

TEST REPORT FIRES-FR-005-13-AUNE

**Cable bearing system and fireboxes BAKS with cables business
Tele-Fonika Kable sp. z o.o. S.K.A. at raised access floor**

This is an electronic version of a test report which was made as a copy of test report officially issued in a paper form. The electronic version of a test report shall be used only for informative purposes. Any information listed in this test report is the property of the sponsor and shall not be used or published without written permission. Contents of this file may only be modified by the editor i.e. Testing laboratory FIRES s.r.o. Batizovce. Sponsor is allowed to publish this test report in parts only with written permission of the editor.



TEST REPORT

FIRES-FR-005-13-AUNE

Tested property: Function in fire
Test method: STN 92 0205: 2012 (ZP-27/2008, DIN 4102-12: 1998-11)
Date of issue: 24. 01. 2013

Name of the product: Cable bearing system and fireboxes BAKS with cables business
Tele-Fonika Kable sp. z o.o. S.K.A. at raised access floor

Manufacturer: BAKS Kazimierz Sielski, ul. Jagodne 5, 05 - 480 Karczew, Poland - producer of cable bearing system

Tele-Fonika Kable sp. z o.o. S.K.A., ul. Wielicka 114, 30-630 Kraków, Poland – producer of cables

TIM-EX Sp. z o.o. S.K.A., ul. Rydygiera 8, 01-793 Warszawa, Poland – supplier of floor

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

Task No.: PR-13-0020
Specimens received: 18. 01. 2013
Date of the test: 24. 01. 2013

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

Number of pages: 59
Test reports: 7

Copy No.: 2

Distribution list:

Copy No. 1 FIRES, s. r. o., Osloboditeľov 282, 059 35 Batizovce, Slovak Republic (electronic version)
Copy No. 2 BAKS Kazimierz Sielski, ul. Jagodne 5, 05 - 480 Karczew, Poland (electronic version)
Copy No. 3 Tele-Fonika Kable sp. z o.o. S.K.A., ul. Wielicka 114, 30-630 Kraków, Poland (electronic version)
Copy No. 4 TIM-EX Sp. z o.o. S.K.A., ul. Rydygiera 8, 01-793 Warszawa, Poland (electronic version)
Copy No. 5 BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland
Copy No. 6 Tele-Fonika Kable sp. z o.o. S.K.A., ul. Wielicka 114, 30-630 Kraków, Poland
Copy No. 7 TIM-EX Sp. z o.o. S.K.A., ul. Rydygiera 8, 01-793 Warszawa, 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), DakS (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.



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.

Test of function in fire was carried out according to standard STN 92 0205: 2012. Similar standards and regulations for tests of function in fire are ZP-27/2008 PAVUS and DIN 4102-12: 1998-11.

Deviations from standard at the test according to ZP-27/2008: This test was carried out according to standard STN 92 0205: 2012 and meets also all requirements of ZP-27/2008 and test results can be directly used for classification of tested cables according to ZP-27/2008. There are no deviations identified in process and carrying out of test.

Deviations from standard at the test according to DIN 4102-12: 1998-11: This test was carried out according to standard STN 92 0205: 2012 and meets requirements of DIN 4102-12: 1998-11. Basic deviation in process and carrying out of test between these standards is in measuring and in control of temperature in the test furnace. According to STN 92 0205: 2012, plate thermometers according to EN 1363-1: 1999 are used. According to DIN 4102-12: 1998-11, common thermocouples of construction which was used for this measurement till issue of EN 1363-1:1999 are used. Measurement by plate thermometers acc. to EN 1363-1: 1999 can be considered as stricter method of temperature control in test furnace in compare with thermocouples used till issue of EN 1363-1: 1999. Therefore, it is possible to use results of test according to STN 92 025: 2012 for classification of tested cables according to DIN 4102-12: 1998-11, but not conversely. Identified deviation results in stricter course of test and it can lead to reduced classification of tested cables what is accepted as enhanced security in practice.

