TEST REPORT FIRES-FR-102-12-AUNE

Fire resistant cables – NHXH, NHXCH, HTKSH and HTKSHekw with cable bearing system BAKS

Reg. No. 041/S-159

The Experts on Fire Safety

TEST REPORT

FIRES-FR-102-12-AUNE

Tested property:	Function in fire
Test method:	DIN 4102 – 12:1998-11
Date of issue:	18. 05. 2012
Name of the product:	Fire resistant cables – NHXH, NHXCH, HTKSH and HTKSHekw with cable bearing system BAKS
Manufacturer:	Fabryka Kabli MADEX s. j., Stefanówka, ul. Żurawia 96, 05 – 462 Wiązowna, Poland – producer of cables BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland - producer of construction
Sponsor:	Fabryka Kabli MADEX s. j., Stefanówka, ul. Żurawia 96, 05 – 462 Wiązowna, Poland
Task No.:	PR-11-0526
Specimens received:	04. 05. 2012
Date of the test:	17. 05. 2012

Technician responsible for the technical side of this report: Bc. Dávid Šubert

Number of pages: 49
Test reports: 5 Copy No.: 3

Distribution list:

Copy No. 1	FIRES, s. r. o., Osloboditeľov 282, 059 35 Batizovce, Slovak Republic (electronic version)
Copy No. 2	Fabryka Kabli MADEX s. j., Stefanówka, ul. Żurawia 96, 05 – 462 Wiązowna, Poland (electronic version)
Copy No. 3	BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland (electronic version)
Copy No. 4	Fabryka Kabli MADEX s. j., Stefanówka, ul. Żurawia 96, 05 – 462 Wiązowna, Poland
Copy No. 5	BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland

This report includes accreditation mark SNAS with additional mark ILAC-MRA. SNAS is signatory of ILAC-MRA, Mutual recognition agreement (of accreditation), which is focused on promoting of international acceptance of accredited laboratory data and reducing technical barriers to trade, such as the retesting of products on markets of signatories. More information about ILAC-MRA is on www.ilac.org. Signatories of ILAC-MRA are e.g. SNAS (Slovakia), CAI (Czech Republic), PCA (Poland), DakkS (Germany) or BMWA (Austria). Up to date list of ILAC-MRA signatories is on www.ilac.org/documents/mra_signatories.pdf. FIRES, s.r.o. Batizovce is full member of EGOLF also, more information www.egolf.org.uk.

FIRES, s.r.o., Osloboditeľov 282, 059 35 Batizovce, Slovak Republic
tel. 00421 52 775 22 98, fax. 00421 52 788 14 12, www.fires.sk
Notified Body No. 1396, Approved Body No. SK01, Member of EGOLF

1. INTRODUCTION

This test report contains the results of test carried out by laboratory of FIRES, s.r.o. in Batizovce, accredited by SNAS for testing. Certificate of accreditation No.: S-159. The purpose of the test was to gain information for product classification.

Representatives from the sponsor's side witnessing the test:

Mr. Artur Twardowski	Fabryka Kabli MADEX s. j.
Mr. Ireneusz Lipiński	Fabryka Kabli MADEX s. j.
Mr. Jacek Kliczek	BAKS Kazimierz Sielski
Mr. Dariusz Gowronski	BAKS Kazimierz Sielski

test directed by	Ing. Marek Gorlický
test carried out by	Bc. Dávid Šubert
operator	Miroslav Hudák

2. MEASURING EQUIPMENT

Identification number	Measuring equipment	Note
F 90 004	Vertical test furnace for fire resistance testing	-
F 69 010	PLC system for data acquisition and control TECOMAT TC 700	-
F 40 017	Control and communication software to PLC TECOMAT TC 700	-
F 40 018	SW Reliance	-
F 40 019	Visual and calculating software to PLC TECOMAT TC 700	-
F 40 020	Driver Tecomat – Reliance (SW)	-
F 69 009	PLC system for data acquisition and climate control TECOMAT TC 604	-
F 60 001 - F 60 009	Sensors of temperature and relative air humidity	climatic conditions measuring
F 71 008, F 71 009	Transducer of differential pressure (–50 to + 150) Pa	pressure inside the test furnace
F 10 521 - F 10 528	Plate thermometers	temperature inside the test furnace, according to EN 1363-1
F 10 701	Sheathed thermocouple type K Ø 3 mm	ambient temperature
F 54 020	Digital calliper (0 to 200) mm	-
F 54 059	Racking meter	-
F 57 007	Digital stop-watch	-
F 96 015	Test signal panel	-

3. PREPARATION OF THE SPECIMENS

Testing laboratory didn't take off individual components of the specimens. Components take-off and its delivering to the testing laboratory were carried out by the test sponsor. Assembling of the supporting system into the test furnace and mounting of cables and weights into the supporting system was carried out by workers of Fabryka Kabli MADEX s. j. and BAKS Kazimierz Sielski under supervision of laboratory technician.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMENS STRUCTURE

Test specimen comprised from power and communication halogen free cables of Fabryka Kabli MADEX s. j. and cable bearing system BAKS Kazimierz Sielski – cable trays, cable ladders, cable clips with accessories (consoles, supports, hangers etc.).

Cables

Used cables by test:	NHXCH FE180 PH90/E90 0,6kV/1kV 4 x 50/25RM	(12 x)
	NHXCH FE180 PH90/E90 0,6kV/1kV 4 x 1,5/1,5RE	(12 x)
	NHXH FE180 PH90/E90 0,6kV/1kV 4 x 50 RM	(12 x)
	NHXH FE180 PH90/E90 0,6kV/1kV 4 x 1,5 RE	(12 x)
	HTKSH PH90 1 x 2 x 1,0 mm	(12 x)
	HTKSHekw PH90 1 x 2 x 1,0 mm	(12 x)

The length of cables was 5,5 m, 4 m from that was exposed to fire.

Power and communication halogen free cables were fixed on the ladders and trays by steel clips according to the cable diameter in the points of allowed bending radius.

Cable bearing systems were made of following constructions:

Suspension tracks No. 1, 2, 3 and 4

Tracks were made of three consoles (type WPCO 1000) which were fixed to ceiling by two dowels (type PSRO M10x80) in spacing of 1200 mm. Two booms (type WMCO 400) were fixed by screws (type SM M10x80). At the end of each boom was fixed holder (UPWO) by two screws (type SGN M8x14). Booms were fixed through these holders by threaded rod (type PG M10) with washer and nuts M10 to ceiling holder (type USOV) which was fixed to ceiling by dowel (type PSRO M10x80).

Tracks No. 1 and 2 were made of cable trays (type KCOP 300H60/B-400, steel sheet thickness 1,5 mm). Trays were laid on the upper consoles and fixed by two screws on each console. Trays were jointed together by two junctions (type LPOP H60B), steel sheet (BLO 400B) and by screws (SGN M6x12). Tray was loaded with 10 $kg.m^{-1}$.

Tracks No. 3 and 4 were made of cable ladders (DGOP 400H60/B-400, steel sheet thickness 1,5 mm). Ladders were laid on the lower consoles and fixed by clips (type ZMO). Ladders were jointed together by two junctions (type LDOCH 60B) with screws (type SGN M8x14). Ladder was loaded with 20 $kg.m^{-1}$.

Suspension tracks No. 5, 6, 7 and 8
Tracks were made of two consoles combined of two horizontal supports (type CWOP 40H40/05) and two threaded rods (type PG M10x80) with washers and nuts M10 which were fixed to ceiling holder (type USOV) which was fixed to ceiling by dowel (type PSRO M10x80) in spacing of 1500 mm.

Tracks No. 5 and 6 were made of cable trays (type KCOP 400H60/B-400, steel sheet thickness 1,5 mm). Trays were laid on the upper consoles and fixed by four screws on each console. Trays were jointed together by two junctions (type LPOP H60B), steel sheet (BLO 400B) and by screws (SGN M6x12). Tray was loaded with 10 $kg.m^{-1}$.

Tracks No. 7 and 8 were made of cable ladders (DGOP 400H60/B-400, steel sheet thickness 1,5 mm). Ladders were laid on the lower consoles and fixed by clips (type ZMO). Ladders were jointed together by two junctions (type LDOCH 60B) with screws (type SGN M8x14). Ladder was loaded with 20 $kg.m^{-1}$.

Tracks No. 9
Ceiling ledges (type SDOP 600) were fixed to ceiling by dowels (SRO M6x30) in spacing of 300 mm. Cables were fixed to ledges by clips (type UKO1).

Tracks No. 10
Ceiling holders (KSA) were fixed to ceiling by dowels (SRO M6x30) in spacing of 300 mm.

All bearing systems were from steel, galvanized according to the Sendzimir method PN-EN 10327:2005.

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

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

4.2 DESCRIPTION OF SPECIMENS FIXATION

The test specimens were 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's fixation into the test furnace is shown in drawing documentation and it was selected by the sponsor.

4.3 INSPECTION OF SPECIMENS

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

4.4 CLIMATIC CONDITIONING OF SPECIMENS

Test specimens were stored in the hall of testing laboratory under the following climatic conditions:

Ambient air temperature [°C]

mean	18,3
standard deviation	1,9

Relative air humidity [%]

mean	46,9
standard deviation	4,8

The humidity equilibrium state of test specimens was not determined. Test specimens did not comprise hygroscopic materials.

5. CARRYING OUT OF THE TEST

5.1 TEST GENERALLY

The test was carried out in horizontal test furnace with dimensions of (4000 x 3000 x 2750) mm (length x width x height).

5.2 CONDITIONS OF THE TEST

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

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

Date of the test	Relative air humidity [%]	Ambient air temperature [°C]
17. 05. 2012	31,9	14,3

5.3 RESULTS OF THE TEST

Measured values are stated in this test report.

6. CLOSING

Evaluation of the test:

Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
1	cable NHXCH FE180 PH90/E90 4x50/25 RM	8	90 minutes no failure / interruption
2	cable NHXCH FE180 PH90/E90 4x50/25 RM		90 minutes no failure / interruption
3	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
4	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
5	cable NHXCH FE180 PH90/E90 4x50/25 RM	6	90 minutes no failure / interruption
6	cable NHXCH FE180 PH90/E90 4x50/25 RM		90 minutes no failure / interruption
7	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
8	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
9	cable NHXH FE180 PH90/E90 4x50 RM	7	88 minutes
10	cable NHXH FE180 PH90/E90 4x50 RM		90 minutes no failure / interruption
11	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
12	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
13	cable NHXH FE180 PH90/E90 4x50 RM	5	90 minutes no failure / interruption
14	cable NHXH FE180 PH90/E90 4x50 RM		90 minutes no failure / interruption
15	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
16	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
17	cable NHXH FE180 PH90/E90 4x1,5 RE	10	90 minutes no failure / interruption
18	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
19	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
20	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
21	cable NHXH FE180 PH90/E90 4x50 RM		90 minutes no failure / interruption
22	cable NHXH FE180 PH90/E90 4x50 RM		85 minutes
23	cable NHXCH FE180 PH90/E90 4x50/25 RM		90 minutes no failure / interruption
24	cable NHXCH FE180 PH90/E90 4x50/25 RM		90 minutes no failure / interruption
25	cable NHXH FE180 PH90/E90 4x1,5 RE	9	90 minutes no failure / interruption
26	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption

Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
27	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE	9	90 minutes no failure / interruption
28	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
29	cable NHXH FE180 PH90/E90 4x50 RM		40 minutes
30	cable NHXH FE180 PH90/E90 4x50 RM		40 minutes
31	cable NHXCH FE180 PH90/E90 4x50/25 RM		90 minutes no failure / interruption
32	cable NHXCH FE180 PH90/E90 4x50/25 RM		90 minutes no failure / interruption
33	cable NHXCH FE180 PH90/E90 4x50/25 RM	4	90 minutes no failure / interruption
34	cable NHXCH FE180 PH90/E90 4x50/25 RM		90 minutes no failure / interruption
35	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
36	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
37	cable NHXCH FE180 PH90/E90 4x50/25 RM	2	90 minutes no failure / interruption
38	cable NHXCH FE180 PH90/E90 4x50/25 RM		90 minutes no failure / interruption
39	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
40	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
41	cable NHXH FE180 PH90/E90 4x50 RM	3	90 minutes no failure / interruption
42	cable NHXH FE180 PH90/E90 4x50 RM		83 minutes
43	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
44	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
45	cable NHXH FE180 PH90/E90 4x50 RM	1	90 minutes no failure / interruption
46	cable NHXH FE180 PH90/E90 4x50 RM		86 minutes
47	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
48	cable NHXH FE180 PH90/E90 4x1,5 RE		90 minutes no failure / interruption
52A	cable HTKSHekw PH90 1x2x1,0 mm	8	90 minutes no failure / interruption
52B	cable HTKSHekw PH90 1x2x1,0 mm		38 minutes
53A	cable HTKSHekw PH90 1x2x1,0 mm	6	41 minutes
53B	cable HTKSHekw PH90 1x2x1,0 mm		38 minutes
54A	cable HTKSH PH90 1x2x1,0 mm	7	41 minutes
54B	cable HTKSH PH90 1x2x1,0 mm		90 minutes no failure / interruption
55A	cable HTKSH PH90 1x2x1,0 mm	5	90 minutes no failure / interruption
55B	cable HTKSH PH90 1x2x1,0 mm		41 minutes
56A	cable HTKSH PH90 1x2x1,0 mm	10	90 minutes no failure / interruption
56B	cable HTKSH PH90 1x2x1,0 mm		90 minutes no failure / interruption
57A	cable HTKSHekw PH90 1x2x1,0 mm		90 minutes no failure / interruption
57B	cable HTKSHekw PH90 1x2x1,0 mm		90 minutes no failure / interruption
58A	cable HTKSH PH90 1x2x1,0 mm	9	90 minutes no failure / interruption
58B	cable HTKSH PH90 1x2x1,0 mm		90 minutes no failure / interruption
59A	cable HTKSHekw PH90 1x2x1,0 mm		60 minutes
59B	cable HTKSHekw PH90 1x2x1,0 mm		60 minutes
60A	cable HTKSHekw PH90 1x2x1,0 mm	4	90 minutes no failure / interruption
60B	cable HTKSHekw PH90 1x2x1,0 mm		90 minutes no failure / interruption
61A	cable HTKSHekw PH90 1x2x1,0 mm	2	43 minutes
61B	cable HTKSHekw PH90 1x2x1,0 mm		90 minutes no failure / interruption
62A	cable HTKSH PH90 1x2x1,0 mm	3	90 minutes no failure / interruption
62B	cable HTKSH PH90 1x2x1,0 mm		90 minutes no failure / interruption
63A	cable HTKSH PH90 1x2x1,0 mm	1	90 minutes no failure / interruption
63B	cable HTKSH PH90 1x2x1,0 mm		90 minutes no failure / interruption

The fire test was discontinued in 95th minute at the request of test sponsor.

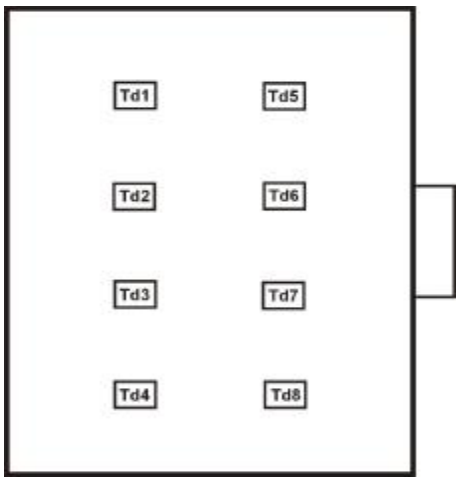
Specimens S1 – S48 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Specimens S52 – S63 were tested by one-phase voltage supply 1 x 110V with LED diodes 3V /0,03W.
Circuit breakers with rating 3 A were used.

