FIRES
The Experts On Fire Safety

TEST REPORT FIRES-FR-030-07-AUNE

Cables with integrity function FE180/E90
Type – NHXH, NHXCH, (N)HXH, (N)HXCH, JE H(St)H

FIRES, s.r.o.
Notifikovaná osoba č./ Notified Body No.: 1396
Autorizovaná osoba reg. č./Approved Body No.: SK01
Osloboditeľov 282, 059 35 Batizovce, Slovakia
Tel.+421 52 775 2298, Fax+421 52 7881412, e-mail: info@fires.sk, www.fires.sk

FIRES
The Experts on Fire Safety

ilac-MRA

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-030-07-AUNE**
Tested property: Function in fire
Test method: DIN 4102 – 12:1998-11

Date of issue: **23. 02. 2007**

Name of the product: Cables with integrity function FE180/E90
Type – NHXH, NHXCH, (N)HXH, (N)HXCH, JE H(St)H

Manufacturer: **Zaklady Kablowe Bitner Celina Bitner,** Friedleina 3/3, 30-009 Kraków, Poland – producer of cables
Baks, 05-480 Karczew, Jagodne 5, Poland – producer of construction

Sponsor: **Zaklady Kablowe Bitner Celina Bitner,** Friedleina 3/3, 30-009 Kraków, Poland – producer of cables

---

Task No.: PR-06-0224
Specimen received: 20. 11. 2006
Date of the fire test: 24. 11. 2006
Technician responsible for the technical side of this report: Miroslav Hudák

---

Number of pages: 6 Number of appendices: 30
Test reports: 3 Copy No.: 2
Distribution list:

Copy No.1: **FIRES, s.r.o.,** Osloboditeľov 282, SK-059 35 Batizovce, Slovakia (electronic version)
Copy No.2: **Zaklady Kablowe Bitner Celina Bitner,** Friedleina 3/3, 30-009 Kraków, Poland (electronic version)
Copy No.3: **Zaklady Kablowe Bitner Celina Bitner,** Friedleina 3/3, 30-009 Kraków, Poland

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

Representatives of the sponsor: Mr. Adam Cichoń (Zaklady Kablowe Bitner)
Mr. Jacek Kliczek (BAKS)

Test directed by: Štefan Rástocký
Test carried out by: Peter Rusnák, Miroslav Hudák

Operator: Alexander Reľovský

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 (+50až-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 54 055	Racking meter	-
F 57 005	Digital stop-watch	-
F 57 002	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 company BAKS according to requirements of the sponsor. Mounting of cables and weights into the supporting system was carried out by workers of the test sponsor.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMEN STRUCTURE

Test specimen comprised from power and communication non-halogen cables and supporting systems:
- BAKS with accessories – ceiling cable trays, cable ladders, ceiling ledges with clamps UEF, UDF, UKO and sleeves – OZO, OZMO;
- NIEDAX with accessories – cable trays LLK;

Cables:	(N)HXH - 4x1,5 RE E30 CERAMIC	(2 x)
	(N)HXH - 4x1,5 RE E90 CERAMIC	(12 x)
	(N)HXH - 4x50 RM E90 CERAMIC	(2 x)
	(N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	(8 x)
	(N)HXCH - 4x10 RE/10 E90 CERAMIC	(4 x)
	(N)HXCH - 4x50 RM/25 E90 CERAMIC	(4 x)
	NHXH - 4x1,5 RE E90 MICA	(4 x)
	NHXCH - 4x10 RE/10 E90 MICA	(2 x)
	NHXH - 4x50 RM E90 MICA	(6 x)
	NHXCH - 4x50 RM/25 E90 MICA	(2 x)
	JE-H(St)H - 2x2x0,8 E30 CERAMIC	(4 x)
	JE-H(St)H - 2x2x0,8 E90 CERAMIC	(12 x)
	JE-H(St)H - 2x2x0,8 E90 MICA	(2 x)

Supporting system BAKS: was made by cable ladders, trays, individual clamps, clamps in ceiling ledges.
Supporting system was made by three vertical ceiling hangers type WCE which horizontal brackets type WMCO were fixed to. Vertical hangers were fixed to concrete ceiling by means of dowels PSRO M10 x 80 in spacing of 1200 mm. Fixation and arrangement of horizontal brackets are visible in appendix No.12 of this report. Two trays type KCOP300H60/3 were fixed to horizontal brackets from one side of vertical consoles and two ladders type DGOP400H60/3 were fixed from other side of vertical hangers. Trays and ladders were fixed to horizontal brackets by means of screws M8 with nuts M8 through clamps type ZMO. Joints of trays and ladders was realized by means of connecting components type (BLO300, LPOLH60) at tray and type LDOCHE60E at ladder and by means of screws M8 with nuts M8 – 20 bolted joints at tray and 12 bolted joints at ladder. From outside, horizontal brackets were fixed through grips type UPWO by means of threaded bar PGM10 fixed from both sides by nut M10 with washer M10 to ceiling hanger type USOV. Ceiling hangers were fixed to ceiling by dowels type PSRO M10.
Ceiling assembling was realized by means of clamps type: UEF, UDF, OZMO, OZO which were fixed to ceiling by dowels SRO M6 x 30 and by means of ceiling ledge, which was fixed to concrete ceiling by three dowels PSRO M8 x 75. Clamps type UKO were inserted to this ceiling ledge. Number of components and arrangement are visible in drawing.
Trays NIEDAX with cover: were fixed to wall made of aerated concrete block Ytong by plasterboard screws Ø (6 x 80) mm. Trays LLK 26.030 and upper trays LLK 60.100 were fixed by one screw in spacing of 500 mm and bottom trays LLK 60.100 were fixed by two screws in spacing of 500 mm. Trays LLK 26.030 were connected by tray junction LST 26.030 and trays LLK 60.100 were connected by two tray junction LST 60. Cable bracket clamps were inserted in trays LLK 60.100 in spacing of 500 mm.
Cable penetration through the wall of test furnace was sealed by mineral wool Nobasil.
Load capacity: bearing system was loaded with maximal tolerance according to the standard:
- trays with 10 kg/m and ladders with 20 kg/m (only BAKS).

Loading with steel chain was 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
43,6	4,5	21,3	1,8

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. 11. 2006	49,9	14,5

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 - 4x1,5 RE/1,5 E90 CERAMIC	**90 minutes no failure/interruption**
Specimen 2: cable (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	**40 minutes**
Specimens 3,4: cables (N)HXH - 4x1,5 RE E90 CERAMIC	**90 minutes no failure/interruption**
Specimen 5: cable NHXH - 4x50 RM E90 MICA	**31 minutes**
Specimen 6: cable NHXH - 4x50 RM E90 MICA	**25 minutes**
Specimen 7: cable (N)HXH - 4x1,5 RE E30 CERAMIC	**46 minutes**
Specimen 8: cable (N)HXH - 4x1,5 RE E30 CERAMIC	**62 minutes**
Specimen 9: cable (N)HXH - 4x1,5 RE E90 CERAMIC	**90 minutes no failure/interruption**
Specimen 10: cable (N)HXH - 4x1,5 RE E90 CERAMIC	**46 minutes**
Specimen 11: cable (N)HXCH - 4x10 RE/10 E90 CERAMIC	**34 minutes**
Specimen 12: cable (N)HXCH - 4x10 RE/10 E90 CERAMIC	**48 minutes**
Specimen 13: cable (N)HXH - 4x1,5 RE E90 CERAMIC	**14 minutes**
Specimen 14: cable (N)HXH - 4x1,5 RE E90 CERAMIC	**15 minutes**
Specimens 15,16: cables (N)HXCH - 4x10 RE/10 E90 CERAMIC	**90 minutes no failure/interruption**
Specimens 17,18: cables (N)HXH - 4x1,5 RE E90 CERAMIC	**16 minutes**
Specimens 19,20: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	**16 minutes**
Specimens 21,22: cables (N)HXCH - 4x50 RM/25 E90 CERAMIC	**90 minutes no failure/interruption**
Specimens 23,24: cables (N)HXH - 4x50 RM E90 CERAMIC	**90 minutes no failure/interruption**
Specimen 25: cable NHXH - 4x50 RM E90 MICA	**32 minutes**
Specimen 26: cable NHXH - 4x50 RM E90 MICA	**36 minutes**
Specimens 27,28: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	**17 minutes**
Specimen 29: cable NHXH - 4x1,5 RE E90 MICA	**90 minutes no failure/interruption**
Specimen 30: cable NHXH - 4x1,5 RE E90 MICA	**22 minutes**
Specimens 31,32: cables (N)HXH - 4x1,5 RE E90 CERAMIC	**18 minutes**
Specimens 33,34: cables NHXH - 4x50 RM E90 MICA	**90 minutes no failure/interruption**
Specimen 35: cable (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	**31 minutes**
Specimen 36: cable (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	**23 minutes**
Specimen 37: cable (N)HXH - 4x1,5 RE E90 CERAMIC	**23 minutes**
Specimen 38: cable (N)HXH - 4x1,5 RE E90 CERAMIC	**33 minutes**
Specimens 39,40: cables NHXCH - 4x50 RM/25 E90 MICA	**90 minutes no failure/interruption**
Specimen 41: cable (N)HXCH - 4x50 RM/25 E90 CERAMIC	**22 minutes**
Specimen 42: cable (N)HXCH - 4x50 RM/25 E90 CERAMIC	**90 minutes no failure/interruption**
Specimens 43,44: cables NHXH - 4x1,5 RE E90 MICA	**90 minutes no failure/interruption**
Specimens 45,46: cables NHXCH - 4x10 RE/10 E90 MICA	**90 minutes no failure/interruption**
Specimens 52: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**38 minutes**
Specimens 53: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**34 minutes**
Specimens 54: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**39 minutes**
Specimens 55: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**37 minutes**
Specimens 56: cable JE-H(St)H - 2x2x0,8 E30 CERAMIC	**35 minutes**
Specimens 57: cable JE-H(St)H - 2x2x0,8 E30 CERAMIC	**27 minutes**
Specimens 58: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**13 minutes**
Specimens 59: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**17 minutes**
Specimens 60: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**17 minutes**
Specimens 61: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**38 minutes**
Specimens 62: cable JE-H(St)H - 2x2x0,8 E30 CERAMIC	**23 minutes**
Specimens 63: cable JE-H(St)H - 2x2x0,8 E30 CERAMIC	**22 minutes**
Specimens 64: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**26 minutes**
Specimens 65: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**28 minutes**
Specimens 66: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**30 minutes**
Specimens 67: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC	**31 minutes**
Specimens 68,69: cables JE-H(St)H - 2x2x0,8 E90 MICA	**90 minutes no failure/interruption**

The fire test was discontinued in 92nd minute at the request of sponsor.

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: Marek Gorlický
Translated by: Marek Rusnák

Issued by: **Responsible for the technical side of this report:**

Ing. Štefan Rástocký
leader of the testing laboratory

Miroslav Hudák
technician of the testing laboratory

7. NORMATIVE REFERENCES

DIN 4102 – 2:1977-09	Fire behavior 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

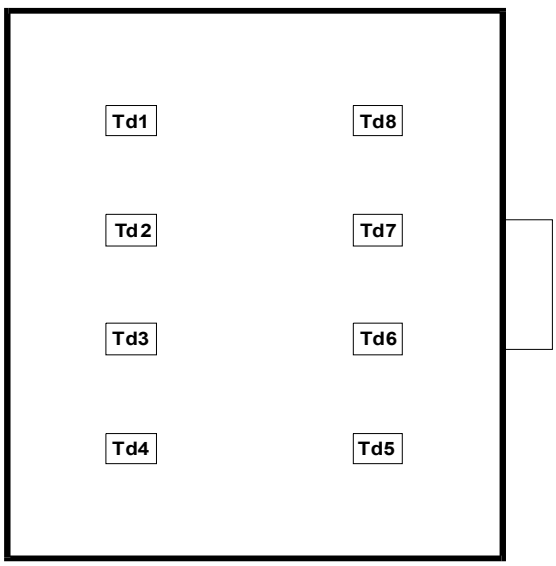
Appendix 1	Measured values inside the test furnace
Appendix 2	Measured values inside the test furnace / graph
Appendix 3	Measured times of tested specimens from V1 to V8
Appendix 4	Measured times of tested specimens from V9 to V16
Appendix 5	Measured times of tested specimens from V17 to V24
Appendix 6	Measured times of tested specimens from V25 to V32
Appendix 7	Measured times of tested specimens from V33 to V40
Appendix 8	Measured times of tested specimens from V41 to V46
Appendix 9	Measured times of tested specimens from V52 to V60
Appendix 10	Measured times of tested specimens from V61 to V69
Appendix 11	Layout of cables in the test furnace
Appendix 12-13	Photos taken before and after the fire test
Appendix 14-30	Drawings

