TEST REPORT FIRES-FR-235-07-AUNE

Cable bearing system BAKS

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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-235-07-AUNE**
Tested property: Function in fire
Test method: DIN 4102 – 12:1998-11

Date of issue: **14. 01. 2008**

Name of the product: Cable bearing system BAKS

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

TECHNOKABEL S.A., Nasielska 55,
04-343 Warszawa, Poland – producer of cables

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

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Task No.: PR-07-0423
Specimen received: 17. 12. 2007
Date of the fire test: 20. 12. 2007
Technician responsible for the technical side of this report: Miroslav Hudák

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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 power and communication non-halogen cables with circuit integrity maintenance. Persons witnessing the test:

Representatives of the sponsor: Mr. Jacek Kliczek (BAKS)
Mr. Mariusz Kwiatkowski (TECHNOKABEL)

Test directed by: Mr. Štefan Rástocký
Test carried out by: Mr. Miroslav Hudák
Operator: Mr. Ján Hurajt

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 and TECHNOKABEL.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMEN STRUCTURE

Test specimen comprised from cable bearing systems BAKS with accessories – cable trays, cable ladders, basket cable trays, ceiling ledges SDOC with clips UKO1, clips UEF, UDF and power and communication non-halogen cables business TECHNOKABEL.

Cables:	(N)HXH 4x1,5 RE FE180 PH30/E30-E60	(2 x)
	(N)HXH 4x50 RM FE180 PH30/E30-E60	(6 x)
	(N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	(2 x)
	(N)HXCH 4x50/25 RM FE180 PH30/E30-E60	(6 x)
	(N)HXH 4x1,5 RE FE180 PH90/E90	(10 x)
	(N)HXH 4x50 RM FE180 PH90/E90	(2 x)
	(N)HXCH 4x1,5/1,5 RE FE180 PH90/E90	(6 x)
	(N)HXCH 4x50/25 RM FE180 PH90/E90	(2 x)
	HTKSH 1x2x0,8 FE180 PH90/E30-E90	(12 x)
	HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	(6 x)

Ceiling installation: was made by ceiling ledges (type SDOC 600) and cable clips (type UEF, UDF). Ceiling ledges were fixed to ceiling by three dowels (type PRSO M8x75) in spacing of 600 mm. Cables were fixed to ledges by clips (type UKO1) in spacing of 600 mm. Cable clips (type UEF, UDF) depending on the diameter of cable were fixed to ceiling by dowels (type SRO M6x30) in spacing of 600 mm.
Suspension track No. 1: was made of three consoles combined of two horizontal supports (type CWOP40H40/05) and two threaded bar M10x600 with washers and nuts M10 and two hangers (type USOV) which were fixed to ceiling by dowels (type PRSO M8x75) in spacing of 1200 mm. Basket cable trays (type KDSO400H60) were fixed to horizontal supports. Load-bearing system was loaded with 20 kg/m.
Suspension track No. 2: was made of three consoles combined of horizontal support (type CWOP40H40/05) and two threaded bar M8x300 with washers and nuts M8 and two hangers (type ZK8) which were fixed to steel profiles I 80. These profiles were fixed to ceiling by four dowels (type PRSO M8x75) in spacing of 1200 mm. Basket cable trays (type KDSO400H60) were fixed to horizontal supports. Load-bearing system was loaded with 10 kg/m.
Suspension track No. 3: was made of four consoles (type WKSO60) which were fixed to ceiling by dowels (type SRO M6x30) in spacing of 1200 mm. Basket cable trays (type KDSO60H60) were fixed to consoles. Load-bearing system was loaded with 1,5 kg/m.
Suspension track No. 4: was made by three hangers (type WPCO 800) which were fixed to ceiling by four dowels (type PSRO M10x80) in spacing of 1500 mm. Four booms (type WMCO 400) were fixed by screws (type SM M10 x 70) 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).
Trays (type KCOP 400H60/3) were fixed at upper booms and jointed together by two junctions (type LPOPH60N) and by sheet (type BLO400N) with screws M6 (type SGN M6x12). Trays were fixed to booms by screws M6 (type SGN M6x12). Trays were loaded with 10 kg/m.
Ladders (type DGOP 400H60N) were fixed at bottom booms and jointed together by junction (type LDOCH60N) with screws M8 (type SGN M8x14). Ladders were fixed to booms by clips (type ZMO) with screws M8 (type SGN M8x14). Ladders were loaded with 20 kg/m.
Types of individual components are from catalogue BAKS 8/2006.

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
46,7	2,1	22,6	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]**
20. 12. 2007	43,6	10,7

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 (N)HXCH 4x50/25 RM FE180 PH90/E90	**81 minutes**
Specimen 2: cable (N)HXCH 4x50/25 RM FE180 PH90/E90	**88 minutes**
Specimen 3: cable (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**62 minutes**
Specimen 4: cable (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**51 minutes**
Specimen 5: cable (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimen 6: cable (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90	**79 minutes**
Specimen 7: cable (N)HXH 4x1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimen 8: cable (N)HXH 4x50 RM FE180 PH30/E30-E60	**7 minutes**
Specimen 9: cable (N)HXH 4x50 RM FE180 PH30/E30-E60	**77 minutes**
Specimens 10,11: cables (N)HXH 4x50 RM FE180 PH90/E90	**90 minutes no failure/interruption**
Specimens 12,13: cables (N)HXH 4x1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimen 14: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**78 minutes**
Specimen 15: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**67 minutes**
Specimen 16: cable (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**81 minutes**
Specimen 17: cable (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**73 minutes**
Specimens 18,19: cables (N)HXH 4x1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimen 20: cable (N)HXH 4x1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimens 21, 22: cables (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimens 23, 24: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**90 minutes no failure/interruption**
Specimens 25, 26: cables (N)HXH 4x1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimens 27, 28: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	**90 minutes no failure/interruption**
Specimens 29, 30: cables (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimen 31: cable (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**64 minutes**
Specimen 32: cable (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**55 minutes**
Specimens 33, 34: cables (N)HXH 4x1,5 RE FE180 PH90/E90	**90 minutes no failure/interruption**
Specimen 35: cable (N)HXH 4x50 RM FE180 PH30/E30-E60	**17 minutes**
Specimen 36: cable (N)HXH 4x50 RM FE180 PH30/E30-E60	**62 minutes**
Specimens 53A,B: HTKSH 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimens 54A,B: HTKSH 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimen 55A: HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**38 minutes**
Specimen 55B: HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**41 minutes**
Specimen 59A: HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**65 minutes**
Specimen 59B: HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**75 minutes**
Specimen 63A: HTKSH 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimen 63B: HTKSH 1x2x0,8 FE180 PH90/E30-E90	**48 minutes**
Specimen 64B: HTKSH 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimens 70A,B: HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimen 71A: HTKSH 1x2x0,8 FE180 PH90/E30-E90	**81 minutes**
Specimen 71B: HTKSH 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure/interruption**
Specimen 74A,B: HTKSH 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure/interruption**

The fire test was discontinued in 93rd minute at the request of sponsor.

Specimens S1 – S36 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Specimens S52 – S75 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
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-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

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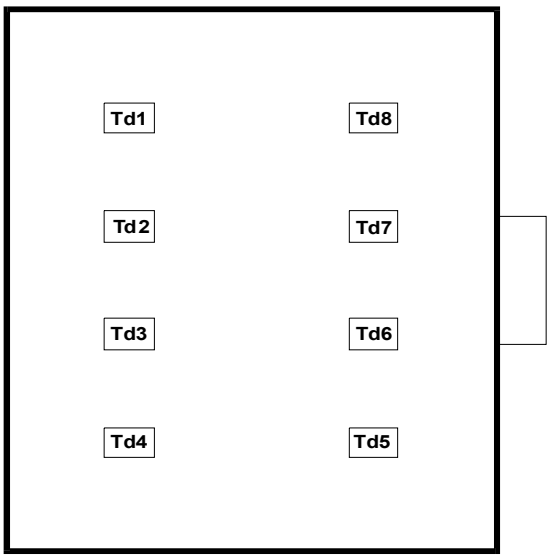
Measured values inside the test furnace