Representatives from the sponsor's side witnessing the test:

Mr. Jacek Kliczek	BAKS Kazimierz Sielski
Mr. Dariusz Gowronski	BAKS Kazimierz Sielski
Mrs. Milena Cierpiąła	Tele-Fonika Kable sp. z o.o. S.K.A.
Mr. Tomasz Zdechlik	Tele-Fonika Kable sp. z o.o. S.K.A.
Mr. Piotr Chlebowicz	TIM – EX Sp. z o.o. S.K.A.
Mr. Dariusz Ćwikła	TIM – EX Sp. z o.o. S.K.A.
Mr. Janusz Gałazka	TIM – EX Sp. z o.o. S.K.A.

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



Identification number	Measuring equipment	Note
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 BAKS Kazimierz Sielski Tele-Fonika Kable sp. z o.o. S.K.A. and TIM – EX Sp. z o.o. S.K.A. under supervision of laboratory technician.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMENS STRUCTURE

Test specimen comprised from cable bearing system BAKS Kazimierz Sielski company – cable trays, cable ladders, cable clips and fireboxes with accessories (consoles, supports, hangers etc.) and power and communication halogen free cables of Tele-Fonika Kable sp. z o.o. S.K.A. company and components of raised access floor of company TIM – EX Sp. z o.o. S.K.A..

Cables

Used cables by test:

(N)HXH-O FE180/E90 4x50 RM	(10x)
(N)HXH-J FE180/E90 4x1,5 RE	(14x)
(N)HXCH-O FE180/E90 4x50/25 RM	(10x)
(N)HXCH-O FE180/E90 4x1,5/1,5 RE	(10x)
JE-H(St)H Bd 1x2x0,8 FE180/E90	(12x)
HTKSH PH90 1x2x1,0 E90	(11x)

The length of cables was 4,5 m and 3,25 m from that was exposed to fire.

Power and communication halogen free cables were fixed in the trays, ladders and mesh trays by steel clips in the points of allowed bending radius.

Cable bearing systems were made of following constructions:

Suspension tracks No. 1, 2, 9 and 10

Tracks are made of three console combined of two horizontal supports (CWP/CWOP40H40/05) which are fixed to two threaded rods (PGM10) by washers (PP10) and nuts (NSM10). Threaded rods were fixed to ceiling in spacing of 1500 mm.

Tracks No. 1 and 9:

Cable trays (KGJ/KGOJ400H60/3, steel sheet thickness 0,9 mm) fixed together by screws (SGN M6x12). Trays were fixed to supports by screws (SGN M6x12) and loaded with 20kg.m⁻¹.

Track No. 2 and 10:

Cable trays (KGL/KGOL300H60/3, steel sheet thickness 0,7 mm) fixed together by screws (SGN M6x12). Trays were fixed to supports by screws (SGN M6x12) and loaded with 20kg.m⁻¹.



Tracks at raised access floor No. 3 – 8

Raised access floor is made of steel pedestals S235JRH/P235TR2 ($\varnothing 33,7$ mm, 6,3 mm thick) (manufacturer: PPHU Urszula Pacek, Poland) fixed to aerated concreted blocks by mastic SH 300 (manufacturer: Forbo Helmitin GmbH) in spacing of 600 mm. Pedestals are joined to each other by steel traverses (40 x 40 x 2) mm. Traverses are fixed to pedestals by steel screws (M8x30). Panels EHB 36/600 (manufacturer: Knauf Integral KG AM, Germany) with dimensions (600 x 600 x 36) mm. Plenum height is 1300 mm.

Floor panels were loaded by 3kN.m^{-2} .

Tracks are made of horizontal profiles supports (CWP/CWOP40H40/07) fixed to pedestals by hangers (OBR35, $\varnothing 35$ mm) and two screws (SM M10x30). Span length between supports is 1200 mm.

Tracks No. 3 and 6:

Cable trays (KGJ/KGOJ400H60/3, steel sheet thickness 0,9 mm) fixed together by screws (SGN M6x12). Trays were fixed to supports by screws (SGN M6x12) and loaded with 20kg.m^{-1} . Cables fixed by cable clips (UDF).

Tracks No. 4 and 7:

Cable ladders (DGOP400H60/3, steel sheet thickness 1,5 mm, spacing of transoms 150 mm) fixed together by two junctions (LDC/LDOCH60N) and screws (SGN M8x14) on sides. Ladders were fixed to supports by junctions (ZM/ZMO) and by screws (SGN M8x14) and loaded with 20kg.m^{-1} . Cables were fixed to ledges by cable clips (UKZ/UKZO1).

