TEST REPORT FIRES-FR-064-06-AUNE

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

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FIRES
The Experts on Fire Safety

Testing laboratory No. 1321 accredited by
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Testing laboratory No. 041/S-159 accredited by
Slovak national accreditation service

TEST REPORT

Test report number:	**FIRES-FR-064-06-AUNE**
Tested property:	Function in fire
Test method:	DIN 4102 – 12:1998-11, ZP – 27/2006
Date of issue:	**30. 06. 2006**

Name of the product:	Cables with integrity function FE180/E90 Type – (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,** Jagodne 5, 05-480 – producer of construction
Sponsor:	**Zaklady Kablowe Bitner Celina Bitner,** Friedleina 3/3, 30-009 Kraków, Poland – producer of cables

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Task No.:	S-FR-06/021-06/008
Specimen received:	18. 05. 2006
Date of the fire test:	15. 06. 2006

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

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Number of pages:	6	Number of appendices:	30
Test reports:	3	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 specimens was power non-halogen cables with circuit integrity maintenance. Persons witnessing the test:

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

Test directed by: Miroslav Smolka
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 04 501, F 04 502, F 04 503, F 04 504 F 04 505, F 04 506, F 04 507, F 04 508	Plate thermometers	temperature inside the test furnace, according to EN 1363-1 a DIN 4102-2
F 04 701	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 54 039	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 was comprised from supporting system with accessories – power and communication non-halogen cables, cable trays, cable ladders, ceiling ledges with clamps UEF, UDF, UKO and sleeves – OZOE, OZMO

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

Supporting system: 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, OZOE 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.

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.

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, 240 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
41,9	5,0	24,2	0,9

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]**
15. 06. 2006	39,8	21,3

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
Specimens 1,2: cable (N)HXH - 4x50 RM E90	**90 minutes no failure**
Specimen 3: cable (N)HXH - 4x1,5 RE E90	**44 minutes**
Specimen 4: cable (N)HXCH - 4x1,5 RE/1,5 E90	**32 minutes**
Specimens 5,6: cable (N)HXH - 4x50 RM E90	**90 minutes no failure**
Specimen 7: cable (N)HXH - 4x1,5 RE E90	**29 minutes**
Specimen 8: cable (N)HXCH - 4x1,5 RE/1,5 E90	**29 minutes**
Specimens 9,10: cable (N)HXCH - 4x50 RM/25 E90	**35 minutes**
Specimens 11,12: cable (N)HXCH - 4x50 RM/25 E90	**90 minutes no failure**
Specimen 13: cable (N)HXH - 4x1,5 RE E90	**57 minutes**
Specimens 14,15: cable (N)HXCH - 4x10 RE/10 E90	**30 minutes**
Specimen 16: cable (N)HXH - 4x1,5 RE E90	**45 minutes**
Specimens 17,18: cable (N)HXCH - 4x10 RE/10 E90	**46 minutes**
Specimen 19: cable (N)HXH - 4x1,5 RE E90	**32 minutes**
Specimen 20: cable (N)HXCH - 4x1,5 RE/1,5 E90	**36 minutes**
Specimens 21,22: cable (N)HXH - 4x50 RM E90	**44 minutes**
Specimens 23,24: cable (N)HXCH - 4x50 RM E90	**90 minutes no failure**
Specimens 25,26: cable (N)HXH - 4x50 RM E90	**90 minutes no failure**
Specimens 27,28: cable (N)HXCH - 4x50 RM E90	**90 minutes no failure**
Specimens 29 30: cable (N)HXH - 4x1,5 RE E90	**50 minutes**
Specimen 31: cable (N)HXCH - 4x1,5 RE/1,5 E90	**33 minutes**
Specimen 32: cable (N)HXCH - 4x1,5 RE/1,5 E90	**38 minutes**
Specimens 33 A,B: cable JE-H(St)H 2x2x0,8 E90	**6 minutes**
Specimens 34 A,B: cable JE-H(St)H 2x2x0,8 E90	**5 minutes**
Specimens 35 A,B: cable JE-H(St)H 2x2x0,8 E90	**31 minutes**
Specimens 36 A,B: cable JE-H(St)H 2x2x0,8 E90	**41 minutes**
Specimens 37 A,B: cable JE-H(St)H 2x2x0,8 E90	**3 minutes**
Specimens 38 A,B: cable JE-H(St)H 2x2x0,8 E90	**4 minutes**
Specimens 39 A,B: cable JE-H(St)H 2x2x0,8 E90	**3 minutes**
Specimens 40 A,B: cable JE-H(St)H 2x2x0,8 E90	**3 minutes**
Specimens 41 A,B: cable JE-H(St)H 2x2x0,8 E90	**3 minutes**
Specimens 42 A,B: cable JE-H(St)H 2x2x0,8 E90	**4 minutes**

The fire test was discontinued in 95th 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 4102-2. 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. Miroslav Smolka, MBA
Translated by: Marek Rusnák

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

Ing. Miroslav Smolka, MBA
leader of the testing laboratory

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

Miroslav Hudák. Peter Rusnák
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
ZP – 27/2006	ZP for determination of functionality classes of cables and cable supporting construction – in case of fire

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 A,B to V42 A,B
Appendix 8	Layout of cables in the test furnace
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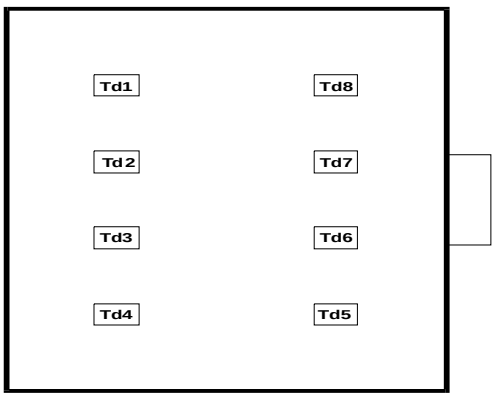
Appendix 11-30	Drawings

Measured values inside the test furnace

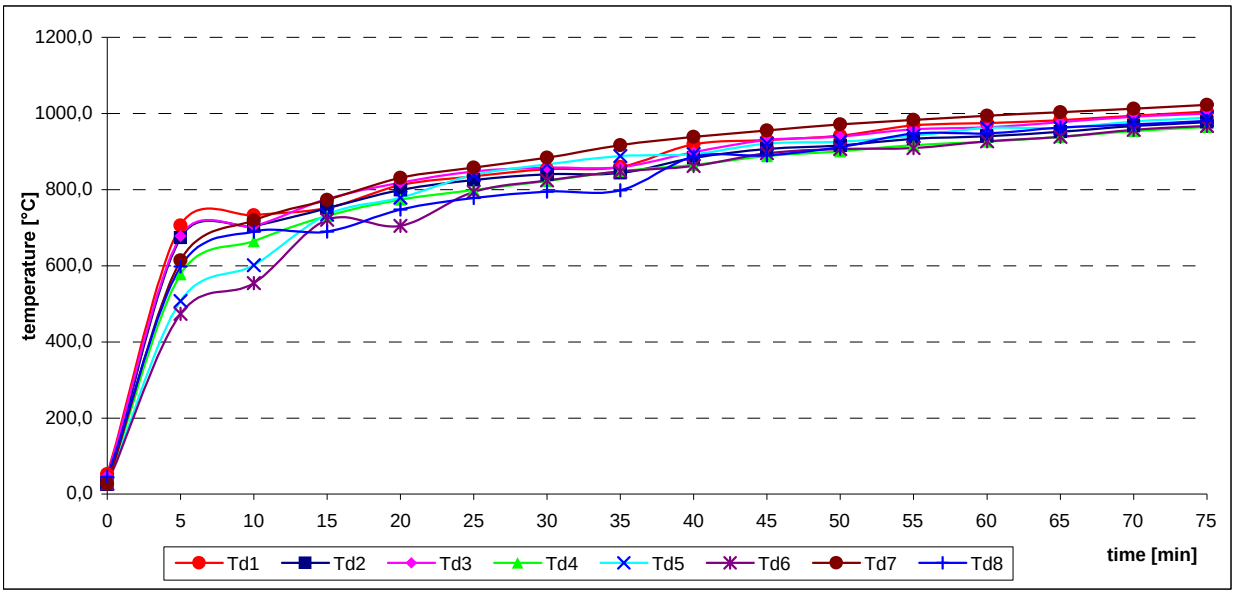
Time t [min]	Temperature [°C]											Deviation d_e [%]	Pressure [Pa]
	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To		p
0	52,2	26,2	47,8	28,9	27,5	26,9	26,7	45,1	36,3	38,8	22,4	0,0	6,0
5	705,6	673,8	677,8	578,0	507,6	474,3	613,9	598,5	622,2	576,9	22,7	-1,9	7,9
10	733,0	704,4	705,2	664,8	601,8	554,4	719,5	689,5	688,3	678,7	23,0	1,9	6,3
15	752,4	750,9	775,9	731,2	734,5	720,7	772,8	689,8	743,9	738,7	23,3	1,4	3,8
20	811,8	799,4	818,6	773,9	779,0	705,0	831,0	748,1	794,5	781,6	23,5	1,6	7,5
25	835,1	825,0	847,9	799,5	838,4	794,0	857,7	778,1	826,0	814,5	23,9	1,6	2,2
30	853,7	840,0	857,9	822,9	866,4	824,4	884,1	795,2	845,7	841,9	24,2	1,4	2,2
35	859,4	843,3	858,9	848,4	888,6	848,0	916,4	798,0	859,0	864,9	24,6	1,1	4,8
40	919,6	883,1	897,9	864,9	893,3	862,5	938,9	886,7	897,8	884,8	24,9	1,1	9,4
45	929,9	907,1	930,6	888,2	920,7	896,1	955,3	889,8	917,4	902,5	25,2	1,2	9,4
50	942,4	915,7	939,2	901,0	926,2	906,6	971,3	911,4	929,6	918,1	25,6	1,2	9,5
55	968,9	933,5	959,1	916,4	940,9	909,5	983,6	947,3	950,0	932,3	25,9	1,2	9,3
60	974,6	940,1	964,1	926,4	962,4	927,1	993,7	948,3	958,5	945,4	26,2	1,3	9,5
65	982,6	952,4	977,1	938,5	962,1	938,9	1003,0	963,1	968,4	957,3	26,5	1,3	9,7
70	994,1	966,9	991,4	953,4	979,2	957,0	1013,0	971,4	981,3	968,4	26,8	1,3	9,5
75	1005,0	976,9	999,6	964,8	988,9	966,9	1023,0	980,5	991,2	978,8	27,1	1,3	9,7
80	1017,0	986,6	1009,0	974,9	999,2	977,7	1033,0	993,0	1001,8	988,4	27,3	1,3	9,8
85	1026,0	998,4	1019,0	981,7	1006,0	983,9	1041,0	1002,0	1010,6	997,5	27,7	1,3	9,6
90	1030,0	1000,0	1021,0	983,3	1006,0	982,4	1047,0	1013,0	1014,3	1006,0	28,0	1,3	9,6