Measured values inside the test furnace

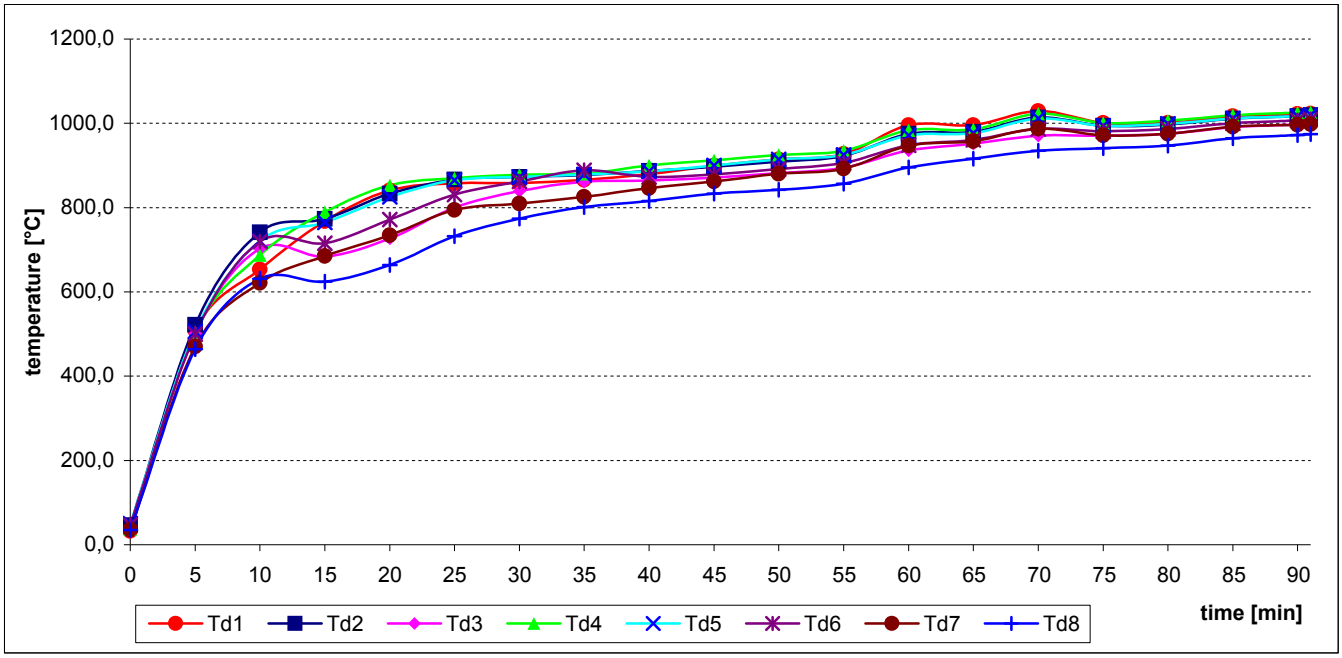
Time	Temperature [°C]											Deviation	Pressure
t [min]	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To	d_e [%]	p [Pa]
0	32,3	46,7	43,4	37,2	49,8	46,8	35,5	35,2	40,9	20,0	12,1	0,0	5,0
5	508,7	521,6	501,9	504,0	505,5	500,1	469,9	464,2	497,0	576,2	12,3	-8,7	14,3
10	652,9	741,1	702,7	687,7	720,7	719,6	621,0	631,1	684,6	678,3	12,6	-3,8	15,0
15	767,8	773,2	683,9	789,4	764,6	715,1	684,8	624,4	725,4	738,5	12,9	-2,9	13,7
20	840,4	832,8	726,7	852,8	825,5	771,5	734,8	664,1	781,1	781,3	14,5	-2,3	14,3
25	857,1	866,9	799,4	869,4	865,3	830,8	794,5	731,9	826,9	814,6	14,7	-1,5	13,2
30	858,4	872,4	839,2	877,9	873,0	861,9	809,4	773,9	845,8	841,8	14,5	-1,0	15,9
35	866,1	877,1	861,4	880,2	878,9	888,3	825,5	801,1	859,8	864,8	14,8	-0,9	12,7
40	879,2	887,0	864,2	899,7	886,2	872,8	846,3	815,7	868,9	884,7	14,9	-1,0	14,3
45	898,9	896,6	871,0	911,8	900,3	878,9	862,4	833,1	881,6	902,3	14,8	-1,1	11,4
50	914,2	909,0	881,7	925,0	914,1	892,0	879,9	842,1	894,8	918,1	13,9	-1,3	14,4
55	927,7	922,6	894,9	935,3	924,7	906,2	892,5	856,9	907,6	932,3	12,6	-1,4	14,7
60	995,5	975,2	935,6	983,3	971,2	947,9	947,2	895,5	956,4	945,3	12,6	-1,3	16,1
65	995,7	979,6	951,6	986,2	977,0	960,6	957,5	915,6	965,5	957,3	12,5	-1,1	14,1
70	1029,0	1014,0	970,6	1023,0	1012,0	986,8	987,7	935,3	994,8	968,4	12,1	-0,9	13,8
75	1001,0	994,0	970,9	1001,0	994,4	981,1	971,7	941,2	981,9	978,7	12,2	-0,8	14,3
80	1001,0	997,4	975,5	1006,0	998,4	986,4	975,0	947,3	985,9	988,4	12,1	-0,7	12,2
85	1017,0	1011,0	991,3	1019,0	1012,0	1000,0	991,7	964,8	1000,9	997,4	12,3	-0,7	14,6
90	1022,0	1017,0	997,1	1025,0	1017,0	1007,0	996,4	972,1	1006,7	1005,9	12,2	-0,6	14,0
91	1023,0	1019,0	999,3	1026,0	1020,0	1009,0	998,2	974,1	1008,6	1007,6	12,4	-0,6	15,1

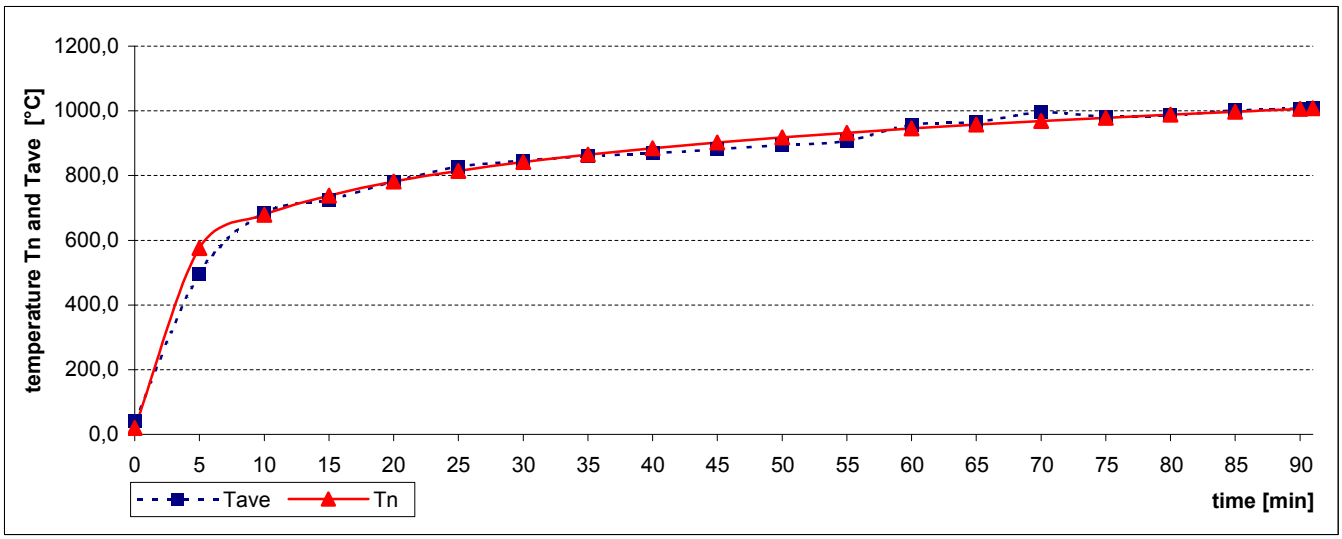
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

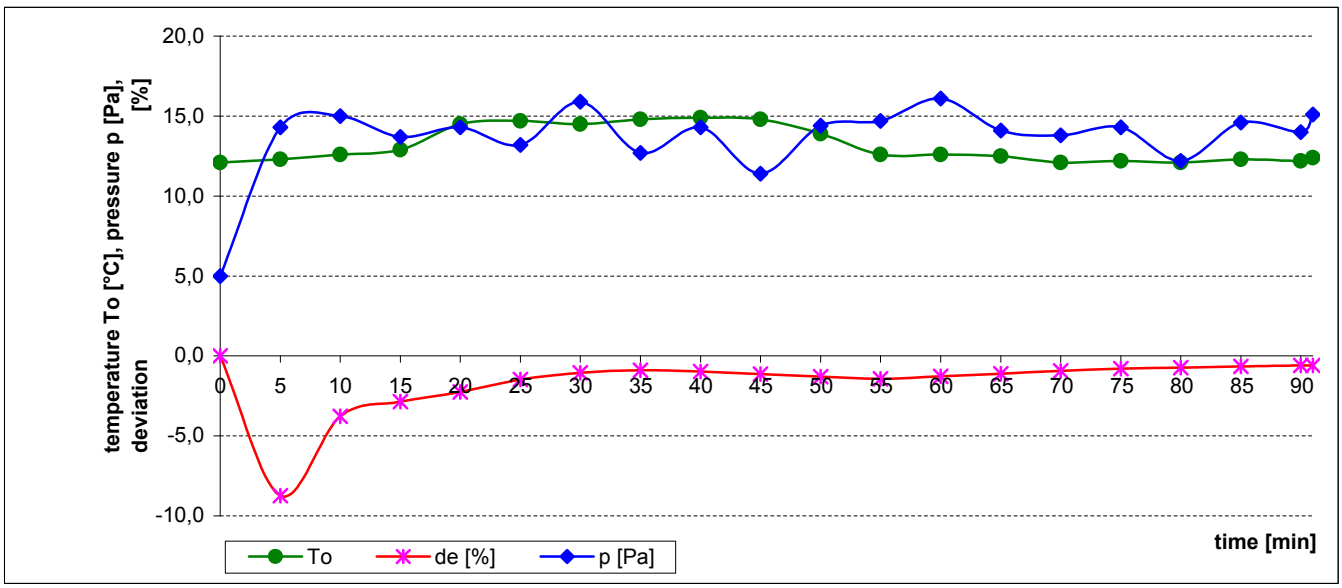
Layout of measuring points in the test furnace:



Measured values inside the test furnace / graph







Measured time of tested specimens from V1 to V8

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V1	1-L1	no failure
	2-L2	no failure
	3-L3	no failure
	4-PEN	no failure
V2	5-L1	40:06
	6-L2	40:06
	7-L3	40:06
	8-PEN	40:06
V3	9-L1	no failure
	10-L2	no failure
	11-L3	no failure
	12-PEN	no failure
V4	13-L1	no failure
	14-L2	no failure
	15-L3	no failure
	16-PEN	no failure
V5	17-L1	no failure
	18-L2	31:12
	19-L3	31:12
	20-PEN	no failure
V6	21-L1	25:03
	22-L2	no failure
	23-L3	no failure
	24-PEN	no failure
V7	25-L1	46:57
	26-L2	46:57
	27-L3	46:57
	28-PEN	46:08
V8	29-L1	no failure
	30-L2	no failure
	31-L3	no failure
	32-PEN	62:24

Specimens 1,2: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC
Specimens 3,4: cables (N)HXH - 4x1,5 RE E90 CERAMIC
Specimens 5.6: cables NHXH - 4x50 RM E90 MICA
Specimens 7,8: cables (N)HXH - 4x1,5 RE E30 CERAMIC

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 V9 to V16

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V9	33-L1	no failure
	34-L2	no failure
	35-L3	no failure
	36-PEN	no failure
V10	37-L1	no failure
	38-L2	no failure
	39-L3	46:32
	40-PEN	no failure
V11	41-L1	no failure
	42-L2	34:22
	43-L3	34:22
	44-PEN	no failure
V12	45-L1	48:35
	46-L2	48:35
	47-L3	no failure
	48-PEN	no failure
V13	49-L1	14:00
	50-L2	14:00
	51-L3	14:18
	52-PEN	14:00
V14	53-L1	15:38
	54-L2	15:38
	55-L3	15:38
	56-PEN	15:38
V15	57-L1	no failure
	58-L2	no failure
	59-L3	no failure
	60-PEN	no failure
V16	61-L1	no failure
	62-L2	no failure
	63-L3	no failure
	64-PEN	no failure

Specimens 9,10: cables (N)HXH - 4x1,5 RE E90 CERAMIC
Specimens 11,12: cables (N)HXCH - 4x10 RE/10 E90 CERAMIC
Specimens 13,14: cables (N)HXH - 4x1,5 RE E90 CERAMIC
Specimens 15,16: cables (N)HXCH - 4x10 RE/10 E90 CERAMIC