Track No. 5 and 8:

Cable mesh trays (KDS/KDSO400H60/3, steel wire $\varnothing 4,5$ mm) fixed together by junctions (USS/USSO). Mesh trays were fixed to supports by junctions (ZS/ZSO) and loaded with 20kg.m^{-1} . Cables were fixed by cable clips (UKZ/UKZO1).

Two fireboxes (BAKS PMO1) are fixed to cable mesh tray horizontally by steel profiles (UPP400) and vertically by steel profiles (UP1) on track No. 8.

Track No. 11

Track was made of six fireboxes (BAKS PMO1) fixed to ceiling. Cables connected to fireboxes are fixed to ceiling by cable clips KSA in spacing of 300 mm.

Track No. 12

Track was made of four fireboxes (BAKS PMO2) fixed to ceiling. Cables connected to fireboxes are fixed to ceiling by cable clips KSA 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 aerated concrete panels with dimensions (4000 x 600 x 240) mm – 6 pieces and fixed to side walls made of aerated concrete blocks YTONG, 250 mm thick. Ceiling panels were jointed by beam which provides balance deflection of the ceiling.

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	18,6
standard deviation	1,1

Relative air humidity [%]

mean	47,6
standard deviation	2,6

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 (3250 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 O₂) 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]
24. 01. 2013	47,0	21,3

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 (N)HXCH-O FE180/E90 4x1,5/1,5 RE	10	90 minutes no failure / interruption
2	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
3	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
4	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
5	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE	9	90 minutes no failure / interruption
6	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
7	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
8	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
9	cable (N)HXH-J FE180/E90 4x1,5 RE + fireboxes PMO2	12	90 minutes no failure / interruption
10	cable (N)HXH-J FE180/E90 4x1,5 RE + fireboxes PMO1	8	90 minutes no failure / interruption
11	cable (N)HXH-J FE180/E90 4x1,5 RE + fireboxes PMO1		90 minutes no failure / interruption
12	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
13	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
14	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
15	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
16	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE	7	90 minutes no failure / interruption
17	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
18	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
19	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
20	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE	6	90 minutes no failure / interruption
21	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE		90 minutes no failure / interruption
22	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
23	cable (N)HXCH-O FE180/E90 4x50/25 RM		90 minutes no failure / interruption
24	cable (N)HXH-J FE180/E90 4x1,5 RE	5	90 minutes no failure / interruption
25	cable (N)HXH-J FE180/E90 4x1,5 RE		90 minutes no failure / interruption
26	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
27	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
28	cable (N)HXH-J FE180/E90 4x1,5 RE	4	90 minutes no failure / interruption
29	cable (N)HXH-J FE180/E90 4x1,5 RE		90 minutes no failure / interruption
30	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
31	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
32	cable (N)HXH-J FE180/E90 4x1,5 RE	3	90 minutes no failure / interruption
33	cable (N)HXH-J FE180/E90 4x1,5 RE		90 minutes no failure / interruption
34	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
35	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
36	cable (N)HXH-J FE180/E90 4x1,5 RE	2	81 minutes
37	cable (N)HXH-J FE180/E90 4x1,5 RE		54 minutes
38	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
39	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
40	cable (N)HXH-J FE180/E90 4x1,5 RE	1	90 minutes no failure / interruption
41	cable (N)HXH-J FE180/E90 4x1,5 RE		63 minutes
42	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
43	cable (N)HXH-O FE180/E90 4x50 RM		90 minutes no failure / interruption
44	cable (N)HXH-J FE180/E90 4x1,5 RE + fireboxes PMO1	11	90 minutes no failure / interruption



Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
52	2 cables HTKSH PH90 1x2x1,0 E90	10	68 minutes
53	2 cables HTKSH PH90 1x2x1,0 E90	9	90 minutes no failure / interruption
54	cable JE-H(St)H Bd 1x2x0,8 FE180/E90 + fireboxes PMO2	12	90 minutes no failure / interruption
55	2 cables HTKSH PH90 1x2x1,0 E90	8	67 minutes
56	2 cables HTKSH PH90 1x2x1,0 E90	7	90 minutes no failure / interruption
57	2 cables HTKSH PH90 1x2x1,0 E90	6	90 minutes no failure / interruption
58	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90	5	90 minutes no failure / interruption
59	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90	4	90 minutes no failure / interruption
60	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90	3	90 minutes no failure / interruption
61	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90	2	90 minutes no failure / interruption
62	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90	1	90 minutes no failure / interruption
63A	cable HTKSH PH90 1x2x1,0 E90 + fireboxes PMO1	11	90 minutes no failure / interruption
63B	cable JE-H(St)H Bd 1x2x0,8 FE180/E90 + fireboxes PMO1		90 minutes no failure / interruption

The fire test was discontinued in 94th minute at the request of test sponsor.

Specimens S1 – S44 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 t [min]	Temperature [°C]											Deviation d _e [%]	Pressure p [Pa]
	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To		
0	36,0	34,8	33,4	34,2	46,1	56,8	46,8	36,4	40,6	20,0	21,3	0,0	18,1
5	544,7	547,0	551,0	550,8	595,0	611,2	586,7	562,4	568,6	576,0	21,4	0,0	18,6
10	671,4	696,6	714,0	713,3	661,7	693,6	697,0	670,1	689,7	678,0	21,4	-1,2	18,9
15	736,6	737,7	738,8	740,8	748,4	788,7	773,0	758,0	752,8	739,0	21,5	-1,1	18,0
20	792,6	795,1	801,1	809,0	788,7	822,5	805,1	799,1	801,7	781,0	21,5	0,0	17,7
25	819,9	819,7	824,9	827,6	812,7	841,6	827,4	824,4	824,8	815,0	21,6	0,4	19,7
30	836,9	839,1	844,1	848,2	829,5	865,6	843,2	841,4	843,5	842,0	21,6	0,4	17,4
35	849,8	852,0	856,8	861,1	844,0	873,5	857,2	857,1	856,4	865,0	21,7	0,3	19,6
40	860,0	862,8	868,2	874,0	856,0	887,1	868,5	868,6	868,2	885,0	21,7	0,0	17,1
45	883,9	882,1	883,7	879,4	883,6	911,9	886,9	880,7	886,5	902,0	21,8	-0,2	17,2
50	909,0	909,4	913,2	911,5	909,0	945,8	914,1	907,3	914,9	918,0	21,8	-0,3	18,7
55	935,4	937,3	942,1	947,9	939,5	979,2	952,5	936,6	946,3	932,0	21,9	-0,2	17,2
60	950,4	953,2	960,4	969,2	958,2	990,9	972,8	954,7	963,7	945,0	21,9	0,0	19,6
65	945,6	947,9	956,4	971,0	978,1	972,9	960,7	953,4	960,8	957,0	22,0	0,1	18,6
70	948,2	948,6	953,5	957,2	966,0	974,6	951,3	953,3	956,6	968,0	22,0	0,0	18,1
75	945,5	950,0	960,5	970,4	970,3	976,7	950,6	954,0	959,8	979,0	22,1	-0,1	17,1
80	962,3	967,8	977,0	988,4	987,8	991,0	967,2	968,6	976,3	988,0	22,1	-0,2	19,8
85	982,3	987,1	996,5	1012,6	1002,5	1009,3	985,5	989,9	995,7	997,0	22,2	-0,2	18,2
90	991,7	997,0	1005,2	1023,1	1008,0	1015,0	995,3	998,3	1004,2	1006,0	22,3	-0,2	19,0
95	1000,3	1005,4	1013,0	1031,0	1019,2	1021,0	1000,4	1006,3	1012,1	1014,0	22,3	-0,2	19,5
96	1001,7	1007,4	1014,6	1032,5	1017,3	1020,5	1002,6	1006,6	1012,9	1016,0	22,3	-0,2	19,6
97	1003,0	1008,0	1017,2	1033,1	1014,8	1023,4	1003,6	1006,8	1013,7	1017,0	22,3	-0,2	19,0
98	1003,7	1008,4	1016,8	1033,5	1016,1	1024,3	1003,9	1009,3	1014,5	1019,0	22,3	-0,2	19,4
99	1003,4	1008,4	1017,3	1034,2	1012,7	1023,3	1005,5	1012,8	1014,7	1020,0	22,4	-0,2	19,9
100	1005,1	1010,1	1018,8	1035,9	1015,3	1025,0	1005,8	1013,2	1016,2	1022,0	22,3	-0,2	17,4