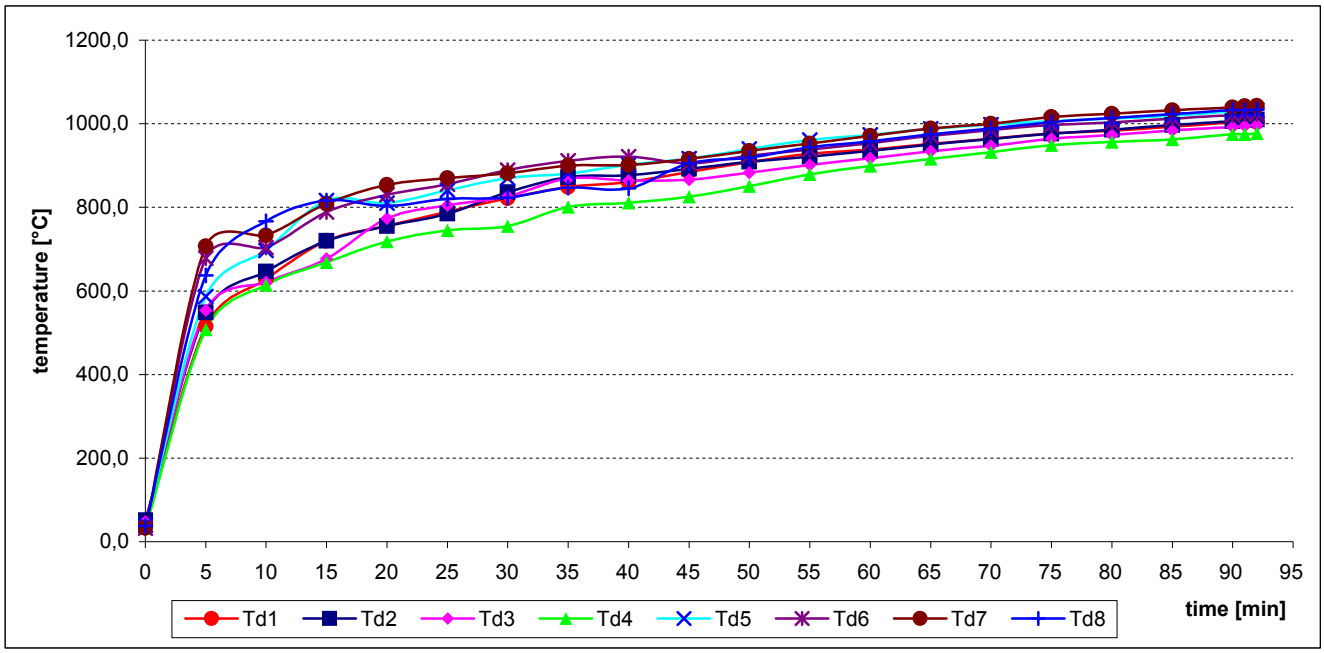
Time t [min]	Temperature [°C]											Deviation d_e [%]	Pressure p [Pa]
	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To		
0	40,2	51,2	47,1	31,8	39,8	31,8	32,7	37,6	39,0	0,0	12,7	0,0	0,0
5	514,7	548,1	553,4	508,1	586,9	678,2	706,9	637,2	591,7	576,2	12,2	-13,5	12,4
10	627,7	646,2	621,0	614,2	697,1	703,8	732,8	766,7	676,2	678,3	12,2	-4,9	12,7
15	719,8	720,1	676,8	668,5	816,3	789,1	808,4	816,7	752,0	738,5	12,5	-3,1	13,1
20	756,0	754,8	773,6	718,4	810,0	830,4	854,2	803,7	787,6	781,3	12,2	-1,6	12,8
25	789,5	784,8	804,9	744,8	841,1	855,2	869,7	820,3	813,8	814,6	12,0	-1,1	13,9
30	821,7	836,4	826,3	754,8	870,1	889,0	881,8	823,0	837,9	841,8	12,1	-1,4	17,2
35	848,3	872,1	869,2	801,1	880,9	911,3	899,5	846,6	866,1	864,8	13,0	-1,1	17,8
40	860,8	876,7	863,9	810,8	902,4	921,4	901,4	845,6	872,9	884,7	13,7	-1,0	17,6
45	884,8	892,3	865,8	825,2	916,9	905,4	915,6	905,4	888,9	902,3	13,5	-1,1	16,6
50	908,2	908,7	882,8	850,9	939,3	923,7	935,4	918,8	908,5	918,1	13,4	-1,1	17,5
55	927,8	921,5	901,0	879,2	960,8	938,2	952,4	943,4	928,0	932,3	13,4	-1,1	17,4
60	938,1	935,1	917,4	899,0	973,3	953,7	971,2	958,2	943,3	945,3	13,6	-1,0	17,5
65	951,8	950,3	934,2	916,0	988,2	971,1	988,4	974,7	959,3	957,3	13,6	-0,9	17,5
70	963,8	963,6	947,3	932,0	997,7	984,9	1000,0	988,8	972,3	968,4	13,6	-0,8	17,6
75	976,9	976,4	964,2	949,0	1006,0	996,7	1016,0	1004,0	986,3	978,7	13,4	-0,7	17,0
80	983,3	985,7	973,3	956,1	1012,0	1003,0	1024,0	1014,0	994,2	988,4	12,6	-0,6	16,8
85	992,9	997,0	984,0	962,9	1019,0	1012,0	1032,0	1023,0	1003,0	997,4	13,3	-0,5	16,4
90	1003,0	1006,0	992,5	974,5	1029,0	1021,0	1039,0	1033,0	1012,7	1005,9	13,7	-0,4	16,3
91	1005,0	1009,0	994,6	975,2	1030,0	1023,0	1042,0	1032,0	1013,9	1007,6	13,6	-0,4	16,5
92	1004,0	1010,0	996,7	977,3	1032,0	1023,0	1043,0	1034,0	1015,4	1009,2	13,7	-0,4	16,2

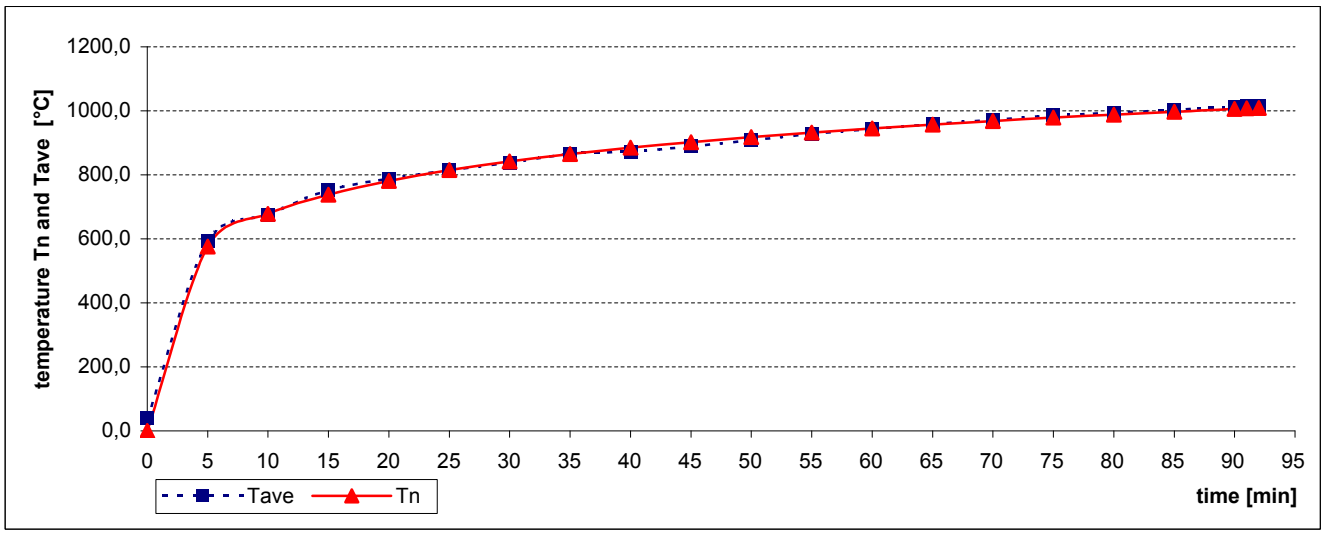
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

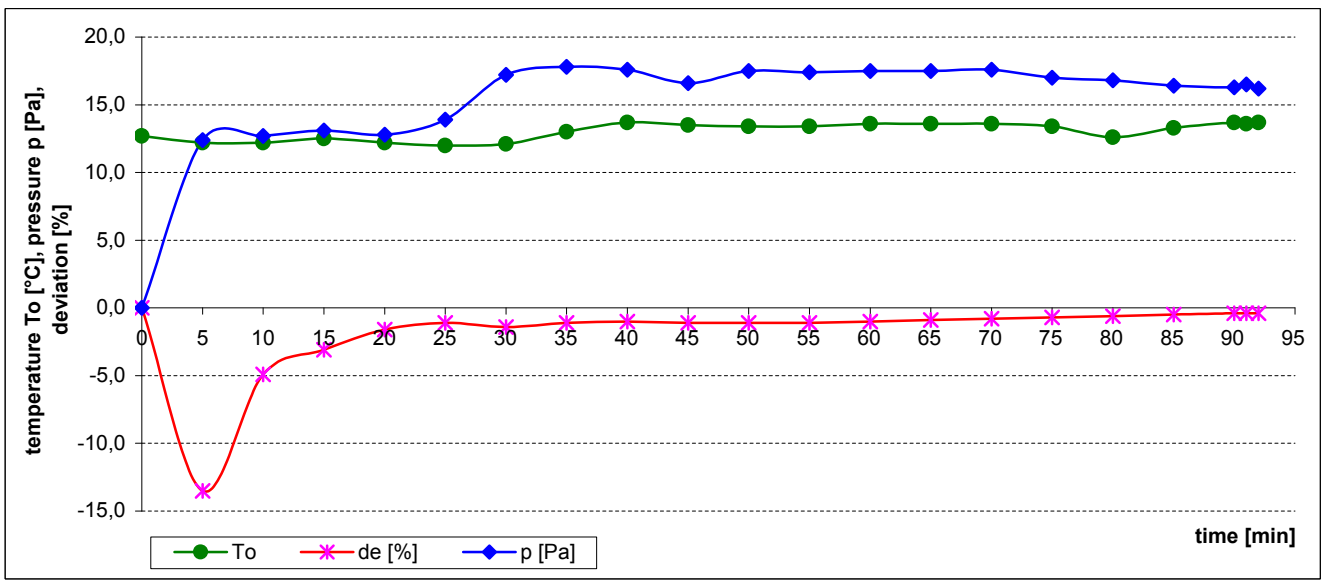
Layout of measuring points in the test furnace:



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	81:57
	2-L2	x
	3-L3	x
	4-PEN	x
S2	5-L1	x
	6-L2	88:29
	7-L3	x
	8-PEN	x
S3	9-L1	x
	10-L2	x
	11-L3	62:33
	12-PEN	x
S4	13-L1	51:18
	14-L2	x
	15-L3	x
	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	x
	22-L2	79:59
	23-L3	x
	24-PEN	x
S7	25-L1	no failure / interruption
	26-L2	no failure / interruption
	27-L3	no failure / interruption
	28-PEN	no failure / interruption
S8	29-L1	7:25
	30-L2	x
	31-L3	x
	32-PEN	x

Specimens 1,2: cables (N)HXCH 4x50/25 RM FE180 PH90/E90
Specimens 3,4: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60
Specimens 5,6: cables (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90
Specimen 7: cable (N)HXH 4x1,5 RE FE180 PH90/E90
Specimen 8: cable (N)HXH 4x50 RM FE180 PH30/E30-E60

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	x
	34-L2	x
	35-L3	77:48
	36-PEN	x
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	no failure / interruption
	46-L2	no failure / interruption
	47-L3	no failure / interruption
	48-PEN	no failure / interruption
S13	49-L1	no failure / interruption
	50-L2	no failure / interruption
	51-L3	no failure / interruption
	52-PEN	no failure / interruption
S14	53-L1	x
	54-L2	78:27
	55-L3	x
	56-PEN	x
S15	57-L1	67:53
	58-L2	x
	59-L3	x
	60-PEN	x
S16	61-L1	81:19
	62-L2	x
	63-L3	x
	64-PEN	x

Specimen 9: cable (N)HXH 4x50 RM FE180 PH30/E30-E60
Specimens 10,11: cables (N)HXH 4x50 RM FE180 PH90/E90
Specimens 12,13: cables (N)HXH 4x1,5 RE FE180 PH90/E90
Specimens 14,15: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60
Specimen 16: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60

