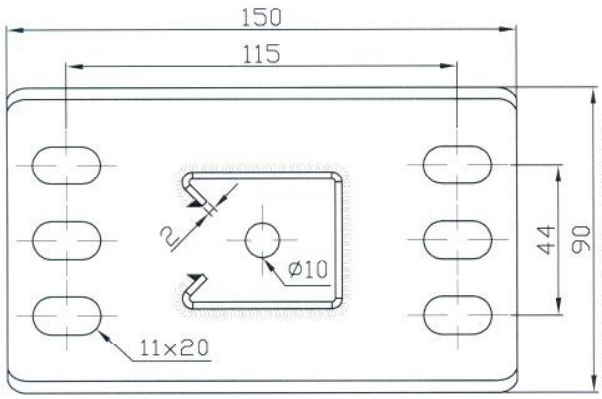
FIRE RESISTANCE

Dátum/Date 24.07.2008
Podpis/Signature

Dokument č. / Document No. FIRES-FR-151-08-NWE

Príloha č./Appendix No. 40



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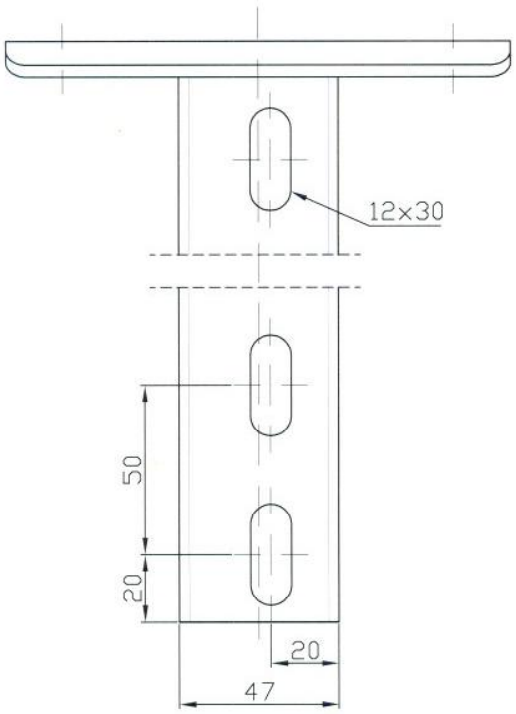
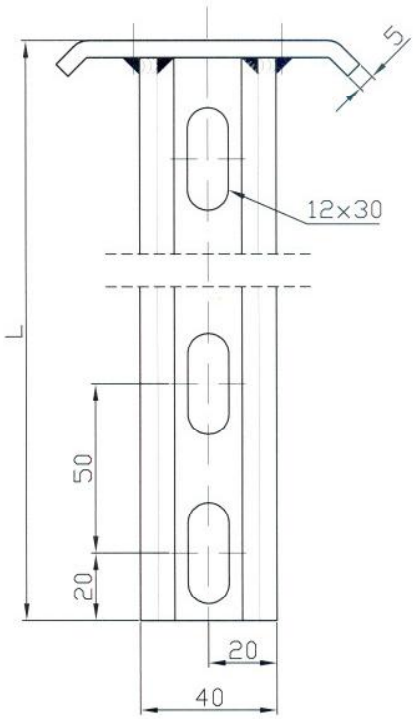
FIRE RESISTANCE

Dátum/Date
24.04.2008
Podpis/Signature

Dokument č.
Document No. FIRES-FR-151-08-ANNE

Príloha č./Appendix No. 41





LP	Nazwa wyrobu	Symbol	Nr Katalogowy	L [mm]	Masa [kg]
10	Wspornik sufitowy	WPCO 2000	800812	2000	4,90
9	Wspornik sufitowy	WPCO 1000	800811	1000	2,45
8	Wspornik sufitowy	WPCO 900	800890	900	2,25
7	Wspornik sufitowy	WPCO 800	800880	800	2,10
6	Wspornik sufitowy	WPCO /00	8008/0	/00	1,86
5	Wspornik sufitowy	WPCO 600	800860	600	1,67
4	Wspornik sufitowy	WPCO 500	800850	500	1,47
3	Wspornik sufitowy	WPCO 400	800840	400	1,30
2	Wspornik sufitowy	WPCO 300	800830	300	1,10
1	Wspornik sufitowy	WPCO 200	800820	200	0,90

Odchyłka wymiarów nietolerowanych

Materiał: Gatunek: ----- | Nr normy: PN-EN 10327:2005 | półfabrykat (nr normy): -----

Masa [kg]: --

Podziałka: 1:2

Format A4 | Arkusz -- | Arkuszy --

	Nazwisko	Podpis	Data
Projektował	Jacek Grochowski		20.10.05
Rysował	Jakub Rudak		20.02.08
Sprawdził	Jacek Kliczek		20.02.08
Zatwierdził	Jacek Kliczek		20.02.08

Nazwa rysunku: WPCO...