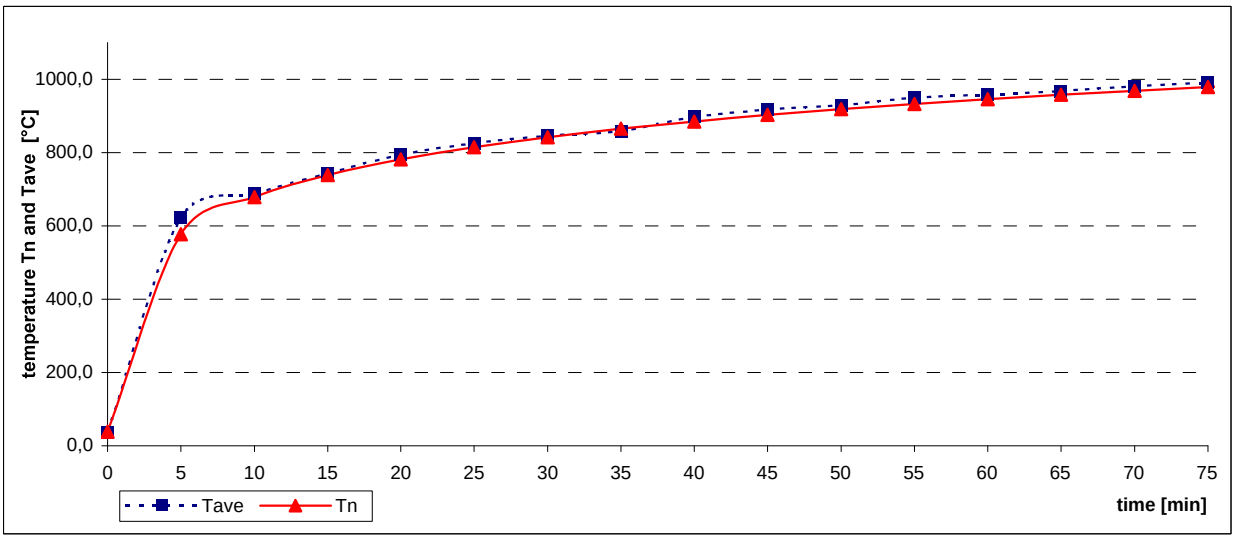
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

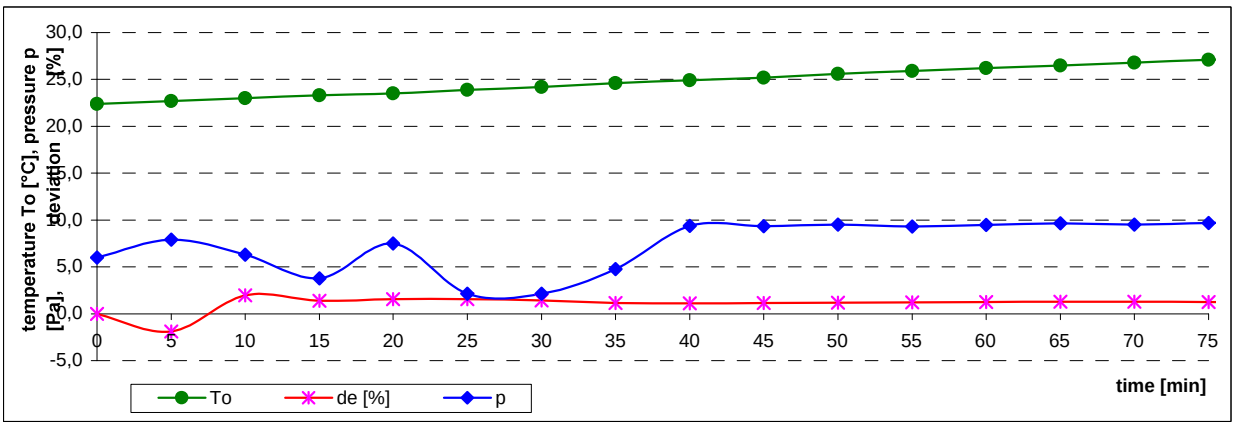
Layout of measuring points in the test furnace:



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	no failure
	6-L2	no failure
	7-L3	no failure
	8-PEN	no failure
V3	9-L1	44:16
	10-L2	44:16
	11-L3	44:16
	12-PEN	45:26
V4	13-L1	63:32
	14-L2	65:16
	15-L3	32:15
	16-PEN	31:53
V5	17-L1	no failure
	18-L2	no failure
	19-L3	no failure
	20-PEN	no failure
V6	21-L1	no failure
	22-L2	no failure
	23-L3	no failure
	24-PEN	no failure
V7	25-L1	55:52
	26-L2	28:59
	27-L3	54:09
	28-PEN	no failure
V8	29-L1	no failure
	30-L2	45:26
	31-L3	29:22
	32-PEN	29:22

Specimens 1,2: cable (N)HXH - 4x50 RM E90
Specimen 3: cable (N)HXH - 4x1,5 RE E90
Specimen 4: cable (N)HXCH - 4x1,5 RE/1,5 E90

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	34:37
	38-L2	no failure
	39-L3	no failure
	40-PEN	no failure
V11	41-L1	no failure
	42-L2	no failure
	43-L3	no failure
	44-PEN	no failure
V12	45-L1	no failure
	46-L2	no failure
	47-L3	no failure
	48-PEN	no failure
V13	49-L1	63:06
	50-L2	59:05
	51-L3	63:32
	52-PEN	56:47
V14	53-L1	no failure
	54-L2	30:22
	55-L3	64:47
	56-PEN	no failure
V15	57-L1	no failure
	58-L2	no failure
	59-L3	no failure
	60-PEN	no failure
V16	61-L1	64:15
	62-L2	58:07
	63-L3	no failure
	64-PEN	45:03

Specimens 9,10: cable (N)HXCH - 4x50 RM/25 E90
Specimens 11,12: cable (N)HXCH - 4x50 RM/25 E90
Specimen 13: cable (N)HXH - 4x1,5 RE E90
Specimens 14,15: cable (N)HXCH - 4x10 RE/10 E90
Specimen 16: cable (N)HXH - 4x1,5 RE E90

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

Measured time of tested specimens from V17 to V24

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
V17	65-L1	no failure
	66-L2	no failure
	67-L3	no failure
	68-PEN	no failure
V18	69-L1	no failure
	70-L2	no failure
	71-L3	no failure
	72-PEN	45:50
V19	73-L1	58:20
	74-L2	46:53
	75-L3	60:57
	76-PEN	32:19
V20	77-L1	no failure
	78-L2	83:03
	79-L3	36:11
	80-PEN	no failure
V21	81-L1	no failure
	82-L2	44:16
	83-L3	44:16
	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: cable (N)HXCH - 4x10 RE/10 E90
Specimen 19: cable (N)HXH - 4x1,5 RE E90
Specimen 20: cable (N)HXCH - 4x1,5 RE/1,5 E90

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	no failure
	98-L2	no failure
	99-L3	no failure
	100-PEN	no failure
V26	101-L1	no failure
	102-L2	no failure
	103-L3	no failure
	104-PEN	no failure
V27	105-L1	no failure
	106-L2	no failure
	107-L3	no failure
	108-PEN	no failure
V28	109-L1	no failure
	110-L2	no failure
	111-L3	no failure
	112-PEN	no failure
V29	113-L1	63:32
	114-L2	63:32
	115-	63:32
	116-PEN	no failure
V30	117-L1	77:26
	118-L2	50:04
	119-L3	no failure
	120-PEN	no failure
V31	121-L1	83:15
	122-L2	83:15
	123-L3	42:10
	124-PEN	32:35
V32	125-L1	no failure
	126-L2	no failure
	127-L3	39:52
	128-PEN	38:04

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

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

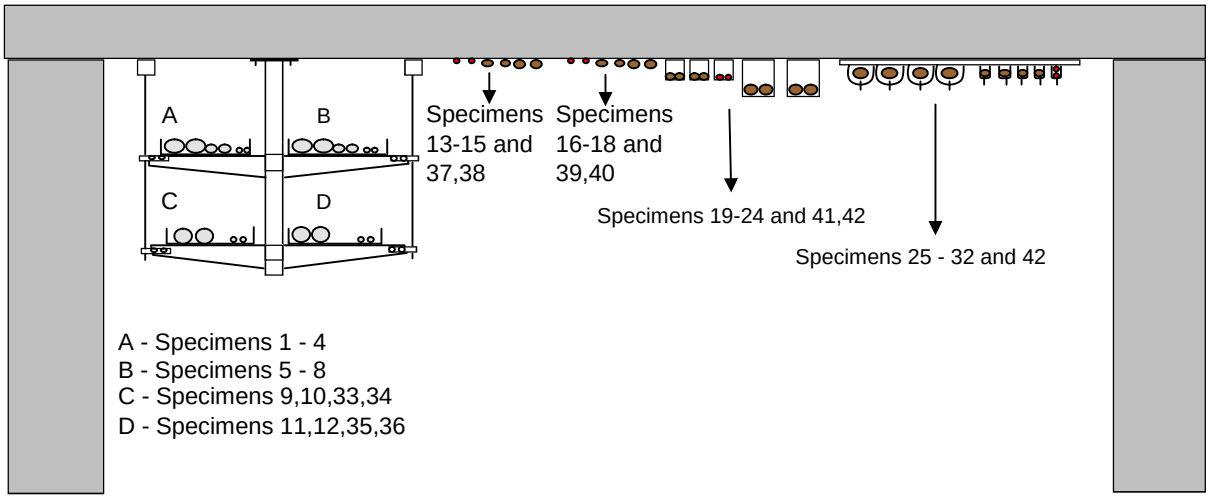
Measured time of tested specimens from V33 A,B to V42 A,B

Specimen	Bulbs	Time to permanent failure interruption [min:s]
V33A	129-L	06:18
	130-PEN	12:46
V33B	131-L	06:18
	132-PEN	12:46
V34A	133-L	05:15
	134-PEN	06:18
V34B	135-L	05:15
	136-PEN	06:18
V35A	137-L	39:29
	138-PEN	55:52
V35B	139-L	31:02
	140-PEN	42:50
V36A	141-L	43:58
	142-PEN	45:50
V36B	143-L	40:49
	144-PEN	45:54
V37A	145-L	03:08
	146-PEN	05:15
V37B	147-L	03:08
	148-PEN	05:15
V38A	149-L	04:00
	150-PEN	05:15
V38B	151-L	04:00
	152-PEN	05:15
V39A	153-L	02:54
	154-PEN	05:15
V39B	155-L	02:54
	156-PEN	05:15
V40A	157-L	03:05
	158-PEN	05:15
V40B	159-L	03:05
	160-PEN	05:15
V41A	161-L	02:37
	162-PEN	06:18
V41B	163-L	02:37
	164-PEN	06:18
V42A	165-L	03:33
	166-PEN	06:18
V42B	167-L	03:33
	168-PEN	06:18

Specimens 33 A,B - 42 A,B: cable JE-H(St)H 2x2x0,8 E30

Signal cables were tested by three-phase voltage supply 1 x 110V with bulbs 240V / 60 W.
Circuit breakers with rating 3 A were used.