Measured values inside the test furnace

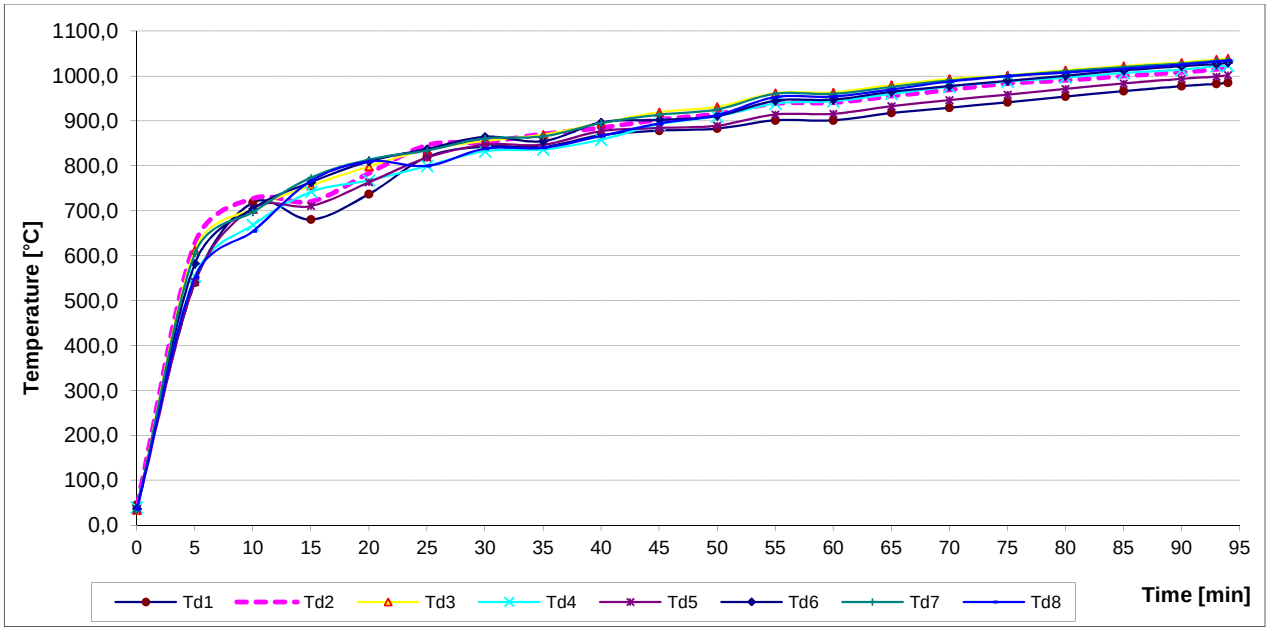
Time	Temperature [°C]											Deviation	Pressure
t [min]	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To	d_e [%]	p [Pa]
0	45,9	43,2	33,7	39,8	36,2	36,9	33,0	36,5	38,2	20,0	14,6	0,0	19,3
5	540,4	628,2	613,1	554,6	541,8	582,6	604,9	552,2	577,2	576,0	15,7	-7,2	17,9
10	718,6	727,5	703,9	668,5	705,8	704,8	697,1	654,3	697,6	678,0	15,0	-2,7	17,8
15	680,6	720,8	756,3	742,3	710,7	763,8	774,1	766,6	739,4	739,0	14,4	-1,6	18,8
20	737,5	783,8	798,9	767,8	763,5	810,3	814,4	810,3	785,8	781,0	14,2	-1,0	17,5
25	819,8	846,2	836,9	799,9	818,6	837,8	834,3	800,1	824,2	815,0	15,8	-0,5	17,8
30	843,2	853,2	855,6	833,1	847,4	864,9	861,2	838,4	849,6	842,0	15,6	-0,5	17,0
35	842,8	871,0	869,7	836,8	847,3	855,2	865,9	840,3	853,6	865,0	14,1	-0,5	17,1
40	868,6	884,9	895,6	858,5	877,5	896,9	895,4	866,9	880,5	885,0	14,2	-0,5	18,3
45	878,6	903,2	919,7	893,0	884,5	902,5	914,0	894,6	898,8	902,0	14,2	-0,5	18,8
50	883,2	915,9	931,6	910,4	889,7	911,4	925,8	913,3	910,2	918,0	14,8	-0,5	17,1
55	901,5	939,0	962,1	938,9	914,4	945,2	960,8	953,2	939,4	932,0	15,5	-0,4	17,2
60	901,6	941,0	963,9	944,1	916,1	947,8	960,5	954,4	941,2	945,0	14,4	-0,5	17,3
65	917,8	955,5	980,1	960,3	933,0	964,9	976,0	970,3	957,2	957,0	15,1	-0,4	19,4
70	929,8	969,4	993,9	976,6	946,5	977,6	990,4	988,1	971,5	968,0	15,5	-0,4	19,6
75	941,7	983,7	1001,6	988,1	958,7	989,6	1000,4	999,9	983,0	979,0	14,6	-0,3	17,6
80	954,7	990,7	1012,8	996,8	971,5	1001,0	1010,5	1007,9	993,2	988,0	14,4	-0,3	17,4
85	966,6	1000,1	1022,6	1006,9	983,7	1012,7	1020,0	1016,4	1003,6	997,0	14,4	-0,2	17,6
90	977,7	1008,7	1030,6	1014,5	993,9	1022,1	1028,0	1025,5	1012,6	1006,0	15,5	-0,2	19,0
93	982,7	1015,1	1037,1	1022,0	999,0	1026,8	1033,8	1032,4	1018,6	1011,0	14,0	-0,1	19,8
94	985,6	1016,4	1039,6	1023,5	1002,1	1030,3	1035,4	1033,9	1020,9	1012,0	14,7	-0,1	18,5

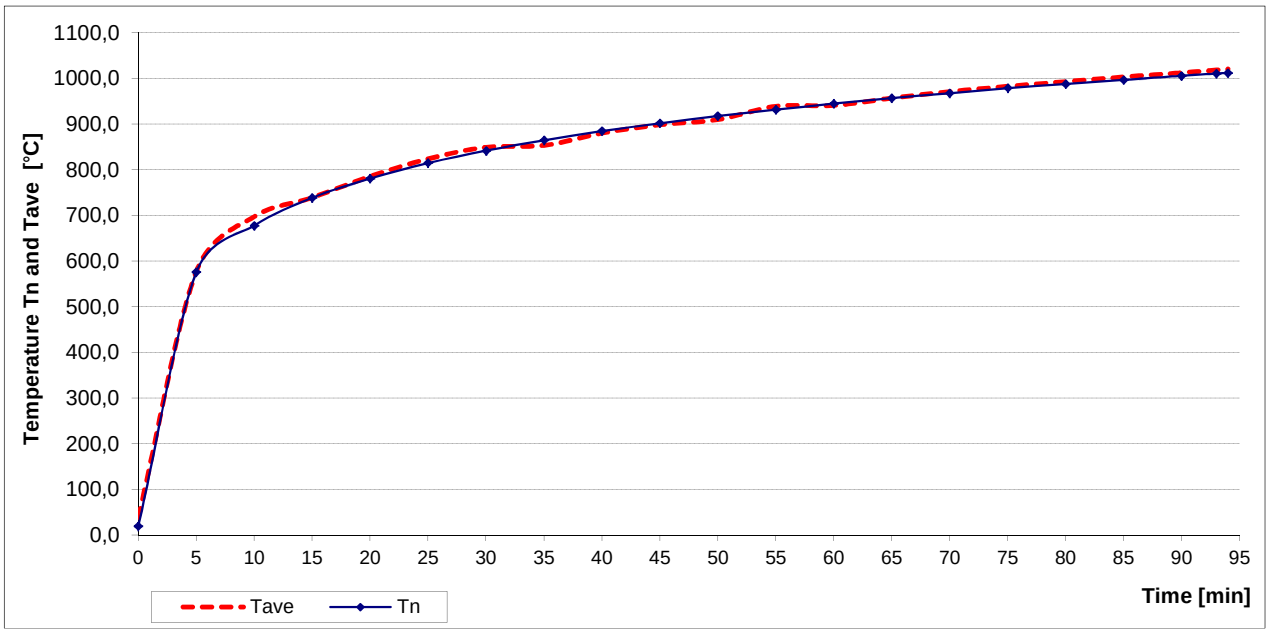
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

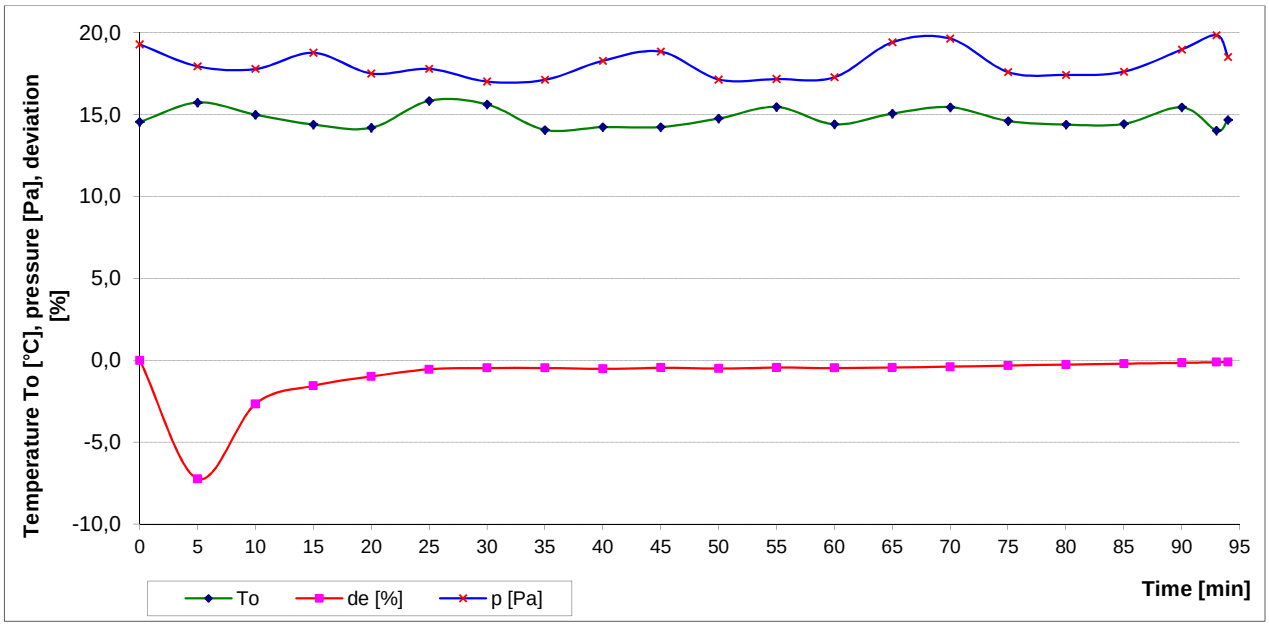
Layout of measuring points inside the test furnace:



Measured values inside the test furnace /graph







Measured time of tested specimens from S1 to S10 - power cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S1	1-L1	no failure / interruption
	2-L2	no failure / interruption
	3-L3	no failure / interruption
	4-PEN	no failure / interruption
S2	5-L1	no failure / interruption
	6-L2	no failure / interruption
	7-L3	no failure / interruption
	8-PEN	no failure / interruption
S3	9-L1	no failure / interruption
	10-L2	no failure / interruption
	11-L3	no failure / interruption
	12-PEN	no failure / interruption
S4	13-L1	no failure / interruption
	14-L2	no failure / interruption
	15-L3	no failure / interruption
	16-PEN	no failure / interruption
S5	17-L1	no failure / interruption
	18-L2	no failure / interruption
	19-L3	no failure / interruption
	20-PEN	no failure / interruption
S6	21-L1	no failure / interruption
	22-L2	no failure / interruption
	23-L3	no failure / interruption
	24-PEN	no failure / interruption
S7	25-L1	no failure / interruption
	26-L2	no failure / interruption
	27-L3	no failure / interruption
	28-PEN	no failure / interruption
S8	29-L1	no failure / interruption
	30-L2	no failure / interruption
	31-L3	no failure / interruption
	32-PEN	no failure / interruption
S9	33-L1	x
	34-L2	88:32
	35-L3	88:32
	36-PEN	x
S10	37-L1	no failure / interruption
	38-L2	no failure / interruption
	39-L3	no failure / interruption
	40-PEN	no failure / interruption

Specimen No.	Cables
1	cable NHXCH FE180 PH90/E90 4x50/25 RM
2	cable NHXCH FE180 PH90/E90 4x50/25 RM
3	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
4	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
5	cable NHXCH FE180 PH90/E90 4x50/25 RM
6	cable NHXCH FE180 PH90/E90 4x50/25 RM
7	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
8	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
9	cable NHXH FE180 PH90/E90 4x50 RM
10	cable NHXH FE180 PH90/E90 4x50 RM

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

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

Measured time of tested specimens from S11 to S20 - power cables

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

Specimen No.	Cables
11	cable NHXH FE180 PH90/E90 4x1,5 RE
12	cable NHXH FE180 PH90/E90 4x1,5 RE
13	cable NHXH FE180 PH90/E90 4x50 RM
14	cable NHXH FE180 PH90/E90 4x50 RM
15	cable NHXH FE180 PH90/E90 4x1,5 RE
16	cable NHXH FE180 PH90/E90 4x1,5 RE
17	cable NHXH FE180 PH90/E90 4x1,5 RE
18	cable NHXH FE180 PH90/E90 4x1,5 RE
19	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
20	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE

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

Measured time of tested specimens from S21 to S30 - power cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S21	81-L1	no failure / interruption
	82-L2	no failure / interruption
	83-L3	no failure / interruption
	84-PEN	no failure / interruption
S22	85-L1	x
	86-L2	x
	87-L3	85:27
	88-PEN	x
S23	89-L1	no failure / interruption
	90-L2	no failure / interruption
	91-L3	no failure / interruption
	92-PEN	no failure / interruption
S24	93-L1	no failure / interruption
	94-L2	no failure / interruption
	95-L3	no failure / interruption
	96-PEN	no failure / interruption
S25	97-L1	no failure / interruption
	98-L2	no failure / interruption
	99-L3	no failure / interruption
	100-PEN	no failure / interruption
S26	101-L1	no failure / interruption
	102-L2	no failure / interruption
	103-L3	no failure / interruption
	104-PEN	no failure / interruption
S27	105-L1	no failure / interruption
	106-L2	no failure / interruption
	107-L3	no failure / interruption
	108-PEN	no failure / interruption
S28	109-L1	no failure / interruption
	110-L2	no failure / interruption
	111-L3	no failure / interruption
	112-PEN	no failure / interruption
S29	113-L1	40:46
	114-L2	x
	115-L3	x
	116-PEN	x
S30	117-L1	x
	118-L2	x
	119-L3	40:46
	120-PEN	x

Specimen No.	Cables
21	cable NHXH FE180 PH90/E90 4x50 RM
22	cable NHXH FE180 PH90/E90 4x50 RM
23	cable NHXCH FE180 PH90/E90 4x50/25 RM
24	cable NHXCH FE180 PH90/E90 4x50/25 RM
25	cable NHXH FE180 PH90/E90 4x1,5 RE
26	cable NHXH FE180 PH90/E90 4x1,5 RE
27	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
28	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
29	cable NHXH FE180 PH90/E90 4x50 RM
30	cable NHXH FE180 PH90/E90 4x50 RM

x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable
Power cables were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Circuit breakers with rating 3 A were used.

Measured time of tested specimens from S31 to S40 - power cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S31	121-L1	no failure / interruption
	122-L2	no failure / interruption
	123-L3	no failure / interruption
	124-PEN	no failure / interruption
S32	125-L1	no failure / interruption
	126-L2	no failure / interruption
	127-L3	no failure / interruption
	128-PEN	no failure / interruption
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	no failure / interruption
	138-L2	no failure / interruption
	139-L3	no failure / interruption
	140-PEN	no failure / interruption
S36	141-L1	no failure / interruption
	142-L2	no failure / interruption
	143-L3	no failure / interruption
	144-PEN	no failure / interruption
S37	145-L1	no failure / interruption
	146-L2	no failure / interruption
	147-L3	no failure / interruption
	148-PEN	no failure / interruption
S38	149-L1	no failure / interruption
	150-L2	no failure / interruption
	151-L3	no failure / interruption
	152-PEN	no failure / interruption
S39	153-L1	no failure / interruption
	154-L2	no failure / interruption
	155-L3	no failure / interruption
	156-PEN	no failure / interruption
S40	157-L1	no failure / interruption
	158-L2	no failure / interruption
	159-L3	no failure / interruption
	160-PEN	no failure / interruption

Specimen No.	Cables
31	cable NHXCH FE180 PH90/E90 4x50/25 RM
32	cable NHXCH FE180 PH90/E90 4x50/25 RM
33	cable NHXCH FE180 PH90/E90 4x50/25 RM
34	cable NHXCH FE180 PH90/E90 4x50/25 RM
35	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
36	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
37	cable NHXCH FE180 PH90/E90 4x50/25 RM
38	cable NHXCH FE180 PH90/E90 4x50/25 RM
39	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE
40	cable NHXCH FE180 PH90/E90 4x1,5/1,5 RE

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

Measured time of tested specimens from S41 to S48 - power cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S41	161-L1	no failure / interruption
	162-L2	no failure / interruption
	163-L3	no failure / interruption
	164-PEN	no failure / interruption
S42	165-L1	83:53
	166-L2	x
	167-L3	83:53
	168-PEN	x
S43	169-L1	no failure / interruption
	170-L2	no failure / interruption
	171-L3	no failure / interruption
	172-PEN	no failure / interruption
S44	173-L1	no failure / interruption
	174-L2	no failure / interruption
	175-L3	no failure / interruption
	176-PEN	no failure / interruption
S45	177-L1	no failure / interruption
	178-L2	no failure / interruption
	179-L3	no failure / interruption
	180-PEN	no failure / interruption
S46	181-L1	x
	182-L2	86:40
	183-L3	86:40
	184-PEN	x
S47	185-L1	no failure / interruption
	186-L2	no failure / interruption
	187-L3	no failure / interruption
	188-PEN	no failure / interruption
S48	189-L1	no failure / interruption
	190-L2	no failure / interruption
	191-L3	no failure / interruption
	192-PEN	no failure / interruption

Specimen No.	Cables
41	cable NHXH FE180 PH90/E90 4x50 RM
42	cable NHXH FE180 PH90/E90 4x50 RM
43	cable NHXH FE180 PH90/E90 4x1,5 RE
44	cable NHXH FE180 PH90/E90 4x1,5 RE
45	cable NHXH FE180 PH90/E90 4x50 RM
46	cable NHXH FE180 PH90/E90 4x50 RM
47	cable NHXH FE180 PH90/E90 4x1,5 RE
48	cable NHXH FE180 PH90/E90 4x1,5 RE

x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable
Power cables were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Circuit breakers with rating 3 A were used.