Nr zmiany

Profesjonalne Systemy Tras Kablowych

Nr rysunku: 8008.....

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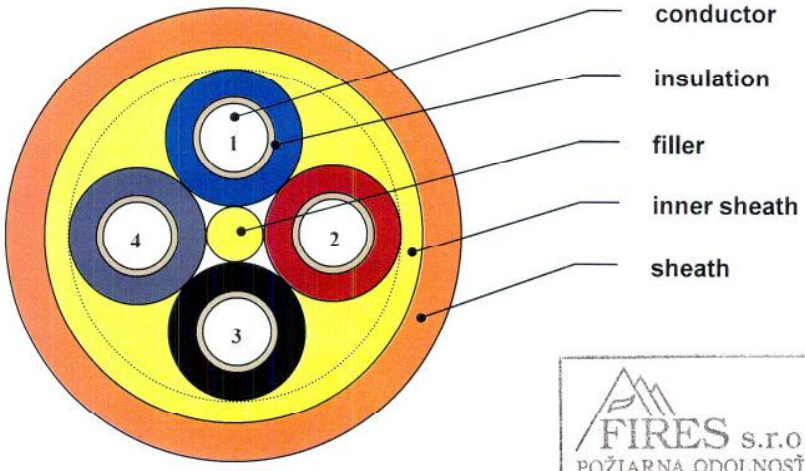
ISO 9001:2000

NHXH FE180 PH30/E30 0,6/1 kV

FIRE RESISTANT HALOGEN FREE POWER CABLES



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POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

Dátum/Date 24.04.2008

Podpis/Signature

Dokument č./Document No. FIRES-FR-154-08-ANNE

Príloha č./Appendix No. 52

APPLICATIONS

NHXH FE180 PH30/E30 0,6/1 kV 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).

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 – power is supplied to equipment which must operate in fire conditions and during fire fighting. The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

The cables are certified by Scientific and Research Development Centre for Fire Protection (Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej) at Józefów – **Certificate of Conformity No. 2412/2007**.

The cables are suitable for indoor and outdoor installations.

CONSTRUCTION

conductor	–	bare copper, solid or stranded, according to PN-EN 60228, EN 60228
insulation	–	mica tape and halogen free cross-linked compound insulation - colours in accordance with PN-HD 308,
filler	–	filler made of halogen free compound,
inner sheath	–	inner sheath made of halogen free compound,
sheath	–	orange, cable sheath made of halogen free compound according to HD 604 S1 and VDE 0276-604 –HM4, (oxygen index bigger than 35%).

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ISO 9001:2000

NHXH FE180 PH30/E30 0,6/1 kV

CHARACTERISTICS

The cables maintain their functions for 30 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
no	mm^2
1	16 ÷ 400
2 - 5	1 ÷ 240
7 – 19	1; 1.5; 2.5 i 4
24 - 40	1; 1.5; 2.5

Operating voltage	0.6/1 kV
Voltage test	4.0 kV rms
Insulation resistivity at 90°C, minimum	1 x 10^{11} Ω·cm
Inductance, approximate	0.7 mH/km
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 50268-2-3, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from -15 to +90°C
during installation	from -5 to +70°C
Minimum bending radius	12 x cable diameter
Cable combustibility	flame retardant
Circuit integrity *	
E30	DIN 4102-12
PH30	PN-EN 50200 or PN-EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Combustibility tests	PN-EN 50266-2-4, IEC 60332-3-24, PN-EN 50200 and PN-EN 50362
Reference standards	AT-0603-0064/2006, WT-TK-44 DIN VDE 0266 PN-HD 604 S1

* Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
	1 x 6,0 RE	8,3	58,0	120
	1 x 10 RE	9,3	96,0	160
	1 x 16 RE	10,3	154,0	240
	1 x 25 RM	12,3	240,0	340
	1 x 35 RM	13,4	336,0	450
	1 x 50 RM	14,1	480,0	570
	1 x 70 RM	15,9	672,0	775
	1 x 95 RM	17,7	912,0	1030
	1 x 120 RM	19,3	1152,0	1260
	2 x 1,5 RE	13,2	28,8	245
	2 x 2,5 RE	14,0	48,0	285
	2 x 4,0 RE	14,9	77,0	345
	2 x 6,0 RE	15,9	115,0	415
	2 x 10 RE	17,6	192,0	550
	2 x 16 RE	19,6	307,0	745
	2 x 25 RM	23,2	480,0	1030
	3 x 1,5 RE	13,7	43,2	270
	3 x 2,5 RE	14,6	72,0	325
	3 x 4,0 RE	15,6	115,0	400
	3 x 6,0 RE	16,7	173,0	490
	3 x 10 RE	18,5	288,0	670