Layout of cables in the test furnace



Specimens 1,2: cable (N)HXH - 4x50 RM E90	Specimens placed in the upper tray
Specimen 3: cable (N)HXH - 4x1,5 RE E90	Specimens placed in the upper tray
Specimen 4: cable (N)HXCH - 4x1,5 RE/1,5 E90	Specimens placed in the upper tray
Specimens 5,6: cable (N)HXH - 4x50 RM E90	Specimens placed on the upper ladder
Specimen 7: cable (N)HXH - 4x1,5 RE E90	Specimens placed on the upper ladder
Specimen 8: cable (N)HXCH - 4x1,5 RE/1,5 E90	Specimens placed on the upper ladder
Specimens 9,10: cable (N)HXCH - 4x50 RM/25 E90	Specimens placed in the lower tray
Specimens 11,12: cable (N)HXCH - 4x50 RM/25 E90	Specimens placed on the lower ladder
Specimen 13: cable (N)HXH - 4x1,5 RE E90	Specimens placed in ceiling clips UEF
Specimens 14,15: cable (N)HXCH - 4x10 RE/10 E90	Specimens placed in ceiling clips UEF
Specimen 16: cable (N)HXH - 4x1,5 RE E90	Specimens placed in ceiling clips UDF
Specimens 17,18: cable (N)HXCH - 4x10 RE/10 E90	Specimens placed in ceiling clips UDF
Specimen 19: cable (N)HXH - 4x1,5 RE E90	Specimens placed in ceiling clips OZMO
Specimen 20: cable (N)HXCH - 4x1,5 RE/1,5 E90	Specimens placed in ceiling clips OZMO
Specimens 21,22: cable (N)HXH - 4x50 RM E90	Specimens placed in ceiling clips OZOE
Specimens 23,24: cable (N)HXCH - 4x50 RM E90	Specimens placed in ceiling clips OZOE
Specimens 25,26: cable (N)HXH - 4x50 RM E90	Specimens placed in ceiling profile ledges with clips UKO
Specimens 27,28: cable (N)HXCH - 4x50 RM E90	Specimens placed in ceiling profile ledges with clips UKO
Specimen 29,30: cable (N)HXH - 4x1,5 RE E90	Specimens placed in ceiling profile ledges with clips UKO
Specimen 31: cable (N)HXCH - 4x1,5 RE/1,5 E90	Specimens placed in ceiling profile ledges with clips UKO
Specimen 32: cable (N)HXCH - 4x1,5 RE/1,5 E90	Specimens placed in ceiling profile ledges with clips UKO
Specimens 33 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed in the lower tray
Specimens 34 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed in the lower tray
Specimens 35 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed on the lower ladder
Specimens 36 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed on the lower ladder
Specimens 37 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed in ceiling clips UEF
Specimens 38 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed in ceiling clips UEF
Specimens 39 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed in ceiling clips UDF
Specimens 40 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed in ceiling clips UDF
Specimens 41 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed in ceiling clips OZMO
Specimens 42 A,B: cable JE-H(St)H 2x2x0,8 E90	Specimens placed in ceiling profile ledges with clips UKO

Photos taken before the test

Photos taken after the termination of the test

Badanie systemów tras kablowych wg normy DIN 4102-12

w FIRES Batizowce, Słowacja.

w dniu 12.06.2006

CERAMIC (E90)

Typ kabla / Parametry kabla i trasy kablowej	(N)HXH 4x1,5RE E90	(N)HXH 4x50RM E90	(N)HXCH 4x1,5RE/ 1,5 E90	(N)HXCH 4x10RE/ 10 E90	(N)HXCH 4x50RM/ 25 E90	JE-H(St)H 2x2x0,8 E90
Oznaczenie kabla na rysunku	1	2	3	4	5	6
Średnica kabla [mm]	16,3	36,9	18,1	23,3	39,5	12,8
Ciężar kabla [kg/m]	0,36	3,02	0,40	0,95	3,21	0,18
Stan magazynowy [m]	200, 373, 438, 325, 230	brak	brak	brak	brak	397
1. Korytko 60x300 mm, - podpory - 1200 mm, - obciążenie 10 kg/m.	2	2	2	---	---	----
2. Drabinka 60x400 mmm, - podpory - 1200 m, - obciążenie 20 kg/m.	2	2	2	---	----	----
3 Korytko 60x300 mm, - podpory - 1200 mm, - obciążenie 10 kg/m.	----	----	----	---	2	2
4. Drabinka 60x400 mmm, - podpory - 1200 m, - obciążenie 20 kg/m.	----	----	----	---	2	2
5. Uchwyt UEF - mocowanie co 300 mm - obciążenie ? kg/m,	2	---	---	2	---	2
6. Uchwyt UDF - mocowanie co 300 mm - obciążenie ? kg/m,	2	---	---	2	---	2
7. Obejmy OZMO - mocowanie co 300 mm - obciążenie 1,0kg/uchwyt	2	----	2	---	---	2
8. Obejmy OZO - mocowanie co 300 mm, - obciążenie 3 kg/uchwyt	---	2	---	---	2	---
9. Uchwyty UK na szynach - mocowanie co 300 mm, - obciążenie ?/uchwyt	2	2	2	---	2	2
10. RR - Rezerwa na inne kabla Np. HTKSH i HDGs						

Ilość odcinków [szt.]	12	8	4	4	8	12

Długość odcinka wynosi 7 m

Potrzebna ilość kabli [m]	84	56	28	28	56	84

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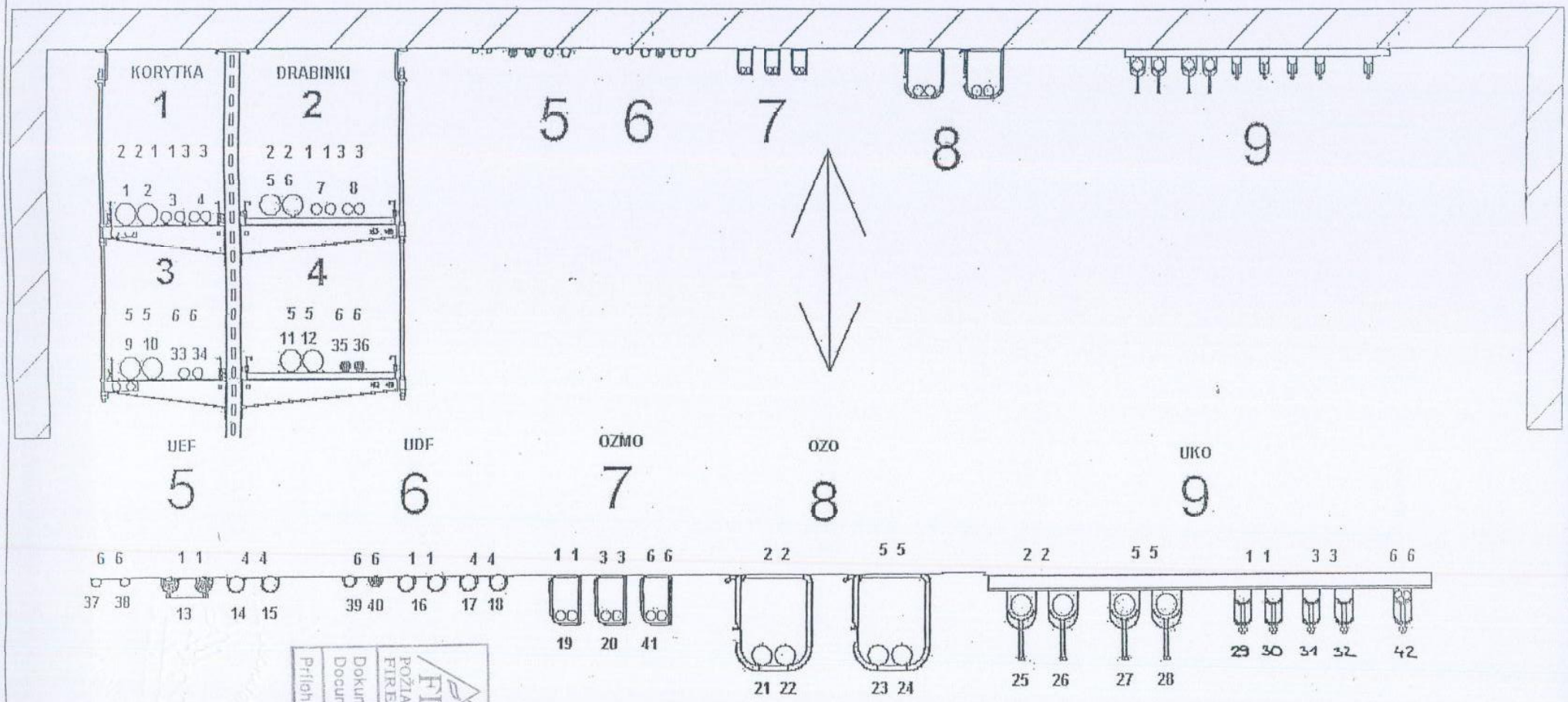
Príloha č./Appendix No. 11

wsad kabli na E90



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Document No. FIRES-EP-064-06-Rule

Príloha č./Appendix No. 12

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	Uchwyty symboliczne niekulerowane		Materiał: Gatunek:		Masa [kg]	Podziałka 1:100	Format A4	
			Nr normy	PN-EN 10142 + A1 + 1997			Arkusz 1	
			półfabrykat (nr normy)				Arkuszy 1	
Projektował	Nazwisko J.Grochowski	Podpis	Data		Nazwa rysunku			
Sprawdził					Nr programu		Nr zmiany	
Zatwierdził					Maszynowego			

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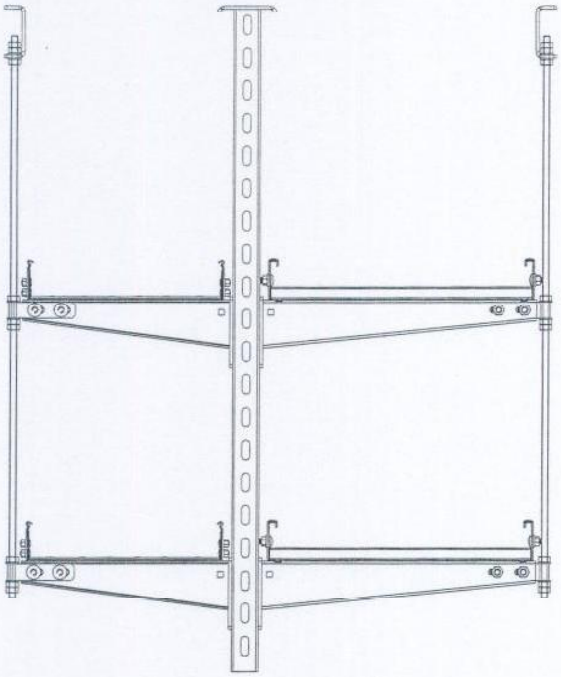
Tras Kablowych