Tave Average temperature in the test furnace calculated from plate thermometers

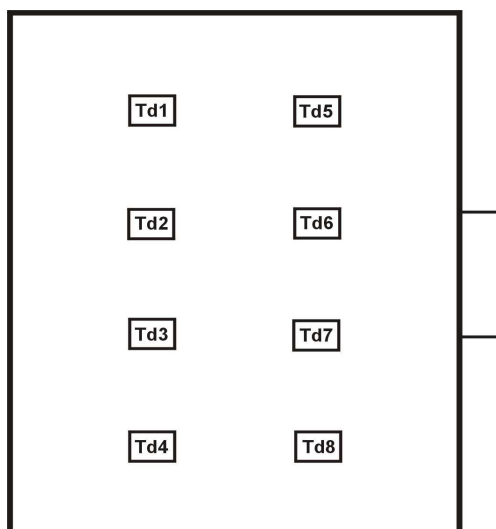
Tn Standard temperature in the test furnace laid down to test guideline

To Ambient temperature

d_e Deviation of the average temperature from the standard temperature calculated according to test guideline

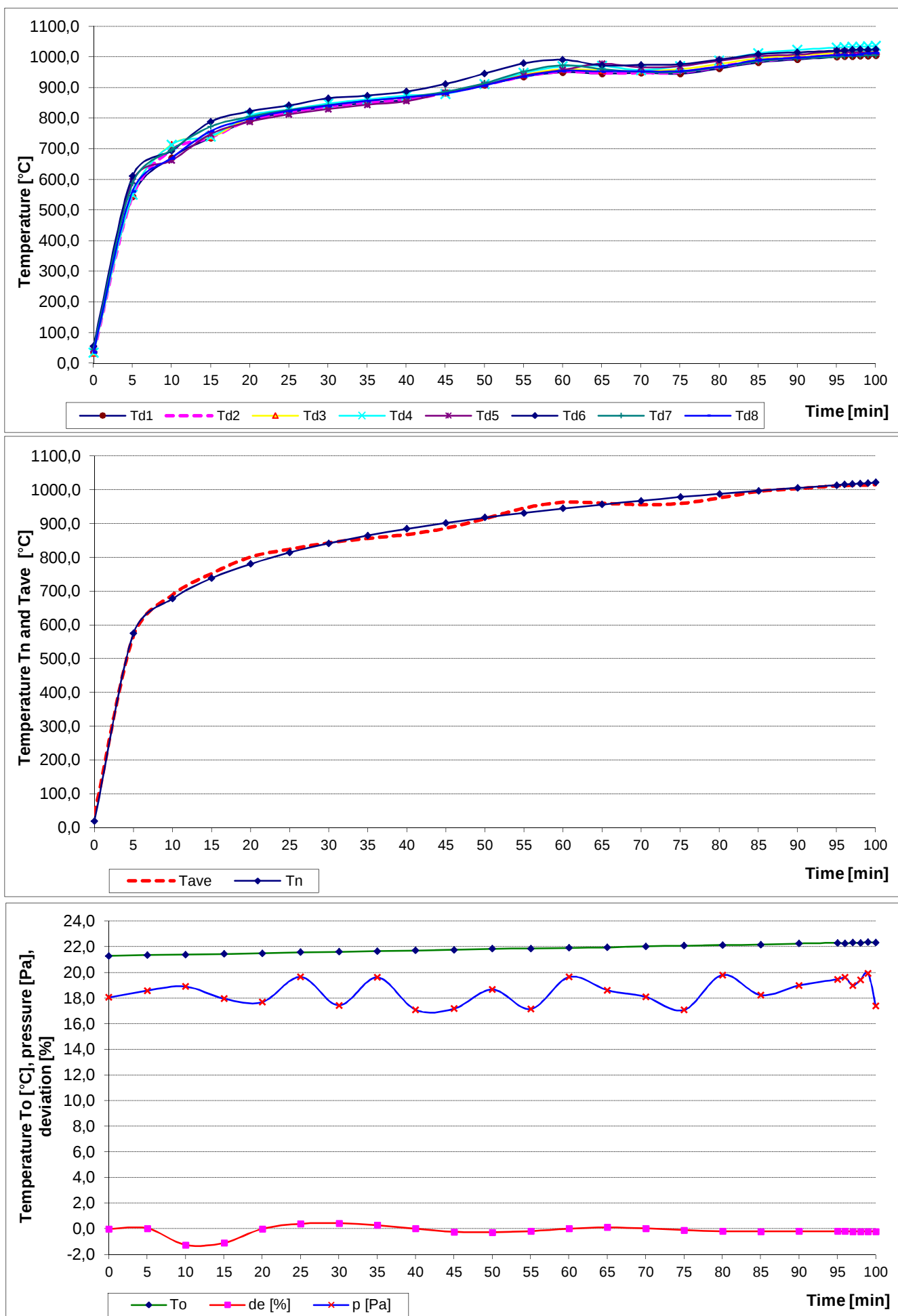
p Pressure inside the test furnace measured under the ceiling of the test furnace