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
	3 x 16 RM	20,9	461,0	885
	3 x 25 RM	24,6	720,0	1270
	4 x 1,5 RE	14,7	58,0	315
	4 x 2,5 RE	15,7	96,0	380
	4 x 4,0 RE	16,9	154,0	475
	4 x 6,0 RE	18,1	230,0	585
	4 x 10 RE	20,1	384,0	805
	4 x 16 RM	22,7	614,0	1095
	4 x 25 RM	26,8	960,0	1550
	4 x 35 RM	30,7	1920,0	1550
	4 x 50 RM	31,7	1920,0	2590
	5 x 1,5 RE	15,8	72,0	365
	5 x 2,5 RE	16,9	120,0	445
	5 x 4,0 RE	18,2	192,0	560
	5 x 6,0 RE	19,5	288,0	695
	5 x 10 RE	21,8	480,0	965
	5 x 16 RM	24,8	768,0	1320
	5 x 25 RM	28,5	1200,0	1880
	5 x 35 RM	31,8	1680,0	2480
	5 x 50 RM	35,0	2400,0	3180
	7 x 1,5 RE	16,9	101,0	425

RE - single wire round conductor;
RM - multiwire round conductor

Other cross-sections and conductor counts available on request.

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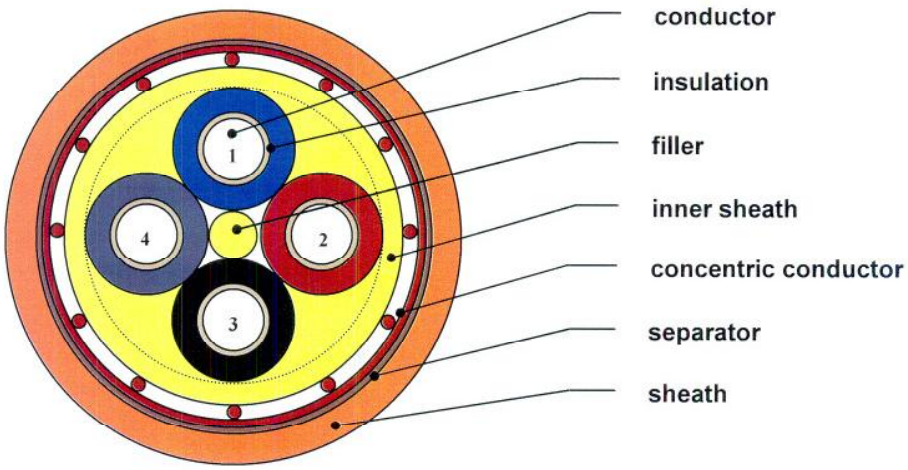
ISO 9001:2000

NHXCH FE180 PH30/E30 0,6/1 kV

FIRE RESISTANT HALOGEN FREE POWER CABLES



APPLICATIONS

NHXCH FE180 PH30/E30 0,6/1 kV 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).

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 – power is supplied to equipment which must operate in fire conditions and during fire fighting. The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

The cables are certified by Scientific and Research Development Centre for Fire Protection (Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej) at Józefów – **Certificate of Conformity No. 2412/2007**.

The cables are suitable for indoor and outdoor installations.

CONSTRUCTION

conductor	–	bare copper, solid or stranded, according to PN-EN 60228, EN 60228,
insulation	–	mica tape and halogen free cross-linked compound insulation - colours in accordance with PN-HD 308,
filler	–	filler made of halogen free compound,
inner sheath	–	inner sheath made of halogen free compound,
concentric conductor	–	concentric conductor made of bare copper wires and a copper tape binder wrapped over the inner sheath,
separator	–	polyester tape,
sheath	–	orange, cable sheath made of halogen free compound according to HD 604 S1 and VDE 0276-604 – HM4, (oxygen index bigger than 35%).