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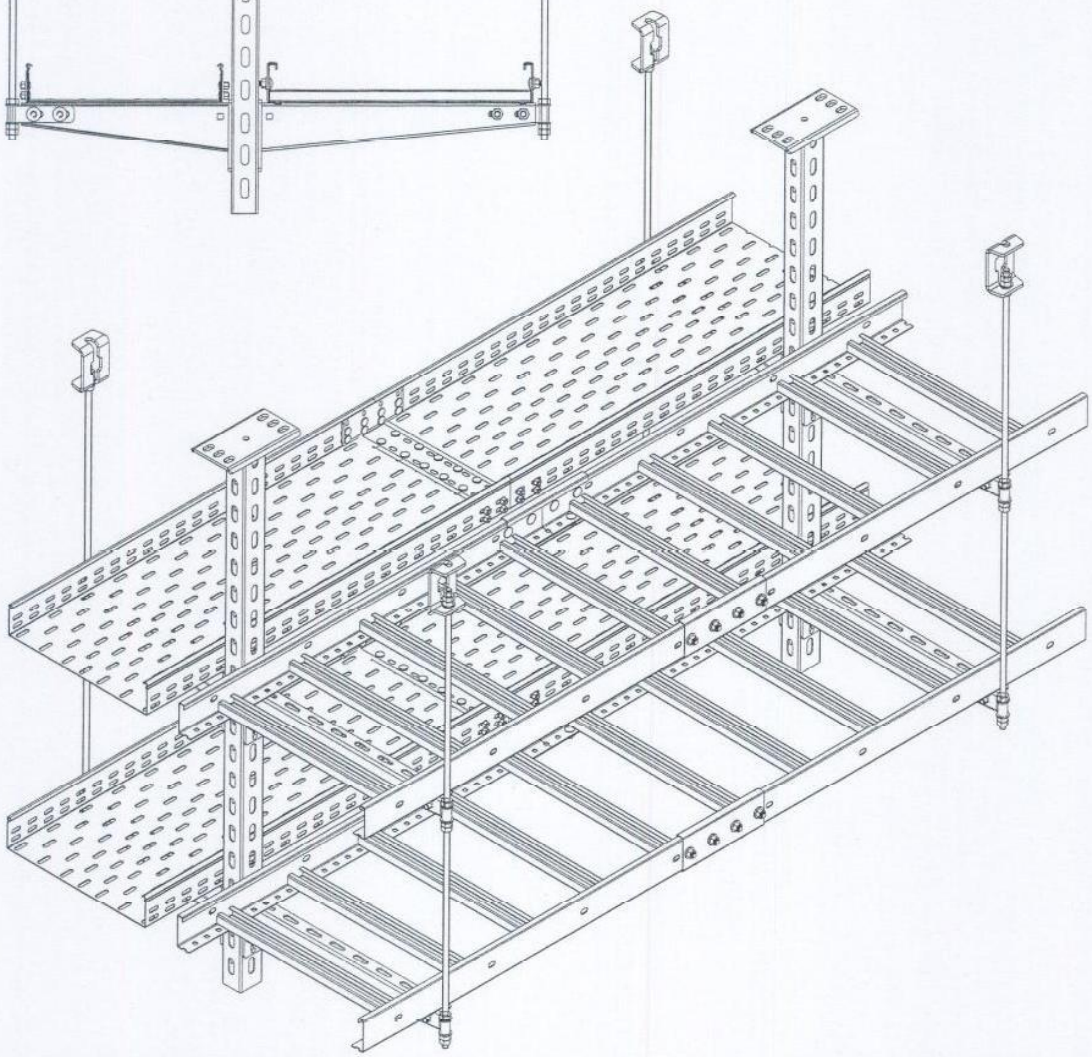
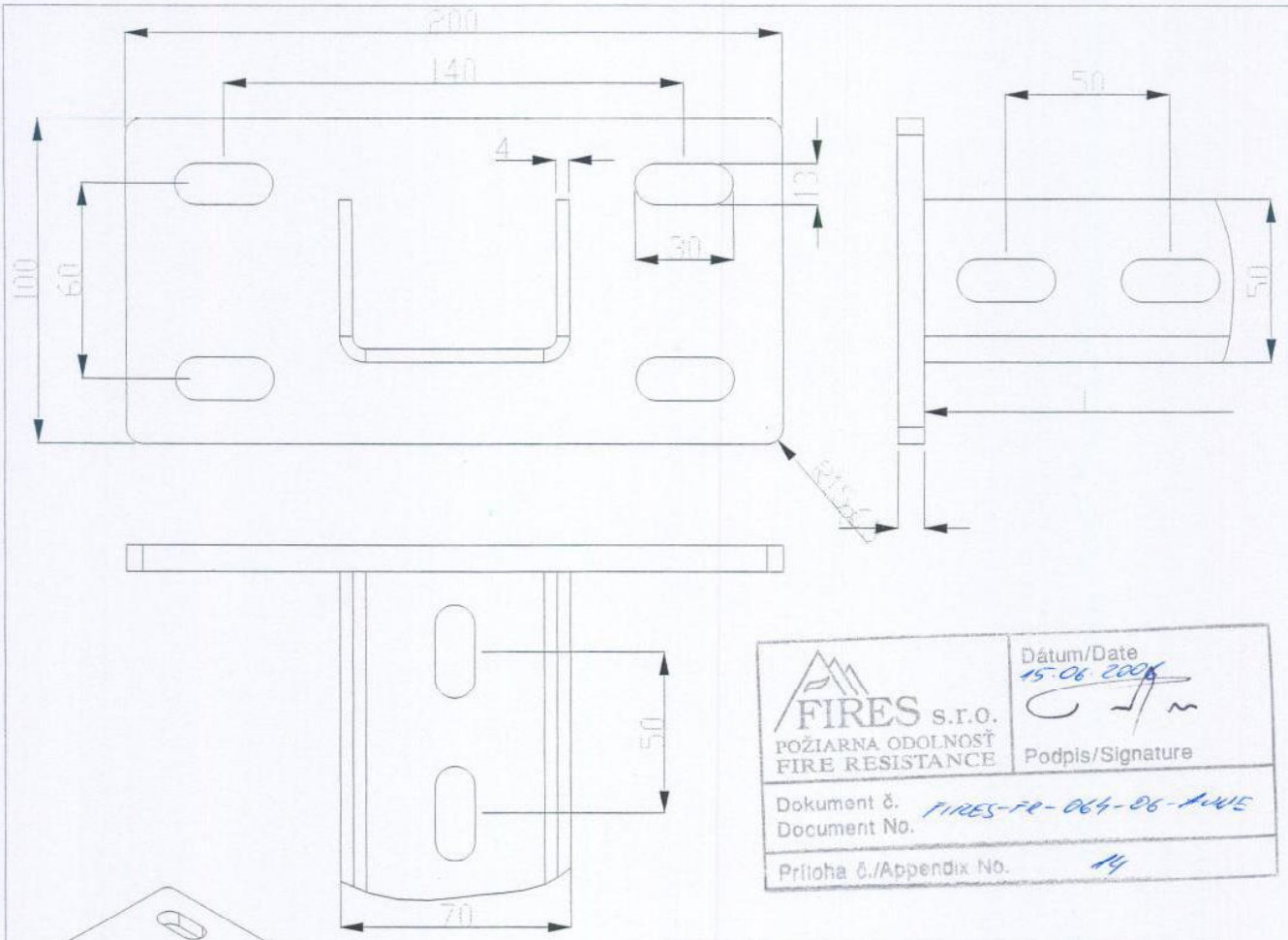
Príloha č./Appendix No. 13

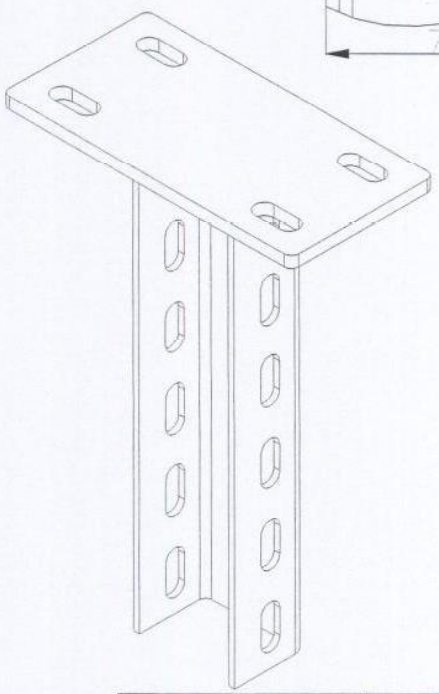


	Odchylka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
				Nr normy	PN-EN 10327:2005		1:10	Arkusz 1
				półfabrykat (nr normy)				Arkuszy 1

Projektował	Nazwisko	Podpis	Data	Nazwa rysunku	
Rysował	J.Grochowski		28-Jun-06		
Sprawdził				Nr programu	Nr zmiany
Zatwierdził				kaseysawego	

Profesjonalne Systemy
Tras Kablowych





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

Dachyliko wyniorów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
			Nr normy	PN-EN 10142 + A1 : 1997		1:2	Arkusz 1
			półfabrykat (nr normy)				Arkuszy 1

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

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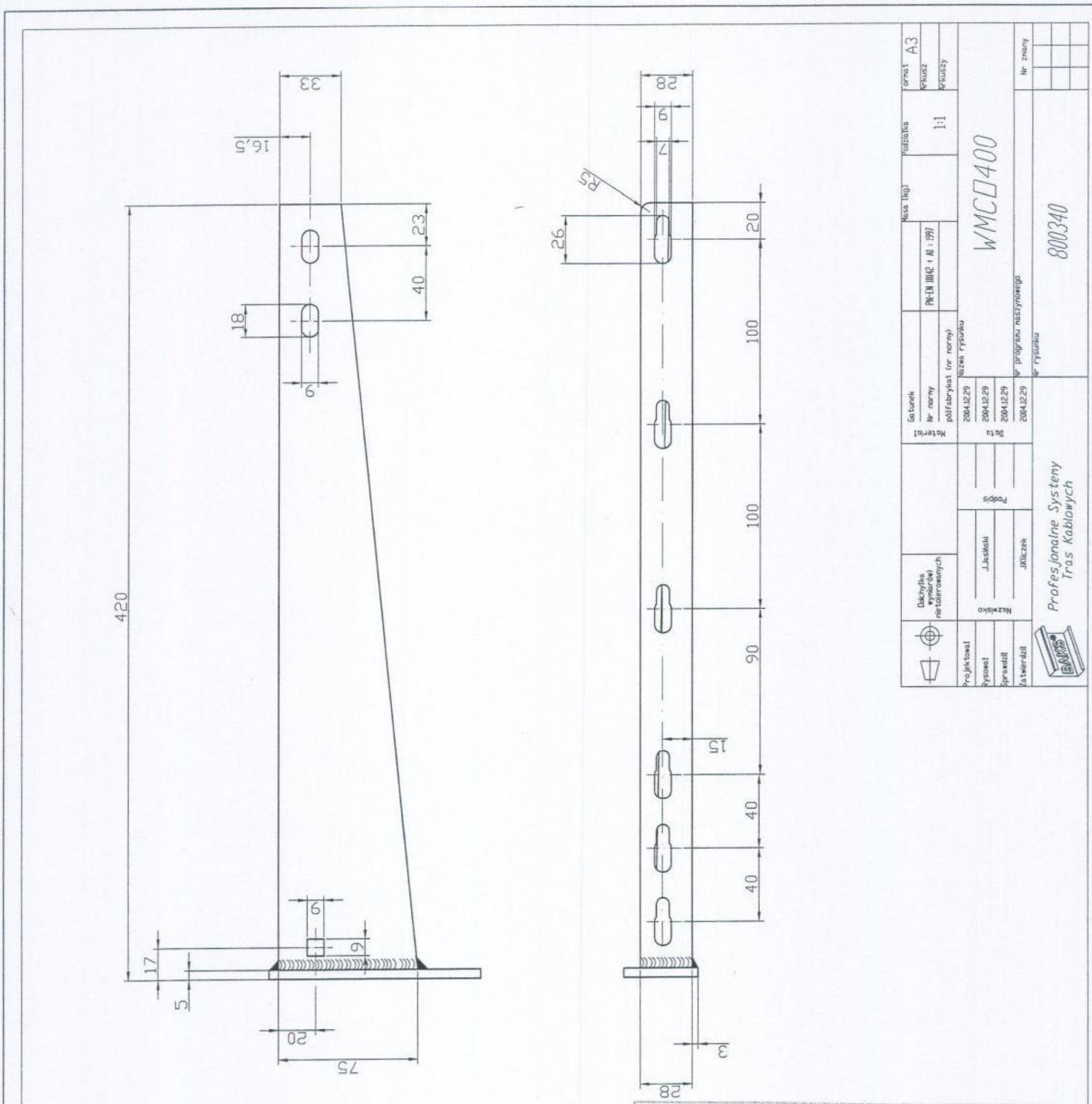