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 V17 to V24

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V17	65-L1	17:59
	66-L2	16:44
	67-L3	16:28
	68-PEN	16:44
V18	69-L1	16:44
	70-L2	16:44
	71-L3	16:44
	72-PEN	16:44
V19	73-L1	17:51
	74-L2	16:11
	75-L3	13:38
	76-PEN	16:11
V20	77-L1	16:19
	78-L2	16:36
	79-L3	16:03
	80-PEN	16:28
V21	81-L1	no failure
	82-L2	no failure
	83-L3	no failure
	84-PEN	no failure
V22	85-L1	no failure
	86-L2	no failure
	87-L3	no failure
	88-PEN	no failure
V23	89-L1	no failure
	90-L2	no failure
	91-L3	no failure
	92-PEN	no failure
V24	93-L1	no failure
	94-L2	no failure
	95-L3	no failure
	96-PEN	no failure

Specimens 17,18: cables (N)HXH - 4x1,5 RE E90 CERAMIC
Specimens 19,20: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC
Specimens 21,22: cables (N)HXCH - 4x50 RM/25 E90 CERAMIC
Specimens 23,24: cables (N)HXH - 4x50 RM E90 CERAMIC

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 V25 to V32

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V25	97-L1	36:46
	98-L2	32:46
	99-L3	32:46
	100-PEN	36:46
V26	101-L1	no failure
	102-L2	no failure
	103-L3	36:46
	104-PEN	72:19
V27	105-L1	17:17
	106-L2	17:17
	107-L3	17:09
	108-PEN	17:09
V28	109-L1	17:34
	110-L2	17:34
	111-L3	17:09
	112-PEN	17:09
V29	113-L1	no failure
	114-L2	no failure
	115-	no failure
	116-PEN	no failure
V30	117-L1	no failure
	118-L2	22:49
	119-L3	no failure
	120-PEN	no failure
V31	121-L1	18:08
	122-L2	18:08
	123-L3	18:08
	124-PEN	18:08
V32	125-L1	18:08
	126-L2	18:08
	127-L3	18:08
	128-PEN	18:08

Specimens 25,26: cables NHXH - 4x50 RM E90 MICA
Specimens 27,28: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC
Specimens 29,30: cables NHXH - 4x1,5 RE E90 MICA
Specimens 31,32: cables (N)HXH - 4x1,5 RE E90 CERAMIC

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 V33 to V40

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V33	129-L1	no failure
	130-L2	no failure
	131-L3	no failure
	132-PEN	no failure
V34	133-L1	no failure
	134-L2	no failure
	135-L3	no failure
	136-PEN	no failure
V35	137-L1	33:35
	138-L2	31:57
	139-L3	31:57
	140-PEN	31:57
V36	141-L1	23:28
	142-L2	23:28
	143-L3	27:20
	144-PEN	27:20
V37	145-L1	27:20
	146-L2	23:28
	147-L3	27:20
	148-PEN	27:20
V38	149-L1	33:35
	150-L2	40:23
	151-L3	33:35
	152-PEN	33:35
V39	153-L1	no failure
	154-L2	no failure
	155-L3	no failure
	156-PEN	no failure
V40	157-L1	no failure
	158-L2	no failure
	159-L3	no failure
	160-PEN	no failure

Specimens 33,34: cables NHXH - 4x50 RM E90 MICA
Specimens 35,36: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC
Specimens 37,38: cables (N)HXH - 4x1,5 RE E90 CERAMIC
Specimens 39,40: cables NHXCH - 4x50 RM/25 E90 MICA

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 V41 to V46

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V41	161-L1	no failure
	162-L2	no failure
	163-L3	22:41
	164-PEN	no failure
V42	165-L1	no failure
	166-L2	no failure
	167-L3	no failure
	168-PEN	no failure
V43	169-L1	no failure
	170-L2	no failure
	171-L3	no failure
	172-PEN	no failure
V44	173-L1	no failure
	174-L2	no failure
	175-L3	no failure
	176-PEN	no failure
V45	177-L1	no failure
	178-L2	no failure
	179-L3	no failure
	180-PEN	no failure
V46	181-L1	no failure
	182-L2	no failure
	183-L3	no failure
	184-PEN	no failure

Specimens 41,42: cables (N)HXCH - 4x50 RM/25 E90 CERAMIC
Specimens 43,44: cables NHXH - 4x1,5 RE E90 MICA
Specimens 45,46: cables NHXCH - 4x10 RE/10 E90 MICA

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 V52 to V60

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V52	209-L	87:16
	210-PEN	38:54
	211-L	no failure
	212-PEN	no failure
V53	213-L	40:50
	214-PEN	34:41
	215-L	no failure
	216-PEN	41:06
V54	217-L	39:03
	218-PEN	39:03
	219-L	47:30
	220-PEN	46:16
V55	221-L	46:49
	222-PEN	37:11
	223-L	42:28
	224-PEN	42:28
V56	225-L	46:24
	226-PEN	46:08
	227-L	no failure
	228-PEN	35:46
V57	229-L	no failure
	230-PEN	40:58
	231-L	27:03
	232-PEN	27:03
V58	233-L	16:53
	234-PEN	16:53
	235-L	13:16
	236-PEN	13:16
V59	237-L	17:17
	238-PEN	17:17
	239-L	17:17
	240-PEN	17:17
V60	241-L	32:38
	242-PEN	32:38
	243-L	17:59
	244-PEN	17:59
V61	245-L	38:16
	246-PEN	38:16
	247-L	no failure
	248-PEN	39:49

Specimens 52,53: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC
Specimens 54,55: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC
Specimens 56,57: cables JE-H(St)H - 2x2x0,8 E30 CERAMIC
Specimens 58,59: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC
Specimens 60,61: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC

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.

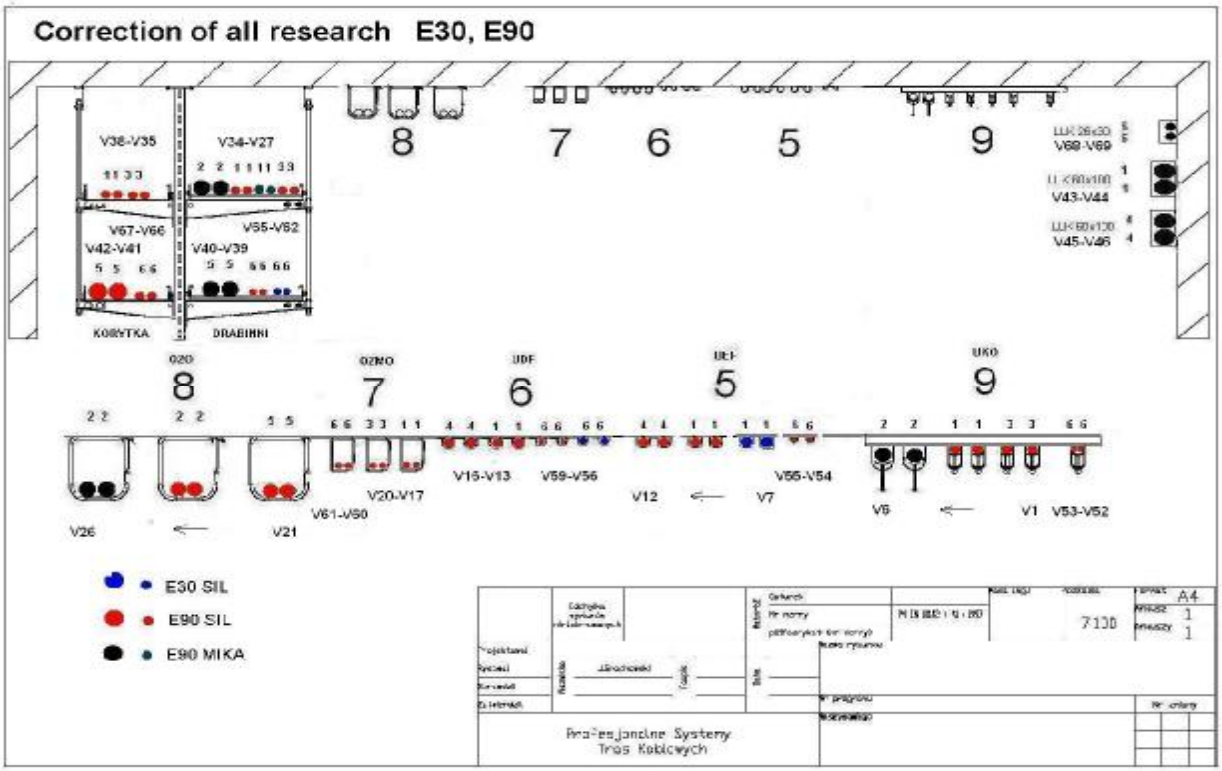
Measured time of tested specimens from V61 to V69

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V62	249-L	30:46
	250-PEN	30:46
	251-L	23:43
	252-PEN	23:43
V63	253-L	29:10
	254-PEN	22:32
	255-L	22:49
	256-PEN	22:49
V64	257-L	26:06
	258-PEN	26:06
	259-L	34:57
	260-PEN	31:21
V65	261-L	30:21
	262-PEN	28:37
	263-L	29:10
	264-PEN	29:10
V66	265-L	50:03
	266-PEN	30:13
	267-L	72:19
	268-PEN	46:08
V67	269-L	36:57
	270-PEN	31:48
	271-L	47:14
	272-PEN	46:08
V68	273-L	no failure
	274-PEN	no failure
	275-L	no failure
	276-PEN	no failure
V69	277-L	no failure
	278-PEN	no failure
	279-L	no failure
	280-PEN	no failure

Specimens 62,63: cables JE-H(St)H - 2x2x0,8 E30 CERAMIC
Specimens 64,65: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC
Specimens 66,67: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC
Specimens 68,69: cables JE-H(St)H - 2x2x0,8 E90 MICA

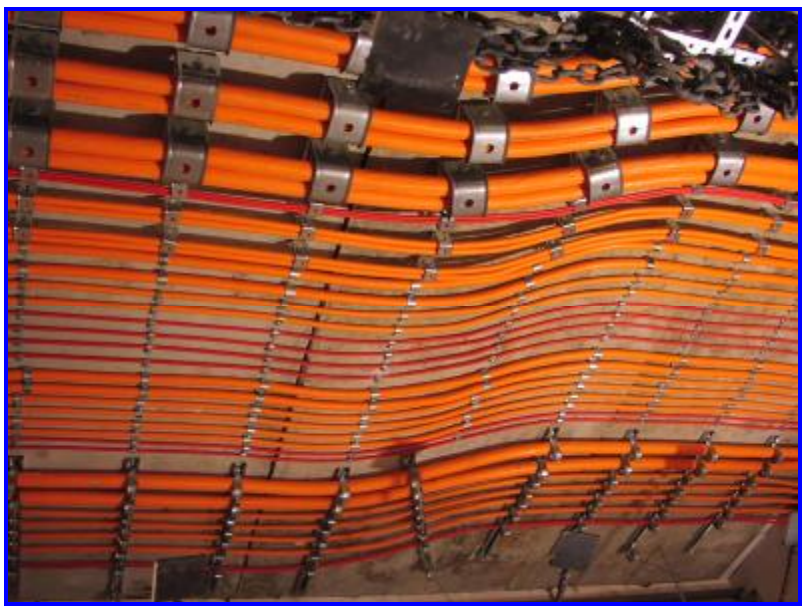
Signal cables were tested by three-phase voltage supply 1 x 110V with LED diods 3V / 0,03W.
Circuit breakers with rating 3 A were used.