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NHXCH FE180 PH30/E30 0,6/1 kV

CHARACTERISTICS

The cables maintain their functions for 30 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
no	mm^2
1	16 ÷ 400
2 - 5	1 ÷ 240
7 – 19	1; 1.5; 2.5 i 4
24 - 40	1; 1.5; 2.5

Operating voltage	0.6/1 kV
Voltage test	4.0 kV rms
Insulation resistivity at 90°C, minimum	1 x 10^{11} Ω·cm
Inductance, approximate	0.7 mH/km
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 50268-2-3, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from -15 to +90°C
during installation	from -5 to +70°C
Minimum bending radius	12 x cable diameter
Cable combustibility	flame retardant
Circuit integrity *	
E30	DIN 4102-12
PH30	PN-EN 50200 or PN-EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Combustibility tests	PN-EN 50266-2-4, IEC 60332-3-24 PN-EN 50200 and PN-EN 50362
Reference standards	AT-0603-0064/2006, WT-TK-44 DIN VDE 0266 PN-HD 604 S1

* Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
	3 x 1,5RE/1,5	15,4	43,2	320
	3 x 2,5 RE/2,5	16,5	72	390
	3 x 4,0 RE/4,0	17,6	115	460
	3 x 6,0 RE/6,0	19,6	173	590
	3 x 10 RE/10	22,6	288	840
	3 x 16 RE/16	25,8	461	1190
	3 x 25 RM/16	29,1	720	1570
	3 x 35 RM/16	32,7	1190	1960
	3 x 50 RM/25	35,7	1723	2560
	4 x 1,5RE/1,5	15,8	72	350
	4 x 2,5 RE/2,5	17,8	96	450
	4 x 4,0 RE/4,0	18,9	154	530

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
	4 x 6,0 RE/6,0	21,1	230	690
	4 x 10 RE/10	25,8	384	1020
	4 x 16 RE/16	25,2	614	1280
	4 x 25 RM/16	31,5	960	1890
	4 x 35 RE/16	32,3	1498	2350
	4 x 50 RM/25	34,4	2160	2870
	7 x 1,5RE/2,5	19,5	101	520
	7 x 2,5 RE/2,5	20,7	168	620
	12 x 1,5RE/2,5	24,6	101	830
	12 x 2,5 RE/4,0	26,7	168	1030

RE - single wire round conductor;
RM - multiwire round conductor

Other cross-sections and conductor counts available on request.

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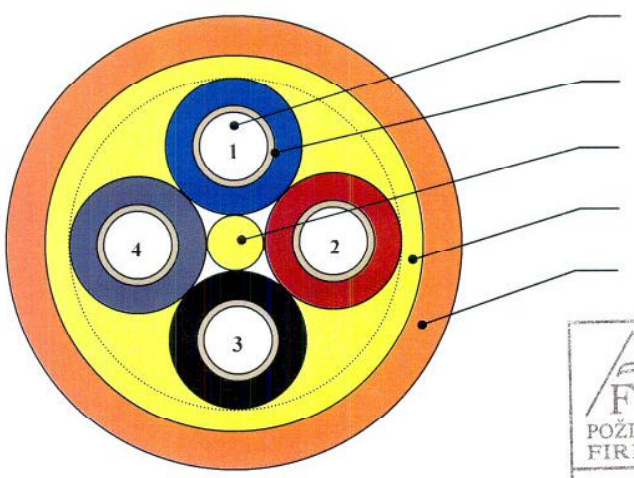
NHXH FE180 PH90/E90 0,6/1 kV

FIRE RESISTANT HALOGEN FREE POWER CABLES



conductor
insulation
filler
inner sheath
sheath

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FIRE RESISTANCE

Dátum/Date 24. 09. 2008
Podpis/Signature

Dokument č./Document No. FIRES-FR-157-08-NNE

Príloha č./Appendix No. 96

APPLICATIONS

NHXH FE180 PH90/E90 0,6/1 kV 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).

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 – power is supplied to equipment which must operate in fire conditions and during fire fighting. The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

The cables are certified by Scientific and Research Development Centre for Fire Protection (Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej) at Józefów – **Certificate of Conformity No. 2412/2007**.

The cables are suitable for indoor and outdoor installations.

CONSTRUCTION

conductor	–	bare copper, solid or stranded, according to PN-EN 60228, EN 60228,
insulation	–	mica tape and halogen free cross-linked compound insulation - colours in accordance with PN-HD 308,
filler	–	filler made of halogen free compound,
inner sheath	–	inner sheath made of halogen free compound,
sheath	–	orange, cable sheath made of halogen free compound according to HD 604 S1 and VDE 0276-604 –HM4, (oxygen index bigger than 35%).