Measured time of tested specimens from S52 to S61 - communication cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S52A	209-L	no failure / interruption
	210-PEN	no failure / interruption
S52B	211-L	38:03
	212-PEN	x
S53A	213-L	41:23
	214-PEN	x
S53B	215-L	38:50
	216-PEN	x
S54A	217-L	41:03
	218-PEN	x
S54B	219-L	no failure / interruption
	220-PEN	no failure / interruption
S55A	221-L	no failure / interruption
	222-PEN	no failure / interruption
S55B	223-L	41:00
	224-PEN	x
S56A	225-L	no failure / interruption
	226-PEN	no failure / interruption
S56B	227-L	no failure / interruption
	228-PEN	no failure / interruption
S57A	229-L	no failure / interruption
	230-PEN	no failure / interruption
S57B	231-L	no failure / interruption
	232-PEN	no failure / interruption
S58A	233-L	no failure / interruption
	234-PEN	no failure / interruption
S58B	235-L	no failure / interruption
	236-PEN	no failure / interruption
S59A	237-L	60:56
	238-PEN	x
S59B	239-L	60:44
	240-PEN	x
S60A	241-L	no failure / interruption
	242-PEN	no failure / interruption
S60B	243-L	no failure / interruption
	244-PEN	no failure / interruption
S61A	245-L	43:19
	246-PEN	x
S61B	247-L	no failure / interruption
	248-PEN	no failure / interruption

Specimen No.	Cables
52	2 cables HTKSHekw PH90 1x2x1,0 mm
53	2 cables HTKSHekw PH90 1x2x1,0 mm
54	2 cables HTKSH PH90 1x2x1,0 mm
55	2 cables HTKSH PH90 1x2x1,0 mm
56	2 cables HTKSH PH90 1x2x1,0 mm
57	2 cables HTKSHekw PH90 1x2x1,0 mm
58	2 cables HTKSH PH90 1x2x1,0 mm
59	2 cables HTKSHekw PH90 1x2x1,0 mm
60	2 cables HTKSHekw PH90 1x2x1,0 mm
61	2 cables HTKSHekw PH90 1x2x1,0 mm

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.

Measured time of tested specimens from S62 to S63 - communication cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S62A	249-L	no failure / interruption
	250-PEN	no failure / interruption
S62B	251-L	no failure / interruption
	252-PEN	no failure / interruption
S63A	253-L	no failure / interruption
	254-PEN	no failure / interruption
S63B	255-L	no failure / interruption
	256-PEN	no failure / interruption

Specimen No.	Cables
62	2 cables HTKSH PH90 1x2x1,0 mm
63	2 cables HTKSH PH90 1x2x1,0 mm

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

PHOTOS

Photo taken before the test.

Photo taken before the test.

Photo taken before the test.

PHOTOS

Photo taken before the test.

Photo taken before the test.

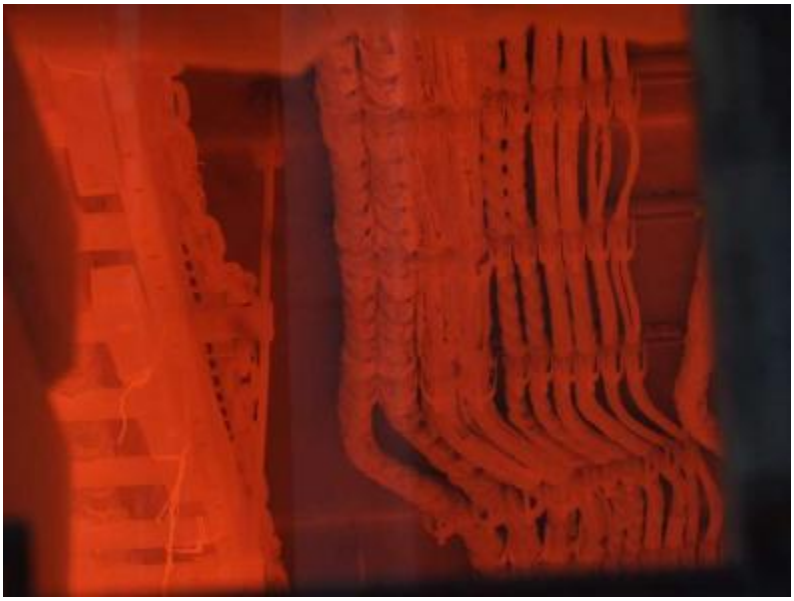


Photo taken during the test.

PHOTOS

Photo taken after the test.

Photo taken after the test.

Photo taken after the test.

PHOTOS

Photo taken after the test.

Photo taken after the test.

Photo taken after the test.

FABRYKA KABLI MADEX

TECHNICAL DESCRIPTION OF FIRE RESISTANT INSTALLATION CABLES
HTKSH PH90; HTKSHekw PH90

1. Technical parameters:

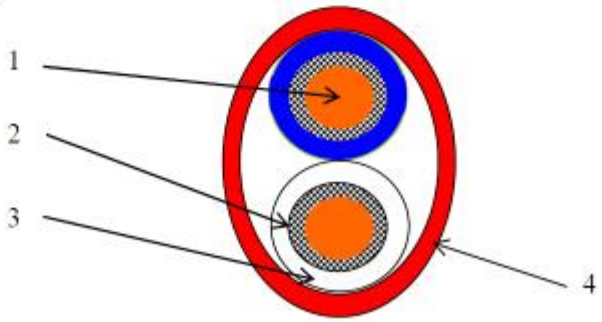
Conductor loop resistance	≤ 48 Ω/km
Insulation resistance	≥ 500 MΩ x km
Working capacity of HTKSH cables	≤ 120 nF/km
Working capacity of HTKSHekw cables	≤ 200 nF/km
Test voltage (50Hz, 1min.); RMS value conductor/conductor and conductor/shield	1,5KV a.c. or 2,25kV d.c.
Temperature range: - during installation - operating	-5°C do +50°C -30°C do +70°C
Voltage rating, Vrms	300V
Minimum bending radius	10 x outer diameter of the cable
Flame retardance	PN-EN 60332-1-2, IEC 60332-1
Resistance to fire	PH 90 PN-EN 50200
Corrosivity of gases issued during fire	PN-EN 50267-2-3 pH ≥ 4,3; conductivity ≤ 10μSmm^{-1}
Smoke density	PN-EN 50268-2 transmittance not less than 70%

2. Construction:
   a) conductor: solid, soft and annealed copper wire according to PN-EN 60228,
   b) flame barrier: mica tape
   c) insulation: cross-linked low smoke halogen free polymer type HM2
   d) twisting: two insulated conductors stranded together
   e) cable' core: pairs stranded in layers and wrapped with polyester tape; number of pairs in cable 1 - 10
   f) screen of cable core: Al/PET tape with CuSn drain wire
   f) sheath: low smoke halogen free flame retardant polymer type HM2; color – red

3. Application: For installation in dry and wet rooms, also for direct bedding in concrete, but not for direct burial in ground and not for use in water. The cable has improved flame retardant and may be used in public buildings with high safety requirements and is suitable for control voltages and data transfer in alarm and fire alarm systems.

4. Drawing of cable test specimens

   a) **HTKSH PH90 1x2x1,0**

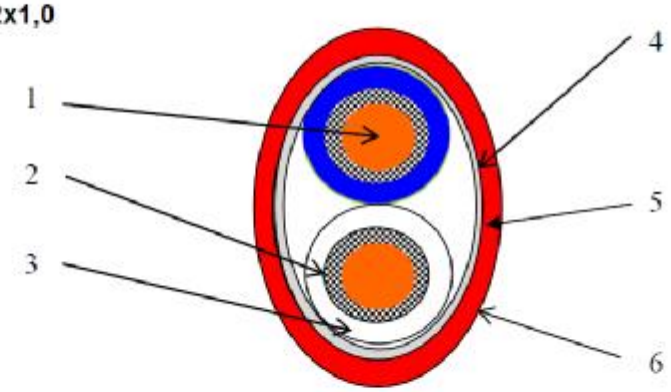


(ed. 30.04.2012) 1

Legend:

1 – solid copper conductor, diameter 0,98mm
2 – mica tape, diameter over tape 1,5mm
3 – insulation: low smoke halogen free flame retardant polymer, diameter 2,30mm
4 – sheath: low smoke halogen free flame retardant polymer, diameter 6,30mm

b) HTKSHekw PH90 1x2x1,0



Legend:

1 – solid copper conductor, diameter 0,98mm
2 – mica tape, diameter over tape 1,5mm
3 – insulation: low smoke halogen free flame retardant polymer, diameter 2,30mm
4 – polyester tape, diameter 3,90mm
5 – Al/PET tape, diameter over tape 3,95mm
6 – sheath: low smoke halogen free flame retardant polymer, diameter 6,60mm

5. Materials characteristic

4.1. Conductor – soft copper wires with following properties:
- elongation at break A_{100} 15÷20%
- tensile strength R_m min. 200 MPa

4.2. Mica tape
- thickness 0,125±0,015mm
- tensile strength min. 100 N/cm
- dielectric constant 1,2
- dielectric strength > 1,2 kV/layer

4.3. Insulation - cross-linked low smoke halogen free polymer
- tensile strength 14 N/mm^2
- elongation at break 180%
- hardness 58°Sh D
- oxygen index 36%

4.4. Al/PET tape 9/12 (thickness of aluminum 9µ; thickness of polyester 12µ)
- tensile strength - 36N/15mm
- elongation at break - 11

4.5. Sheath:
- tensile strength 11 MPa
- elongation at break 150%
- hardness 58°Sh D
- oxygen index 45%

FABRYKA KABLI MADEX

TECHNICAL DESCRIPTION OF FIRE RESISTANT CABLE NHXH FE180 PH90/E90 0,6/1 kV

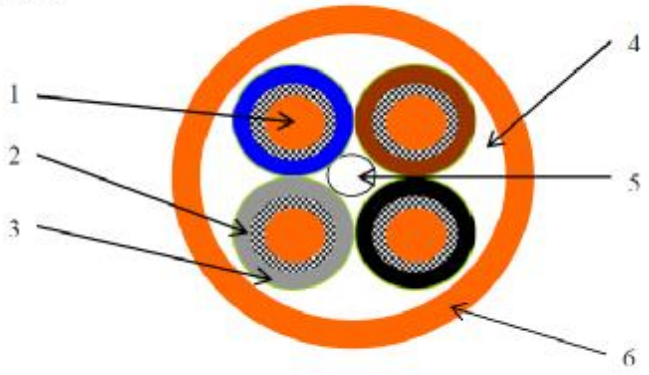
1. Technical parameters:

Nominal voltage U_o/U	0,6/1 kV
Conductor resistance – maximal value at temp. 20°C	according to PN-EN 60228
Test voltage	4 kV, 50 Hz
Insulation resistance - minimal value	10^{11} Ω·cm
Temperature range: - during installation - operating	-5°C do +50°C -25°C do +90°C
Maximum temperature for short circuit conditions	+ 250°C
Minimum bending radius: - one core cables - multi core cables	15 x outer diameter of the cable 12 x outer diameter of the cable
Flame retardance	PN-EN 60332-1-2, IEC 60332-1, PN-EN 60332-3-24, IEC 60332-3-24
Fire resistance of electric cable systems required to maintain circuit integrity	E90 DIN 4102-12
Circuit integrity	PN-IEC 60331-21 180min (FE180) temp. 750°C
Resistance to fire	PH 90 PN-EN 50200; PN-EN 50362
Corrosivity of gases issued during fire	PN-EN 50267-2-3 pH ≥ 4,3; conductivity ≤ 10μSmm^{-1}
Smoke density	PN-EN 50268-2 transmittance not less than 70%

2. Construction:
   a) conductor: copper according to PN-EN 60228,
      RE - round solid class 1
      RM – multiwire (stranded) class 2
   b) flame barrier: mica tape
   c) insulation: cross-linked low smoke halogen free polymer type HXI1
   d) Core identification: according to PN-HD 308; (J) means yellow – green protective conductor
   e) filling sheath: extruded halogen free flame retardant compound
   f) sheath: low smoke halogen free flame retardant polymer type HM4; color – orange

3. Application: For installation in dry and wet rooms, also for direct bedding in concrete, but not for direct burial in ground and not for use in water. The cable has improved flame retardant and may be used in public buildings with high safety requirements and is suitable for installation in fire alarm systems, safety lightning and other emergency electrical supply systems.

4. Drawing of cable test specimens



(ed. 30.04.2012) 1

Legend:

a) **NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE**
1 – solid copper conductor, diameter 1,37mm
2 – mica tapes (3 tapes thickness 0,125mm + 1 tape thickness 0,10mm with overlapping 20%), diameter over tapes - 2,4mm
3 – insulation: cross-linked low smoke halogen free polymer, diameter 4,58mm
4 – filling sheath: low smoke halogen free flame retardant polymer, diameter 13,20mm
5 – filler element: low smoke halogen free flame retardant polymer, diameter 1,82mm
6 – sheath: low smoke halogen free flame retardant polymer, diameter 16,10mm

b) **NHXH FE180 PH90/E90 0,6/1kV 4x50RM**
1 – multiwire (stranded) class 2 copper conductor, diameter 8,18mm
2 – mica tapes (3 tapes thickness 0,125mm + 1 tape thickness 0,10mm with overlapping 20%), diameter over tapes – 9,3mm
3 – insulation: cross-linked low smoke halogen free polymer, diameter 11,77mm
4 – filling sheath: low smoke halogen free flame retardant polymer, diameter 29,8mm
5 – filler element: low smoke halogen free flame retardant polymer, diameter 4,78mm
6 – sheath: low smoke halogen free flame retardant polymer, diameter 33,70mm

5. Materials characteristic

4.1. Conductor – soft copper wires with following properties:
- elongation at break A_{100} - 15÷20%
- tensile strength R_m - min. 200 MPa

4.2. Mica tape

- thickness	0,125±0,015mm	0,10±0,015
- tensile strength	min. 100 N/cm	min. 100 N/cm
- dielectric constant	1,2	1,2
- dielectric strength	> 1,2 kV/layer	> 1 kV/layer

4.3. Insulation - cross-linked low smoke halogen free polymer
- tensile strength - 11,5 N/mm^2
- elongation at break - 280%
- hardness - 45°Sh D
- oxygen index - 33%

4.4. Filling sheath - halogen free compound with low emission of toxic and corrosives gases

4.5. Sheath:
- tensile strength - 12 MPa
- elongation at break - 180%
- hardness - 50°Sh D
- oxygen index - 40%

FABRYKA KABLI MADEX

TECHNICAL DESCRIPTION OF FIRE RESISTANT CABLE NHXCH FE180 PH90/E90 0,6/1 kV

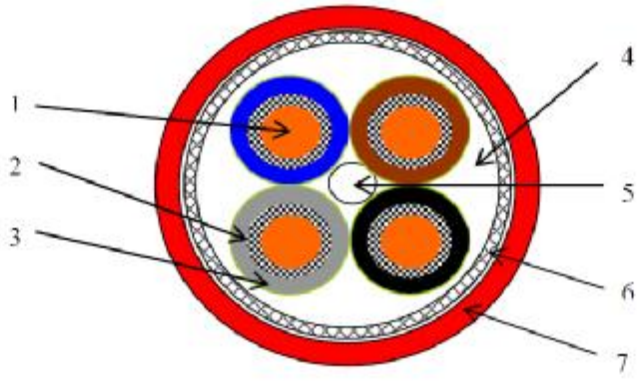
1. Technical parameters:

Nominal voltage U_o/U	0,6/1 kV
Conductor resistance – maximal value at temp. 20°C	according to PN-EN 60228
Test voltage	4 kV, 50 Hz
Insulation resistance - minimal value	10^{11} Ω·cm
Temperature range: - during installation - operating	-5°C do +50°C -25°C do +90°C
Maximum temperature for short circuit conditions	+ 250°C
Minimum bending radius: - one core cables - multi core cables	15 x outer diameter of the cable 12 x outer diameter of the cable
Flame retardance	PN-EN 60332-1-2, IEC 60332-1, PN-EN 60332-3-24, IEC 60332-3-24
Fire resistance of electric cable systems required to maintain circuit integrity	E90 DIN 4102-12
Circuit integrity	PN-IEC 60331-21 180min (FE180) temp. 750°C
Resistance to fire	PH 90 PN-EN 50200; PN-EN 50362
Corrosivity of gases issued during fire	PN-EN 50267-2-3 pH ≥ 4,3; conductivity ≤ 10μSmm^{-1}
Smoke density	PN-EN 50268-2 transmittance not less than 70%

2. Construction:
   a) conductor: copper according to PN-EN 60228,
      RE - round solid class 1
      RM – multiwire (stranded) class 2
   b) flame barrier: mica tape
   c) insulation: cross-linked low smoke halogen free polymer type HXI1
   d) core identification: according to PN-HD 308; (J) means yellow – green protective conductor
   e) filling sheath: extruded low smoke halogen free flame retardant compound
   f) concentric conductor: helically applied Cu-wires + counter helix
   g) sheath: low smoke halogen free flame retardant polymer type HM4; color – orange

3. Application: For installation in dry and wet rooms, also for direct bedding in concrete, but not for direct burial in ground and not for use in water. The cable has improved flame retardant and may be used in public buildings with high safety requirements and is suitable for installation in fire alarm systems, safety lightning and other emergency electrical supply systems.