Layout of cables in the test furnace



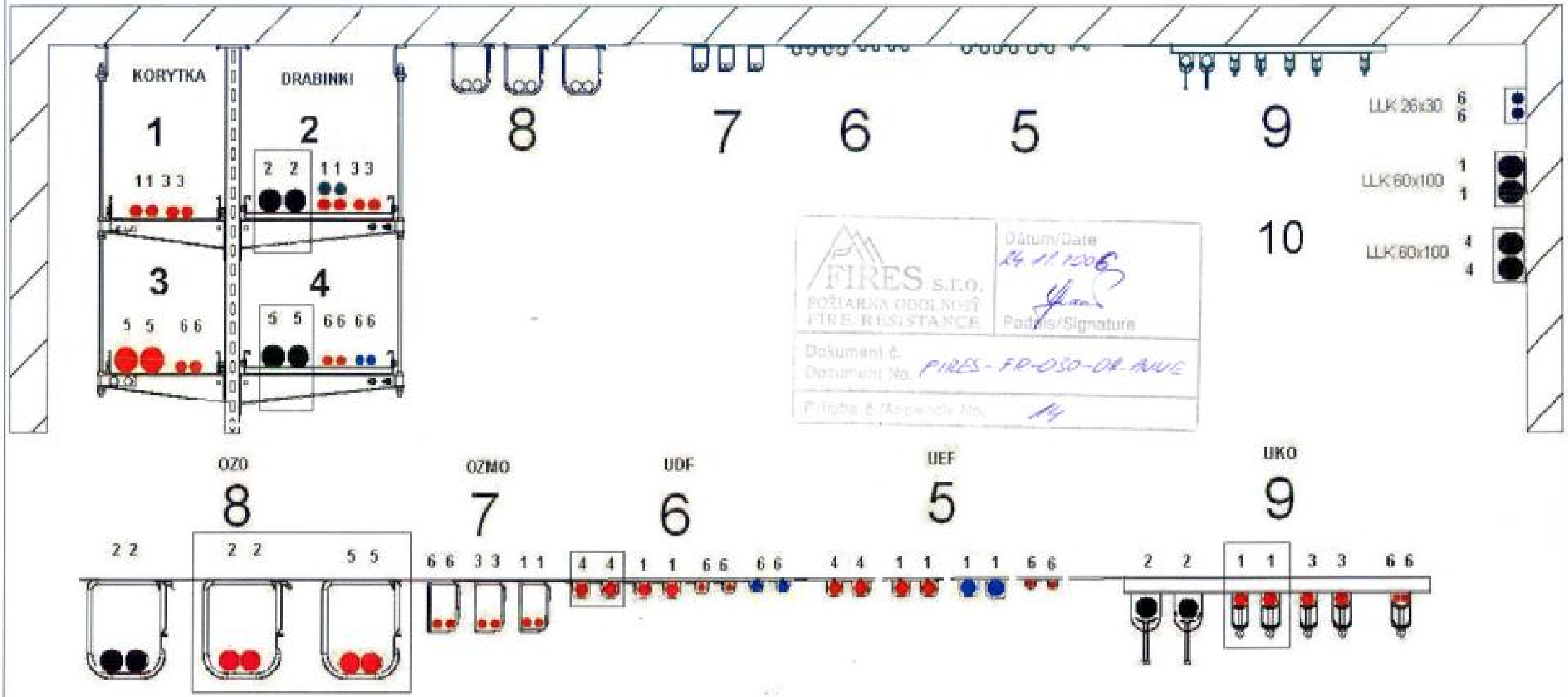
Specimens 1,2: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	Specimens placed in ceiling profile ledges with clips UKO
Specimens 3,4: cables (N)HXH - 4x1,5 RE E90 CERAMIC	Specimens placed in ceiling profile ledges with clips UKO
Specimens 5.6: cables NHXH - 4x50 RM E90 MICA	Specimens placed in ceiling profile ledges with clips UKO
Specimens 7,8: cables (N)HXH - 4x1,5 RE E30 CERAMIC	Specimens placed in ceiling clips UEF
Specimens 9,10: cables (N)HXH - 4x1,5 RE E90 CERAMIC	Specimens placed in ceiling clips UEF
Specimens 11,12: cables (N)HXCH - 4x10 RE/10 E90 CERAMIC	Specimens placed in ceiling clips UEF
Specimens 13,14: cables (N)HXH - 4x1,5 RE E90 CERAMIC	Specimens placed in ceiling clips UDF
Specimens 15,16: cables (N)HXCH - 4x10 RE/10 E90 CERAMIC	Specimens placed in ceiling clips UDF
Specimens 17,18: cables (N)HXH - 4x1,5 RE E90 CERAMIC	Specimens placed in ceiling clips OZMO
Specimens 19,20: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	Specimens placed in ceiling clips OZMO
Specimens 21,22: cables (N)HXCH - 4x50 RM/25 E90 CERAMIC	Specimens placed in ceiling clips OZO
Specimens 23,24: cables (N)HXH - 4x50 RM E90 CERAMIC	Specimens placed in ceiling clips OZO
Specimens 25,26: cables NHXH - 4x50 RM E90 MICA	Specimens placed in ceiling clips OZO
Specimens 27,28: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	Specimens placed in the upper ladder
Specimens 29,30: cables NHXH - 4x1,5 RE E90 MICA	Specimens placed in the upper ladder
Specimens 31,32: cables (N)HXH - 4x1,5 RE E90 CERAMIC	Specimens placed in the upper ladder
Specimens 33,34: cables NHXH - 4x50 RM E90 MICA	Specimens placed in the upper ladder
Specimens 35,36: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	Specimens placed in the upper tray
Specimens 37,38: cables (N)HXH - 4x1,5 RE E90 CERAMIC	Specimens placed in the upper tray
Specimens 39,40: cables NHXCH - 4x50 RM/25 E90 MICA	Specimens placed in the lower ladder
Specimens 41,42: cables (N)HXCH - 4x50 RM/25 E90 CERAMIC	Specimens placed in the lower tray
Specimens 43,44: cables NHXH - 4x1,5 RE E90 MICA	Specimens placed in the tray NIEDAX
Specimens 45,46: cables NHXCH - 4x10 RE/10 E90 MICA	Specimens placed in the tray NIEDAX
Specimens 52,53: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC	Specimens placed in ceiling profile ledges with clips UKO
Specimens 54,55: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC	Specimens placed in ceiling clips UEF
Specimens 56,57: cables JE-H(St)H - 2x2x0,8 E30 CERAMIC	Specimens placed in ceiling clips UDF
Specimens 58,59: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC	Specimens placed in ceiling clips UDF
Specimens 60,61: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC	Specimens placed in ceiling clips OZMO
Specimens 62,63: cables JE-H(St)H - 2x2x0,8 E30 CERAMIC	Specimens placed in the lower ladder
Specimens 64,65: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC	Specimens placed in the lower ladder
Specimens 66,67: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC	Specimens placed in the lower tray
Specimens 68,69: cables JE-H(St)H - 2x2x0,8 E90 MICA	Specimens placed in the tray NIEDAX

Photos taken before the test



Photos taken after the termination of the test

Correction of all research E30, E90



E30 SIL

E90 SIL

E90 MIKA

Dachyłki wymiarów nietolerowanych

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

Masa [kg]

Podziałka: 7:100

Format: A4; Arkusz: 1; Arkuszy: 1

Projektował; Rysował: J.Grochowski; Sprawdził; Zatwierdził

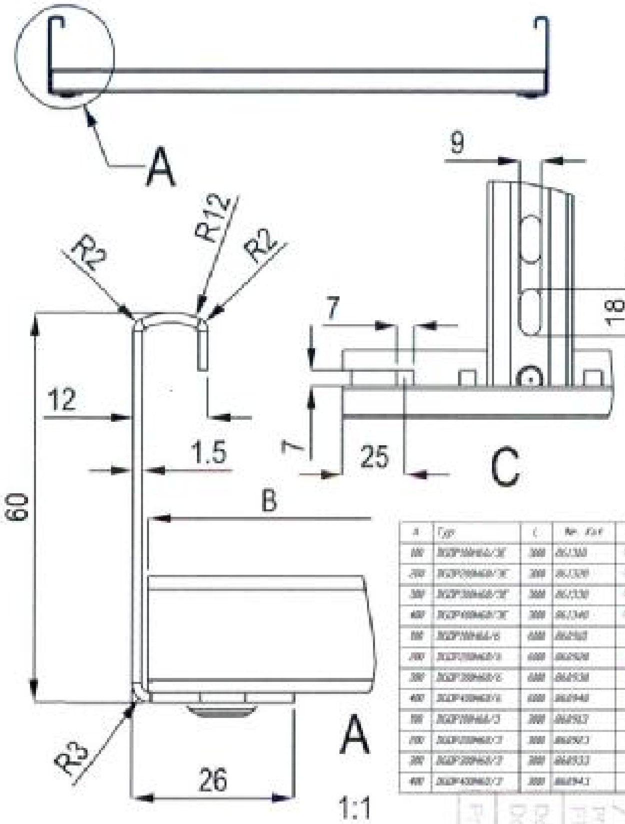
Nazwisko; Podpis; Data

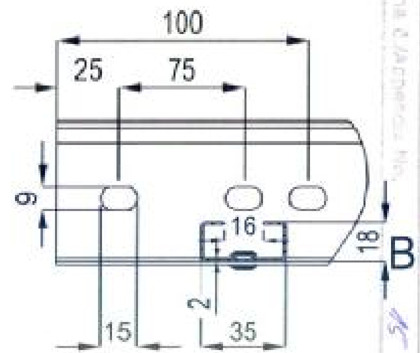
Nazwa rysunku

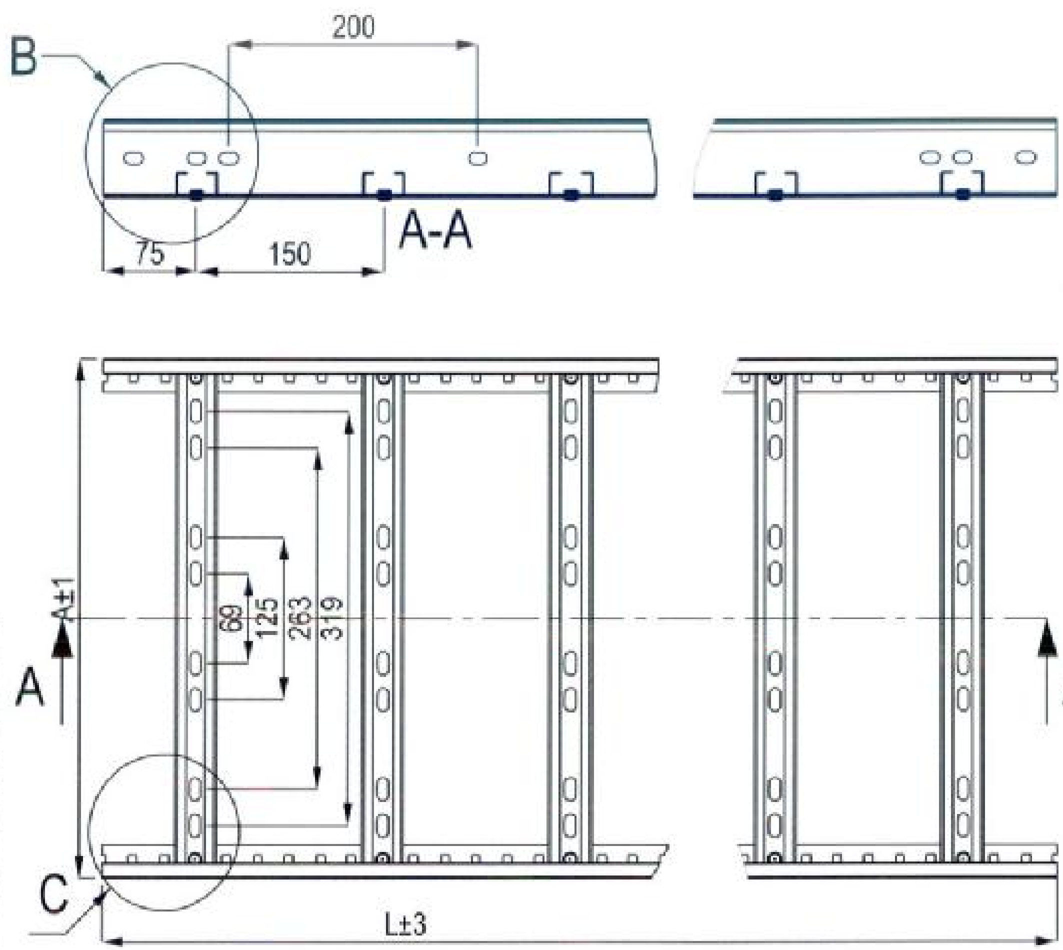
Nr programu

Nr zmiany

Profesjonalne Systemy Tras Kablowych







A	Typ	C	Nr Kat	materiał	B
100	DGOP100H60/3C	3000	861310	[illegible]	95
200	DGOP200H60/3C	3000	861320	[illegible]	195
300	DGOP300H60/3C	3000	861330	[illegible]	295
400	DGOP400H60/3C	3000	861340	[illegible]	395
100	DGOP100H60/6	6000	860910	[illegible]	95
200	DGOP200H60/6	6000	860920	[illegible]	195
300	DGOP300H60/6	6000	860930	[illegible]	295
400	DGOP400H60/6	6000	860940	[illegible]	395
100	DGOP100H60/3	3000	860913	[illegible]	95
200	DGOP200H60/3	3000	860923	[illegible]	195
300	DGOP300H60/3	3000	860933	[illegible]	295
400	DGOP400H60/3	3000	860943	[illegible]	395

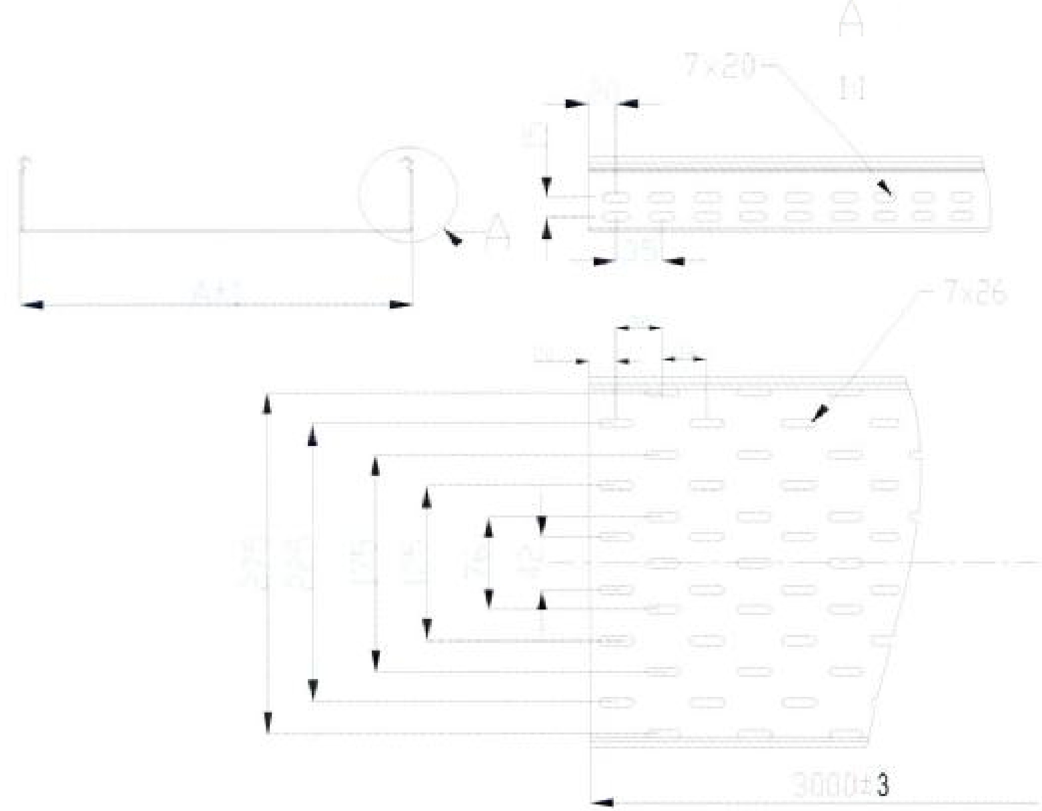
FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