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	x
	66-L2	73:14
	67-L3	x
	68-PEN	x
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	no failure / interruption
	82-L2	no failure / interruption
	83-L3	no failure / interruption
	84-PEN	no failure / interruption
S22	85-L1	no failure / interruption
	86-L2	no failure / interruption
	87-L3	no failure / interruption
	88-PEN	no failure / interruption
S23	89-L1	no failure / interruption
	90-L2	no failure / interruption
	91-L3	no failure / interruption
	92-PEN	no failure / interruption
S24	93-L1	no failure / interruption
	94-L2	no failure / interruption
	95-L3	no failure / interruption
	96-PEN	no failure / interruption

Specimen 17: cable (N)HXH 4x1,5 RE FE180 PH30/E30-E60
Specimens 18,19: cables (N)HXH 4x1,5 RE FE180 PH90/E90
Specimen 20: cable (N)HXH 4x1,5 RE FE180 PH90/E90
Specimens 21,22: cables (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90
Specimens 23,24: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60

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	no failure / interruption
	98-L2	no failure / interruption
	99-L3	no failure / interruption
	100-PEN	no failure / interruption
S26	101-L1	no failure / interruption
	102-L2	no failure / interruption
	103-L3	no failure / interruption
	104-PEN	no failure / interruption
S27	105-L1	no failure / interruption
	106-L2	no failure / interruption
	107-L3	no failure / interruption
	108-PEN	no failure / interruption
S28	109-L1	no failure / interruption
	110-L2	no failure / interruption
	111-L3	no failure / interruption
	112-PEN	no failure / interruption
S29	113-L1	no failure / interruption
	114-L2	no failure / interruption
	115-	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	64:53
	122-L2	x
	123-L3	x
	124-PEN	x
S32	125-L1	x
	126-L2	x
	127-L3	55:21
	128-PEN	x

Specimens 25,26: cables (N)HXH 4x1,5 RE FE180 PH90/E90
Specimens 27,28: cables (N)HXH 4x50 RM FE180 PH30/E30-E60
Specimens 29,30: cables (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90
Specimens 31,32: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60

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 S36

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S33	129-L1	no failure / interruption
	130-L2	no failure / interruption
	131-L3	no failure / interruption
	132-PEN	no failure / interruption
S34	133-L1	no failure / interruption
	134-L2	no failure / interruption
	135-L3	no failure / interruption
	136-PEN	no failure / interruption
S35	137-L1	17:11
	138-L2	x
	139-L3	x
	140-PEN	x
S36	141-L1	x
	142-L2	62:20
	143-L3	x
	144-PEN	x

Specimens 33,34: cables (N)HXH 4x1,5 RE FE180 PH90/E90
Specimens 35,36: cables (N)HXH 4x50 RM FE180 PH30/E30-E60

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 S53 to S74

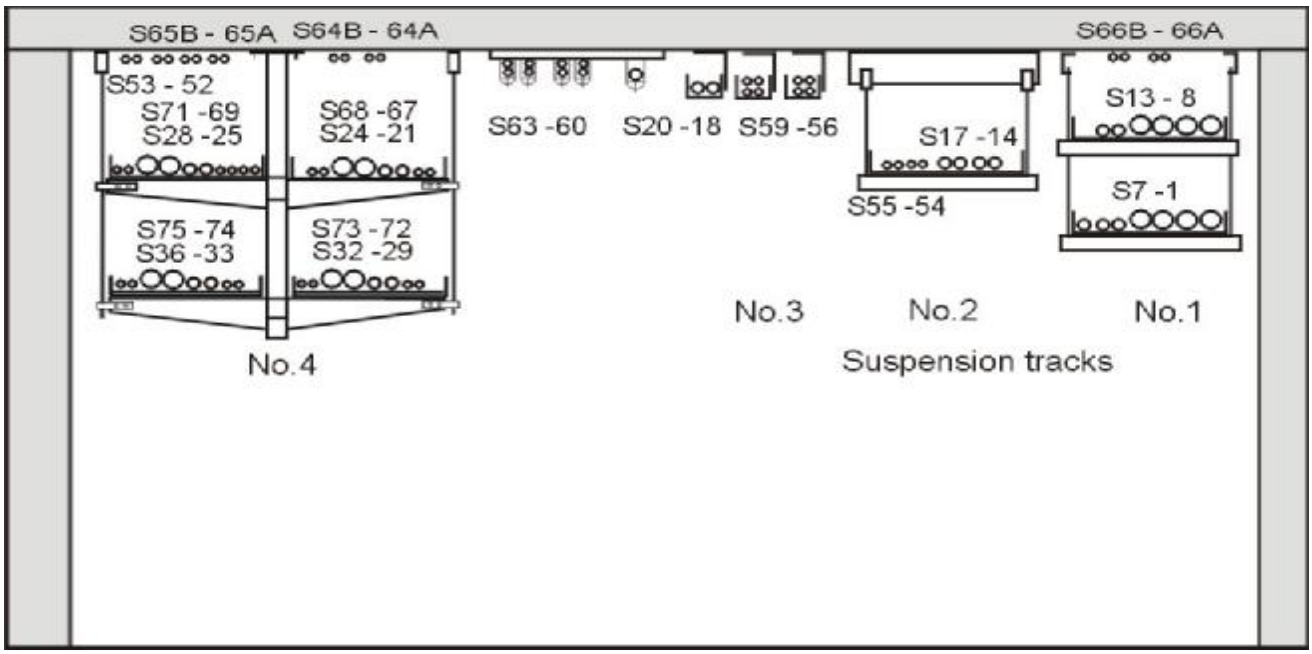
Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S53A	213-L	no failure / interruption
	214-PEN	no failure / interruption
S53B	215-L	no failure / interruption
	216-PEN	no failure / interruption
S54A	217-L	no failure / interruption
	218-PEN	no failure / interruption
S54B	219-L	no failure / interruption
	220-PEN	no failure / interruption
S55A	221-L	38:41
	222-PEN	x
S55B	223-L	41:31
	224-PEN	x
S59A	237-L	65:28
	238-PEN	x
S59B	239-L	75:09
	240-PEN	x
S63A	253-L	no failure / interruption
	254-PEN	no failure / interruption
S63B	255-L	48:51
	256-PEN	x
S64B	259-L	no failure / interruption
	260-PEN	no failure / interruption
V70A	281-L	no failure / interruption
	282-PEN	no failure / interruption
V70B	283-L	no failure / interruption
	284-PEN	no failure / interruption
V71A	285-L	81:54
	286-PEN	x
V71B	287-L	no failure / interruption
	288-PEN	no failure / interruption
V74A	297-L	no failure / interruption
	298-PEN	no failure / interruption
V74B	299-L	no failure / interruption
	300-PEN	no failure / interruption

Specimens 53A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90
Specimens 54A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90
Specimens 55A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90
Specimens 59A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90
Specimens 63A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90
Specimen 64B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90
Specimens 70A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90
Specimens 71A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90
Specimens 74A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90

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

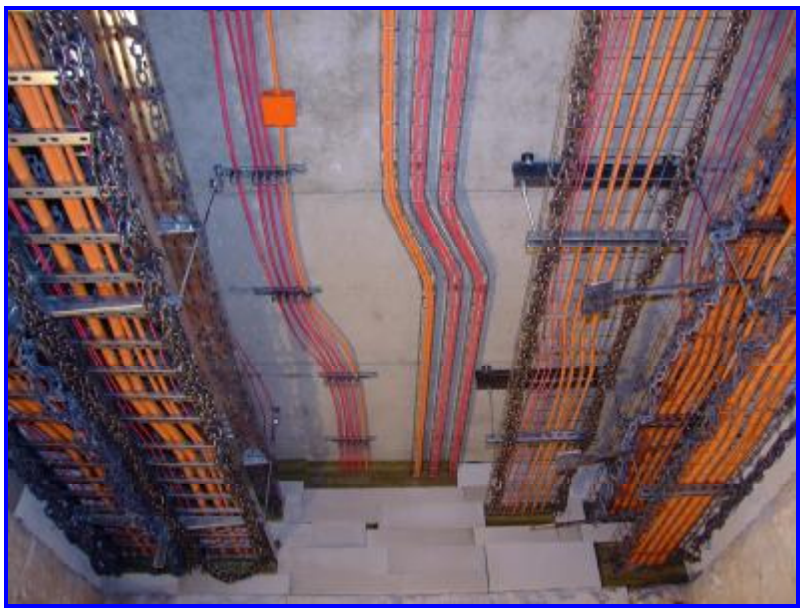
Signal cables were tested by three-phase voltage supply 1 x 110V with LED diods 3V / 0,03W. Circuit breakers with rating 3 A were used.