4. Drawing of cable test specimens



(ed. 30.04.2012)

Legend:

a) NHXCH FE180 PH90/E90 0,6/1kV 4x1,5RE

1 – solid copper conductor, diameter 1,37mm
2 – mica tapes (3 tapes thickness 0,125mm + 1 tape thickness 0,10mm with overlapping 20%), diameter over tapes - 2,4mm
3 – insulation: cross-linked low smoke halogen free polymer, diameter 4,51mm
4 – filling sheath: low smoke halogen free flame retardant polymer, diameter 13,20mm
5 – filler element: low smoke halogen free flame retardant polymer, diameter 1,74mm
6 – concentric conductor, diameter 13,60mm
7 – sheath: low smoke halogen free flame retardant polymer, diameter 17,35mm

b) NHXCH FE180 PH90/E90 0,6/1kV 4x50RM

1 – multiwire (stranded) class 2 copper conductor, diameter 8,14mm
2 – mica tapes (3 tapes thickness 0,125mm + 1 tape thickness 0,10mm with overlapping 20%), diameter over tapes – 9,3mm
3 – insulation: cross-linked low smoke halogen free polymer, diameter 11,71mm
4 – filling sheath: low smoke halogen free flame retardant polymer, diameter 30,35mm
5 – filler element: low smoke halogen free flame retardant polymer, diameter 4,80mm
6 – concentric conductor, diameter 31,5mm
7 – sheath: low smoke halogen free flame retardant polymer, diameter 36,80mm

5. Materials characteristic

4.1. Conductor – soft copper wires with following properties:
- elongation at break A_{100} 15÷20%
- tensile strength R_m min. 200 MPa

4.2. Mica tape

- thickness	0,125±0,015mm	0,10±0,015
- tensile strength	min. 100 N/cm	min. 100 N/cm
- dielectric constant	1,2	1,2
- dielectric strength	> 1,2 kV/layer	> 1 kV/layer

4.3. Insulation - cross-linked low smoke halogen free polymer
- tensile strength 11,5 N/mm^2
- elongation at break 280%
- hardness 45°Sh D
- oxygen index 33%

4.4. Filling sheath - a thermoplastic halogen free compound with oxygen index 40%

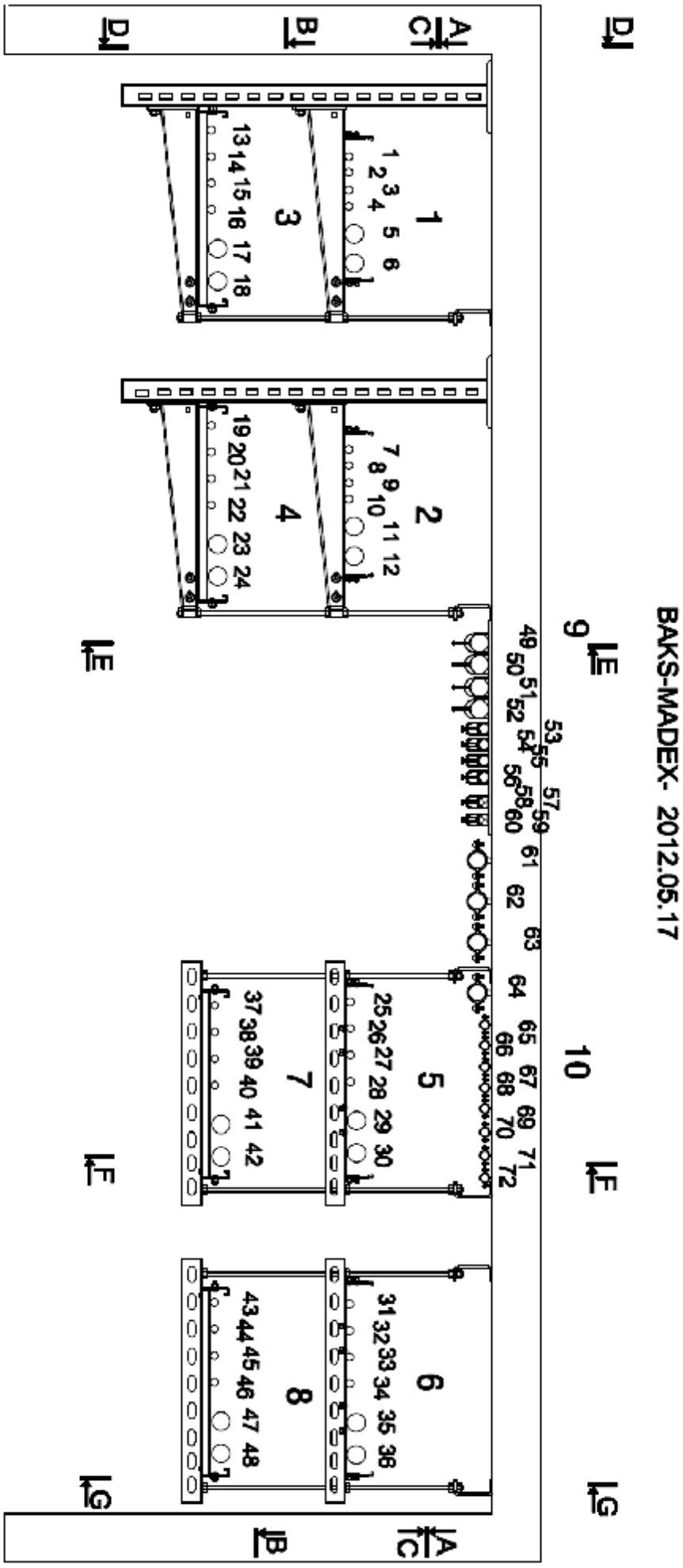
4.5. Concentric conductor

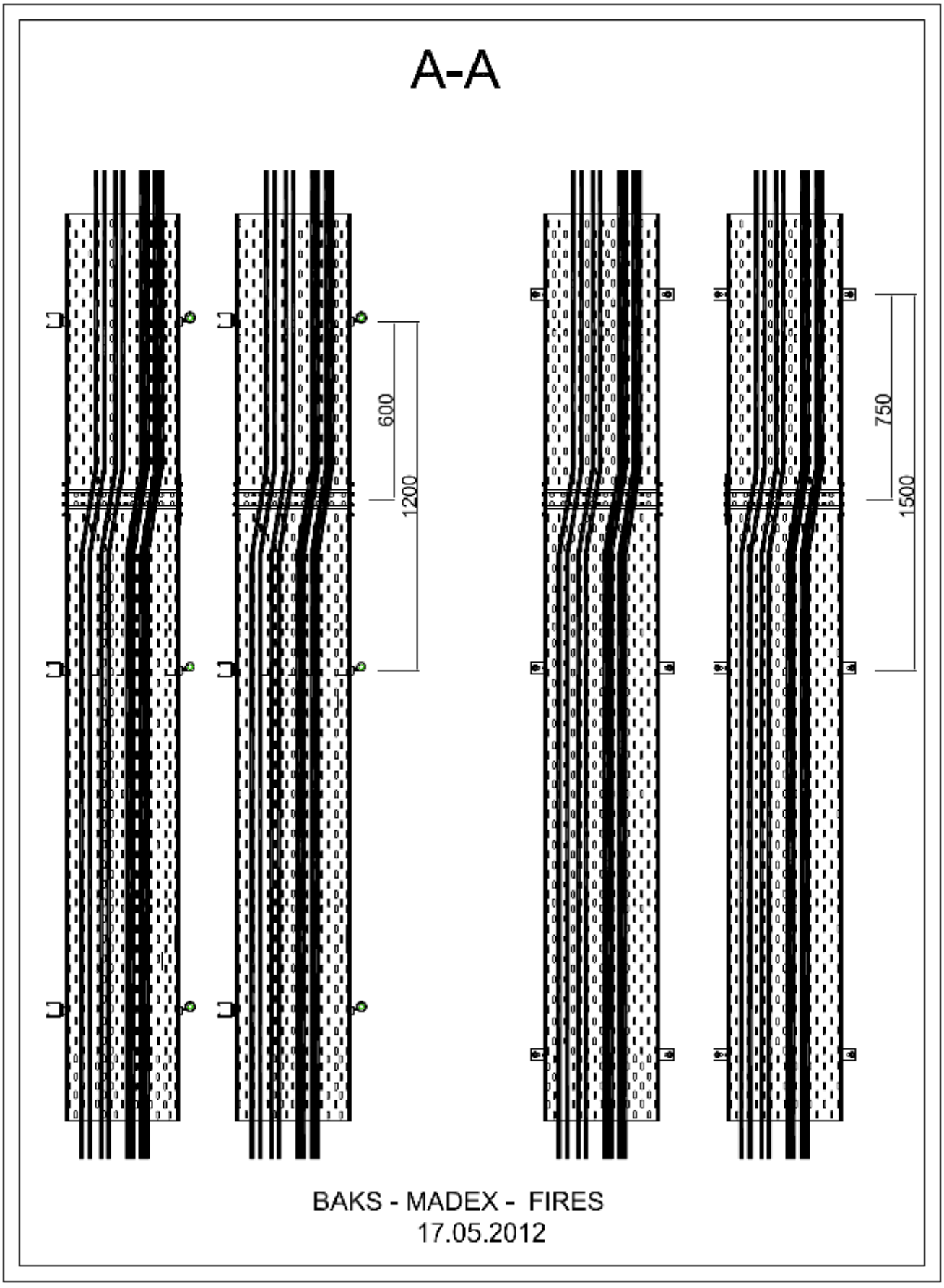
soft copper wires + counter helix made of copper tape thickness 0,1mm and wrapped with polyester foil

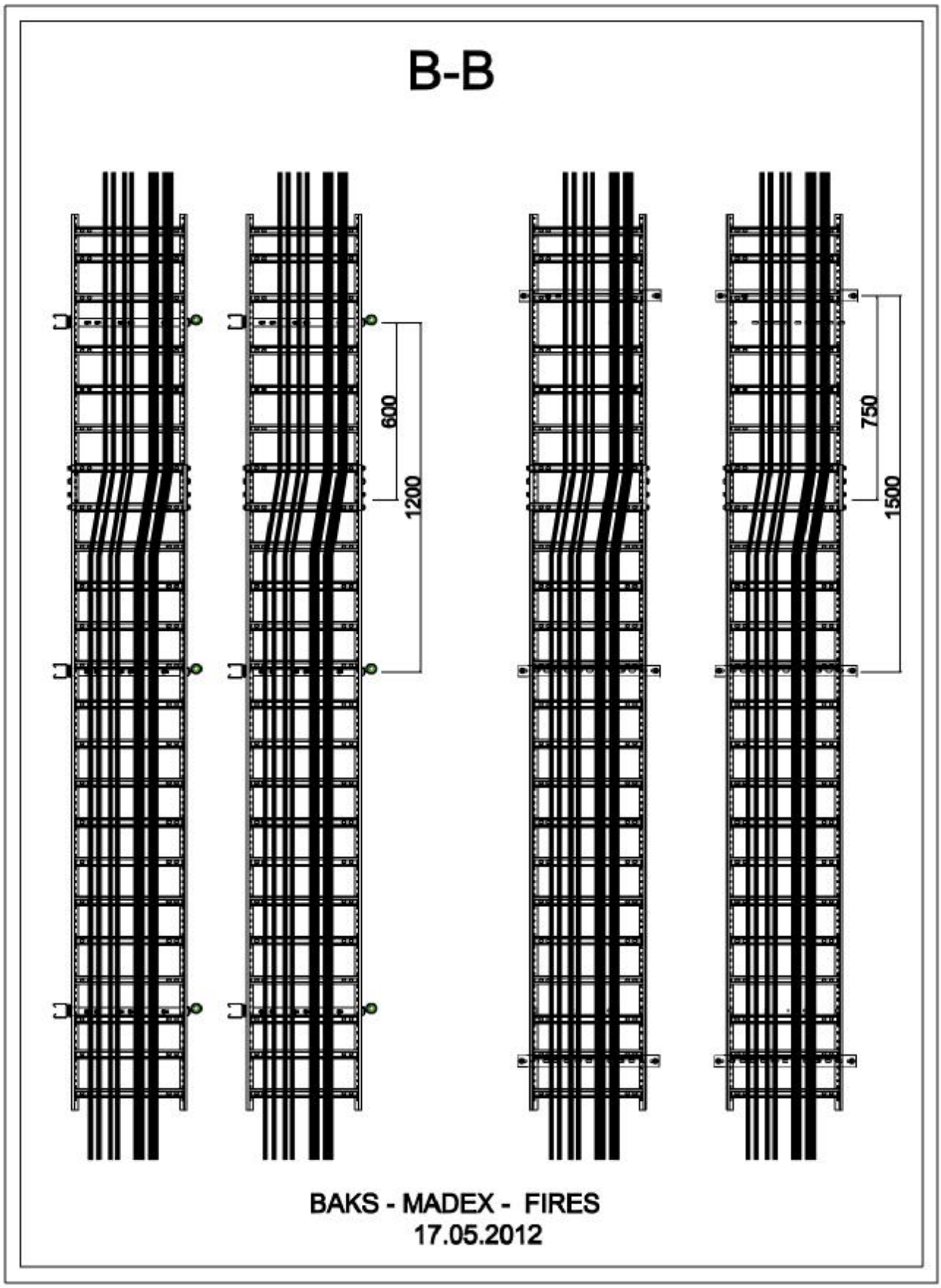
4.6. Sheath:
- tensile strength 12 MPa
- elongation at break 180%
- hardness 50°Sh D
- oxygen index 40%