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Dátum/Date 25.04.2008
Podpis/Signature

Dokument č./Document No. FIRES-FR-151-08-ANJE

Príloha č./Appendix No. 4

ISO 9001:2000

NHXH FE180 PH90/E90 0,6/1 kV

CHARACTERISTICS

The cables maintain their functions for 90 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
no	mm^2
1	16 ÷ 400
2 - 5	1 ÷ 240
7 – 19	1; 1.5; 2.5 i 4
24 - 40	1; 1.5; 2.5

Operating voltage	0.6/1 kV
Voltage test	4.0 kV rms
Insulation resistivity at 90°C, minimum	1 x 10^{11} Ω·cm
Inductance, approximate	0.7 mH/km
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 50268-2-3, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from -15 to +90°C
during installation	from -5 to +70°C
Minimum bending radius	12 x cable diameter
Cable combustibility	flame retardant
Circuit integrity *	
E90	DIN 4102-12
PH90	PN-EN 50200 or PN-EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Combustibility tests	PN-EN 50266-2-4, IEC 60332-3-24 PN-EN 50200 and PN-EN 50362
Reference standards	AT-0603-0064/2006, WT-TK-44 DIN VDE 0266 PN-HD 604 S1

* Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
	1 x 6,0 RE	8,4	58,0	125
	1 x 10 RE	9,4	96,0	170
	1 x 16 RE	10,4	154,0	250
	1 x 25 RM	12,4	240,0	355
	1 x 35 RM	13,4	336,0	450
	1 x 50 RM	14,5	480,0	580
	1 x 70 RM	16,4	672,0	790
	1 x 95 RM	18,1	912,0	1040
	1 x 120 RM	19,7	1152,0	1275
	2 x 1,5 RE	14,0	28,8	265
	2 x 2,5 RE	14,8	48,0	315
	2 x 4,0 RE	15,7	77,0	375
	2 x 6,0 RE	16,7	115,0	445
	2 x 10 RE	18,4	192,0	585
	2 x 16 RE	20,4	307,0	780
	2 x 25 RM	24,0	480,0	925
	3 x 1,5 RE	14,9	43,2	315
	3 x 2,5 RE	15,5	72,0	355
	3 x 4,0 RE	16,5	115,0	435
	3 x 6,0 RE	17,6	173,0	525
	3 x 10 RE	19,3	288,0	690

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
	3 x 16 RE	22,0	461,0	980
	3 x 25 RM	25,5	720,0	1390
	4 x 1,5 RE	15,7	58,0	350
	4 x 2,5 RE	16,7	96,0	420
	4 x 4,0 RE	17,8	154,0	510
	4 x 6,0 RE	19,0	230,0	625
	4 x 10 RE	20,9	384,0	835
	4 x 16 RM	23,7	614,0	1140
	4 x 25 RM	27,8	960,0	1720
	4 x 35 RM	29,5	1344,0	2050
	4 x 50 RM	32,7	1920,0	2660
	5 x 1,5 RE	17,2	72,0	425
	5 x 2,5 RE	18,2	120,0	505
	5 x 4,0 RE	19,3	192,0	610
	5 x 6,0 RE	20,7	288,0	750
	5 x 10 RE	22,7	480,0	1000
	5 x 16 RE	26,3	768,0	1460
	5 x 25 RM	30,6	1200,0	2100
	5 x 35 RM	32,9	1680,0	2550
	5 x 50 RM	37,7	2400,0	3550
	7 x 1,5 RE	18,1	101,0	475

RE - single wire round conductor;
RM - multiwire round conductor

Other cross-sections and conductor counts available on request.

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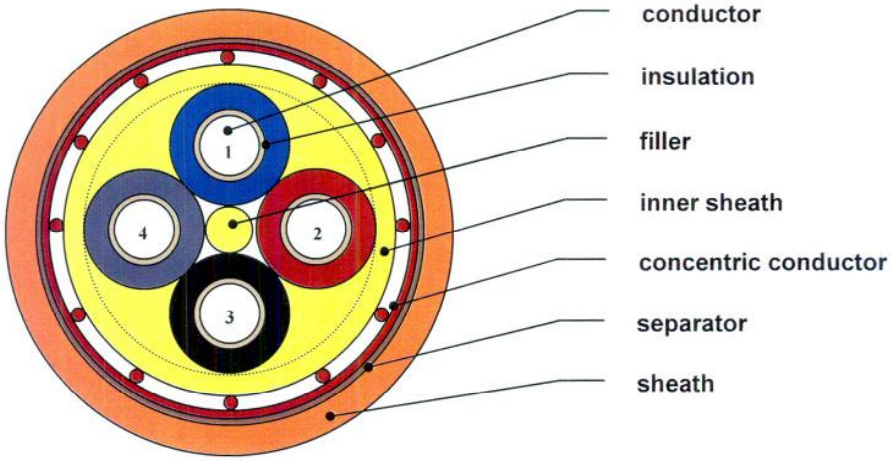
NHXCH FE180 PH90/E90 0,6/1 kV

FIRE RESISTANT HALOGEN FREE POWER CABLES



APPLICATIONS

NHXCH FE180 PH90/E90 0,6/1 kV 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).

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 – power is supplied to equipment which must operate in fire conditions and during fire fighting. The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

The cables are certified by Scientific and Research Development Centre for Fire Protection (Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej) at Józefów – **Certificate of Conformity No. 2412/2007**.