Layout of cables in the test furnace

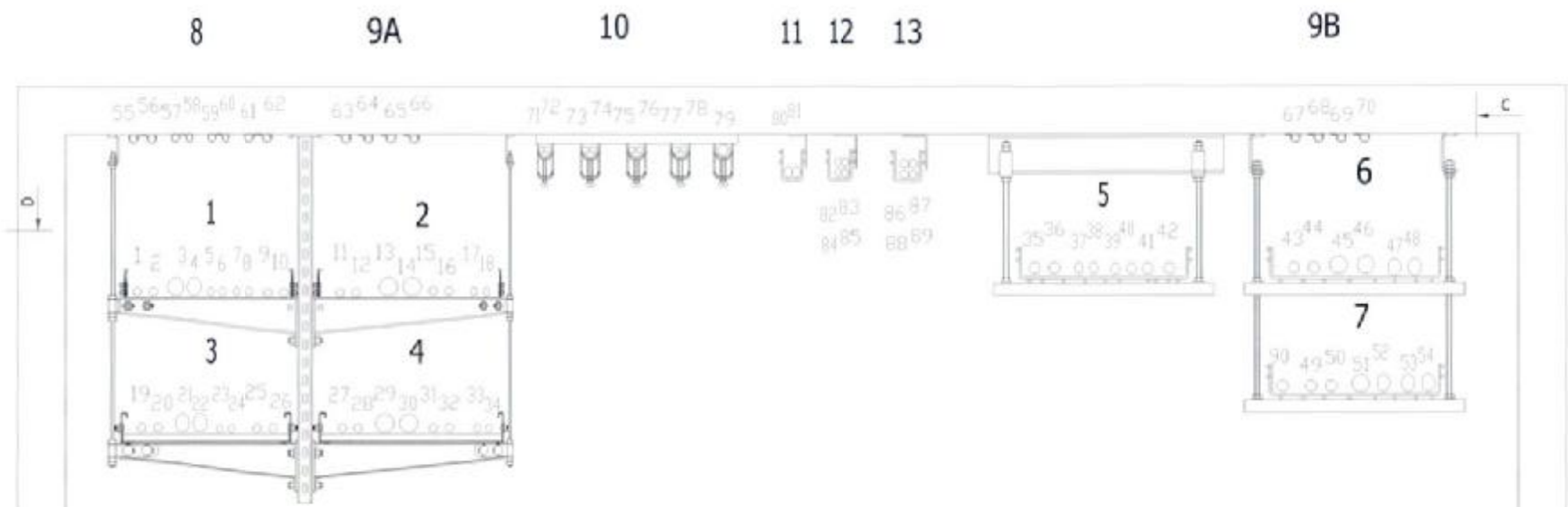


Specimens 1,2: cables (N)HXCH 4x50/25 RM FE180 PH90/E90	Specimens placed in the basket cable tray (BAKS) Suspension track No.1
Specimens 3,4: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	
Specimens 5,6: cables (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90	
Specimen 7: cable (N)HXH 4x1,5 RE FE180 PH90/E90	Specimen with box WKE (Spelsberg)
Specimen 8: cable (N)HXH 4x50 RM FE180 PH30/E30-E60	Specimens placed in the basket cable tray (BAKS) Suspension track No.1
Specimen 9: cable (N)HXH 4x50 RM FE180 PH30/E30-E60	
Specimens 10,11: cables (N)HXH 4x50 RM FE180 PH90/E90	
Specimens 12,13: cables (N)HXH 4x1,5 RE FE180 PH90/E90	
Specimens 14,15: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	Specimens placed in the basket cable tray (BAKS) Suspension track No.2
Specimen 16: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	
Specimen 17: cable (N)HXH 4x1,5 RE FE180 PH30/E30-E60	
Specimens 18,19: cables (N)HXH 4x1,5 RE FE180 PH90/E90	Specimens placed in the basket cable tray (BAKS) Suspension track No.3
Specimen 20: cable (N)HXH 4x1,5 RE FE180 PH90/E90	Specimen placed in ceiling profile ledges with clips UKO (BAKS) in spacing of 600 mm with box WKE (Spelsberg)
Specimens 21,22: cables (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90	Specimens placed in the cable tray (BAKS) Suspension track No.4
Specimens 23,24: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	
Specimens 25,26: cables (N)HXH 4x1,5 RE FE180 PH90/E90	
Specimens 27,28: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	
Specimens 29,30: cables (N)HXCH 4x1,5/1,5 RE FE180 PH90/E90	Specimens placed in the ladder (BAKS) Suspension track No.4
Specimens 31,32: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	
Specimens 33,34: cables (N)HXH 4x1,5 RE FE180 PH90/E90	
Specimens 35,36: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	
Specimens 53A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in ceiling clips UEF (BAKS) in spacing of 600 mm
Specimens 54A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in the basket cable tray (BAKS) Suspension track No.2
Specimens 55A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	
Specimens 59A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in the basket cable tray (BAKS) Suspension track No.3
Specimens 63A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90	Specimen placed in ceiling profile ledges with clips UKO (BAKS) in spacing of 600 mm
Specimen 64B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in ceiling clips UDF (BAKS) in spacing of 600 mm
Specimens 70A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in the cable tray (BAKS) Suspension track No.4
Specimens 71A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90	
Specimens 74A,B: cables HTKSH 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in the ladder (BAKS) Suspension track No.4

Photos taken before the test



Photos taken after the termination of the test



BAKS-TECHNOKABEL
FIRES
51 tydzień 2007rok

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20.12.2007
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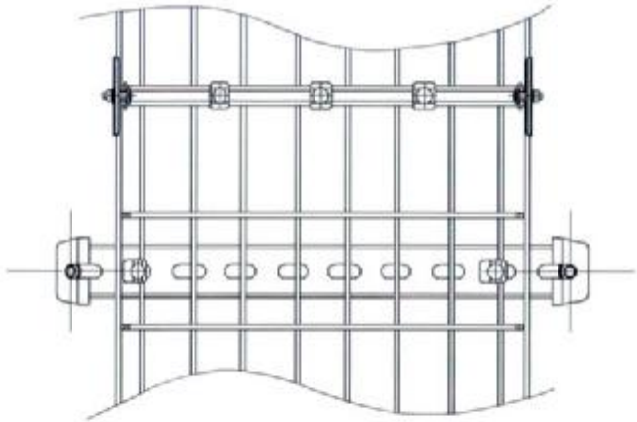
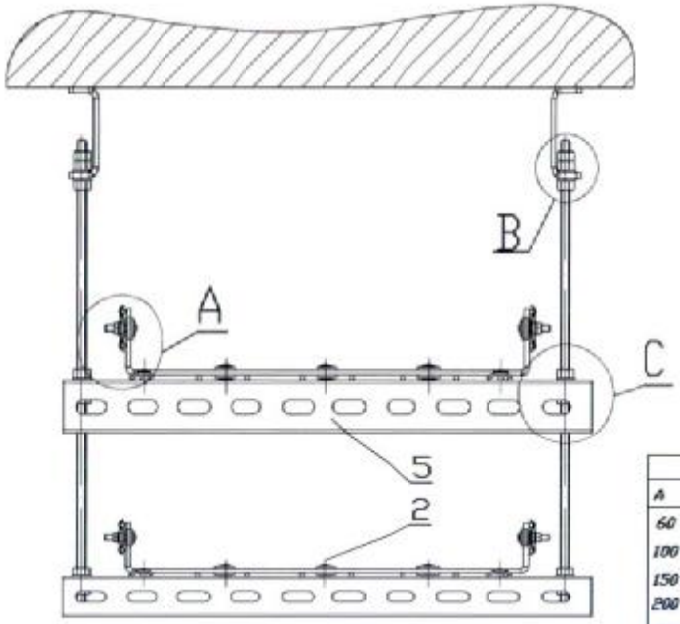
Document No. FIRES-FR-235-06-AWE

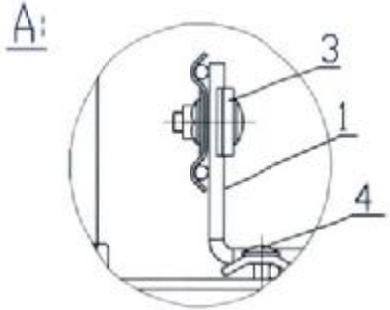
Príloha č./Appendix No. 12

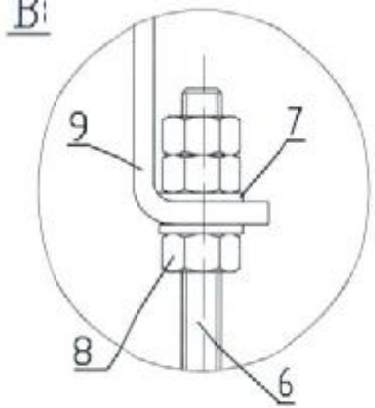
Profesjonalne Systemy Tras Kablowych

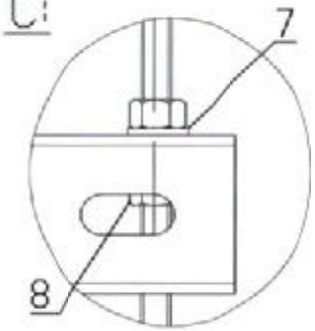
Fires 51 tydzień











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Dokument č./Document No. FIRES-FR-255-02-AmWE

Príloha č./Appendix No. 13

	Poz.1	Poz.A
A	Typ	Typ
60	KDSO60H60/3-E	
100	KDSO100H60/3-E	CWDP40H40/02-E
150	KDSO150H60/3-E	
200	KDSO200H60/3-E	CWDP40H40/03-E
300	KDSO300H60/3-E	CWDP40H40/04-E
400	KDSO400H60/3-E	CWDP40H40/05-E

Lp.	Nazwa	Numer	Materiał	Szt.	Nr katalogowy
9	uchyt sufitowy	USDV-E		2	
8	nakrętka	KS M8-E		14	
7	podkładka	PP 8-E		12	
6	pręt gwintowany	PGM8/1-E		2	
5	ceownik szerokobry	CWDP40H40/05-E		2	
4	zacisk śrubowy	ZSD-E		4	
3	łącznik śrubowy	USSVD-E		4	
2	łącznik śrubowy	USSD-E		6	
1	koryto siatkowe	KDSO400H60/3-E		2	

opracował	Jaśkiewicz	21-01-00
rysował	Jaśkiewicz	21-01-00
zatwierdził	Jaśkiewicz	21-01-00

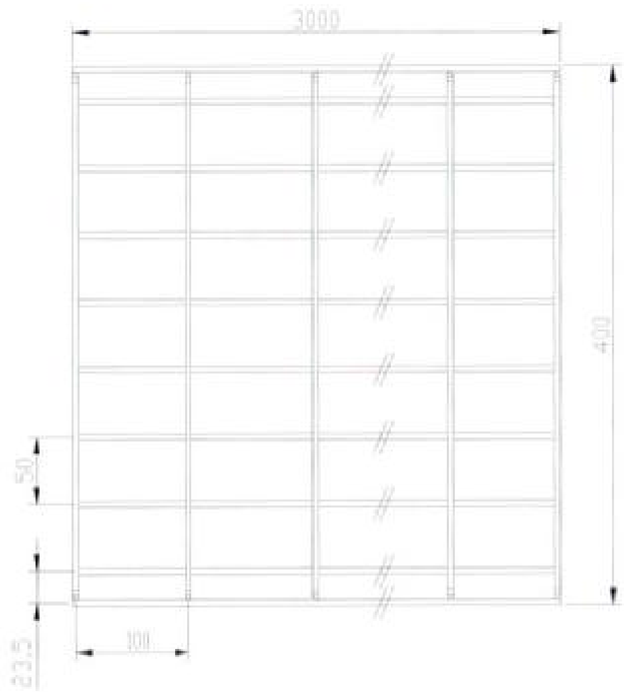
SKALA 1:5

KDSO400H60/3-E

BAKS
DZIAŁ KONSTRUKCYJNY
ul. Jagodna 5 05-480
Karczew

Arkusz 1 z 1 — Arkusz A3

System odporności ogniowej E-90



Projektował	T.Grudniewski	
Rysował	T.Grudniewski	
Sprawdził	J.Kliczek	
Zatwierdził	J.Kliczek	