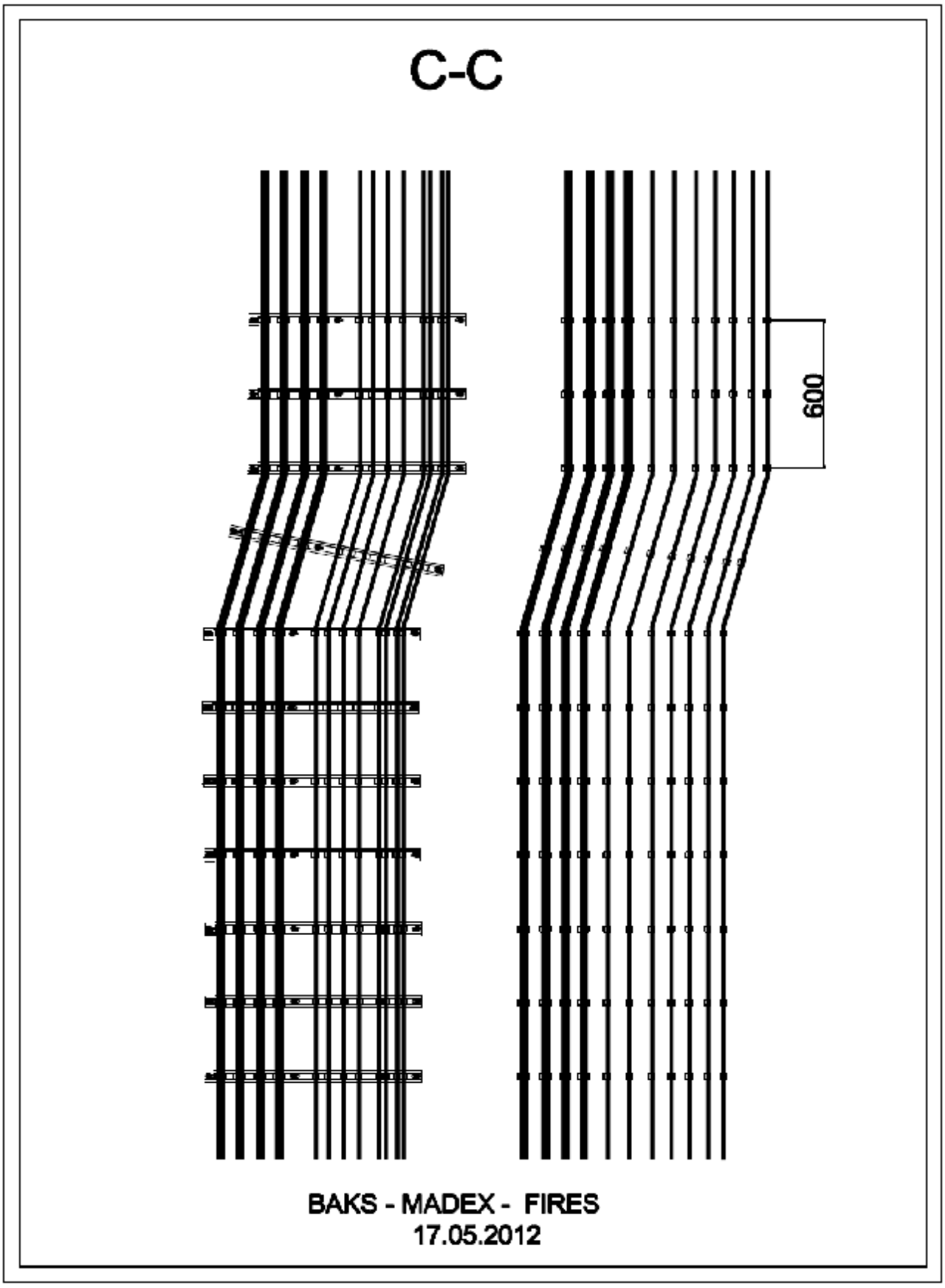
Nr	Nr Fires	Symbol kaba	Pozycja	Konstrukcja mocowania, odległość, obciążenie
1	63	HTKSH PH90 1x2x1,0	1	Korytko kablowe KCOP 300H60/... B-400 1.2 m /10kg/m / grubość blachy 1,5 mm Mocowanie : Wspornik WPCO1000, Wysięgnik WMCO400 , pręt gwintowany PG M10 do betonu za pomocą uchwytu USOV i śruby rozporowej PSRO M10x80
2		HTKSH PH90 1x2x1,0		
3	48	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
4	47	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
5	46	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
6	45	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
7	61	HTKSHekw PH90 1x2x1,0	2	Korytko kablowe KCOP 300H60/... B-400 1.2 m /10kg/m / grubość blachy 1,5 mm Mocowanie : Wspornik WPCO1000, Wysięgnik WMCO400 , pręt gwintowany PG M10 do betonu za pomocą uchwytu USOV i śruby rozporowej PSRO M10x80
8		HTKSHekw PH90 1x2x1,0		
9	40	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
10	39	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
11	38	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
12	37	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
13	62	HTKSH PH90 1x2x1,0	3	Drabina kablowa DGOP400H60/... B-400 1.2 m /20kg/m / grubość blachy 1,5 mm Mocowanie : Wspornik WPCO1000, Wysięgnik WMCO400 , pręt gwintowany PG M10 do betonu za pomocą uchwytu USOV i śruby rozporowej PSRO M10x80
14		HTKSH PH90 1x2x1,0		
15	44	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
16	43	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
17	42	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
18	41	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
19	60	HTKSHekw PH90 1x2x1,0	4	Drabina kablowa DGOP400H60/... B-400 1.2 m /20kg/m / grubość blachy 1,5 mm Mocowanie : Wspornik WPCO1000, Wysięgnik WMCO400 , pręt gwintowany PG M10 do betonu za pomocą uchwytu USOV i śruby rozporowej PSRO M10x80
20		HTKSHekw PH90 1x2x1,0		
21	36	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
22	35	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
23	34	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
24	33	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
25	55	HTKSH PH90 1x2x1,0	5	Korytko kablowe KCOP 400H60/... B-400 1.5 m /10kg/m / grubość blachy 1,5 mm Mocowanie : Ceownik CWOP40H40/05, pręt gwintowany PG M10 do betonu za pomocą uchwytu USOV i śruby rozporowej PSRO M10x80
26		HTKSH PH90 1x2x1,0		
27	16	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
28	15	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
29	14	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
30	13	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
31	53	HTKSHekw PH90 1x2x1,0	6	Korytko kablowe KCOP 400H60/... B-400 1.5 m /10kg/m / grubość blachy 1,5 mm Mocowanie : Ceownik CWOP40H40/05, pręt gwintowany PG M10 do betonu za pomocą uchwytu USOV i śruby rozporowej PSRO M10x80
32		HTKSHekw PH90 1x2x1,0		
33	8	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
34	7	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
35	6	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
36	5	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
37	54	HTKSH PH90 1x2x1,0	7	Drabina kablowa DGOP400H60/... B-400 1.5 m /20kg/m / grubość blachy 1,5 mm Mocowanie : : Ceownik CWOP40H40/05, pręt gwintowany PG M10 do betonu za pomocą uchwytu USOV i śruby rozporowej PSRO M10x80
38		HTKSH PH90 1x2x1,0		
39	12	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
40	11	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
41	10	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
42	9	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		

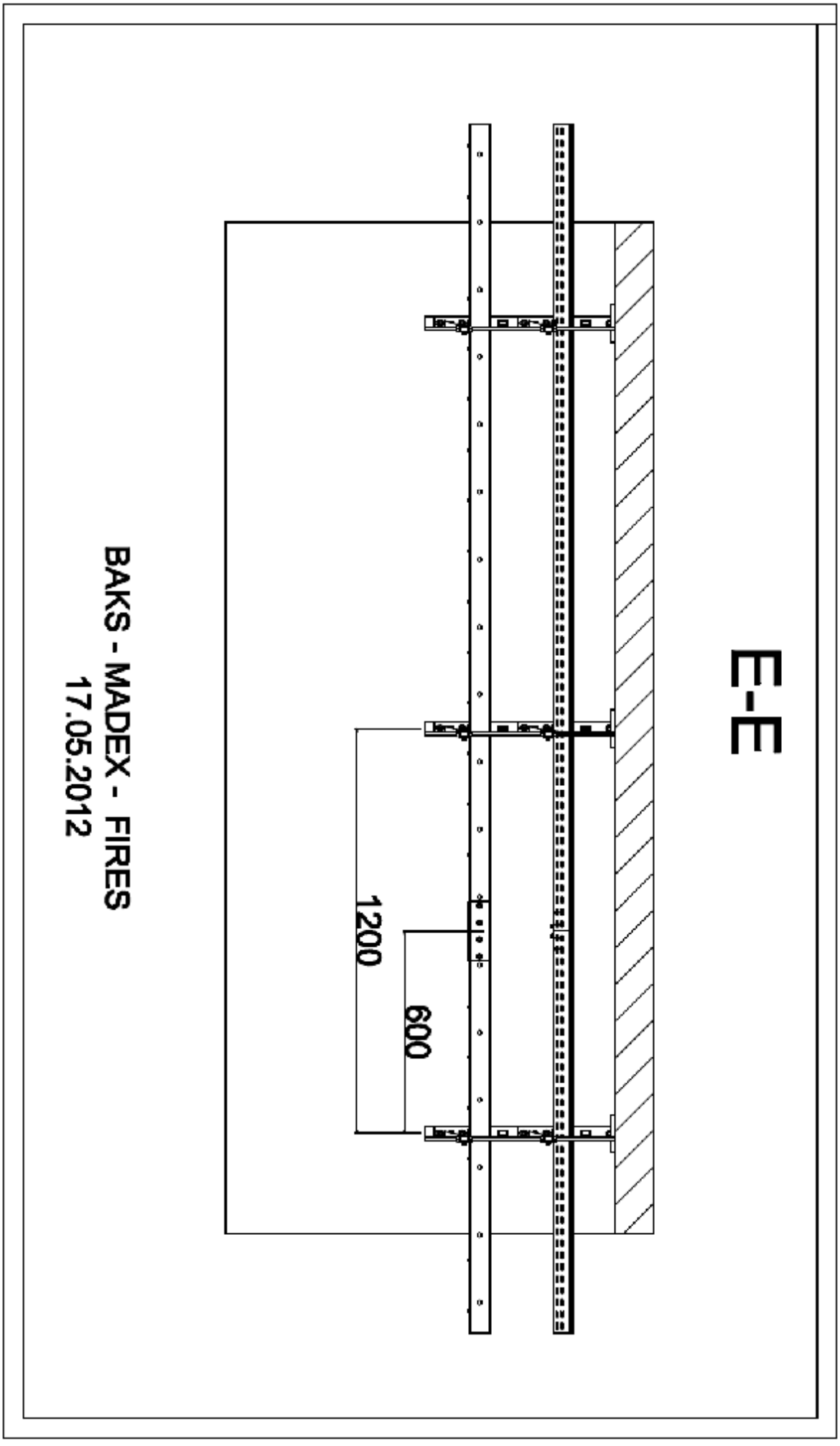
Nr	Nr Fires	Symbol kaba	Pozycja	Konstrukcja mocowania, odległość, obciążenie
43	52	HTKSHekw PH90 1x2x1,0	8	Drabina kablowa DGOP400H60/... B-400 1.5 m /20kg/m / grubość blachy 1,5 mm Mocowanie : : Ceownik CWOP40H40/05, pręt gwintowany PG M10 do betonu za pomocą uchwytu USOV i śruby rozporowej PSRO M10x80
44		HTKSHekw PH90 1x2x1,0		
45	4	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
46	3	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
47	2	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
48	1	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
49	32	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM	9	Uchwyty kablowe UKO1+ SDOP 500. Mocowanie do betonu co 300mm za pomocą kołka SRO 6x30
50	31	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
51	30	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
52	29	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
53	28	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
54	27	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
55	26	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
56	25	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
57	59	HTKSHekw PH90 1x2x1,0		
58		HTKSHekw PH90 1x2x1,0		
59	58	HTKSH PH90 1x2x1,0		
60		HTKSH PH90 1x2x1,0		
61	24	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM	10	Uchwyty kablowe KSA. Mocowanie do betonu co 300mm za pomocą kołka SRO 6x30
62	23	NHXCH FE180 PH90/E90 0,6/1kV 4x50/25RM		
63	22	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
64	21	NHXH FE180 PH90/E90 0,6/1kV 4x50RM		
65	20	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
66	19	NHXCH FE180 PH90/E90 0,6/1kV 4x1,5/1,5RE		
67	18	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
68	17	NHXH FE180 PH90/E90 0,6/1kV 4x1,5RE		
69	57	HTKSHekw PH90 1x2x1,0		
70		HTKSHekw PH90 1x2x1,0		
71	56	HTKSH PH90 1x2x1,0		
72		HTKSH PH90 1x2x1,0		