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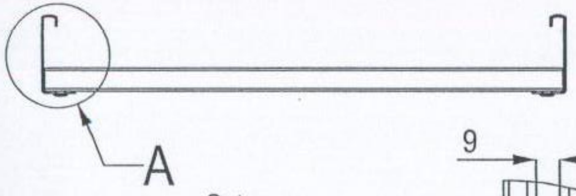
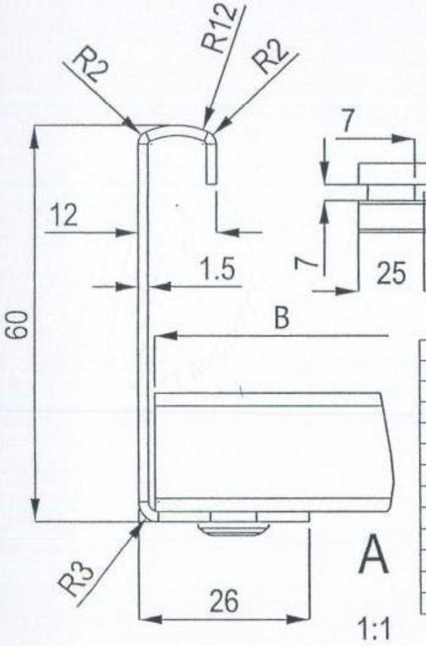
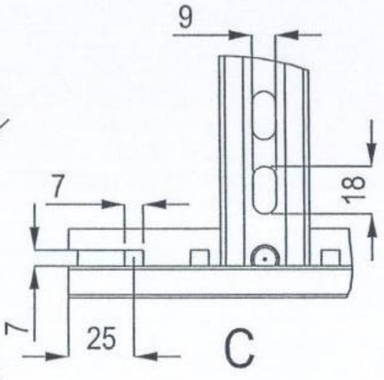
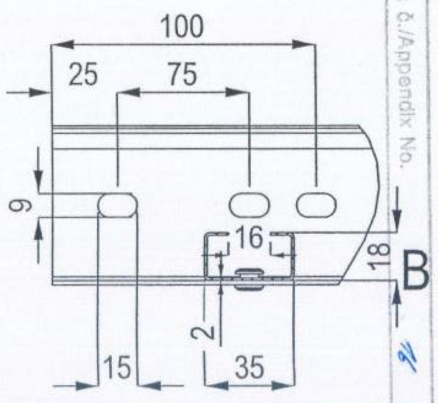
Príloha č./Appendix No. 15

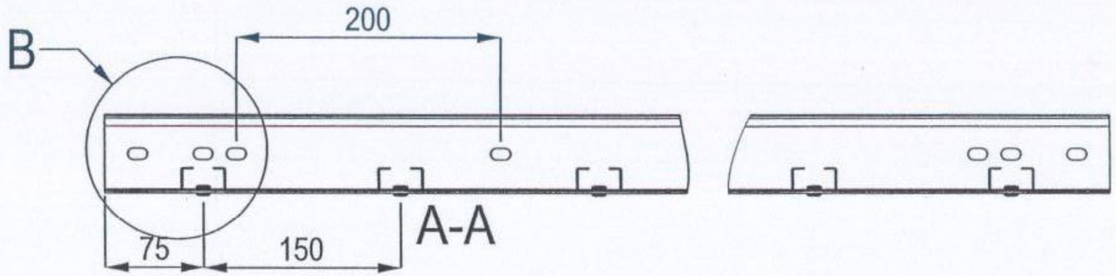


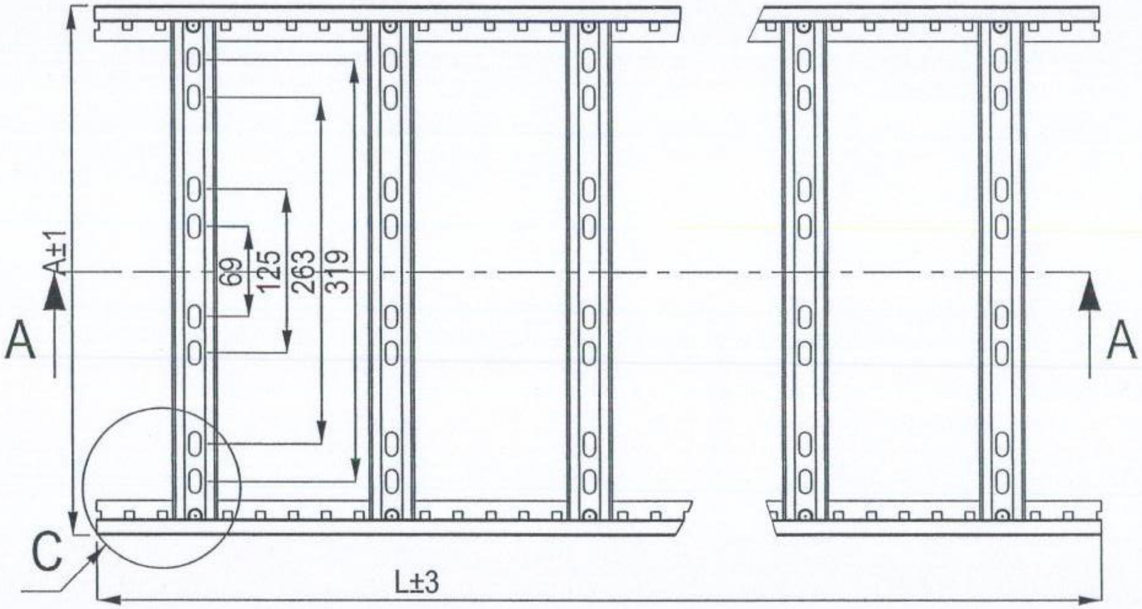




A	Typ	L	Nr. Kat	material	B
100	DGOP100H60/3E	3000	861310	OH18N9 1.4301	95
200	DGOP200H60/3E	3000	861320	OH18N9 1.4301	195
300	DGOP300H60/3E	3000	861330	OH18N9 1.4301	295
400	DGOP400H60/3E	3000	861340	OH18N9 1.4301	395
100	DGOP100H60/6	6000	860910	[illegible]	95
200	DGOP200H60/6	6000	860920	[illegible]	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







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Document No. FIRES-FR-069-06-AUXE

Príloha č./Appendix No. 16

Dátum/Date 15.06.2006

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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	Nazwisko	J.GROCHOWSKI	Podpis	Data	20.10.05	Nazwa rysunku		
Rysował		J.Grochowski			20.10.05	DGOP400H60/3		
Sprawdził		T.WLODARCZYK			20.10.05			
Zatwierdził		J.KLICZEK			20.10.05	Nr programu maszynowego		Nr zmiany

BAKS Profesjonalne Systemy Tras Kablowych

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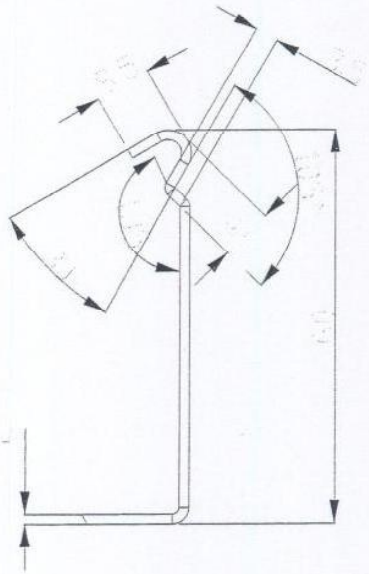
Podpis/Signature

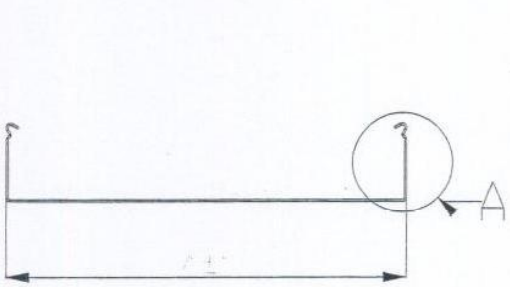
Dokument č. / Document No. FIRES-FR-064-06-AUKE

Príloha č./Appendix No. 12

A	Typ	Nr.kat	Materiał
50	KCDP50H60/3E	861010	DH1BN9 1.4301
100	KCDP100H60/3E	861010	DH1BN9 1.4301
200	KCDP200H60/3E	861020	DH1BN9 1.4301
300	KCDP300H60/3E	861030	DH1BN9 1.4301
50	KCDP50H60/3	860110	PN-EN 10142 + A1 : 1997
100	KCDP100H60/3	860110	PN-EN 10142 + A1 : 1997
200	KCDP200H60/3	860120	PN-EN 10142 + A1 : 1997
300	KCDP300H60/3	860130	PN-EN 10142 + A1 : 1997



A



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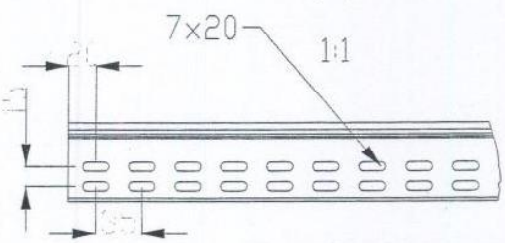

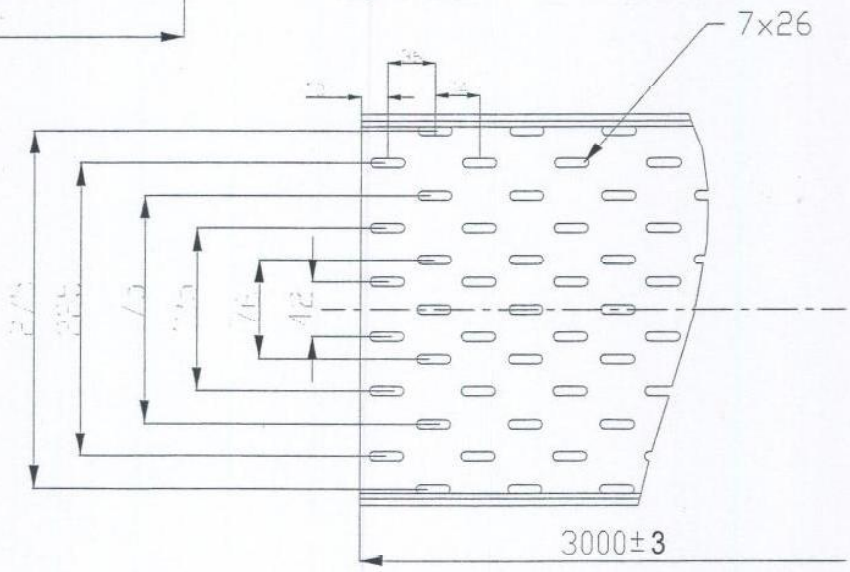

Dachyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
			Nr normy	PN-EN 10142 + A1 : 1997		1:5	Arkusz
			półfabrykat (nr normy)				Arkuszy

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	J.GROCHOWSKI		20.10.05	KCDP300H60/3
Rysował	J.Grochowski		20.10.05	
Sprawdził	T.WŁODARCZYK		20.10.05	
Zatwierdził	J.KLICZEK		20.10.05	Nr programu / Nr zmiany