Nazwa rysunku: KDS□400H60/3

Format A4

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Dátum/Date: 20. 12. 2008
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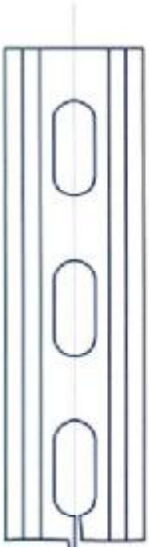
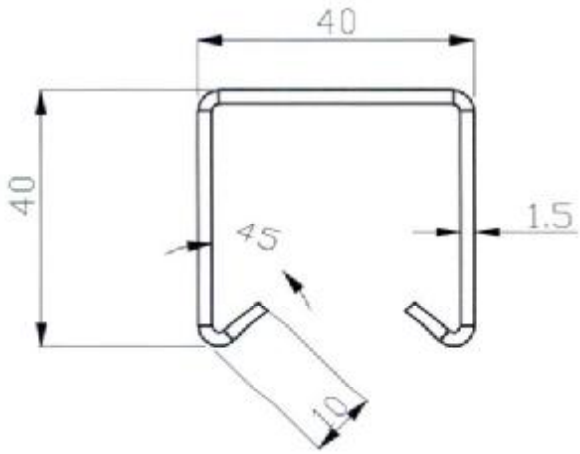
Dokument č.
Document No. FIRES-FR-235-08-AUNE

Príloha č./Appendix No. 19





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20. 12. 2004

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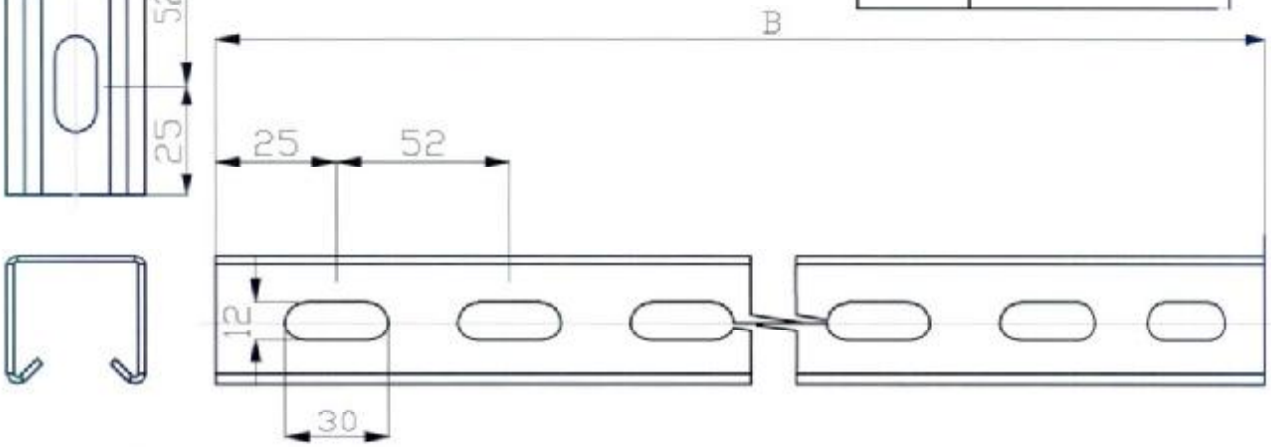
Dokument č.
Document No. FIRES-FR-255-01-ANG

Príloha č./Appendix No. 15

B	Typ
215	CWOP40H40/02
315	CWOP40H40/03
415	CWOP40H40/04
515	CWOP40H40/05



	Odchyłka wymiarów nietolerowanych		Materiał: Gatunek		Masa [kg]	Skala 1:2	Format A4
			Nr normy	PN-EN 10027-2005			Arkusz
			półfabrykat (nr normy)				Arkuszy

	Nazwisko	Podpis	Data
Projektował	J.GROCHOWSKI		2010.05
Rysował	J.Grochowski		2010.05
Sprawdził	T.WŁODARCZYK		2010.05
Zatwierdził	J.KLIMCZEK		2010.05

Nazwa rysunku: CWOP40H40/....

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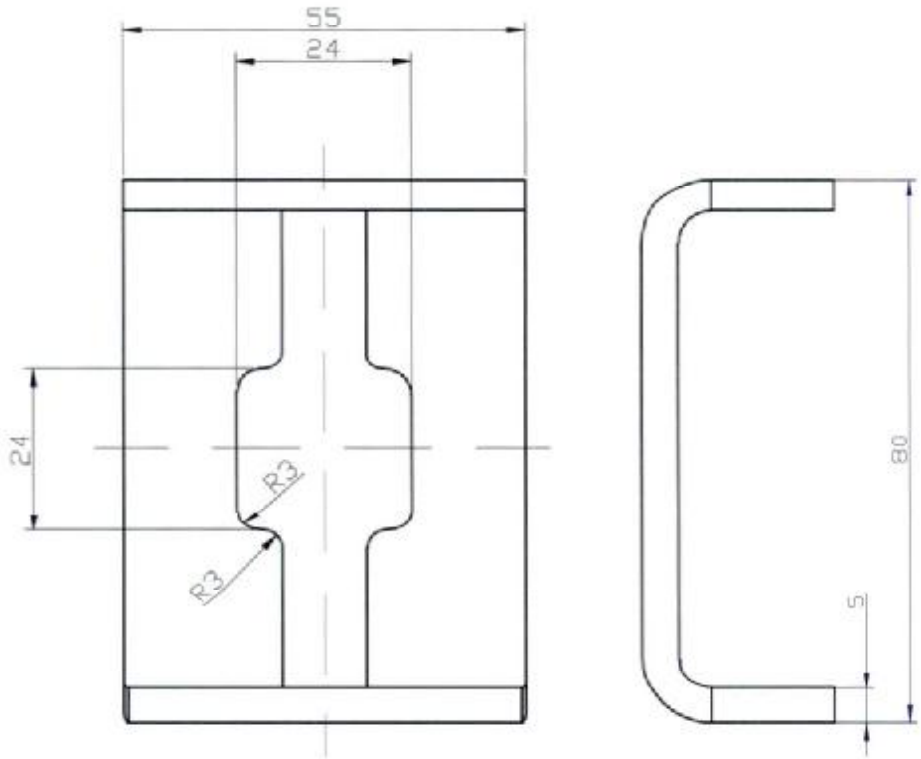
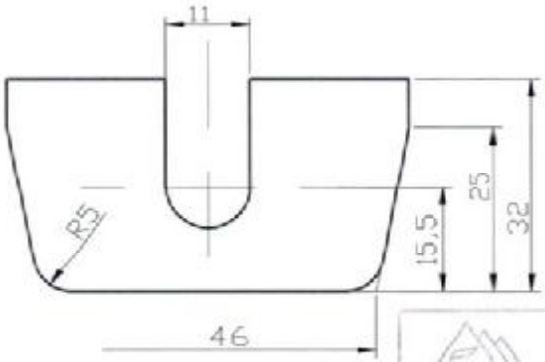
Nr rysunku

Nr zmiany





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Dátum/Date 20.12.2008

Podpis/Signature

Dokument č. / Document No. FIRES-FR-233-08 ANNEX

Príloha č./Appendix No. 16

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

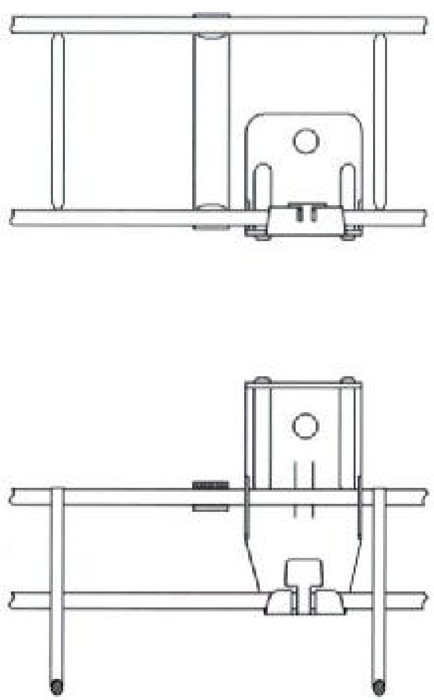
	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	T.Grudniewski		2004.12.29	USOV
Rysował	J.Jasiński		2004.12.29	
Sprawdził	J.Kliczek		2004.12.29	
Zatwierdził	J.Kliczek		2004.12.29	Nr programu maszynowego ---

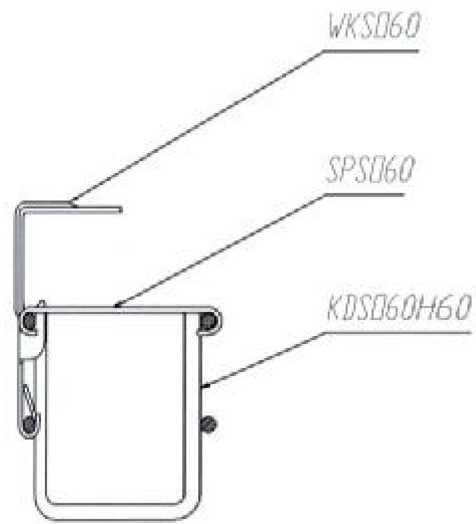
Nr zmiany

Nr rysunku

BAKS

Profesjonalne Systemy Tras Kablowych





Odchyłki wymiarów nietolerowanych		Materiał: Gatunek / Nr normy / półfabrykat (nr normy)	Masa (kg)	Podziałka 1:1	Format A4 / Arkusz 1 / Arkuszy 1
Projektował / Rysował / Sprawdził / Zatwierdził	Nazwisko / Podpis	Data 19.12.2007	Nazwa rysunku: ZAWIESIE DO KDSO60H60		
Profesjonalne Systemy Tras Kablowych			Nr programu maszynowego --- / Nr rysunku		Nr zmiany

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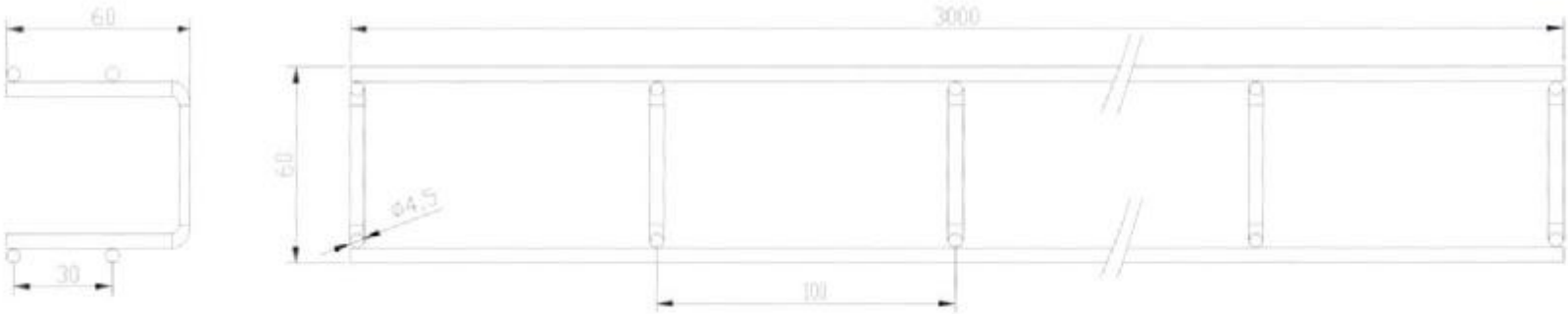
Dátum/Date: 20. 12. 2007