The cables are suitable for indoor and outdoor installations.

CONSTRUCTION

conductor	–	bare copper, solid or stranded according to PN-EN 60228, EN 60228,
insulation	–	mica tape and halogen free cross-linked compound insulation - colours in accordance with PN-HD 308,
filler	–	filler made of halogen free compound,
inner sheath	–	inner sheath made of halogen free compound,
concentric conductor	–	concentric conductor made of bare copper wires and a copper tape binder wrapped over the inner sheath,
separator	–	polyester tape,
sheath	–	orange, cable sheath made of halogen free compound according to HD 604 S1 and VDE 0276-604 – HM4, (oxygen index bigger than 35%).

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NHXCH FE180 PH90/E90 0,6/1 kV

CHARACTERISTICS

The cables maintain their functions for 90 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
no	mm^2
1	16 ÷ 400
2 - 5	1 ÷ 240
7 – 19	1; 1.5; 2.5 i 4
24 - 40	1; 1.5; 2.5

Operating voltage	0.6/1 kV
Voltage test	4.0 kV rms
Insulation resistivity at 90°C, minimum	1 x 10^{11} Ω·cm
Inductance, approximate	0.7 mH/km
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 50268-2-3, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from -15 to +90°C
during installation	from -5 to +70°C
Minimum bending radius	12 x cable diameter
Cable combustibility	flame retardant
Circuit integrity *	
E90	DIN 4102-12
PH90	PN-EN 50200 or PN-EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Combustibility tests	PN-EN 50266-2-4, IEC 60332-3-24, PN-EN 50200 and PN-EN 50362
Reference standards	AT-0603-0064/2006, WT-TK-44 DIN VDE 0266 PN-HD 604 S1

*Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
	3 x 1,5RE/1,5	16,6	43,2	360
	3 x 2,5 RE/2,5	17,7	72	430
	3 x 4,0 RE/4,0	18,8	115	520
	3 x 6,0 RE/6,0	20,8	173	660
	3 x 10 RE/10	23,8	288	940
	3 x 16 RE/16	26,2	461	1340
	3 x 25 RM/16	30,4	720	1750
	3 x 35 RM/16	33,0	1190	2160
	3 x 50 RM/25	37,0	1723	2840
	4 x 1,5RE/1,5	16,8	81	390
	4 x 2,5 RE/2,5	19,0	96	500
	4 x 4,0 RE/4,0	20,1	154	600

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
	4 x 6,0 RE/6,0	22,3	230	770
	4 x 10 RE/10	25,1	384	1140
	4 x 16 RE/16	26,2	614	1340
	4 x 25 RM/16	32,8	960	2100
	4 x 35 RE/16	35,6	1498	2610
	4 x 50 RM/25	35,4	2160	2950
	7 x 1,5RE/2,5	20,7	101	580
	7 x 2,5 RE/2,5	21,9	168	690
	12 x 1,5RE/2,5	25,9	101	935
	12 x 2,5 RE/4,0	27,9	168	1150

RE - single wire round conductor;
RM - multiwire round conductor

Other cross-sections and conductor counts available on request.

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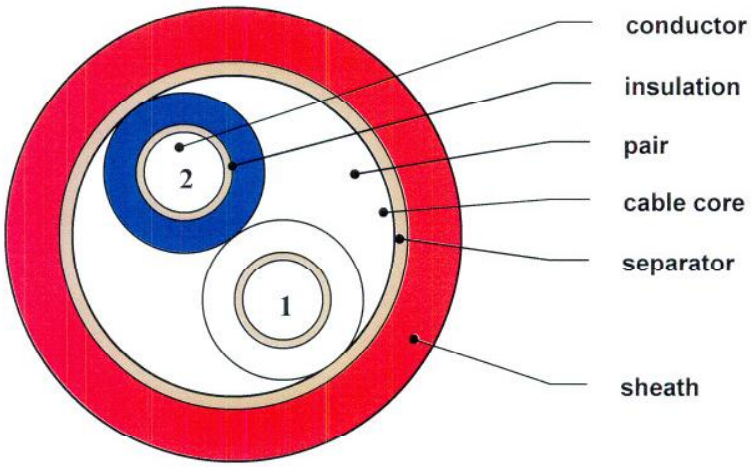
HTKSH FE180 PH90/E30-E90

FIRE RESISTANT HALOGEN FREE CABLES



APPLICATIONS

HTKSH FE180 PH90/E30-E90 fire resistant and halogen free cables are intended for installation in alarm, signalling, 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 are 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). 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 installations.