Dátum/Date: 24.11.2006
Podpis/Signature
Dokument č./Document No.: FIRES-FR-030-06-AUKE
Príloha č./Appendix No.: 15

Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
			Nr normy	PN-EN 10142+A1:1997		1:5	Arkusz
			półfabrykat (nr normy)				Arkuszy
Projektował	J.GROCHOWSKI	Podpis	Data	20.10.05	Nazwa rysunku		
Rysował	J.Grochowski			20.10.05	DGOP400H60/3		
Sprawdził	T.WŁODARCZYK			20.10.05			
Zatwierdził	J.KLICZEK			20.10.05	Nr programu maszynowego		Nr zmiany

BAKS Profesjonalne Systemy Tras Kablowych

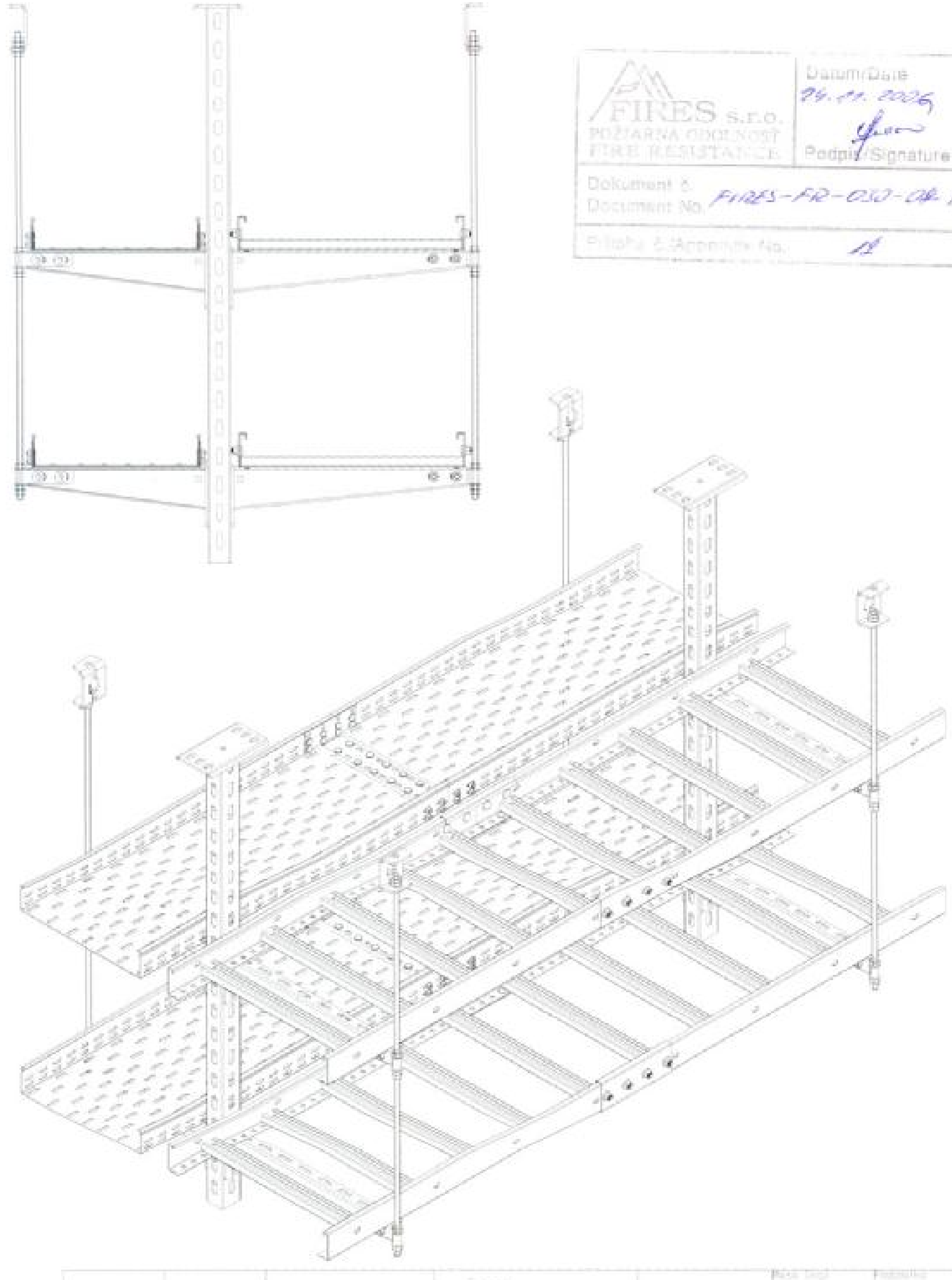
A	Typ	Nr kat.	Materiał
50	KCDP50H60/3E	[illegible]	[illegible]
100	KCDP100H60/3E	[illegible]	[illegible]
200	KCDP200H60/3E	[illegible]	[illegible]
300	KCDP300H60/3E	[illegible]	[illegible]
50	KCDP50H60/3	[illegible]	PN-EN 10142 + AC:1997
100	KCDP100H60/3	[illegible]	PN-EN 10142 + AC:1997
200	KCDP200H60/3	[illegible]	PN-EN 10142 + AC:1997
300	KCDP300H60/3	860130	PN-EN 10142 + AC:1997



Dodrybki wymiarów nietolerowanych		Materiał	Zatunek		Masa [kg]	Podziałka 1:5	Format A4
			Nr normy	PN-EN 10142 + AC:1997			Arkusz
			Zastosowano normy				Arkuszy
Projektował	Nazwisko	[illegible]	Podpis	Data	[illegible]	Nazwa rysunku: KCDP300H60/3
Rysował		[illegible]			[illegible]	
Sprawdził		T. WŁODARCZYK			[illegible]	
Zatwierdził		[illegible]			[illegible]	Nr programu rysunkowego	Nr zmiany

Profesjonalne Systemy Tras Kablowych

860130



FIRES s.r.o. POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 24.11.2006 Podpis/Signature
Dokument č. Document No. FIRES-FR-030-06-AUE	
Príloha č./Appendix No. 18	

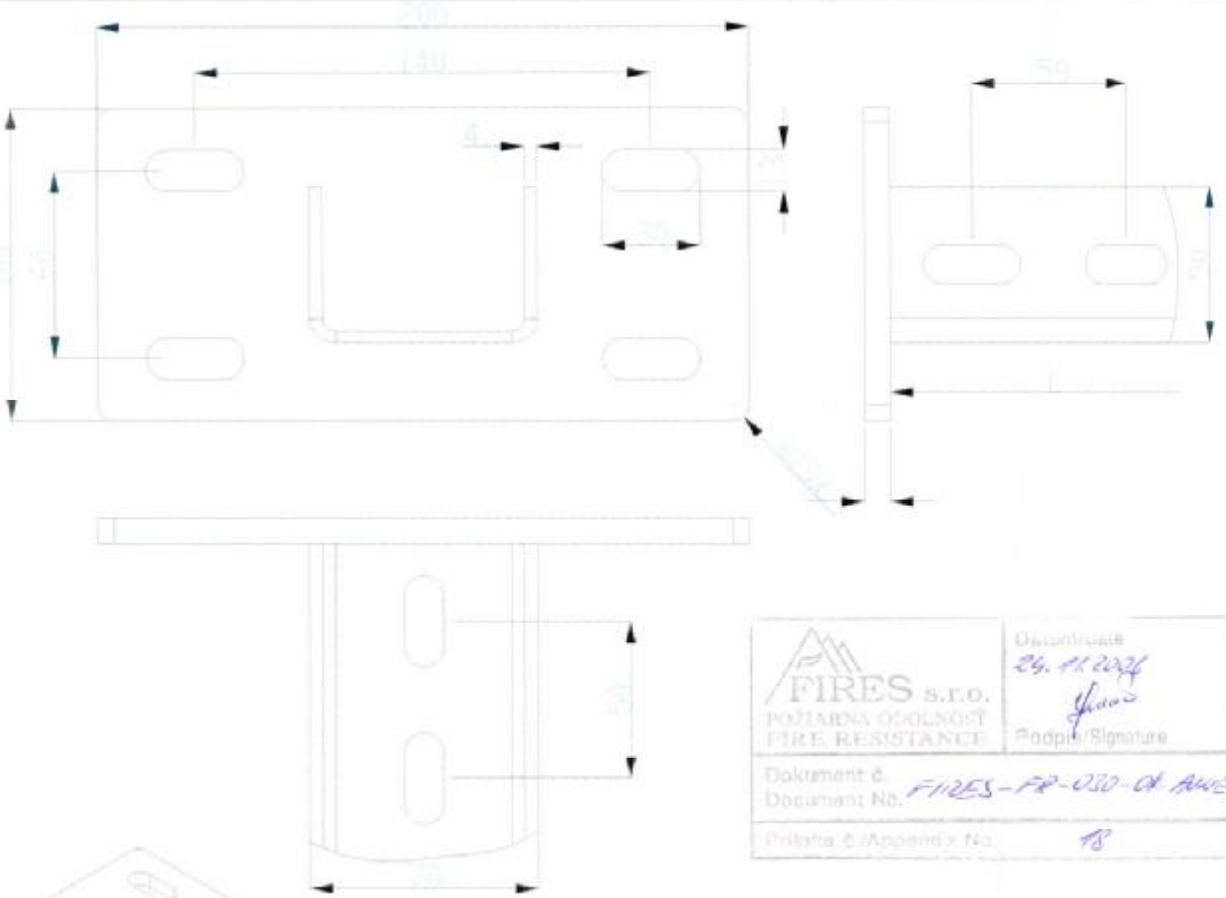
Odchyłki wymiarów nietolerowanych

Arkusz 1

Skala 1:10

Format A4

Profesjonalne Systemy Tras Kablowych



FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

Dátum/Date: 29.11.2024
Podpis/Signature

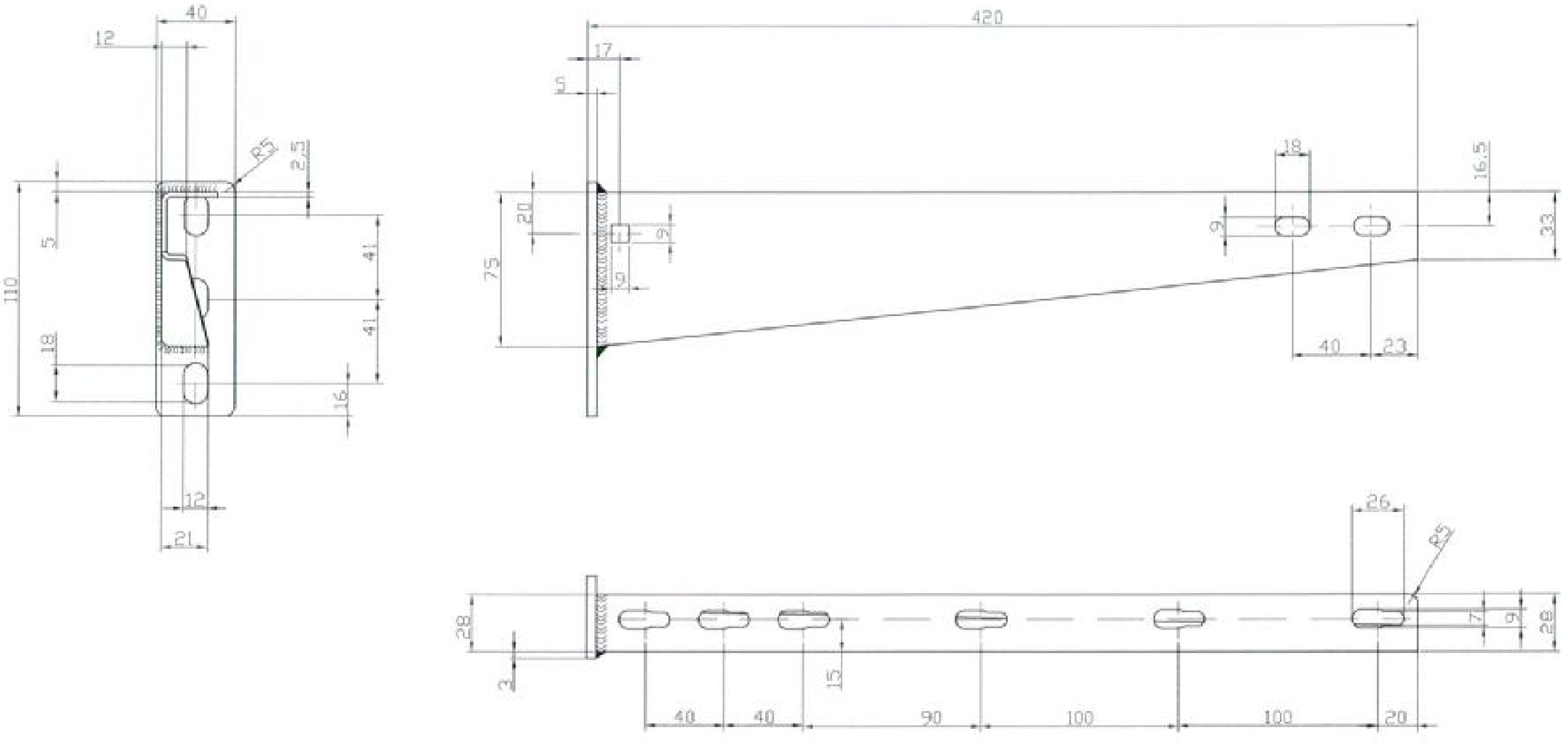
Dokument č./Document No.: FIRES-PR-030-04 ANNEX