Podpis/Signature: [signature]

Dokument č./Document No.: FIRES-FR-235-07-AUNE

Príloha č./Appendix No.: 17



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Dokument č./Document No. FIRES-FR-235-04-ANNEX

Príloha č./Appendix No. 18

Profesjonalne Systemy
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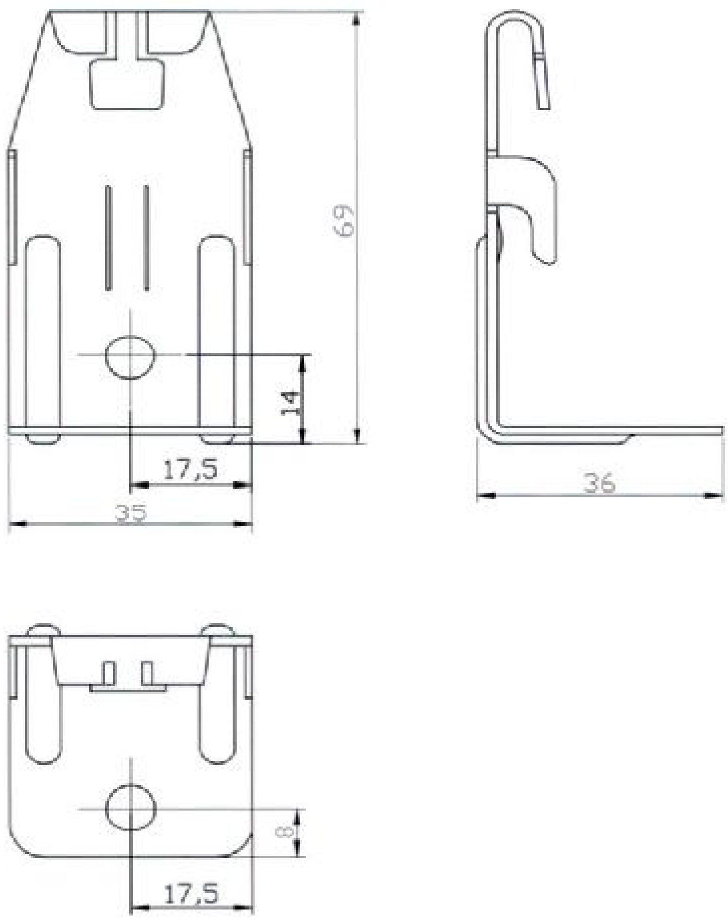
KDSO60H60/3

A4

12



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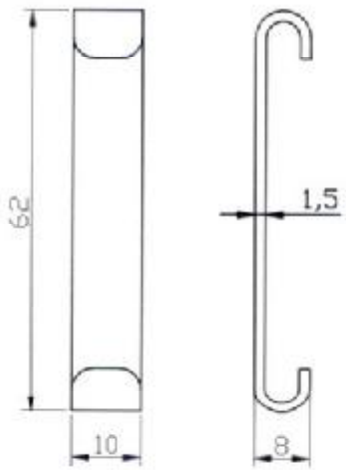
Document No. FIRES-FR-235-21-AUUE

Príloha č./Appendix No. 19

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

				Nazwa rysunku
Projektował	Nazwisko	Podpis	Data	WKS□60
Rysował				
Sprawdził				
Zatwierdził				Nr programu maszynowego --- / Nr zmiany
Profesjonalne Systemy Tras Kablowych				Nr rysunku



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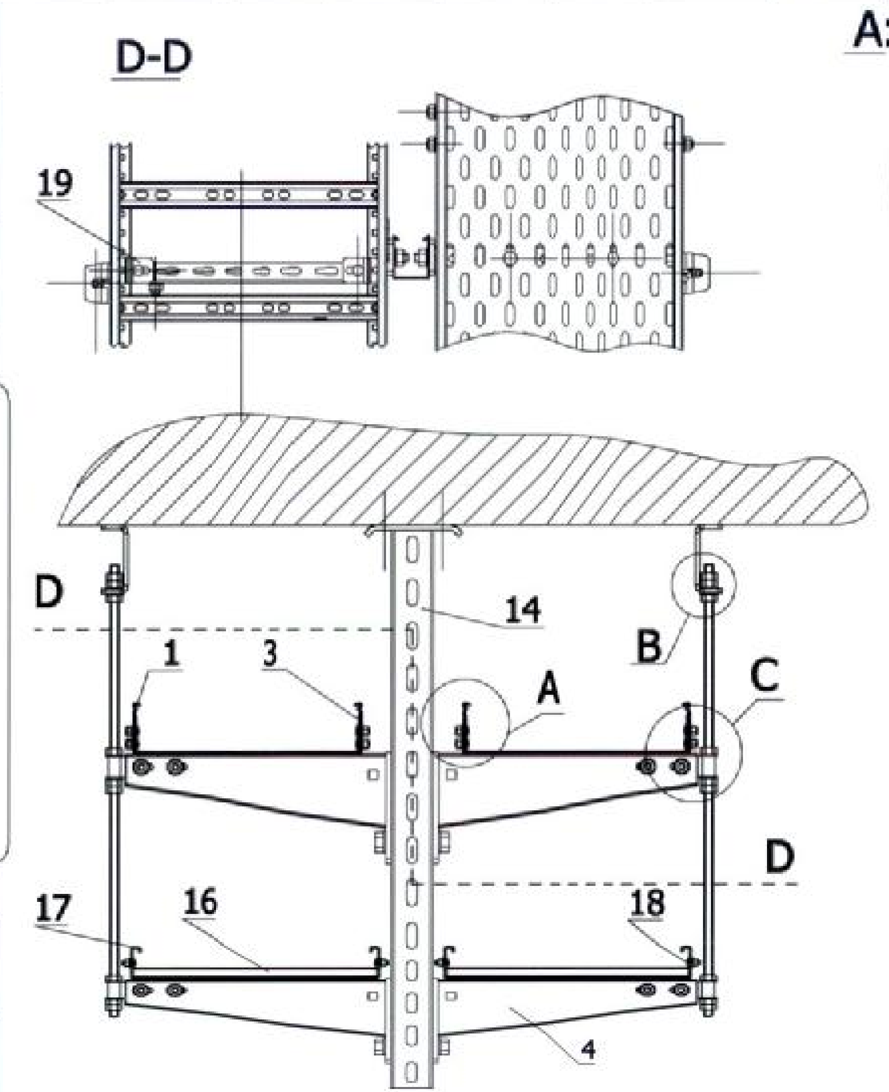
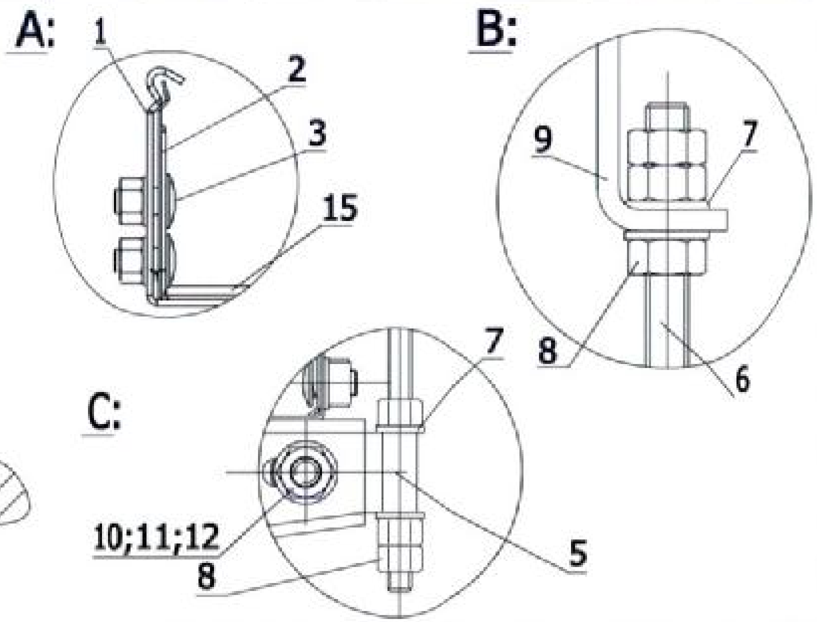
Príloha č./Appendix No. 20

Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka 1:1	Format A4
			Nr normy				Arkuszy 1
			półfabrykat (nr normy)				Arkusz 1
Projektował			10.12.2007	Nazwa rysunku SK060			
Rysował	Nazwisko	Podpis					
Sprawdził				Nr programu maszynowego			Nr zmiany
Zatwierdził				Nr rysunku			

Profesjonalne Systemy
Tras Kablowych





Pos.	Benennung	Zeichnung-Nr	Material	Stck.	Katalogs Nr
19	zacisk mocujacy	ZKO		4	
18	śruba	SGN M8x14		16	
17	łącznik	LDDOH60N		4	
16	drabinka	DGDP400H60N		2	
15	blacha łącznikowa	BLSV60N		4	
14	Wspornik	WPCS500		1	
13	śruba	SM M10x30		8	
12	nakrętka	NS M8		8	
11	podkładka	PP 8E		8	
10	śruba	SSM8x16		8	
9	uchwyt sufitowy	USDV		2	
8	nakrętka	NS M10		12	
7	podkładka	PP 10		12	
6	pręt gwintowany	PGM10/1		2	
5	uchwyt	UPV10		4	
4	wysięgnik	WPCO400		4	
3	śruba	SGN M6x12		28	
2	łącznik	LPDP60N		4	
1	koryto	KCDP400H60		2	

gekonstruiert	J.Grochowski	BAKS	
gezeichnet	J.Grochowski	BAKS	
geprueft	J.Wilczek	BAKS	
Massstab 1:5	DGDP400H60N + KCDP400H60 Fire	BAKS DZIAŁ KONSTRUKCYJNY ul. Jagodne 5 05-480 Karczew	Blatt 1 von 1; Groesse A3; Name: Feuerbestandig System; Vorhaben/Ersatz