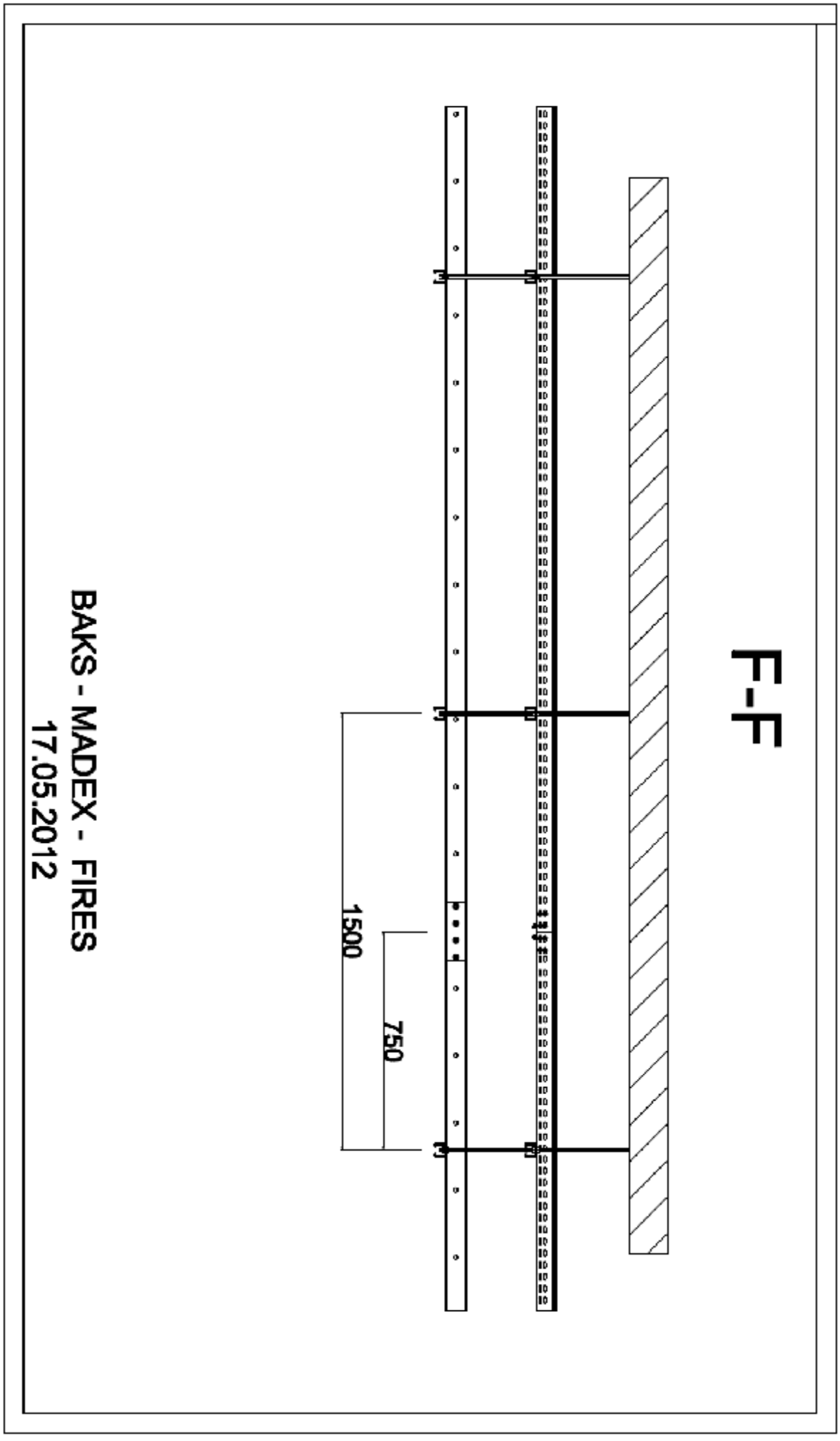

BAKS-MADEX- 2012.05.17
DJ
AJ
CJ
BJ
DJ
9
10
IE
IF
IG
IA
IC
IB
1
2
3
4
5
6
7
8

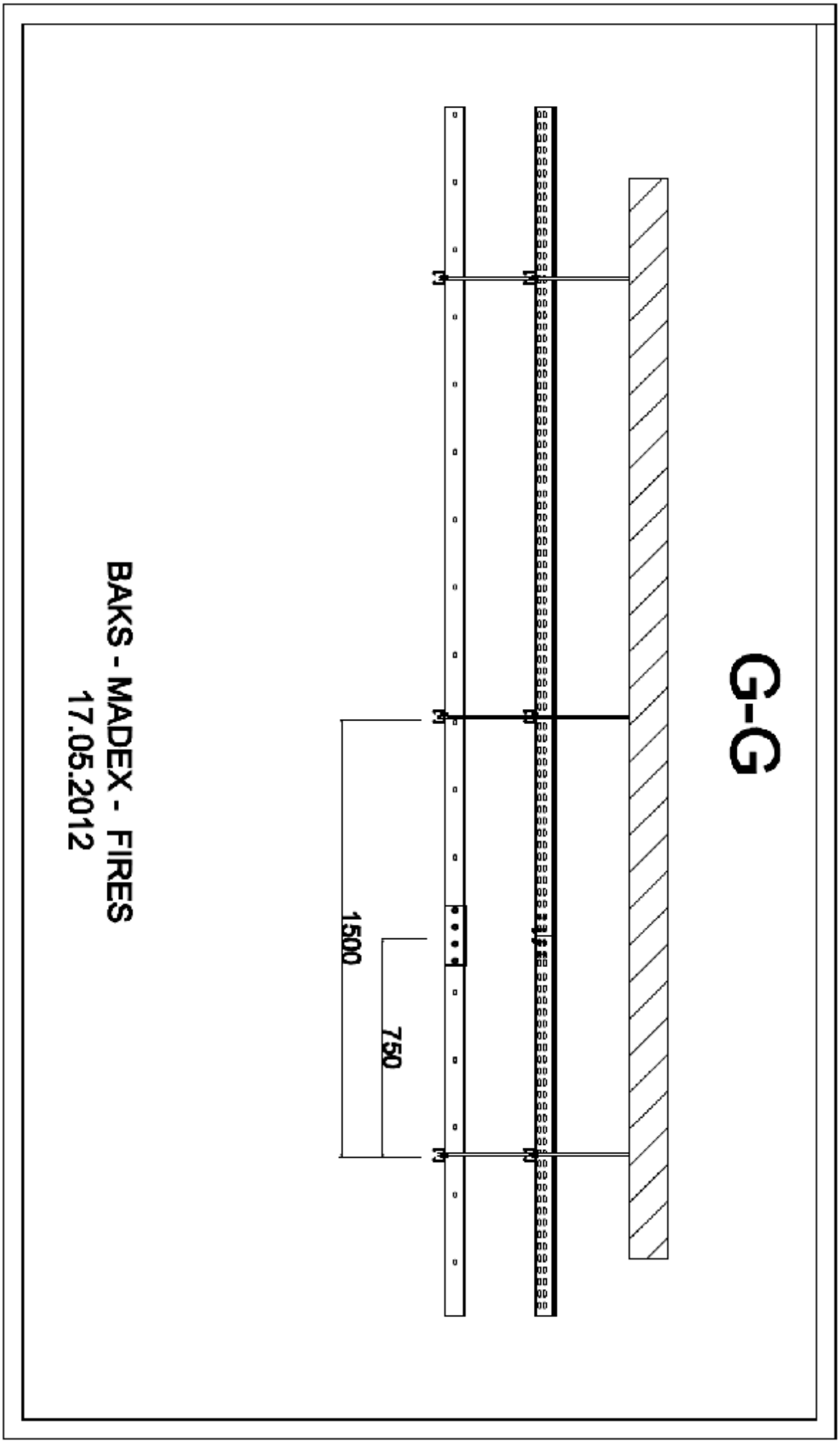

A-A
600
1200
750
1500
BAKS - MADEX - FIRES
17.05.2012

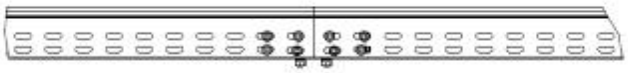

B-B
600
1200
750
1500
BAKS - MADEX - FIRES
17.05.2012

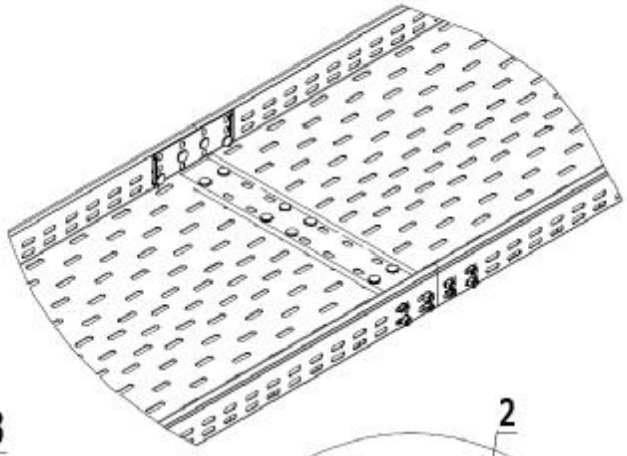

C-C
600
BAKS - MADEX - FIRES
17.05.2012

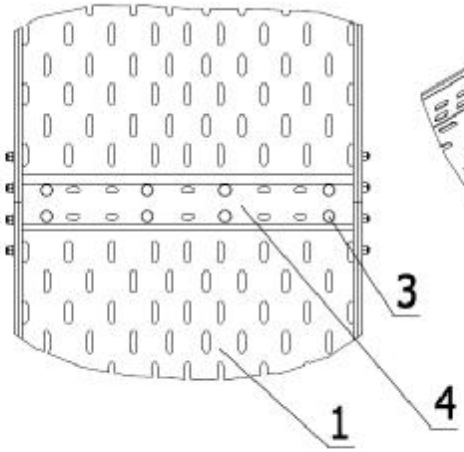

E-E
1200
600
BAKS - MADEX - FIRES
17.05.2012

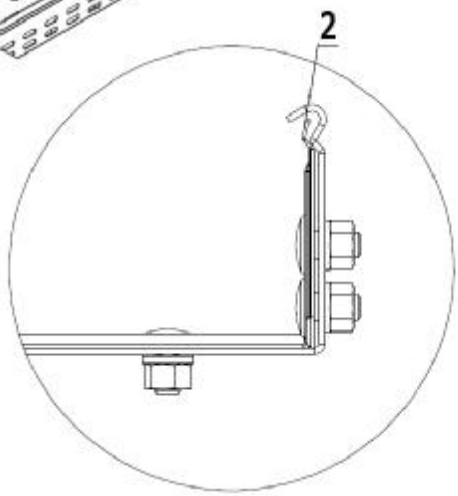

F-F
1500
750
BAKS - MADEX - FIRES
17.05.2012


G-G
1500
750
BAKS - MADEX - FIRES
17.05.2012









Poz.1		Poz.4
A	Typ	Typ
100	KCP100H60/3N-F	BL□100N
200	KCP200H60/3N-F	BL□200N
300	KCP300H60/3N-F	BL□300N
400	KCP400H60/3N-F	BL□400N

Lp.	Nazwa	Symbol	Materiał	Szt.	Nr katalogowy
4	Blacha łącznikowa	BL□400N		1	
3	Śruba	SGN M6x12		24	
2	Łącznik	LP□PH60N		2	
1	Koryto	KC□P400H60/3N		1	

Odchyłki wymiarów nietolerowanych

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

Masa [kg]

Podziałka: 1:10

Format: A4; Arkusz: 1; Arkuszy: 1

Projektował			
Rysował	J.Grochowski		
Sprawdził			
Zatwierdził			

Nazwisko | Podpis | Data

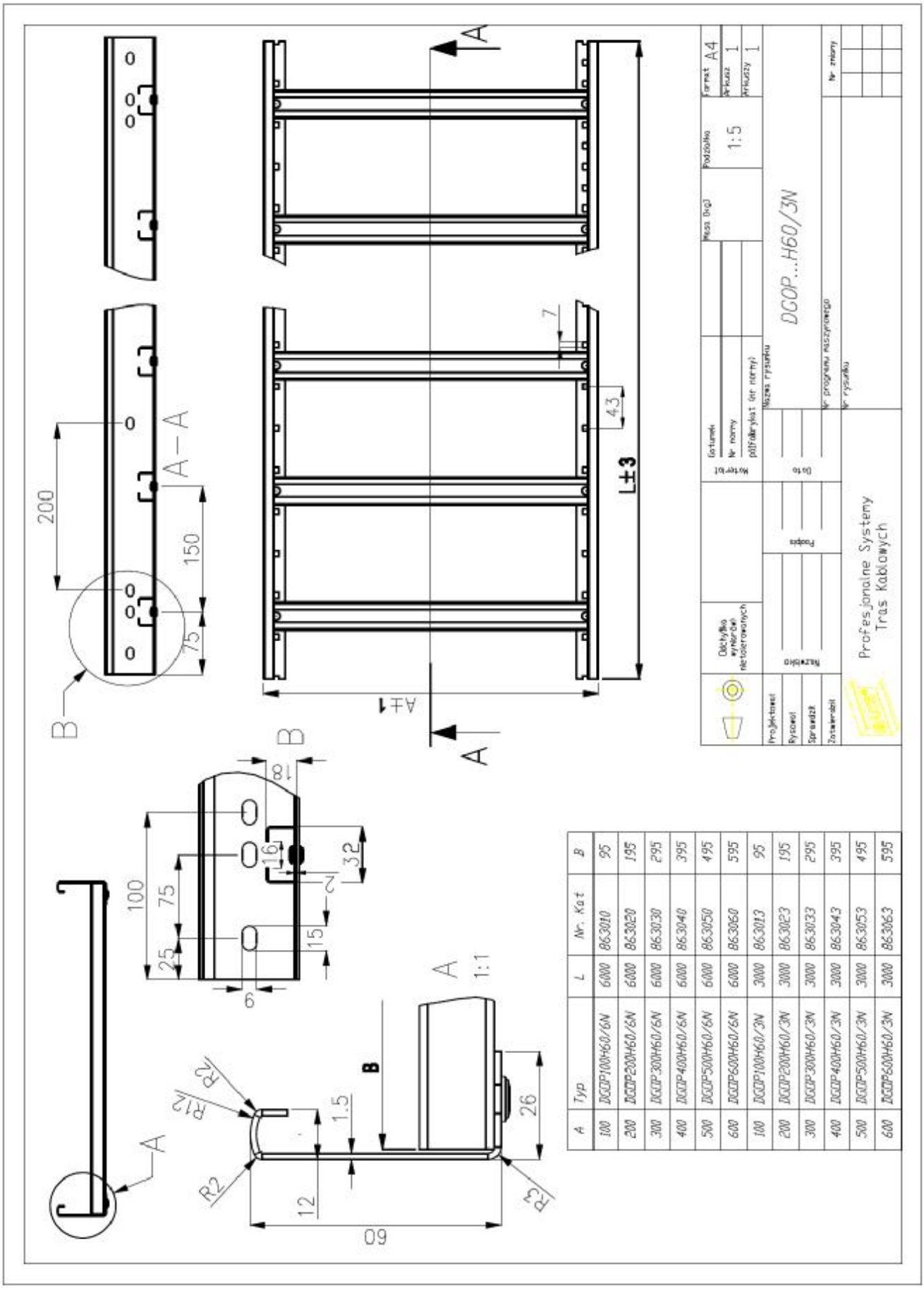
Nazwa rysunku: KC□P400H60/3N

Nr programu maszynowego

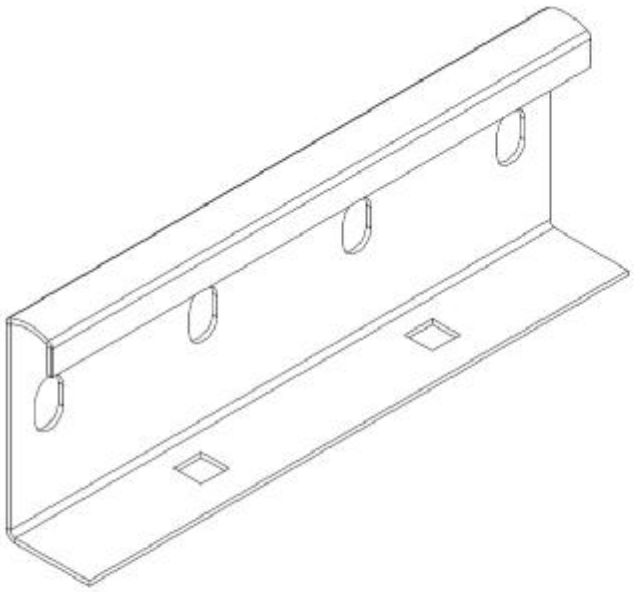
Nr rysunku

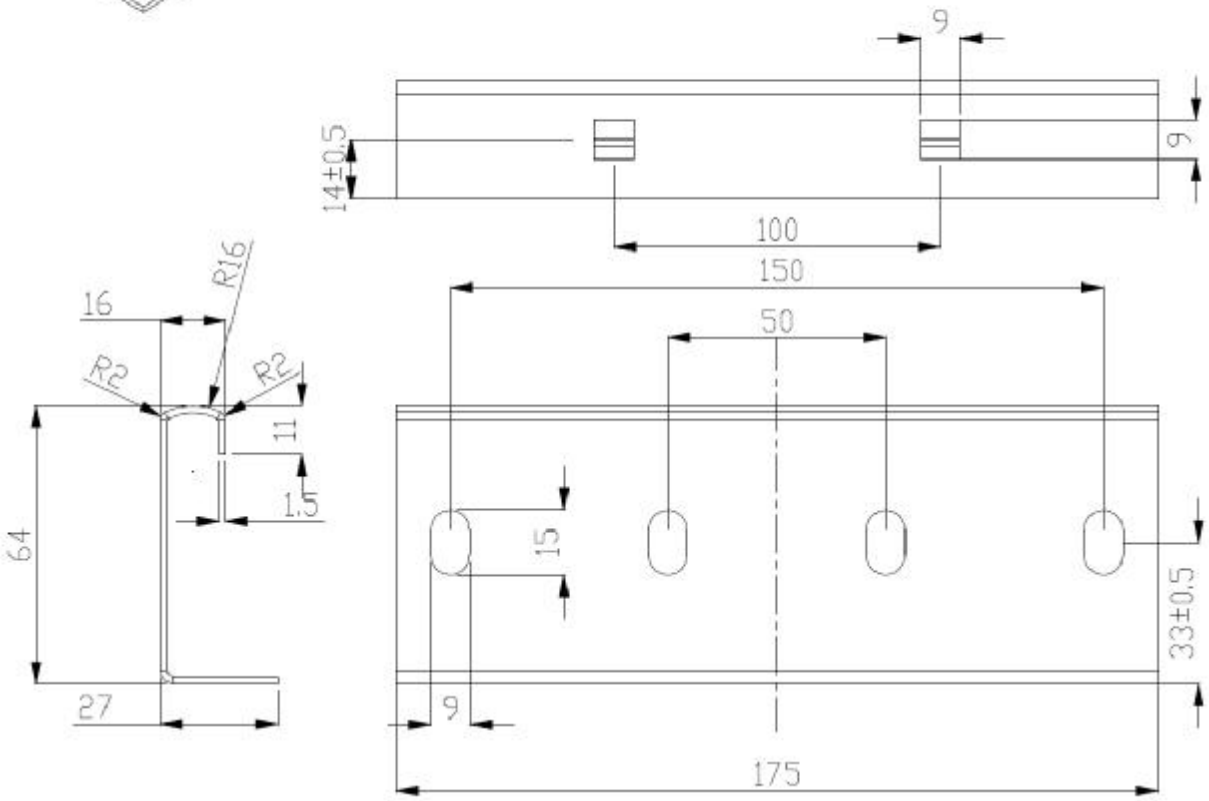
Nr zmiany

Profesjonalne Systemy Tras Kablowych

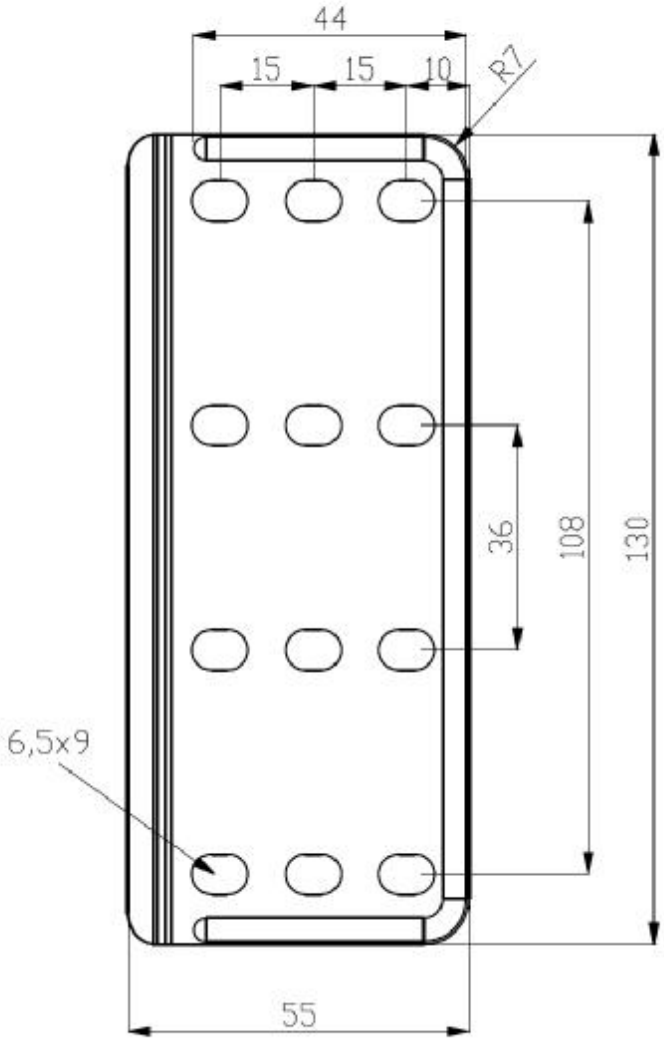


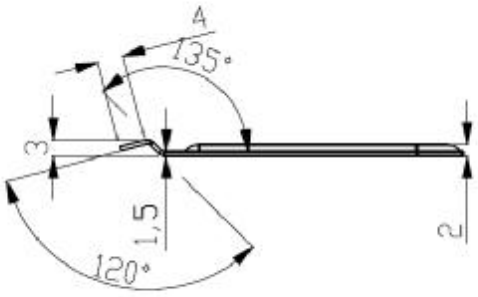
A	Typ	L	Nr. Kat	B
100	DCOP100H60/6N	6000	863010	95
200	DCOP200H60/6N	6000	863020	195
300	DCOP300H60/6N	6000	863030	295
400	DCOP400H60/6N	6000	863040	395
500	DCOP500H60/6N	6000	863050	495
600	DCOP600H60/6N	6000	863060	595
100	DCOP100H60/3N	3000	863013	95
200	DCOP200H60/3N	3000	863023	195
300	DCOP300H60/3N	3000	863033	295
400	DCOP400H60/3N	3000	863043	395
500	DCOP500H60/3N	3000	863053	495
600	DCOP600H60/3N	3000	863063	595



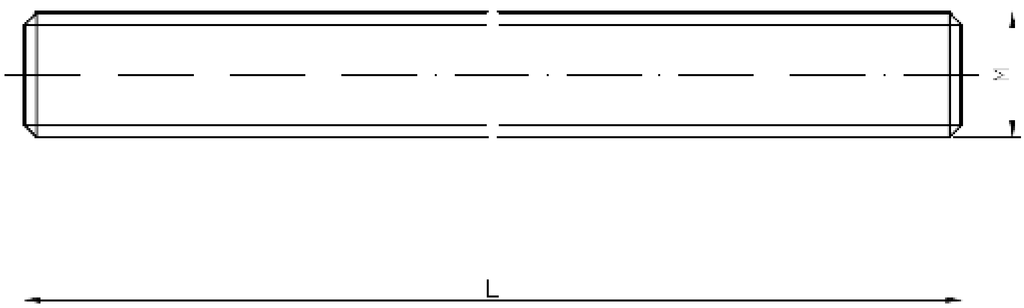


	Odchylka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podobieństo	Format A4
				Nr normy				Arkusz
				półFabrykat (nr normy)				Arkuszy
Projektował	JGRODKOWSKI	Podpis	Data	20.10.05	Nazwa rysunku LDOCH60N			
Rysował	JGrochowski			20.10.05				
Sprawdził	T.WŁODARCZYK			20.10.05				
Zatwierdził	J.KLICZEK			20.10.05	Nr programu			Nr zmiany
Profesjonalne Systemy Tras Kablowych					Nr programu Nadsyłającego			