Príloha č./Appendix No.: 18

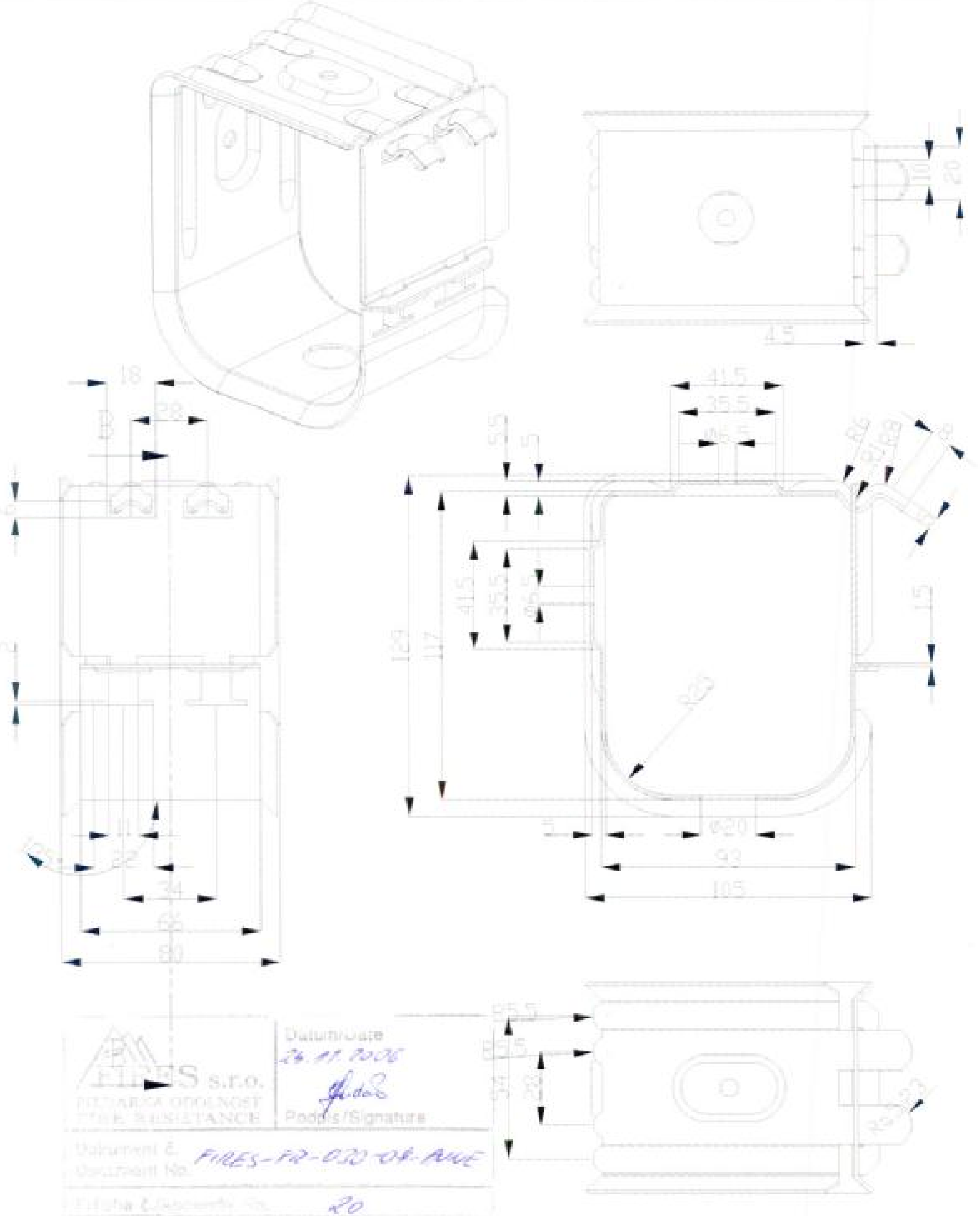
Nr	Nazwa	L
1	WPCE_200	200
2	WPCE_300	300
3	WPCE_400	400
4	WPCE_500	500
5	WPCE_600	600
6	WPCE_700	700
7	WPCE_800	800
8	WPCE_900	900
9	WPCE_1000	1000
10	WPCE_2000	2000

Profesjonalne Systemy Tras Kablowych

WPCE



40
12
110
5
18
R5
2,5
41
41
16
12
21
420
17
5
20
75
9
9
9
18
16,5
33
40
23
26
R5
28
3
15
7
9
28
40
40
90
100
100
20



FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

Dátum/Date: 26.11.2006

Podpis/Signature

Dokument č.
Document No. FIRES-FR-020-06-AUE

Príloha č./Appendix No. 20

Odchyłka wymiarów nietolerowanych		Materiał: Gatunek; Nr normy: PN-EN 10142 + A1 : 1997; Półwyrób/nr normy	Masa [kg]; Podziałka 1:2; Format A4; Arkusz; Arkuszy
Projektował: T.Gruchniewski	Nazwisko	Podpis	Data
Rysował: T.Gruchniewski			
Sprawdził: J.Kiczek			
Zatwierdził: J.Kiczek			

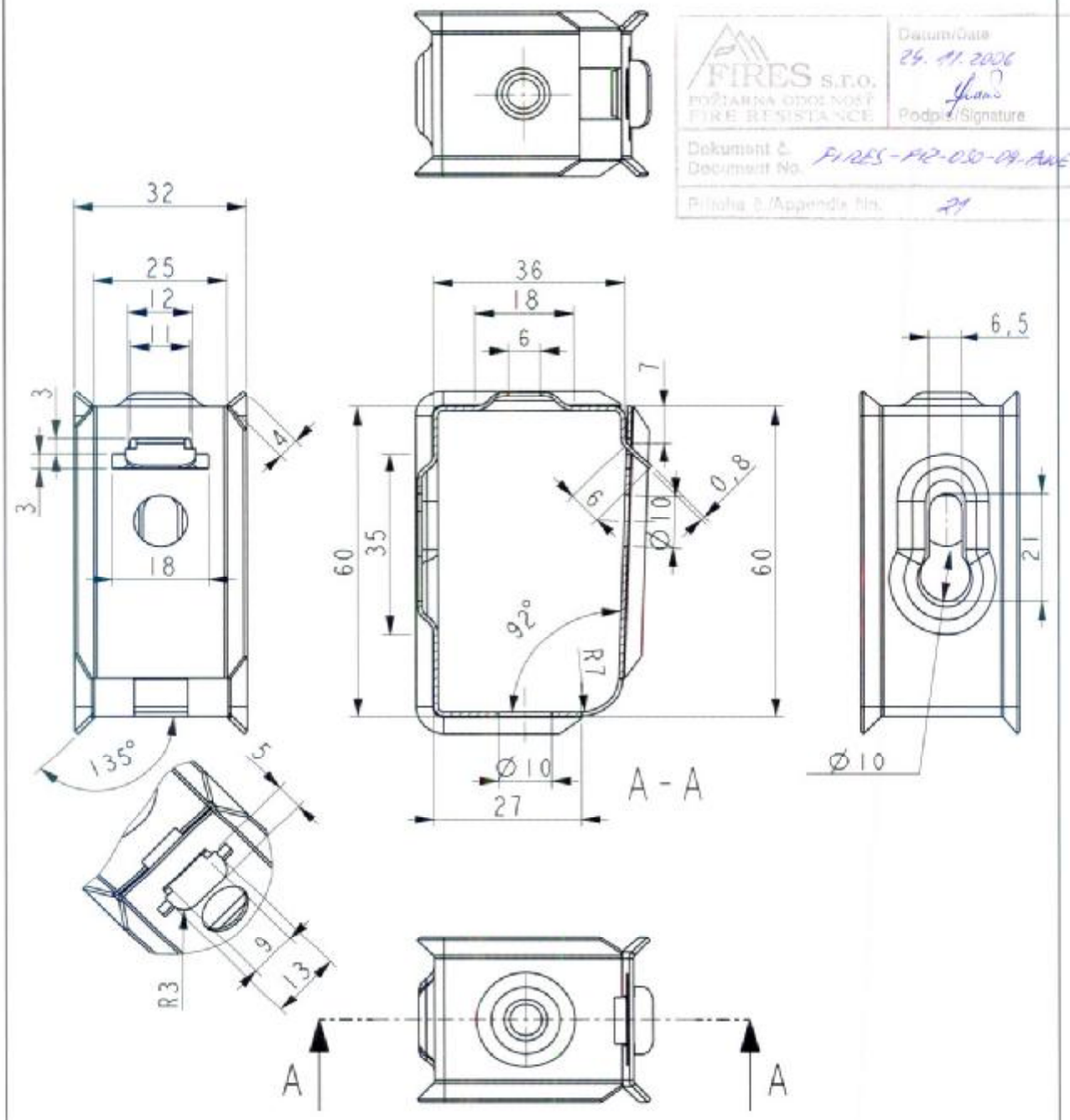
Nazwa rysunku: **Obejma zatrzaskowa OZOE**

Nr programu roboczego

Nr zmiany

Nr rysunku

Profesjonalne Systemy Tras Kablowych



FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

Datum/Date 24. 11. 2006

Podpis/Signature

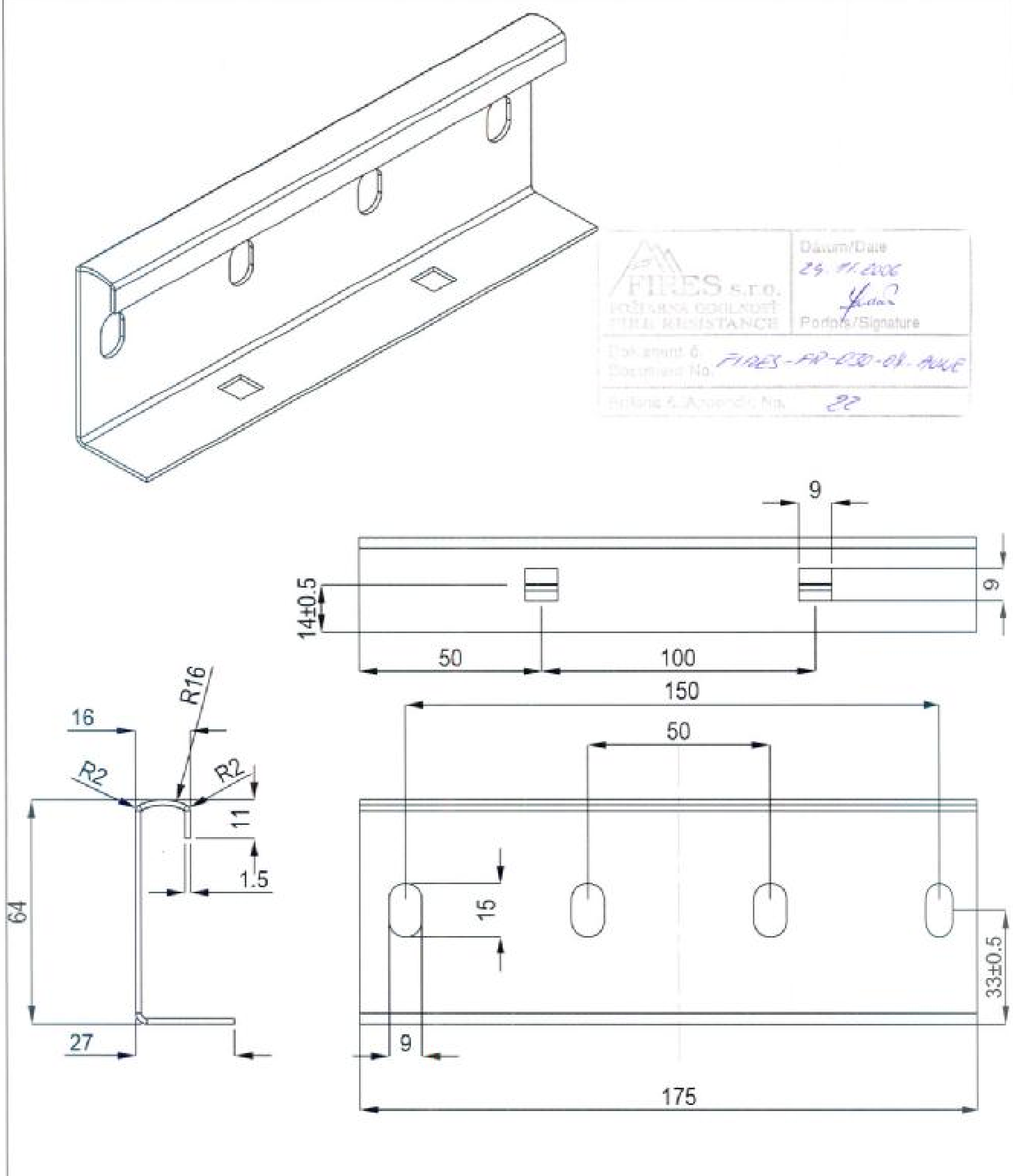
Dokument č./Document No. FIRES-PZ-030-09-ARE