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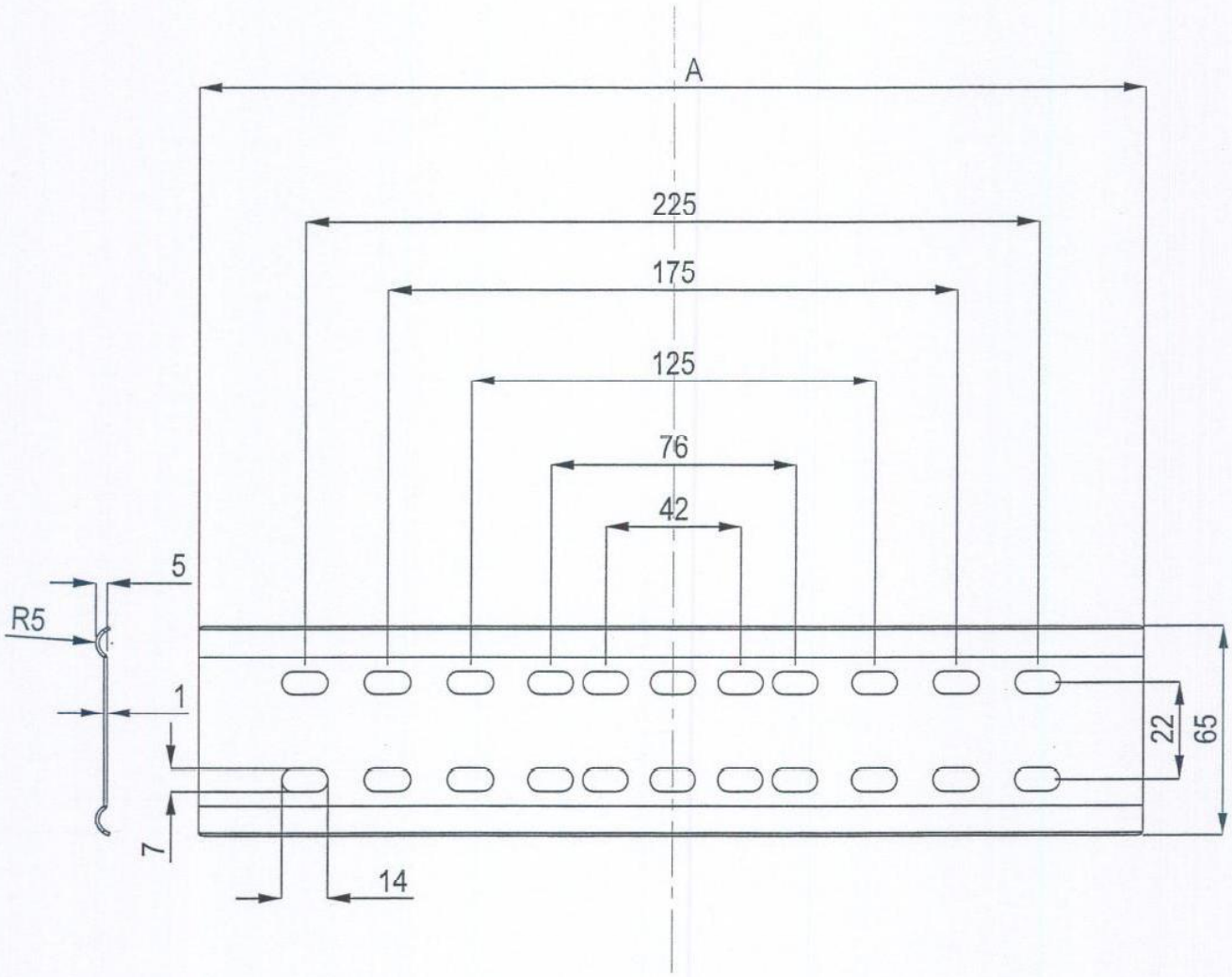
Nr rysunku: 860130



A	Typ	Nr.kat	Material
90	BLO100E	861110	OH18N9 1.4301
190	BLO200E	861120	OH18N9 1.4301
290	BLO300E	861130	OH18N9 1.4301
90	BLO100	860310	PN-EN 10142 + A1 : 1997
190	BLO200	860320	PN-EN 10142 + A1 : 1997
290	BLO300	860330	PN-EN 10142 + A1 : 1997

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Príloha č./Appendix No. 18

Odchyłki wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format	A4
			Nr normy	PN-EN 10142 + A1 : 1997			Arkusz	
			półfabrykat (nr normy)			1:2	Arkuszy	

	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

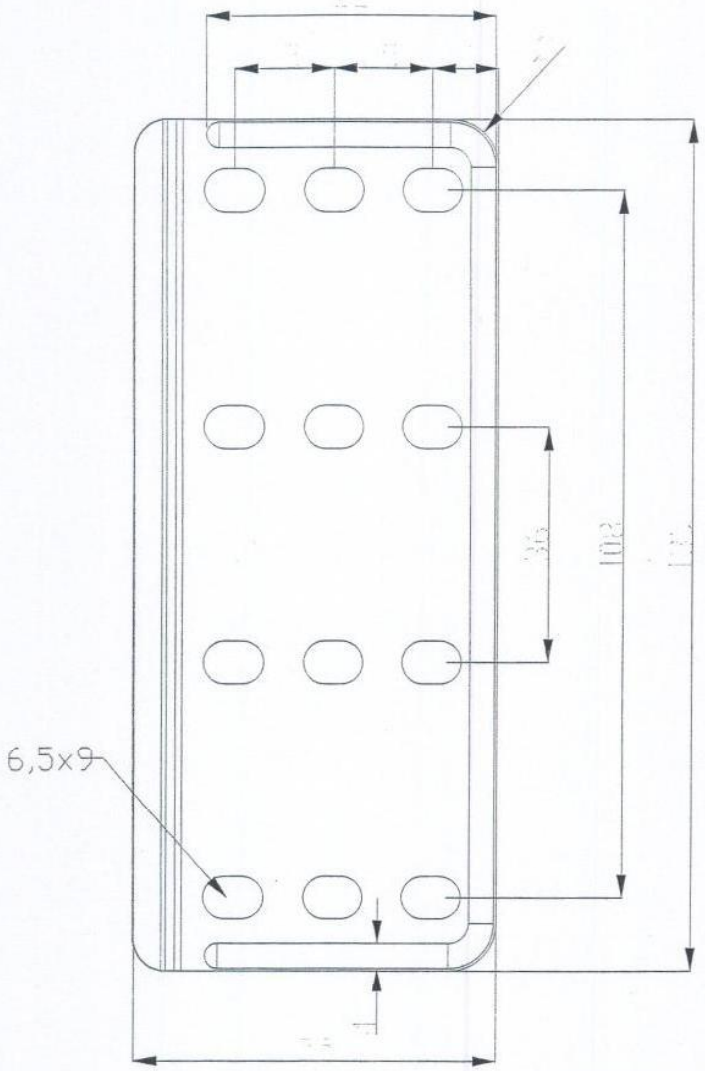
Nazwa rysunku: BLO300

Nr programu

Nr rysunkowego: 860330

Nr zmiany

Profesjonalne Systemy Tras Kablowych



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Dátum/Date 15.06.2006

Podpis/Signature

Dokument č. / Document No. FIRES-FR-064-06-ALWE

Príloha č./Appendix No. 19

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

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	J.GRODHOWSKI		20.10.05	
Rysował	J.Grochowski		20.10.05	LPOLH60
Sprawdził	T.WŁODARCZYK		20.10.05	
Zatwierdził	J.KLICZEK		20.10.05	Nr zmiany

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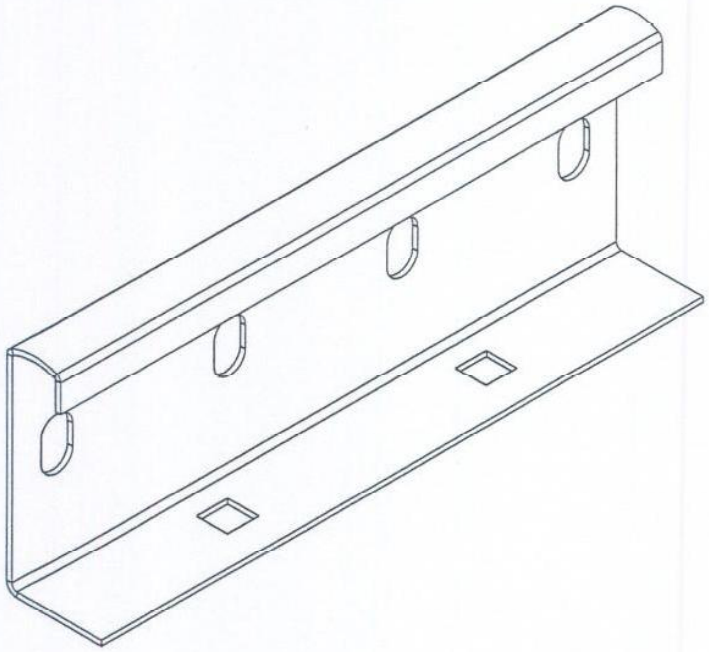
Nr programu kasetyzującego: 860100



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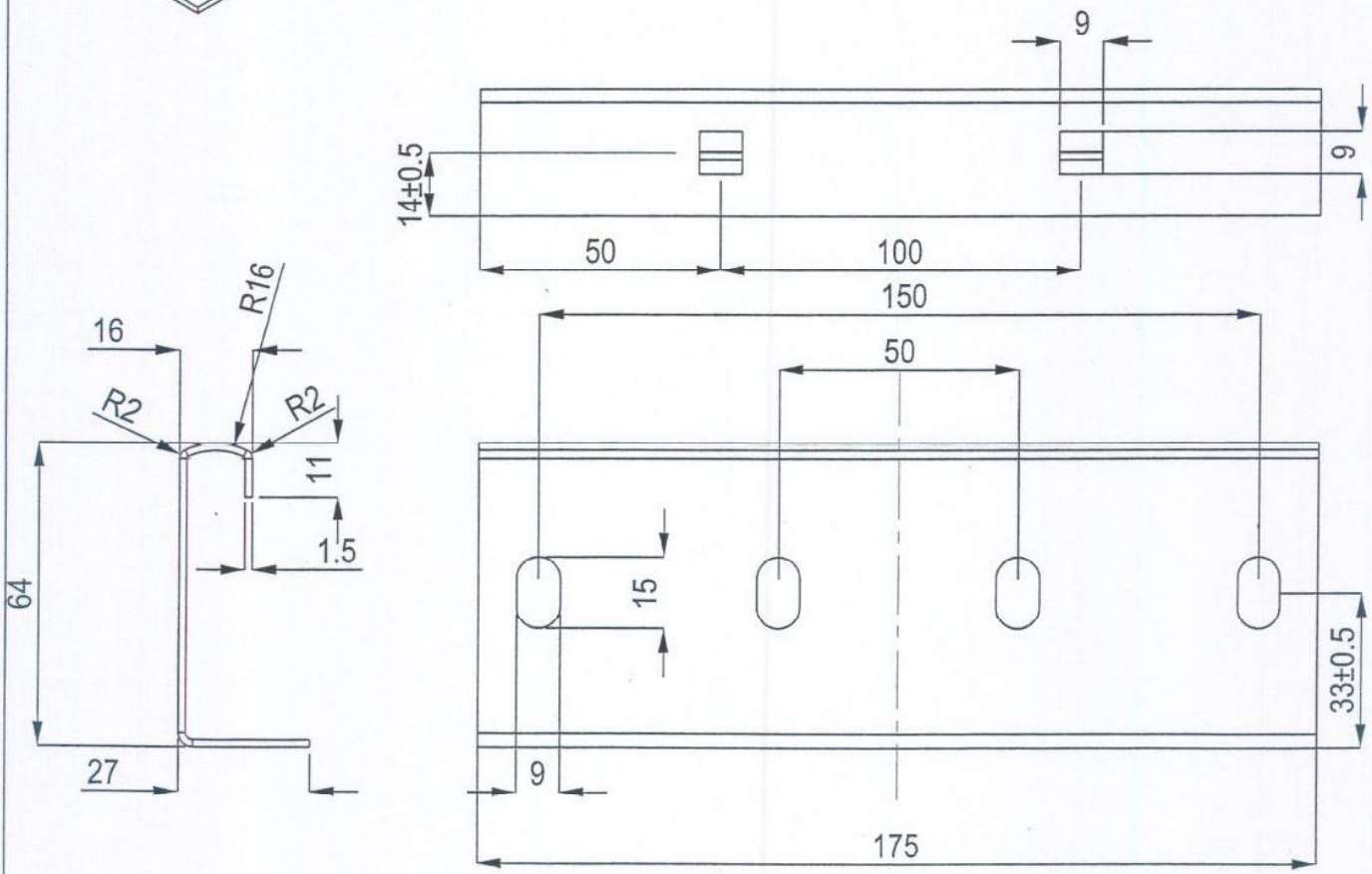
Dátum/Date 15-06-2006