	Odchyłka wymiarów nietolerowanych		Materiał: Gatunek		Masa [kg]	Podziałka 1:1	Format A4
			Nr normy				Arkusz
			półfabrykat (nr normy)				Arkuszy
Projektował	Nazwisko: J.GROCHOWSKI	Podpis	Data	Nazwa rysunku: LPOPH60N			
Rysował	J.Grochowski						
Sprawdził	T.WŁODARCZYK						
Zatwierdził	J.KLICZEK			Nr programu maszynowego		Nr zmiany	
Profesjonalne Systemy Tras Kablowych				Nr rysunku			



Symbol	Gwint M (mm)	Długość L (mm)	Masa (kg)	Nr katalogowy
PGM12/1	12	1000	0,72	651201
PGM10/1	10	1000	0,49	651001
PGM6/1	6	1000	0,16	650301

Dokładność wymiarów nietolerowanych	Grubość [mm] –	Materiał: Gatunek: Stal cynkowana galwanicznie; Nr normy:	Masa [kg]	Podziałka 2:1	Format A4; Arkusz; Arkuszy

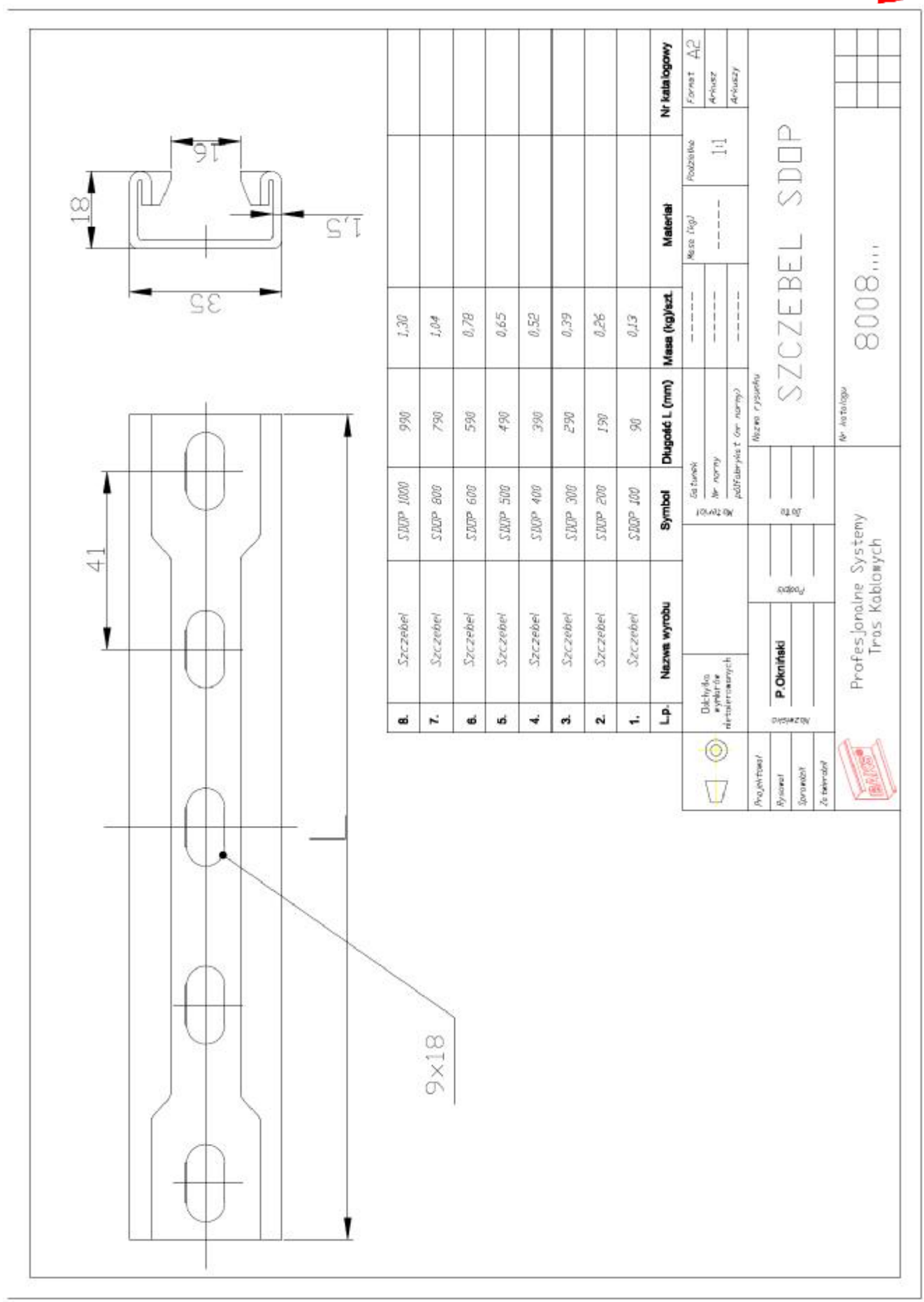
	Nazwisko	Podpis	Data
Projektował	J.GROCHOWSKI		20.10.05
Rysował	J.Grochowski		20.10.05
Sprawdził	T.WLODARCZYK		20.10.05
Zatwierdził	J.KLICZEK		20.10.05

Nazwa rysunku: PGM..../1

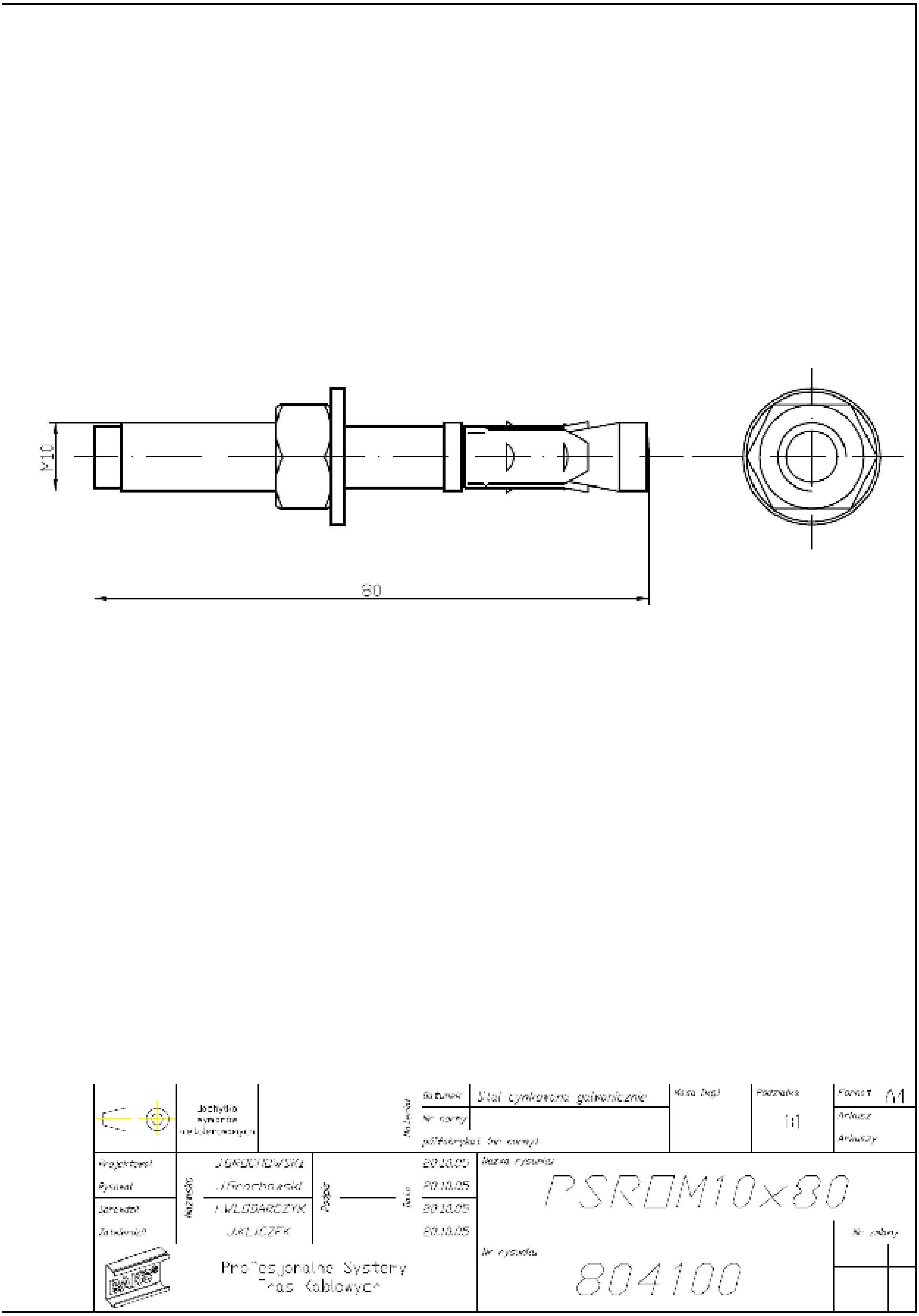
Nr zmiany

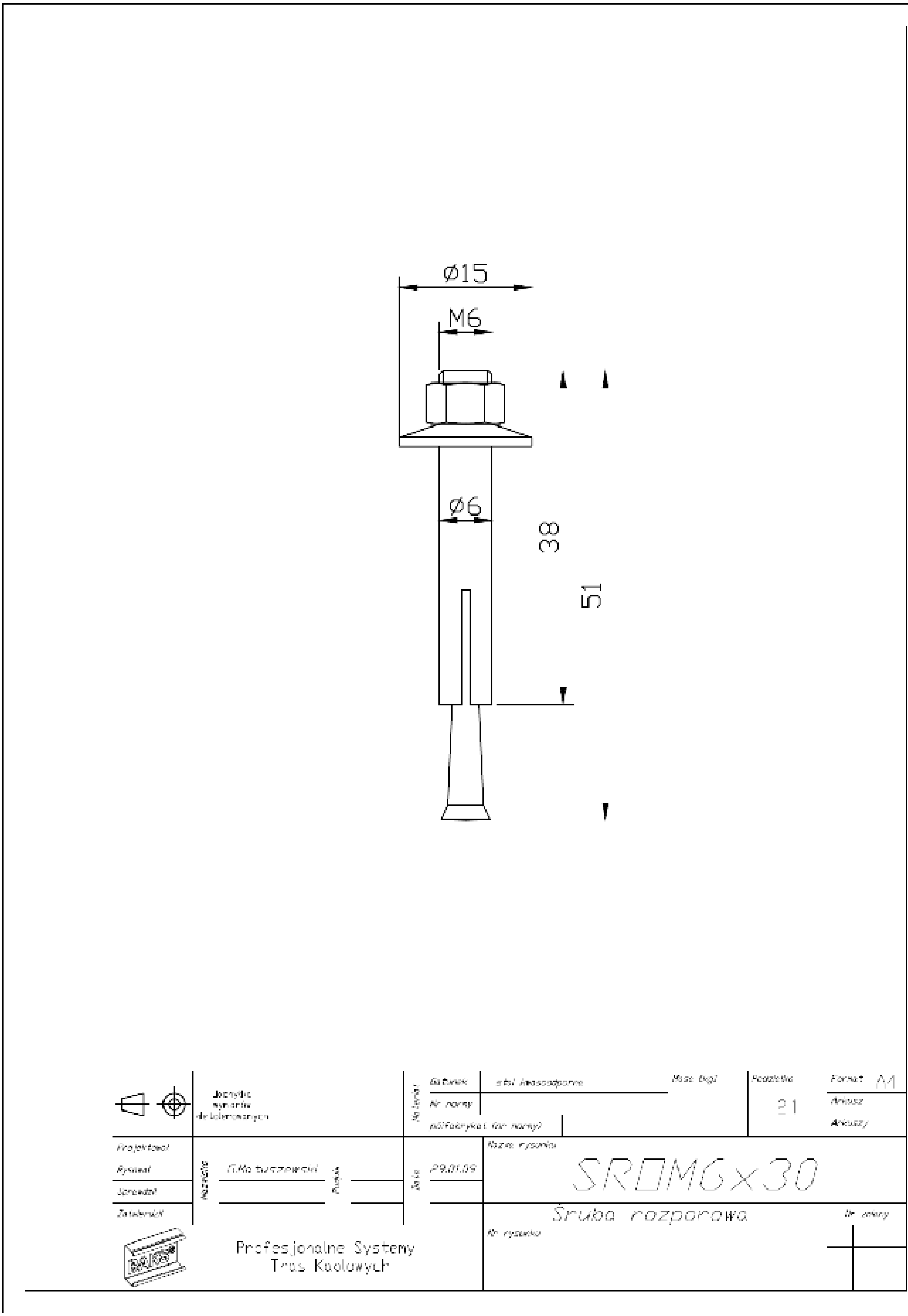
Profesjonalne Systemy Tras Kablowych

Nr rysunku

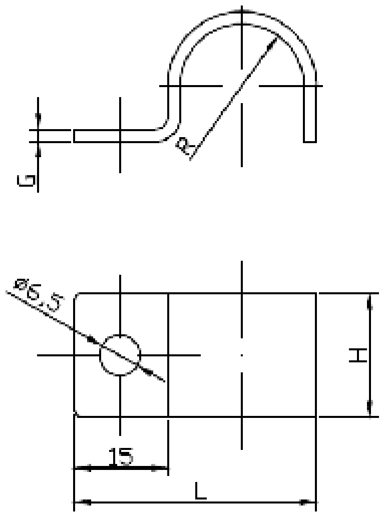


L.p.	Nazwa wyrobu	Symbol	Długość L (mm)	Masa (kg)/szt.	Materiał	Nr katalogowy
8.	Szczebel	SDOP 1000	990	1,30		
7.	Szczebel	SDOP 800	790	1,04		
6.	Szczebel	SDOP 600	590	0,78		
5.	Szczebel	SDOP 500	490	0,65		
4.	Szczebel	SDOP 400	390	0,52		
3.	Szczebel	SDOP 300	290	0,39		
2.	Szczebel	SDOP 200	190	0,26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


M10
80
Stal cynkowana galwanicznie
1:1
A4
PSR M10x80
804100



Ø15
M6
Ø6
38
51
Format A4
2:1
Nazwa rysunku
SR□M6x30
Śruba rozporowa
Nr rysunku
29.01.09
Profesjonalne Systemy
Tras Kablowych



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

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

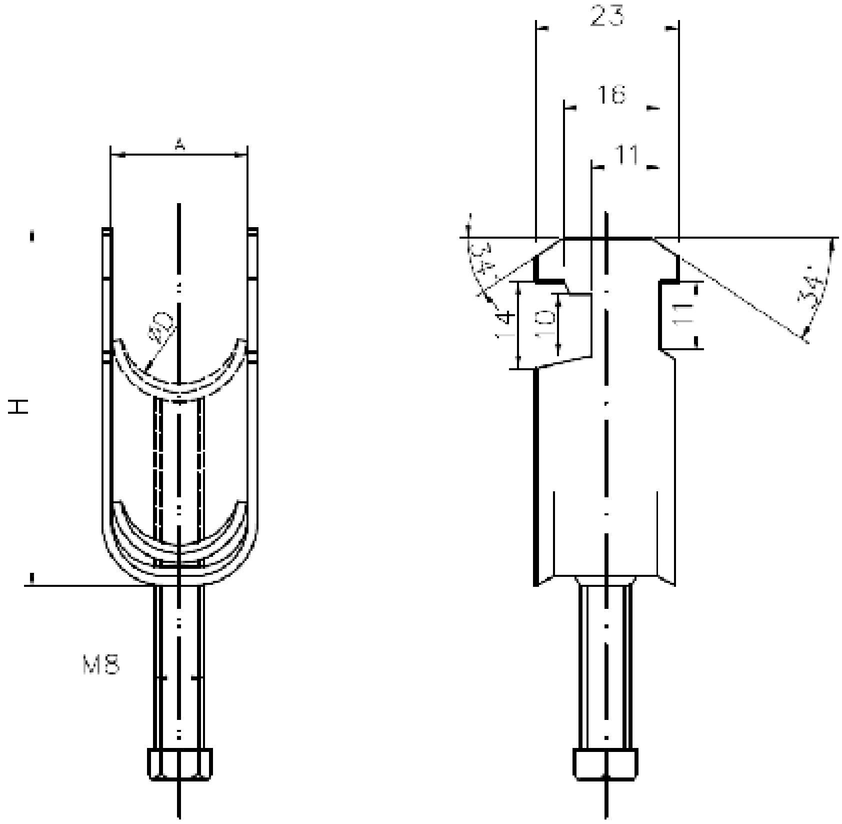
Funkcja	Nazwisko	Podpis	Data
Projektował	Jacek Grochowski		20.10.05
Rysował	Jakub Rudak		20.02.08
Sprawdził	Jacek Kliczek		20.02.08
Zatwierdził	Jacek Kliczek		20.02.08

Nazwa rysunku: UDF 5-43

Nr zmiany

Profesjonalne Systemy Tras Kablowych

Nr rysunku: 4055......