Príloha č./Appendix No. 21

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

Projektował	Nazwisko		Data	Nazwa rysunku
Rysował	J. Grochowski	Podpis		OZMO
Sprawdził				Nr programu
Zatwierdził				Nr zmiany

ARE Lesjonalne Systemy Tras Kablowych



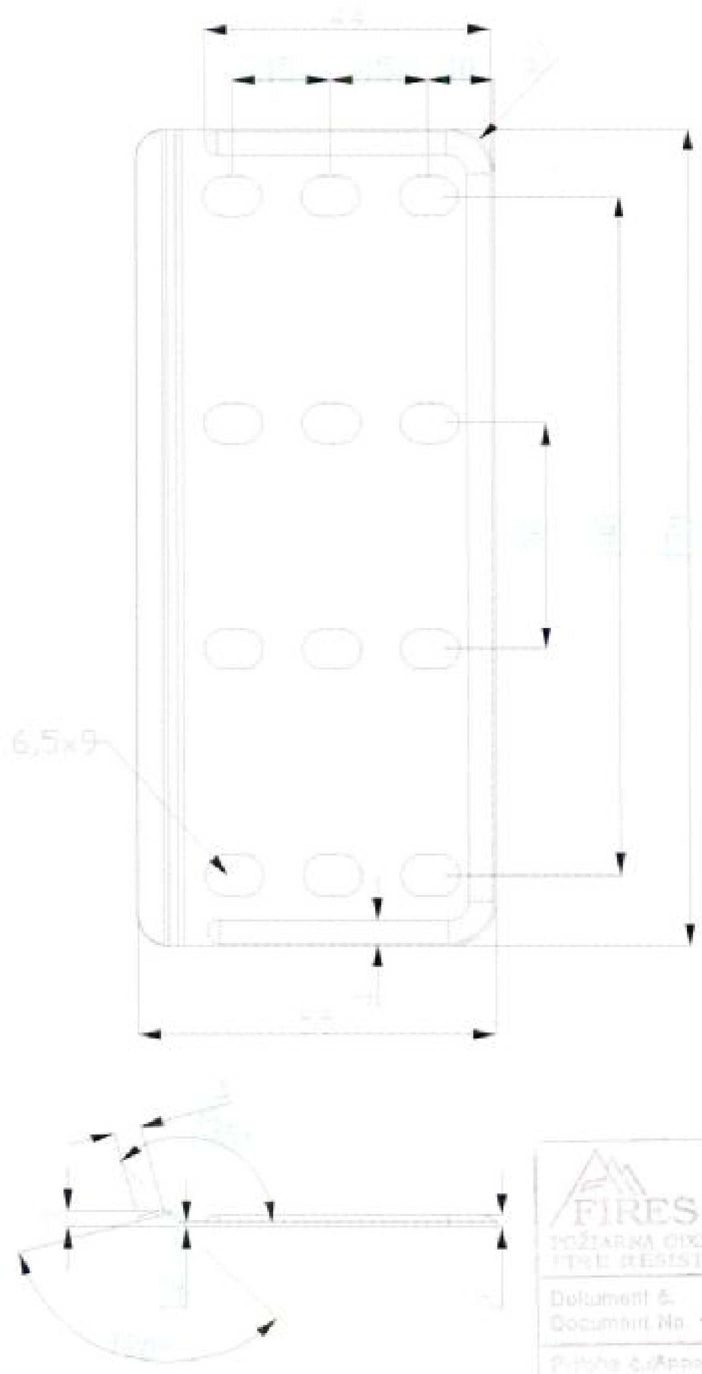
FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE
Dátum/Date 24.11.2006
Podpis/Signature
Dokument č. Document No. FIRES-FR-030-06-AUUE
Príloha č. Appendix No. 22

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

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	J.GROCHOWSKI		20.10.05	LDOCH60E LDOCH60
Rysował	J.Grochowski		20.10.05	
Sprawdził	T.WLODARCZYK		20.10.05	
Zatwierdził	J.KLICZEK		20.10.05	Nr programu maszynowego: 861400 860600

Nr zmiany

BAKS Profesjonalne Systemy Tras Kablowych

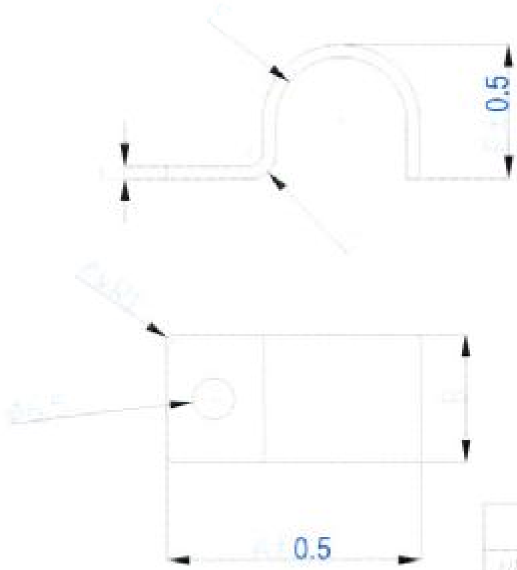


FIRES s.r.o. POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 24. 11. 2006 Podpis/Signature
Dokument č. Document No.	FIRES-FR-030-04-AUVE
Príloha č./Appendix No.	23

Odchyłka wymiarów nietolerowanych		Materiał	Gatunek	Masa [kg]	Podziałka 1:1	Format A4
			Nr normy	PN-EN 10142 + A1 : 1997		
Projektował	Nazwisko	Podpis	Data	Nazwa rysunku: LPOLH60	
Rysował					
Sprawdził					
Zatwierdził				Nr rysunku	

Profesjonalne Systemy Tras Kablowych

860100



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

FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

Dátum/Date 24. 07. 2006

Podpis/Signature

Dokument č. / Document No. FIRES-FR-030-07-AUKE

Príloha č./Appendix No. 24

Projektował	JĘDRZEJOWSKI	
Rysował	JĘDRZEJOWSKI	
Sprawdził	T.WŁODARCZYK	
Zatwierdził	ZALEJEK	

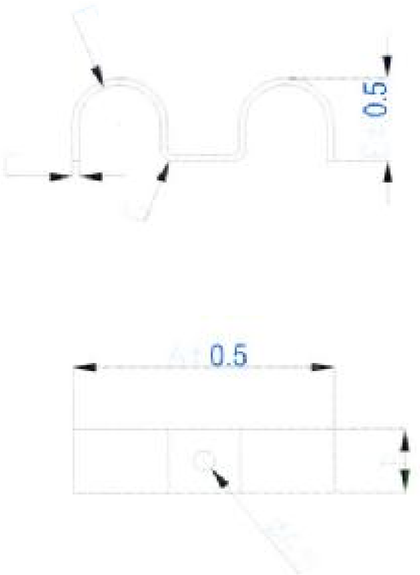
PN-EN 10142 + A1 : 2002

A4

UDF

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	25	R12.5	R4

FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

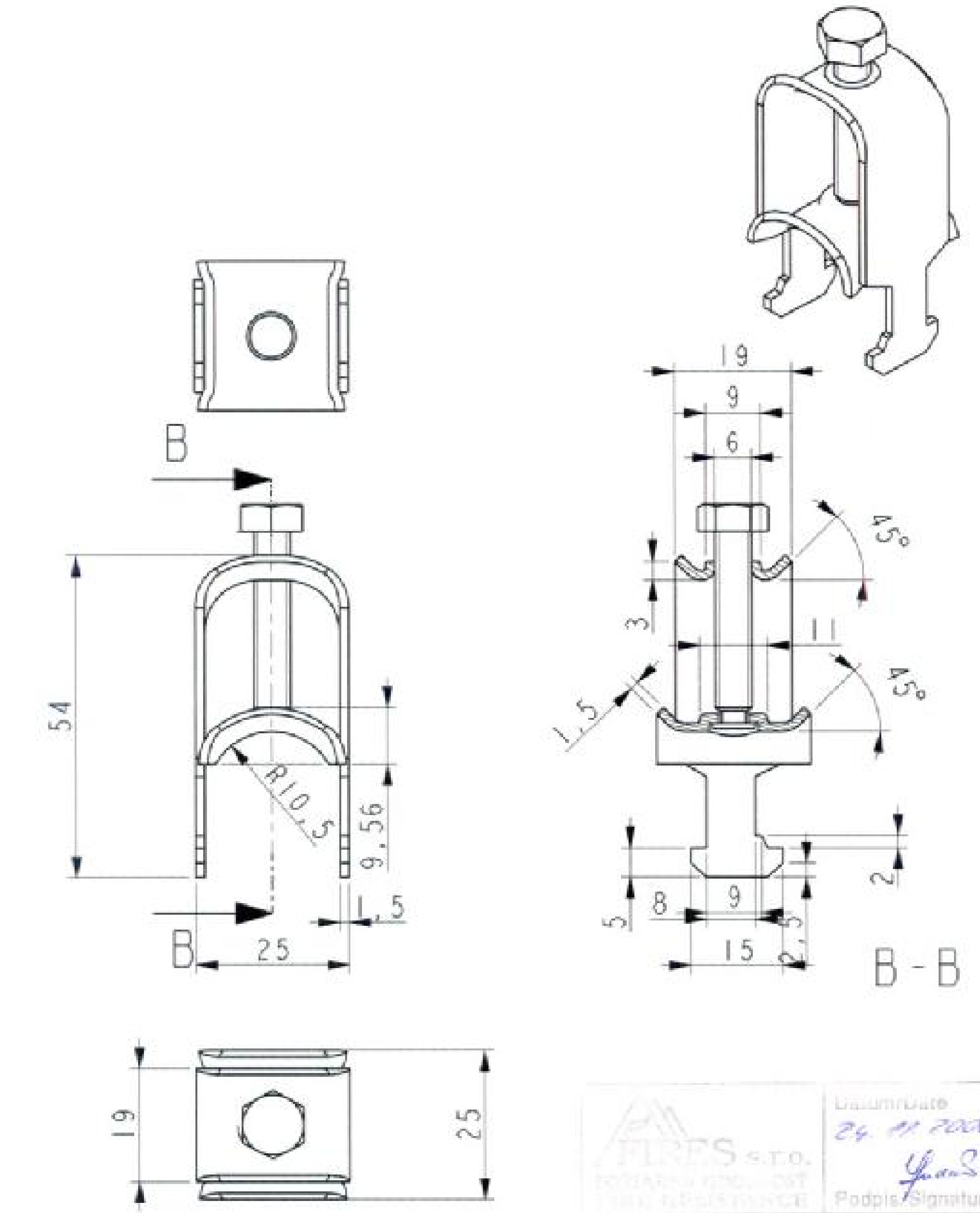
Dátum/Date: 24. 11. 2006
Podpis/Signature

Dokument č.
Document No. FIRES-FR-030-06-AUUC

Príloha č./Appendix No. 25

Dachylko wymiarów nieftolerowanych		Uwagi: Dotyczy PN-EN 22768-1	Skala: 1:1	Format A4
Projektował	JĘDRZEJOWSKI	26.11.04	Nazwa rysunku	UEF
Rysował	JĘDRZEJOWSKI	26.11.04		
Sprawdził	T. WŁODARCZYK	26.11.04		
Zatwierdził	UKLEJA	26.11.04	Nr rysunku	---

Profesjonalne Systemy
Tras Kablowych



FIRES s.r.o.