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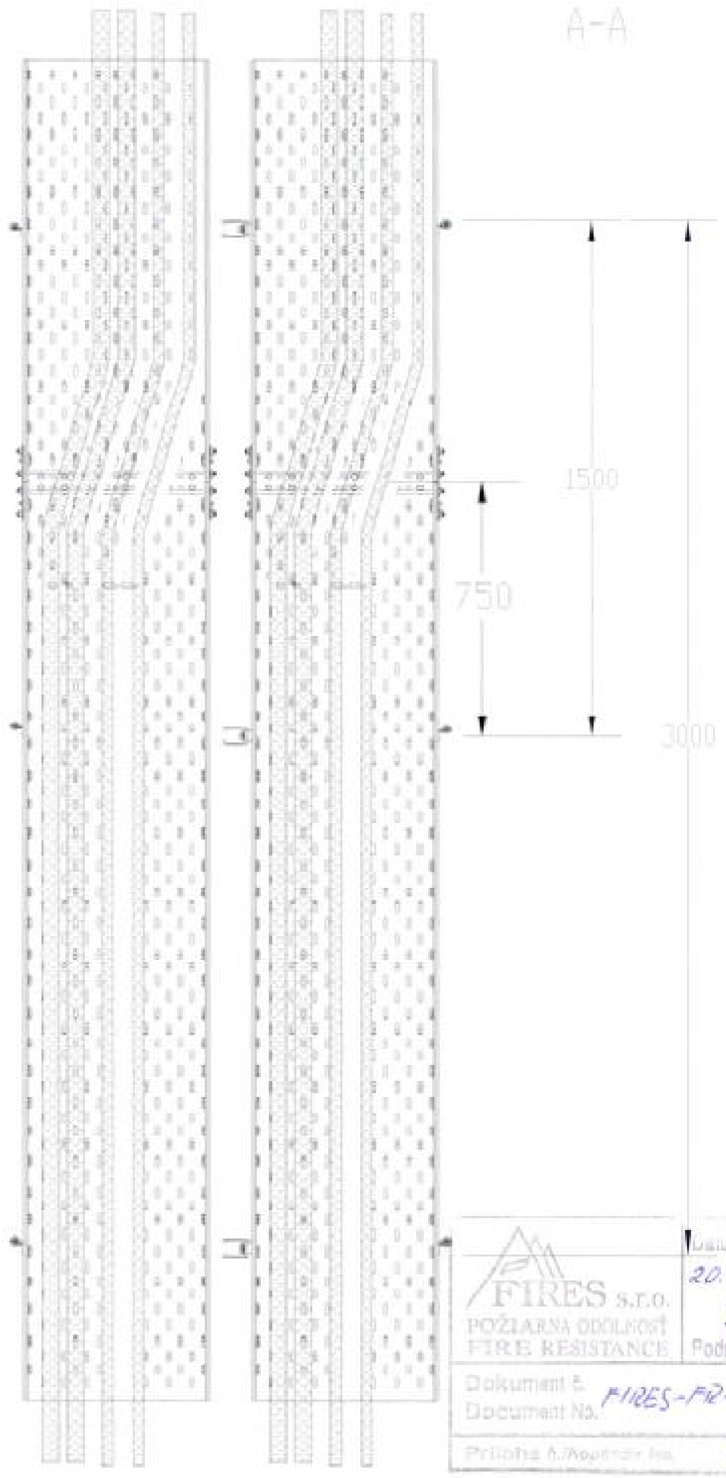

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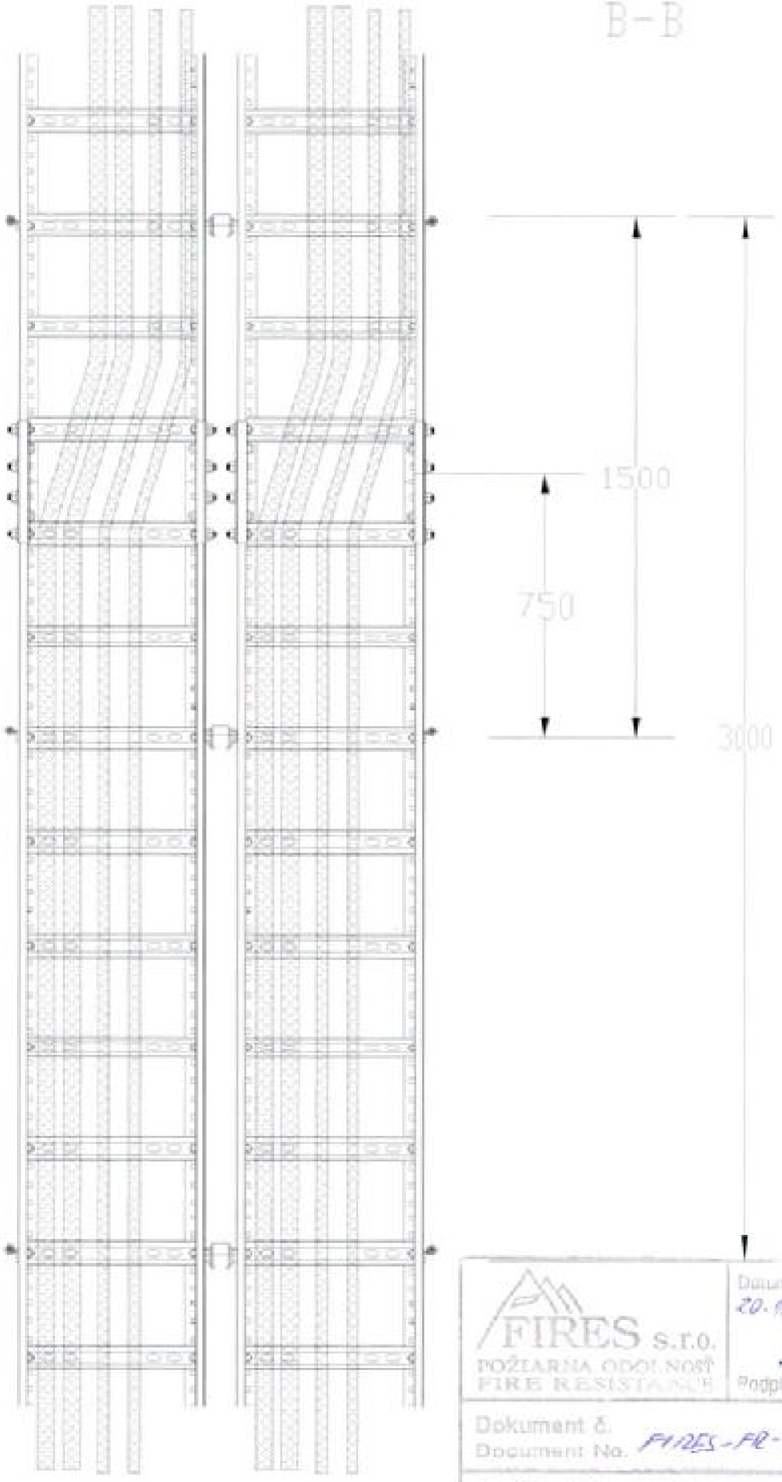
Príloha č./Appendix No. 22

Odchyłki wymiarów nietolerowanych	Materiał: Gatunek / Nr normy: PN-EN 10327/2005 / Półfabrykat (nr normy)	Masa (kg) / Podziałka	Format A4 / Arkusz 2 / Arkuszy 5
Projektował / Rysował / Sprawdził / Zatwierdził	Nazwisko / Podpis / Data	Nazwa rysunku	Nr zmiany
Profesjonalne Systemy Tras Kablowych		Nr programu maszynowego / Nr rysunku: Batizowce 51 tydzień	



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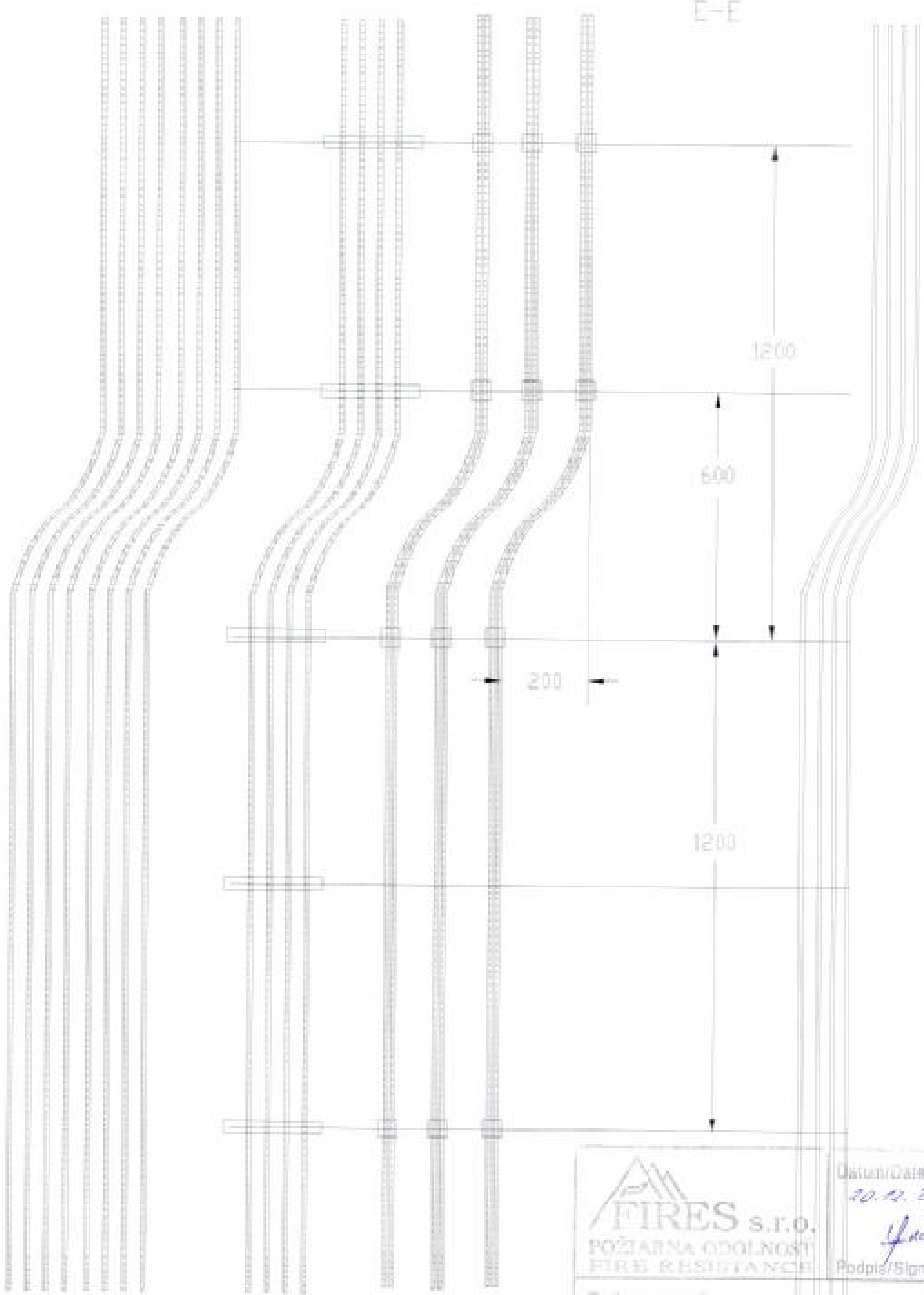
Document No. FIRES-FR-235-08-AUKE