Podpis/Signature

Dokument č. Document No. FIRES-FR-064-06-ALKE

Príloha č./Appendix No. 20



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	LDOCH60E LDOCH60
Rysował	J.Grochowski		20.10.05	
Sprawdził	T.WLODARCZYK		20.10.05	
Zatwierdził	J.KLICZEK		20.10.05	

Nr programu wycinającego: 861400 860600

Nr zmiany

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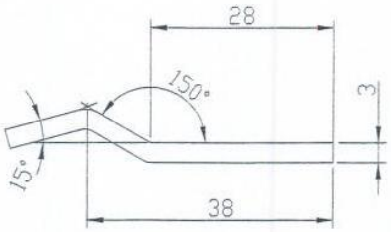
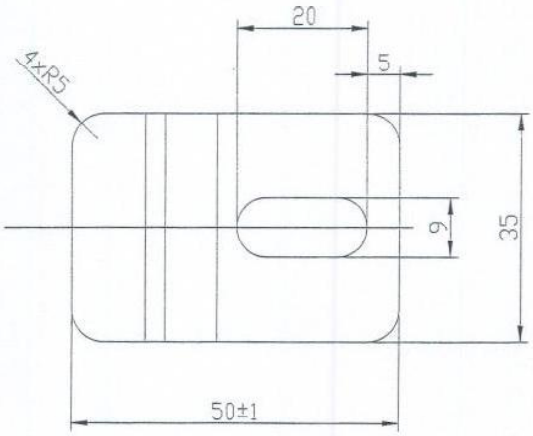
Príloha č./Appendix No. 27





	Odchylka wymiarów) nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
				Nr normy	PN-EN 10142 + A1 : 1997	0.025	1:1	Arkusz 1
				półfabrykat (nr normy)				Arkuszy 1

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

Nr zmiany

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Nr rysunku 802900

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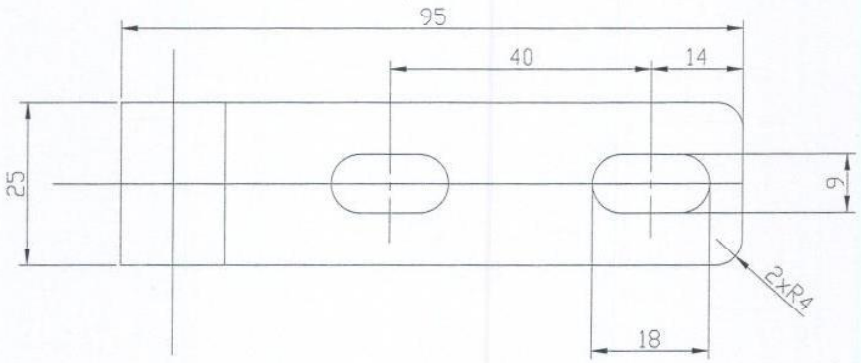
Dokument č./Document No. FIRES-FR-064-06-AURE

Príloha č./Appendix No. 22



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

Projektował	Nazwisko J.Grochowski	Podpis	Data ---------	Nazwa rysunku UPWO	
Rysował	J.Grochowski		------		
Sprawdził	J.Kliczek		------		
Zatwierdził	J.Kliczek		---------	Nr programu maszynowego ---	Nr zmiany

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Nr rysunku 803300

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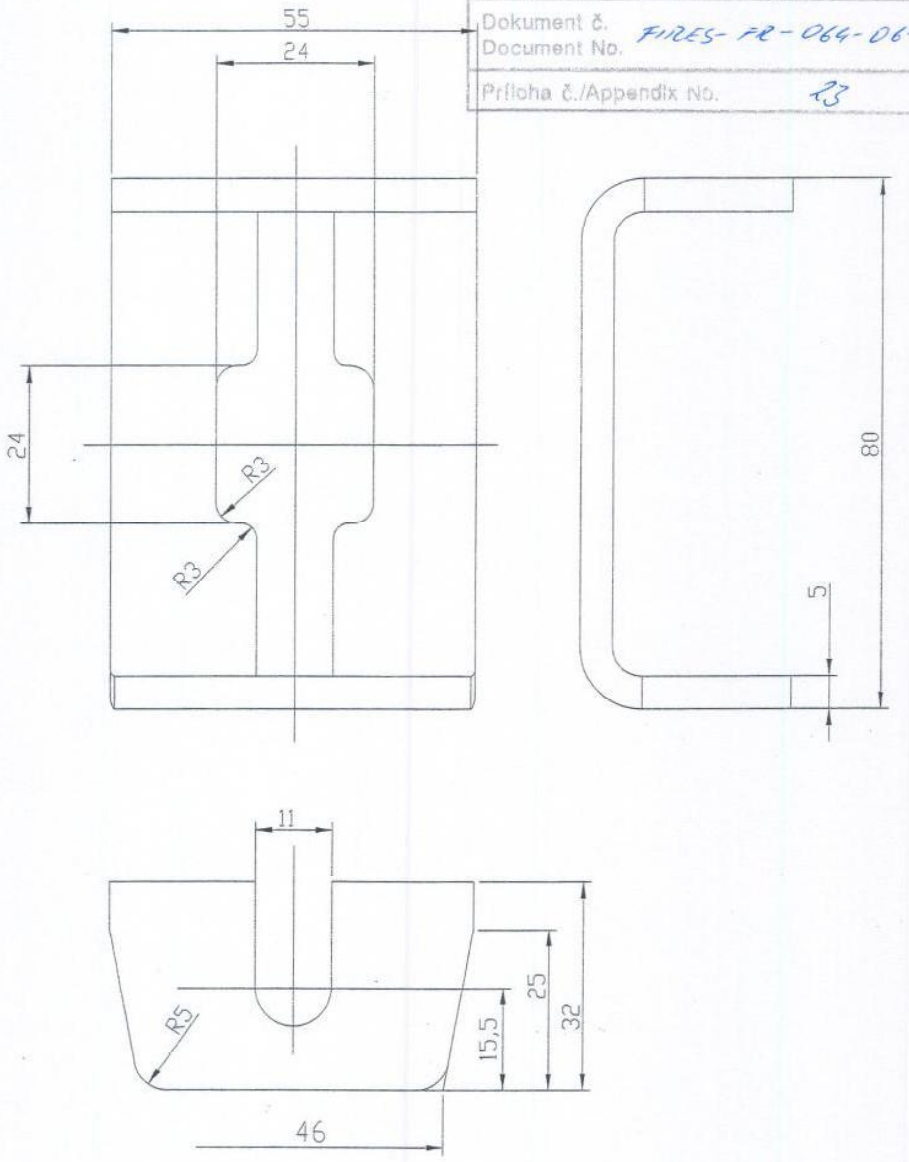
15.06.2006
Podpis/Signature

Dokument č.
Document No. FIRES-FR-064-06-ANE

Príloha č./Appendix No. 23



Ocynk galwaniczny

Odchyłka 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

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

Nazwisko | Podpis | Data

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Nr rysunku
803700

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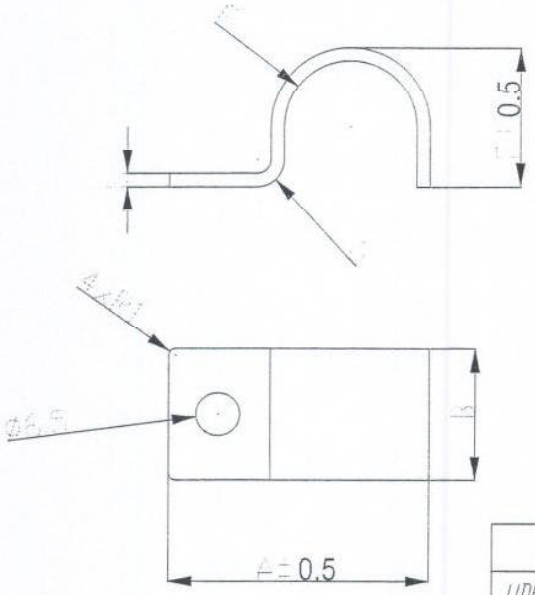
Podpis/Signature

Dokument č.
Document No. FIRES-FR-064-06-ANNE

Príloha č./Appendix No. 24



	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

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		20.10.04
Rysował	J.GROCHOWSKI		20.10.04
Sprawdził	T.WŁODARCZYK		20.10.04
Zatwierdził	J.KLICZEK		20.10.04

Nazwa rysunku: UDF

Nr programu maszynowego: ---

Nr zmiany

Nr rysunku: ---

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Dátum/Date 15.06.2006

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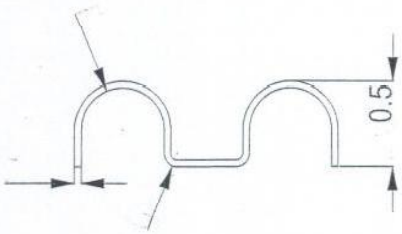
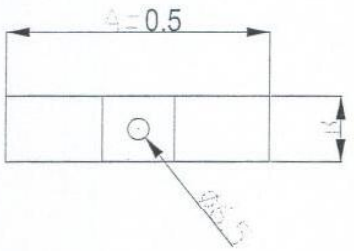
Dokument č. / Document No. FIRES-FR-064-06-ACME

Príloha č./Appendix No. 25





	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

Odchyłka 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		20.10.04
Rysował	J.GROCHOWSKI		20.10.04
Sprawdził	T.WŁODARCZYK		20.10.04
Zatwierdził	J.KLICZEK		20.10.04