Datum/Date: 24. 11. 2006

Podpis/Signature

Document No.: FIRES-FR-030-08-AUUE

Appendix No.: 26

Odchyłka 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

BAKS®

Profesjonalne Systemy Tras Kablowych

Nr rysunku

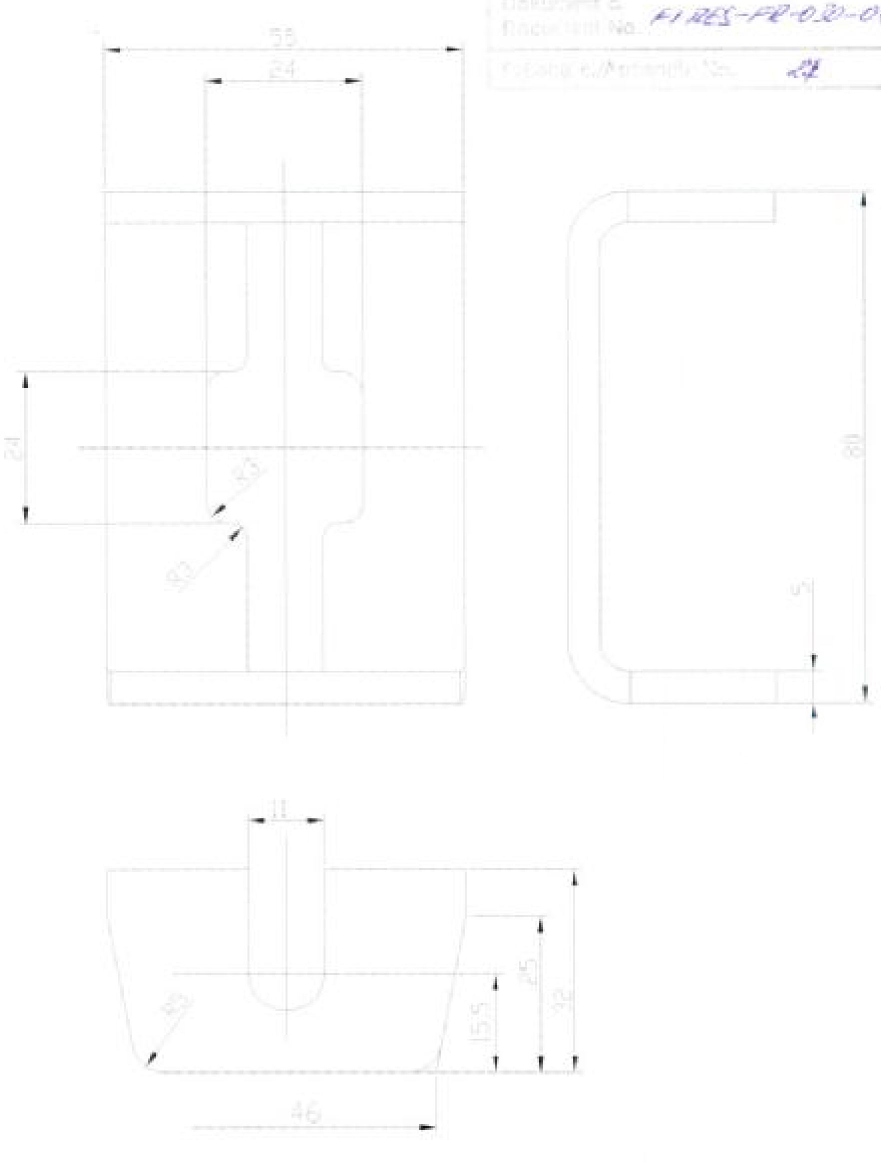
FIRES s.r.o.
POŽIARNA ODOLNOSŤ
FIRE RESISTANCE

Dátum/Date: 24.11.2006

Podpis/Signature

Dokument & Document No.: FIRES-FR-030-07-AUUE

Príloha č./Appendix No.: 24



Ocynk galwaniczny

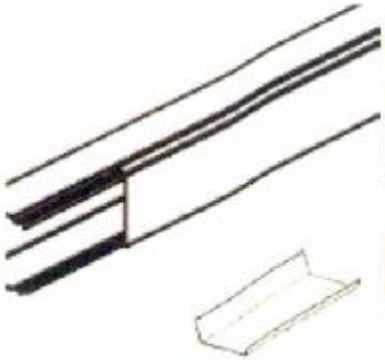
Odchyłki wymiarów nietolerowanych	Materiał	Gatunek	St3S	Masa [kg]	Podziałka	Format A4
		Nr normy	PN-EN 10142 + A1 : 1997		1:1	Arkusz 1
		Półfabrykat (nr normy)				Arkuszy 1

	Nazwisko	Podpis	Data	
Projektował	T.Gruszewski		2004.12.29	Nazwa rysunku: USOV
Rysował	J.Jasiński		2004.12.29	
Sprawdził	Jaliczek		2004.12.29	Nr programu maszynowego: ----
Zatwierdził	Jaliczek		2004.12.29	Nr zmiany

BAKS® Profesjonalne Systemy Tras Kablowych

Nr rysunku: 803700

NIEDAX Nr artykułu	Wymiary mm H x B	kod EAN 40 13339			kg Sztuka	VPE



S **Kanał ochronny LS z pokrywą,** z otworami w dnie, dł. dostawcza 2

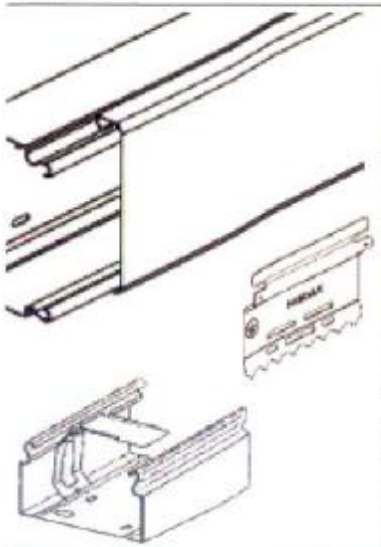
LLK 26.030	26 x 30	506903			0,48	36

Ms **Łącznik,** proszę zamówić oddzielnie 1 szt. na każde miejsce połączenia.
Łącznik zapewnia jednoczesne połączenie mechaniczne i elektryczne kanałów.

LST 26.030	26 x 30	516407			0,012	20 s

Ms **Łącznik,** jak wyżej lecz z wtyczkami płaskimi 6,3 mm,
do wyrównywania potencjału wszystkich elementów przewodzących osprzętu.

LSTA 26.030	26 x 30	516902			0,013	10 s



S **Kanał ochronny LS z pokrywą,** z otworami w dnie, dł. dostawcza 2

LLK 60.100	60 x 100	509201			4,36	8

S **Łącznik,** proszę zamówić oddzielnie 2 szt. na każde miejsce połączenia.
Łącznik zapewnia jednoczesne połączenie mechaniczne i elektryczne kanałów.

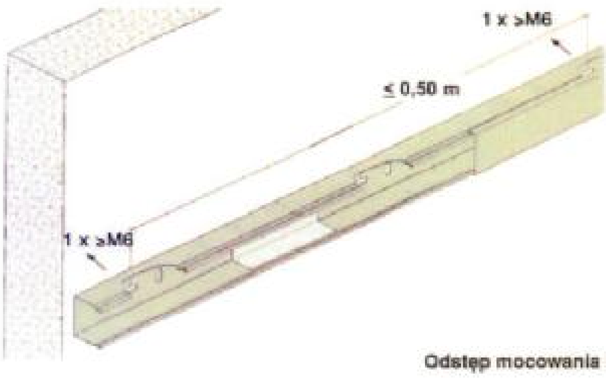
LST 60	60	516605			0,017	20 s

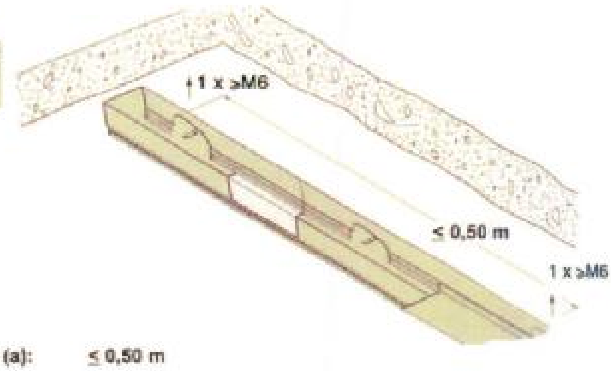
Klamra kablowa do kanałów ochronnych LS

LHS 60.100	60 x 100	517206			0,02	20 s

NIEDAX

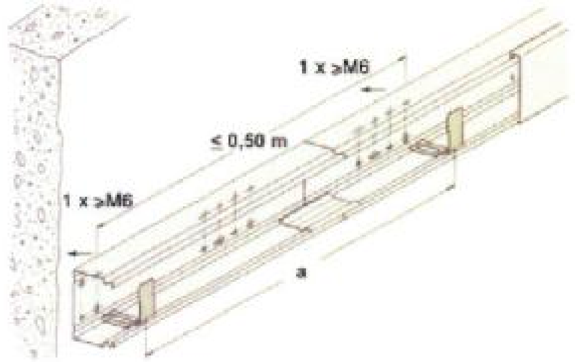
Kanał LLK 26.030



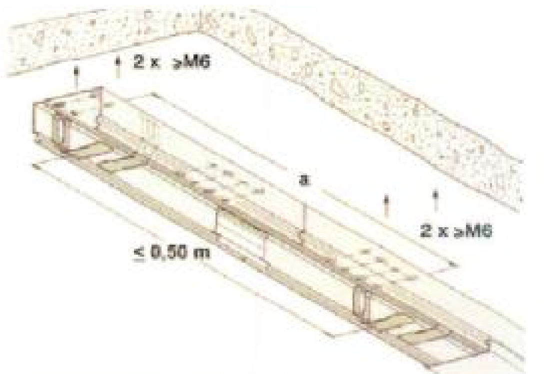


Odstęp mocowania (a): ≤ 0,50 m

Kanał LLK 60.100

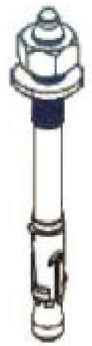


Odstęp mocowania (a): ≤ 0,50 m
Klamra kablowa: 1 sztuka na ≤ 0,50 m,



Odstęp mocowania (a): ≤ 0,50 m
Klamra kablowa: 2 sztuki na ≤ 0,50 m, podwójne mocowanie klamrami

FIRES s.r.o. POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 24.11.2006 Podpis/Signature
Dokument č. Document No.	FIRES-FR-030-06-AUE
Príloha č. Appendix no.	29



G Kotwa stalowa, **dopuszczenie nr: Z-21.1-606** **z nakrętką i podkładką**

DAM 6x5	M 6	5	204200	6	50	0,0126	50 szt.

G Kotwa stalowa, **dopuszczenie nr: ETA-00/0001** **z nakrętką i podkładką**

DAZ 8x10	M 8	10	0	8	75	0,0520	50 szt.
DAZ 10x10	M 10	10	204210	10	80	0,0620	50 szt.
DAZ 10x30	M 10	30	204220	10	100	0,0700	25 szt.
DAZ 12x10	M 12	10	204230	12	90	0,0975	20 szt.
DAZ 16x25	M 16	25	204240	16	120	0,2400	10 szt.

Kotwy stalowe NIEDAX*	NA 6 x 5	DAM 6 x 5	DAZ 8x10	DAZ 10x10 DAZ 10 x 30	DAZ 12x10	DAZ 16x25
Efektywna głębokość zakotwienia h_{ef}	30 mm		45 mm	60 mm	70 mm	85 mm
Moment dokręcający przy zakotwieniu M_D	----	4 Nm	20 Nm	45 Nm	60 Nm	110 Nm
Dopuszczenie nr	Z-21.1-606		ETA-00/0001			

Max. dopuszczalne obciążenie kotwy w zarysowanym i nie zarysowanym betonie ≥ B 25

Odporność ogniowa	NA 6 x 5	DAM 6 x 5	DAZ 8x10	DAZ 10x10 DAZ 10 x 30	DAZ 12x10	DAZ 16x25
30 min.			≤ 0,50 kN	≤1,30 kN	≤1,80 kN	≤4,00 kN
60 min.	≤ 0,35 kN	≤ 0,35 kN	≤ 0,50 kN	≤1,30 kN	≤1,80 kN	≤4,00 kN
90 min.	≤ 0,35 kN	≤ 0,25 kN	≤ 0,50 kN	≤1,30 kN	≤1,80 kN	≤4,00 kN
Wartości pod poniższymi warunkami:						
rozstaw **a** pomiędzy 2 kotwami (charakterystyczny rozstaw osi)	18 cm	18 cm	18 cm	24 cm **	28 cm	34 cm
Odstęp **r** od krawędzi płyty podłoża kotwiącego (charakterystyczny odstęp od krawędzi)	10 cm	10 cm	9 cm	12 cm	14 cm	17 cm
Minimalna grubość płyty podłoża kotwiącego (minimalna grubość podłoża)	10 cm	10 cm	10 cm	12 cm	14 cm	17 cm

** Obowiązuje tylko do odstępu dla sąsiednich grup kotew