Príloha č./Appendix No. 23

Odchyłki wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
			Nr normy	PN-EN 10327:2005			Arkusz 2
			Półfabrykat (nr normy)				Arkuszy 3
Projektował	Nazwisko	Podpis	Data	Nazwa rysunku			
Rysował							
Sprawdził							
Zatwierdził				Nr programu rozdzielczego			Nr zmiany
Profesjonalne Systemy Tras Kablowych				Nr rysunku: Batizowce 51 tydzień			



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Príloha č./Appendix No. 24

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

Dokładność wymiarów nietolerowanych

	Nazwisko	Podpis	Data
Projektował			
Rysował	J.Grochowski		05-May-06
Sprawdził			
Zatwierdził			

Nazwa rysunku

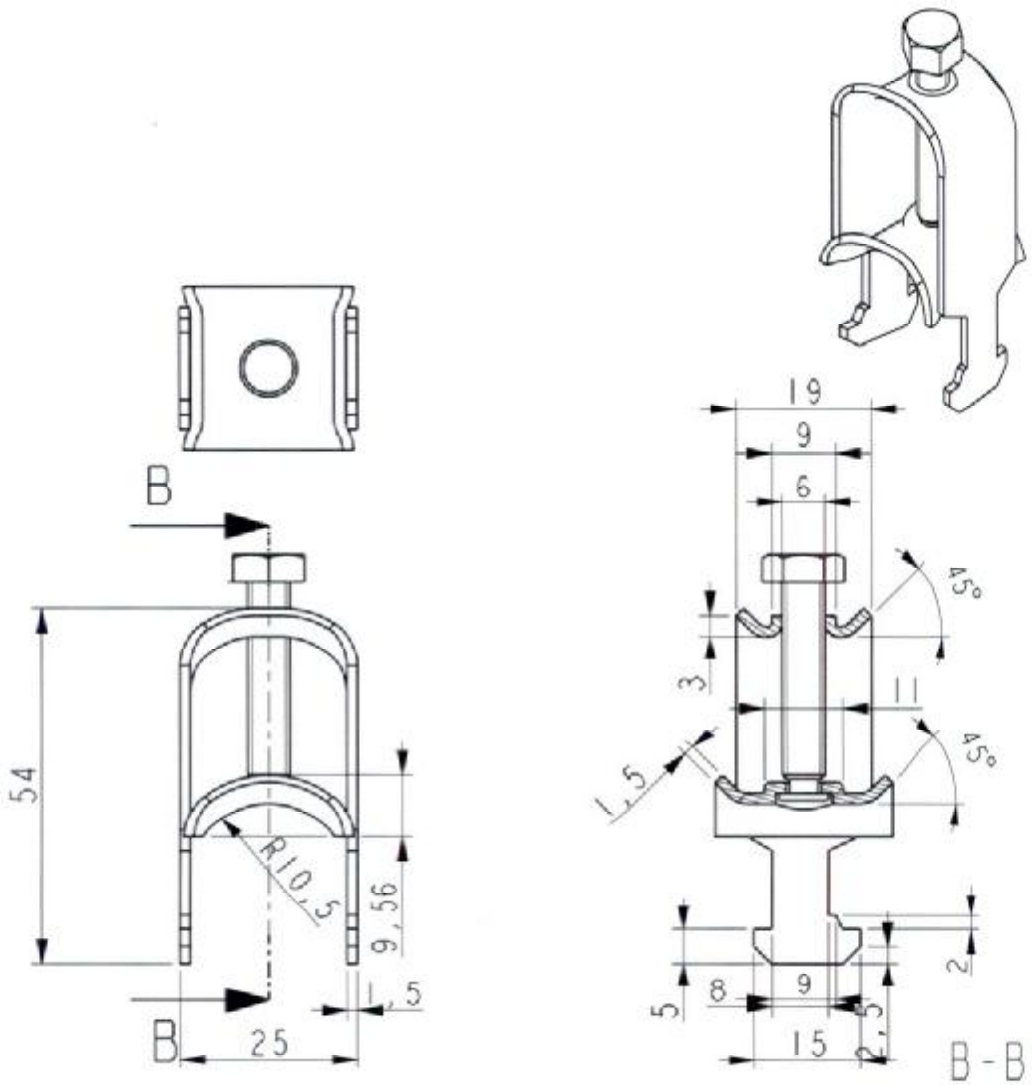
Nr programu maszynowego

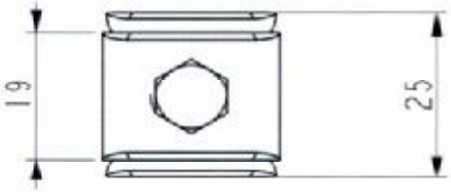
Nr rysunku

Nr zmiany

Profesjonalne Systemy Tras Kablowych

Batizowce 51 tydzień





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Dátum/Date 20.12.2008

Podpis/Signature

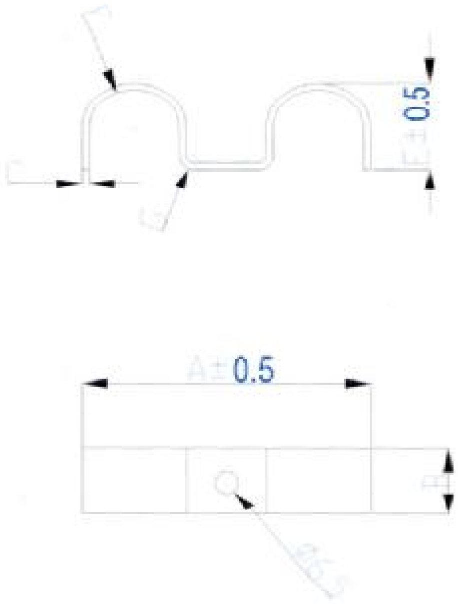
Dokument č./Document No. FIRES-FR-235-04-PWC

Príloha č./Appendix No. 25

	Odchylka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka 1:1	Format A4
				Nr normy	PN-EN 10327:2005			Arkusz 1
				półfabrykat (nr normy)				Arkuszy 1
Projektował	Nazwisko		Podpis	Data	Nazwa rysunku			
Rysował	J.Grochowski			28-Jun-06				
Sprawdził								
Zatwierdził					Nr programu maszynowego			Nr zmiany
					Nr rysunku			

BAIRO

Profesjonalne Systemy Tras Kablowych



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

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Dátum/Date: 20. 12. 2007
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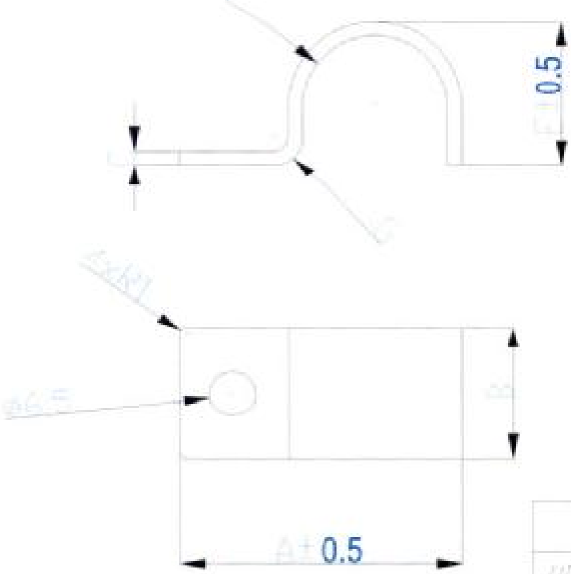
Dokument č. / Document No.: FIRES-FR-235-07-AUGE

Príloha č./Appendix No.: 26

Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa (kg)
			Nr normy	PN-EN 10142 + A1 : 1997	Podziałka 1:1
			półfabrykat (nr normy)		Format A4; Arkusz 1; Arkuszy 1
Projektował	J.GROCHOWSKI	Data	20.10.04	Nazwa rysunku	UEF
Rysował	J.GROCHOWSKI		20.10.04		
Sprawdził	T.WŁODARCZYK		20.10.04		
Zatwierdził	J.KLICZEK		20.10.04	Nr programu roboczego	---
				Nr rysunku	---

Nazwisko | Podpis | Nr zmiany

Profesjonalne Systemy Tras Kablowych



	A	B	C	E	F	G
UDF5	23	14	1.2	5	R2.5	R2.4
UDF6	24	14	1.2	6	R3	R2.4
UDF7	25	14	1.2	7	R3.5	R2.4
UDF8	26	14	1.2	8	R4	R2.4
UDF9	27	14	1.2	9	R4.5	R2.4
UDF10	29	14	1.2	10	R5	R2.4
UDF12	30	14	1.2	12	R6	R2.4
UDF14	33	20	2	13	R7	R4
UDF15	34	20	2	16	R7.5	R4
UDF16	35	20	2	17	R8	R4
UDF18	37	20	2	19	R9	R4
UDF20	39	20	2	21	R10	R4
UDF22	41	20	2	23	R11	R4
UDF25	44	20	2	26	R12.5	R4

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Príloha č./Appendix No. 21

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	

	Nazwisko	Podpis	Data
Projektował	J.GROCHOWSKI		2010.04
Rysował	J.GROCHOWSKI		2010.04
Sprawdził	T.WŁODARCZYK		2010.04
Zatwierdził	J.KLICZEK		2010.04

Nazwa rysunku: UDF

Nr programu maszynowego: ---

Nr zmiany

Nr rysunku: ---

Profesjonalne Systemy Tras Kablowych