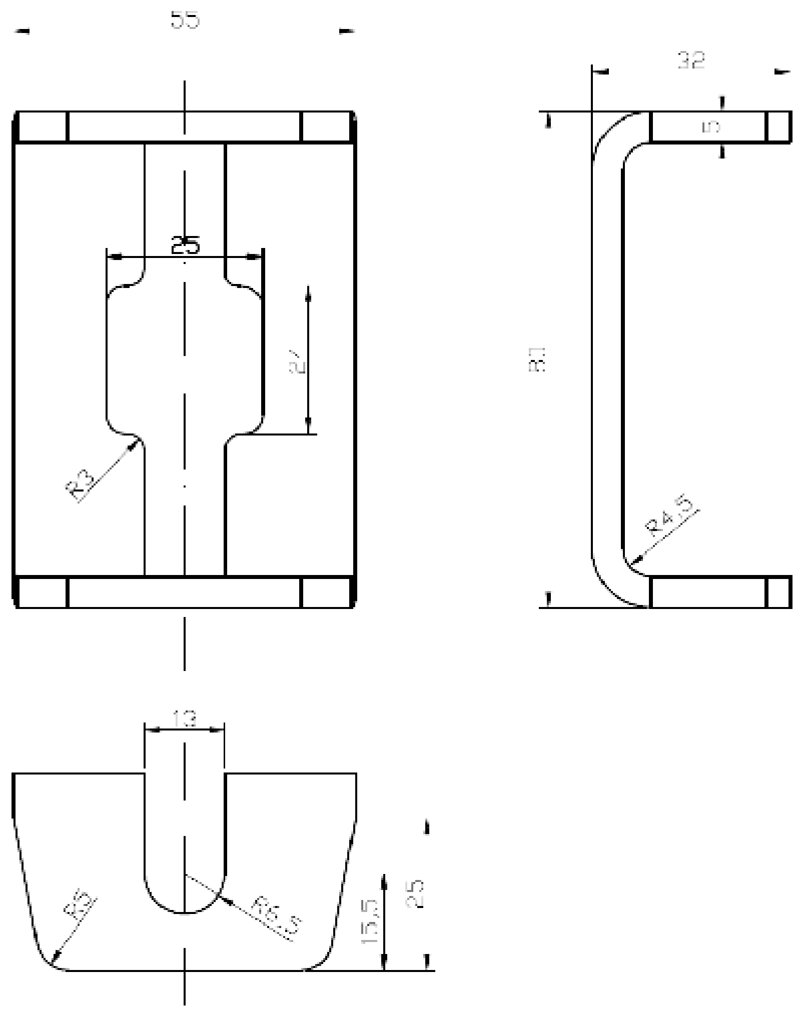
UK01/64-70	72	116	70
UK01/58-64	66	103	64
UK01/46-52	54	97	52
UK01/40-46	48	86	46
UK01/34-40	42	78	40
UK01/28-34	36	71	34
UK01/22-28	30	61	28
UK01/16 22	24	57	22
SYMBOL	A		ØD

Format A4

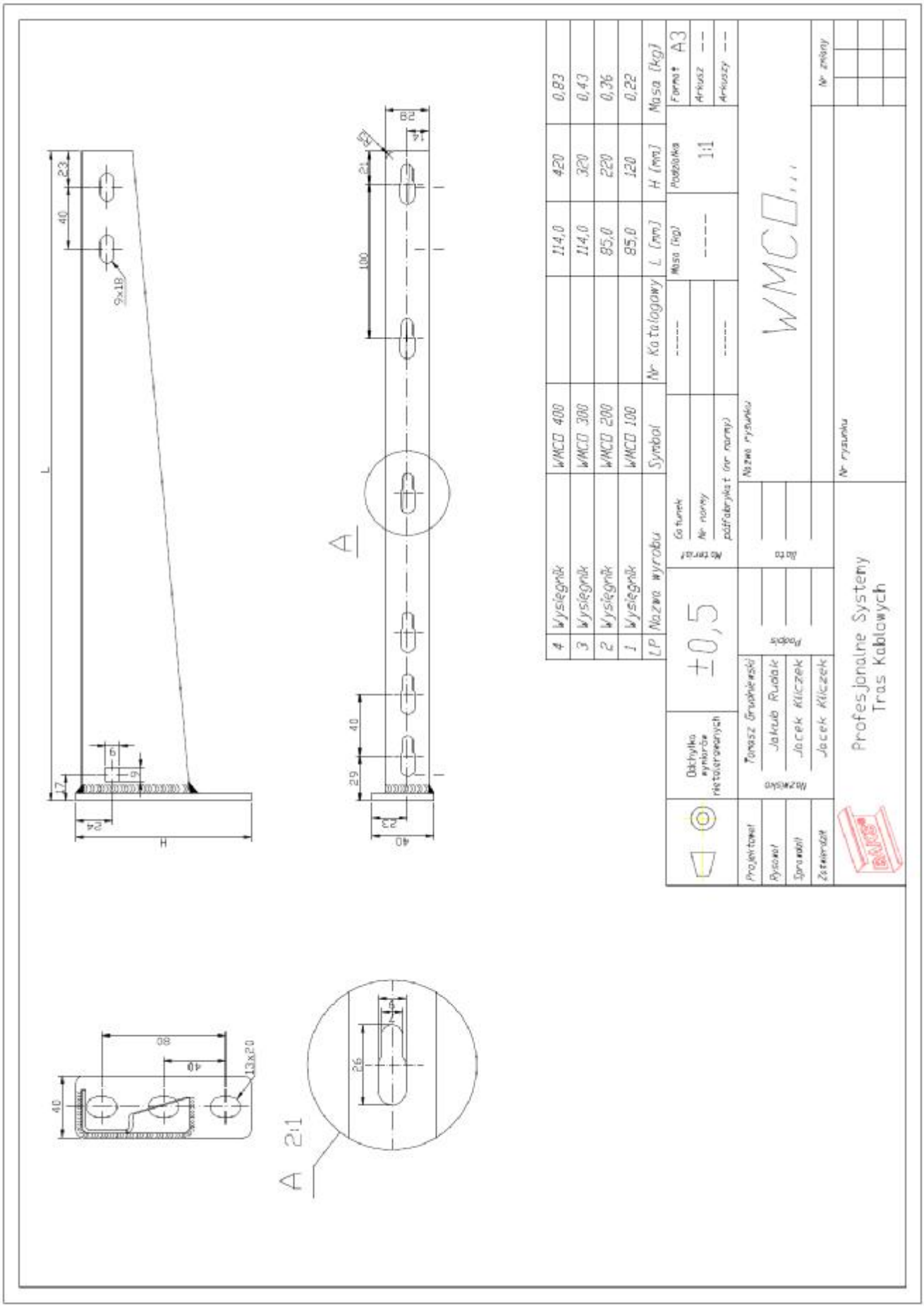
1:1

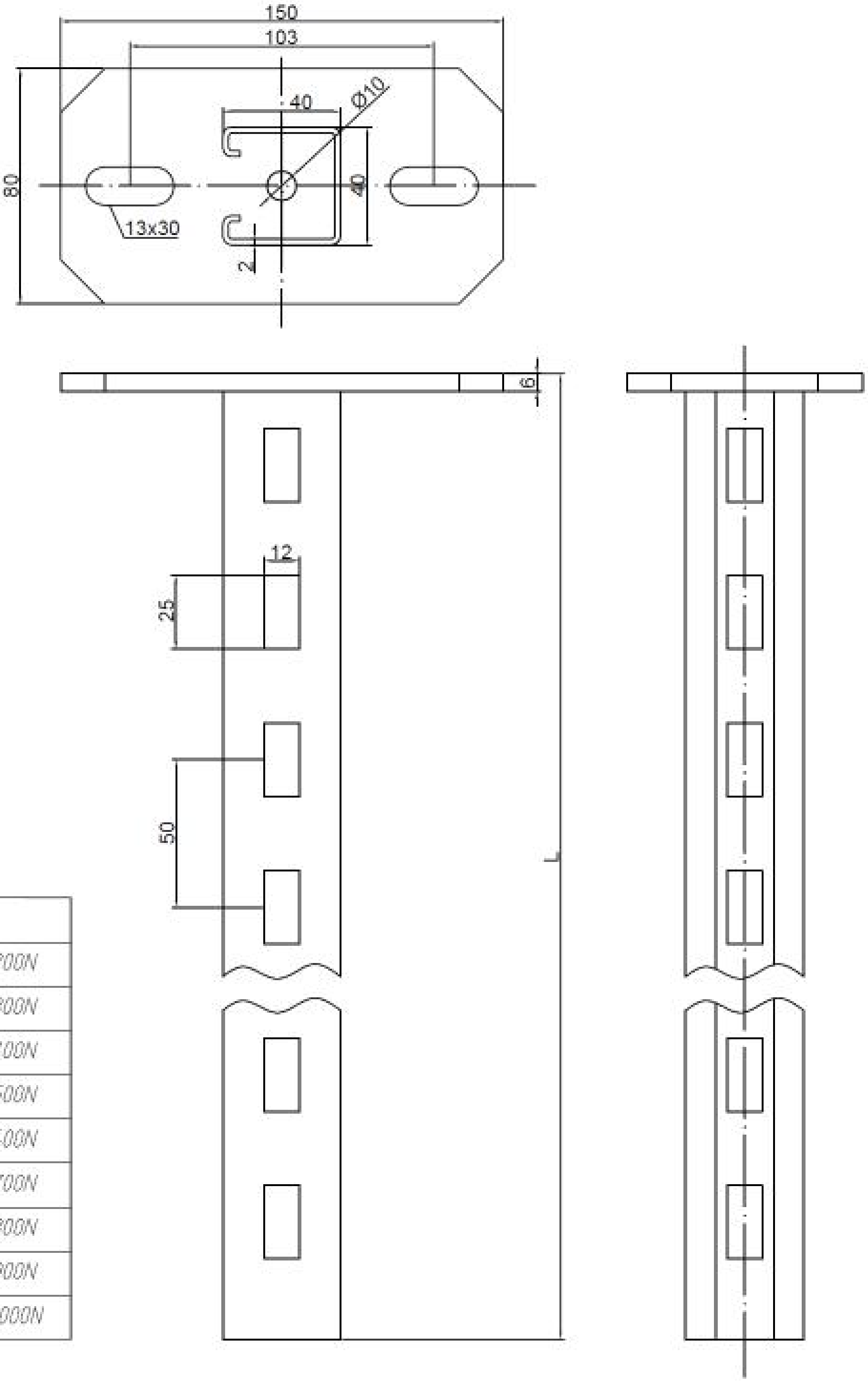
UK01

Profesjonalne Systemy Tras Kablowych



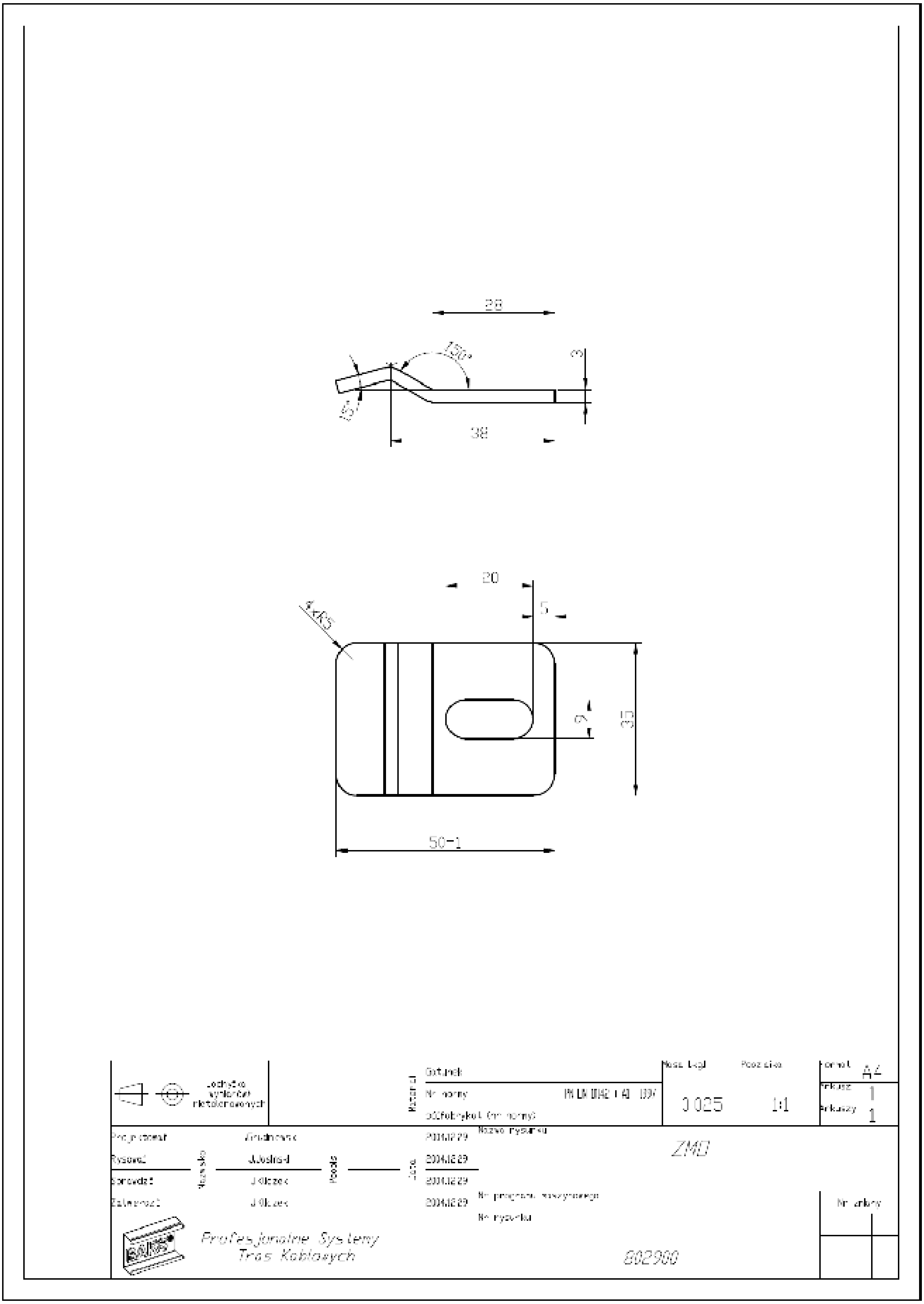
Odchyłki wymiarów nietolerowanych	Grubość [mm] 5	Materiał: Gatunek	Blacha stal. cynk. met. zanurz.	Masa [kg] 0,21	Podziałka 1:1
		Nr normy	PN-EN ISO 1461:2000		Format A4
		półfabrykat (nr normy)			Arkusz / Arkuszy
Projektował	J.GROCHOWSKI	Data	20.10.05	Nazwa rysunku	USOV
Rysował	J.Grochowski		20.10.05		
Sprawdził	T.WLODARCZYK		20.10.05		
Zatwierdził	J.KLICZEK		20.10.05		Nr zmiany
Profesjonalne Systemy Tras Kablowych				Nr rysunku	803700


WMCO...
Profesjonalne Systemy Tras Kablowych
Nr rysunku
Nr zmiany
Nazwa rysunku
Format A3
Arkusz --
Arkuszy --
Podziałka 1:1
Masa [kg]
Nr katalogowy
Symbol
Nazwa wyrobu
LP
H [mm]
L [mm]
WMCO 400
WMCO 300
WMCO 200
WMCO 100
Wysięgnik
420
320
220
120
114,0
114,0
85,0
85,0
0,83
0,43
0,36
0,32
A
A 2:1
9x18
13x20
±0,5



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

Odchyłka wymiarów nietolerowanych
Materiał: Gatunek / Nr normy / półfabrykat (nr normy)
Masa [kg]
Podziałka 1:1
Format A4
Arkusz 1
Arkuszy 1
Projektował
Rysował
Sprawdził
Zatwierdził
Nazwisko
Podpis
Data
Nazwa rysunku: WPC□..N
Nr programu maszynowego
Nr zmiany
Nr rysunku
Profesjonalne Systemy Tras Kablowych


28
150°
3
15°
38
20
5
4xR5
9
35
50-1
Profesjonalne Systemy
Tras Kablowych
A4
1:1
802900

7. FINAL PROVISION

§ 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 STN EN 1363-1, and where appropriate DIN 4102-2 and DIN 4102 - 12. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

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

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

Approved by:

Ing. Štefan Rástocký
leader of the testing laboratory

Prepared by:

Bc. Dávid Šubert
technician of the testing laboratory

8. NORMATIVE REFERENCES

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

THE END OF THE TEST REPORT