CONSTRUCTION

conductor	–	bare copper, solid,
insulation	–	mica tape and halogen free compound insulation - colours in accordance with PN-92/T-90321 standard,
pair	–	insulated conductors twisted into pairs,
cable core	–	pairs laid-up into a cable core,
separator	–	polyester tape,
sheath	–	red, cable sheath made of halogen free compound according to EN 50290-2-27 and VDE 0250-214 – HM2, (oxygen index bigger than 35%).

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HTKSH FE180 PH90/E30-E90

CHARACTERISTICS

The cables maintain their functions for 90 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Conductor diameter		mm	0.8	1.0	1.4	1.8	2.3	2.8
Conductor cross-section		mm^2	0.5	0.75	1.5	2.5	4	6
DC loop resistance at 20°C, maximum		Ω/km	75	48	24.5	14.9	9.3	6.3
Capacitance between conductors at 1 kHz	maximum	nF/km	120	120	120	120	120	120
	average		60	70	70	70	100	100

Operating voltage	240 V
Voltage test	1.5 kV rms
Insulation resistance, minimum	100 MΩ·km
Inductance, approximate	0.7 mH/km
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 50268-2-3, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from - 30 to + 80°C
during installation	from - 5 to + 70°C
Minimum bending radius	10 x cable diameter
Cable combustibility	flame retardant
Combustibility tests	PN-EN 60332-1-2
Circuit integrity *	
E30-E90	DIN 4102-12
PH90	PN-EN 50200 or EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Reference standards	WT-TK-43 PN-92/T-90320 PN-92/T-90321

*Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Cable type	Number of pairs (x 2) x conductor diameter	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm	mm	kg/km	kg/km
HTKSH FE180 PH90/E30-E90	1 x 2 x 0.8	6.5	15	61
HTKSH FE180 PH90/E30-E90	1 x 2 x 1,0	7.7	20	70

Other diameters and conductor counts available on request.

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FIRE RESISTANCE

Dátum/Date 24. 04. 2008

Podpis/Signature

Dokument č./Document No. FIRES-FR-151-08-ANE

Príloha č./Appendix No. 57

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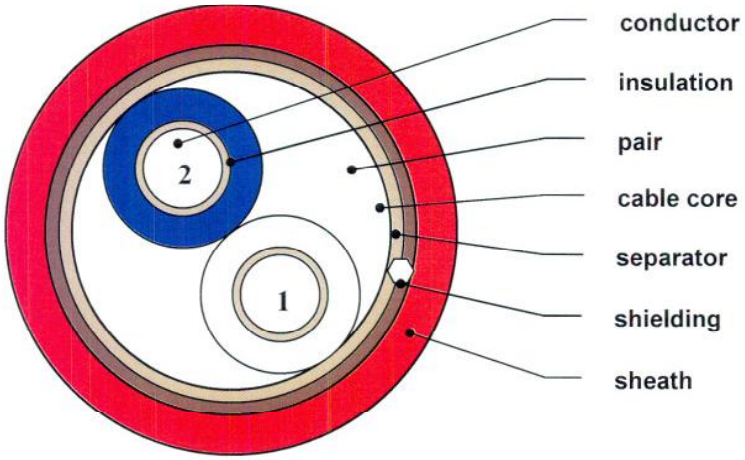
HTKSHekw FE180 PH90/E30-E90

FIRE RESISTANT HALOGEN FREE CABLES



APPLICATIONS

HTKSHekw FE180 PH90/E30-E90 fire resistant and halogen free cables are intended for installation in alarm, signalling, 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 are 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). The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

Cable circuits are protected by an overall electrostatic shield against external electric field interferences.

The cables are suitable for indoor installations.

CONSTRUCTION

conductor	–	bare copper, solid,
insulation	–	mica tape and halogen free compound insulation - colours in accordance with PN-92/T-90321 standard,
pair	–	insulated conductors twisted into pairs,
cable core	–	pairs laid-up into a cable core,
separator	–	polyester tape,
shielding	–	overall electrostatic shield incorporating a plastic laminated metal foil and a tinned copper drain wire Ø 0.8 mm,
sheath	–	red, cable sheath made of halogen free compound according to EN 50290-2-27 and VDE 0250-214 – HM2, (oxygen index bigger than 35%).