Nazwa rysunku: UEF

Nr programu maszynowego: ---

Nr zmiany

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Nr rysunku: ---

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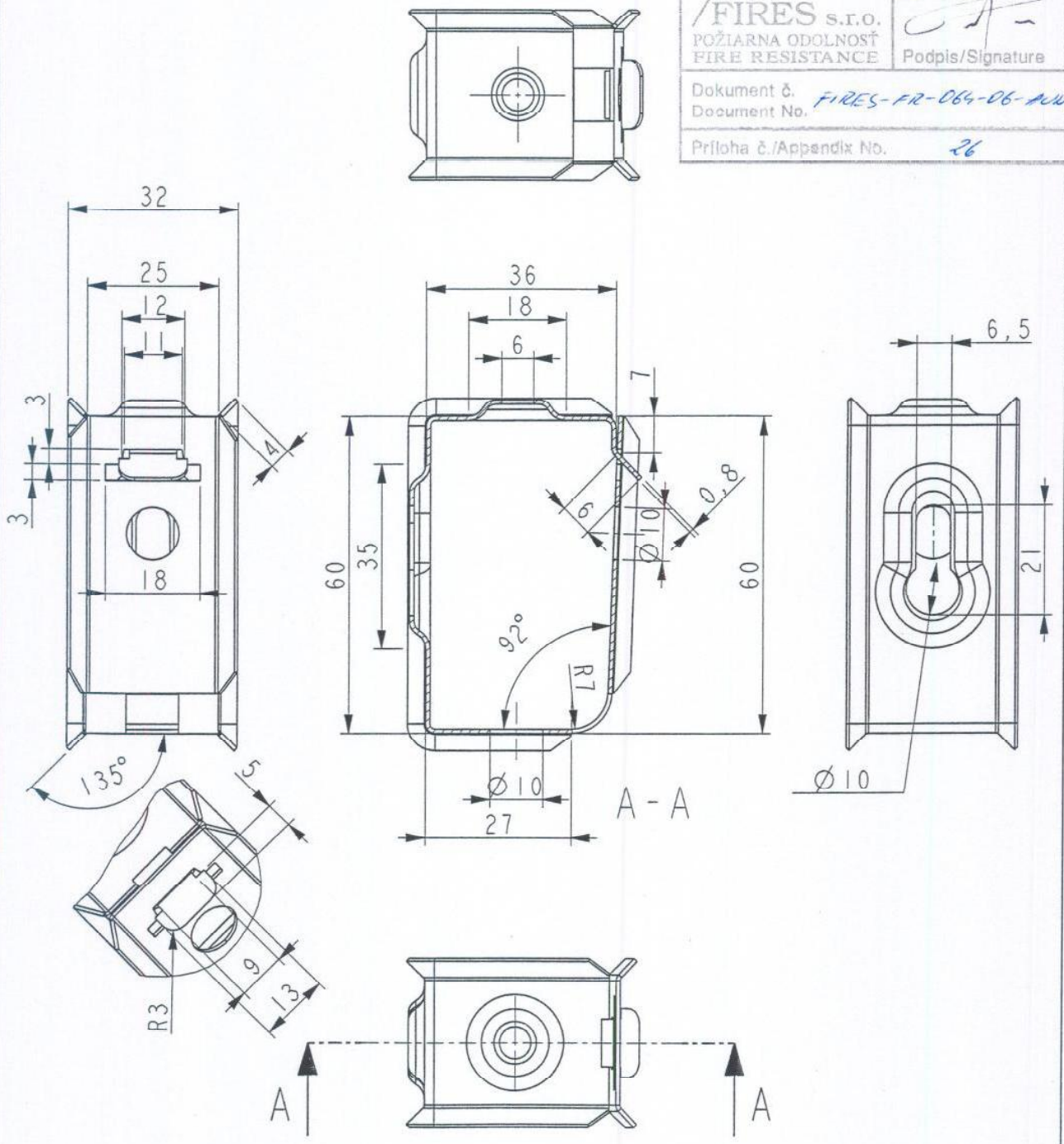
Podpis/Signature

Dokument č. / Document No. FIRES-FR-064-06-ADDE

Príloha č./Appendix No. 26



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

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

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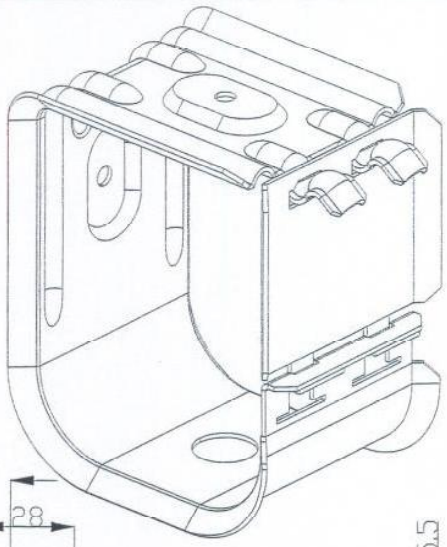

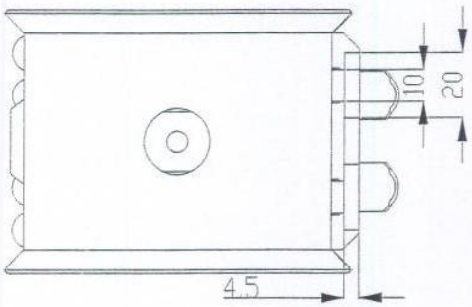

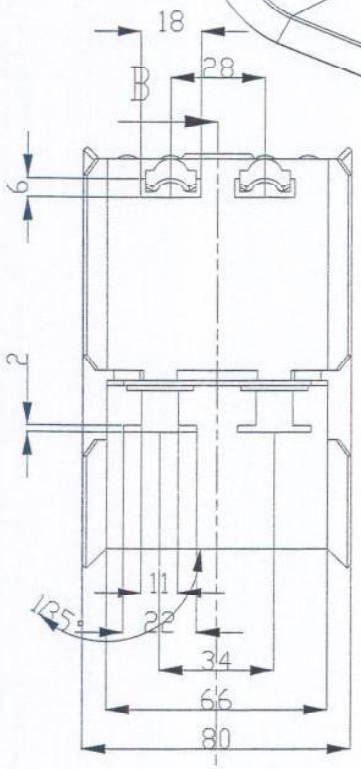

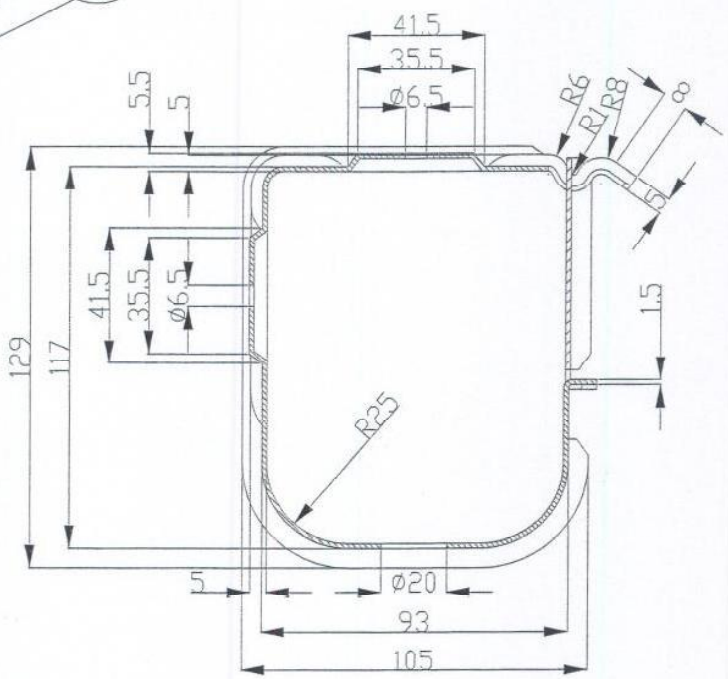

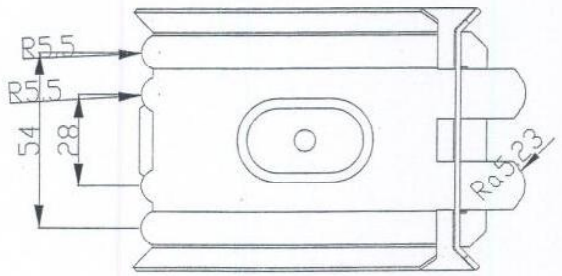

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Príloha č./Appendix No. 23

Odchyłki wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
			Nr normy	PN-EN 10142 + A1 : 1997		1:2	Arkusz 1
			półfabrykat (nr normy)				Arkuszy 1

	Nazwisko	Podpis	Data	Nazwa rysunku
Projektował	T.Grudniewski			–
Kysował	T.Grudniewski			Obejma zatrzaskowa OZOE
Sprawdził	J.Kliczek			Nr programu maszynowego / Nr zmiany
Zatwierdził	J.Kliczek			Nr rysunku

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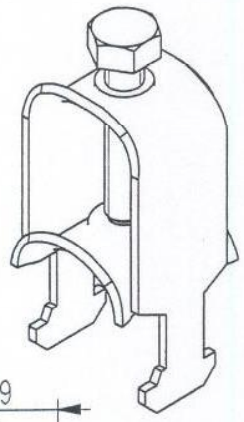

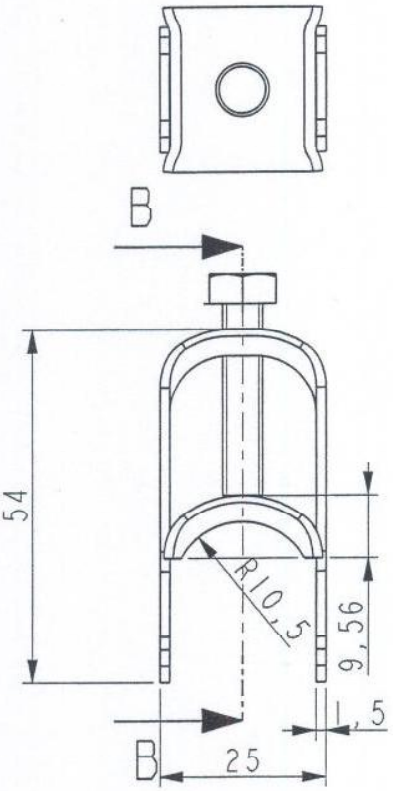

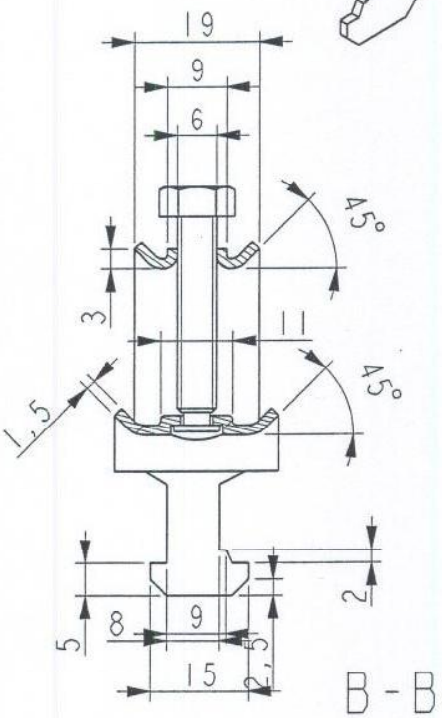

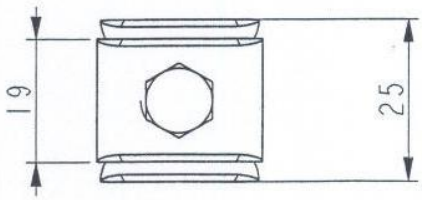

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Dokument č. / Document No. FIRES-FR-064-06-MME

Príloha č./Appendix No. 28

	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
Projektował	Nazwisko	Podpis	Data	Nazwa rysunku				
Rysował	J.Grochowski		28-Jun-06					
Sprawdził								
Zatwierdził				Nr programu maszynowego				Nr zmiany
				Nr rysunku				

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