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HTKSHekw FE180 PH90/E30-E90

CHARACTERISTICS

The cables maintain their functions for 90 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Conductor diameter		mm	0.8	1.0	1.4	1.8	2.3	2.8
Conductor cross-section		mm^2	0.5	0.75	1.5	2.5	4	6
DC loop resistance at 20°C, maximum		Ω/km	75	48	24.5	14.9	9.3	6.3
Capacitance between conductors at 1 kHz	maximum	nF/km	200	200	200	200	200	200
	average		90	130	130	130	150	150

Operating voltage	240 V
Voltage test	1.5 kV rms
Insulation resistance, minimum	100 MΩ·km
Inductance, approximate	0.7 mH/km
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 50268-2-3, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from - 30 to + 80°C
during installation	from - 5 to + 70°C
Minimum bending radius	10 x cable diameter
Cable combustibility	flame retardant
Combustibility tests	PN-EN 60332-1-2
Circuit integrity *	
E30-E90	DIN 4102-12
PH90	PN-EN 50200 or EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Reference standards	WT-TK-43 PN-92/T-90320 PN-92/T-90321

*Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Cable type	Number of pairs (x 2) x conductor diameter	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm	mm	kg/km	kg/km
HTKSHekw FE180 PH90/E30-E90	1 x 2 x 0.8	7.4	15	66
HTKSHekw FE180 PH90/E30-E90	1 x 2 x 1.0	7.8	20	75

Other diameters and conductor counts available on request.

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FIRE RESISTANCE

Dátum/Date 29.09.2008
Podpis/Signature

Dokument č./Document No. FIRES-FR-151-08-ANNE

Príloha č./Appendix No. 53

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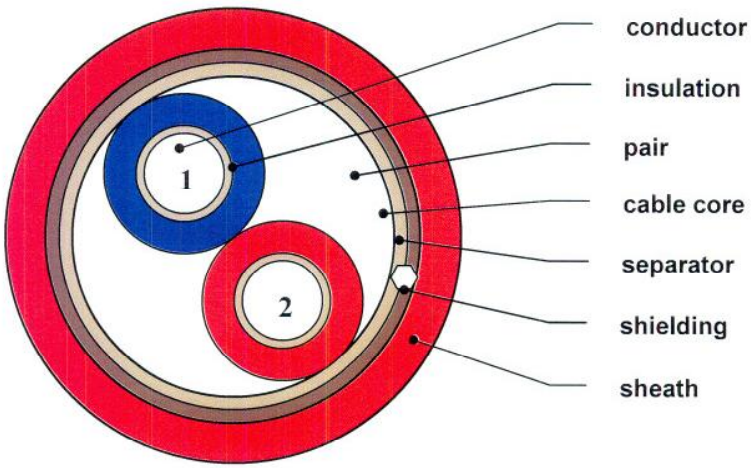
JE-H(St)H...Bd FE180 PH90/E30-E90

FIRE RESISTANT HALOGEN FREE CABLES



APPLICATIONS

JE-H(St)H...Bd FE180 PH90/E30-E90 fire resistant and halogen free cables are intended for installation in alarm, signalling, 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 are 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). The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

Cable circuits are protected by an overall electrostatic shield against external electric field interferences.

The cables are suitable for indoor installations.

CONSTRUCTION

conductor	–	bare copper, solid,
insulation	–	mica tape and halogen free compound insulation - colours in accordance with PN-92/T-90321 standard,
pair	–	insulated conductors twisted into pairs,
cable core	–	pairs laid-up into a cable core,
separator	–	polyester tape,
shielding	–	overall electrostatic shield incorporating a plastic laminated metal foil and a tinned copper drain wire,
sheath	–	red, cable sheath made of halogen free compound according to EN 50290-2-27 and VDE 0250-214 – HM2, (oxygen index bigger than 35%).

TECHNOKABEL®

ISO 9001:2000

JE-H(St)H...Bd FE180 PH90/E30-E90

CHARACTERISTICS

The cables maintain their functions for 90 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Conductor diameter		mm	0.8	1.0	1.4	1.8	2.3	2.8
Conductor cross-section		mm^2	0.5	0.75	1.5	2.5	4	6
DC loop resistance at 20°C, maximum		Ω/km	75	48	24.5	14.9	9.3	6.3
Capacitance between conductors at 1 kHz	maximum	nF/km	200	200	200	200	200	200
	average		90	130	130	130	150	150

Operating voltage	240 V
Voltage test	1.5 kV rms
Insulation resistance, minimum	100 MΩ·km
Inductance, approximate	0.7 mH/km
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 50268-2-3, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from - 30 to + 80°C
during installation	from - 5 to + 70°C
Minimum bending radius	10 x cable diameter
Cable combustibility	flame retardant
Combustibility tests	PN-EN 60332-1-2
Circuit integrity *	
E30-E90	DIN 4102-12
PH90	PN-EN 50200 or EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Reference standards	VDE 0815

*Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Cable type	Number of pairs (x 2) x conductor diameter	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm	mm	kg/km	kg/km
JE-H(St)H FE180 PH90/E30-E90	1 x 2 x 0,8 Bd	7.4	15	66

Other diameters and conductor counts available on request.

FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

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Podpis/Signature

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