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	no failure / interruption
	34-L2	no failure / interruption
	35-L3	no failure / interruption
	36-PEN	no failure / interruption
S10	37-L1	no failure / interruption
	38-L2	no failure / interruption
	39-L3	no failure / interruption
	40-PEN	no failure / interruption

Specimen No.	Cables
1	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
2	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
3	cable (N)HXCH-O FE180/E90 4x50/25 RM
4	cable (N)HXCH-O FE180/E90 4x50/25 RM
5	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
6	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
7	cable (N)HXCH-O FE180/E90 4x50/25 RM
8	cable (N)HXCH-O FE180/E90 4x50/25 RM
9	cable (N)HXH-J FE180/E90 4x1,5 RE + fireboxes PMO2
10	cable (N)HXH-J FE180/E90 4x1,5 RE + fireboxes PMO1

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 (N)HXH-J FE180/E90 4x1,5 RE + fireboxes PMO1
12	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
13	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
14	cable (N)HXCH-O FE180/E90 4x50/25 RM
15	cable (N)HXCH-O FE180/E90 4x50/25 RM
16	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
17	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
18	cable (N)HXCH-O FE180/E90 4x50/25 RM
19	cable (N)HXCH-O FE180/E90 4x50/25 RM
20	cable (N)HXCH-O FE180/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	no failure / interruption
	86-L2	no failure / interruption
	87-L3	no failure / interruption
	88-PEN	no failure / interruption
S23	89-L1	no failure / interruption
	90-L2	no failure / interruption
	91-L3	no failure / interruption
	92-PEN	no failure / interruption
S24	93-L1	no failure / interruption
	94-L2	no failure / interruption
	95-L3	no failure / interruption
	96-PEN	no failure / interruption
S25	97-L1	no failure / interruption
	98-L2	no failure / interruption
	99-L3	no failure / interruption
	100-PEN	no failure / interruption
S26	101-L1	no failure / interruption
	102-L2	no failure / interruption
	103-L3	no failure / interruption
	104-PEN	no failure / interruption
S27	105-L1	no failure / interruption
	106-L2	no failure / interruption
	107-L3	no failure / interruption
	108-PEN	no failure / interruption
S28	109-L1	no failure / interruption
	110-L2	no failure / interruption
	111-L3	no failure / interruption
	112-PEN	no failure / interruption
S29	113-L1	no failure / interruption
	114-L2	no failure / interruption
	115-L3	no failure / interruption
	116-PEN	no failure / interruption
S30	117-L1	no failure / interruption
	118-L2	no failure / interruption
	119-L3	no failure / interruption
	120-PEN	no failure / interruption

Specimen No.	Cables
21	cable (N)HXCH-O FE180/E90 4x1,5/1,5 RE
22	cable (N)HXCH-O FE180/E90 4x50/25 RM
23	cable (N)HXCH-O FE180/E90 4x50/25 RM
24	cable (N)HXH-J FE180/E90 4x1,5 RE
25	cable (N)HXH-J FE180/E90 4x1,5 RE
26	cable (N)HXH-O FE180/E90 4x50 RM
27	cable (N)HXH-O FE180/E90 4x50 RM
28	cable (N)HXH-J FE180/E90 4x1,5 RE
29	cable (N)HXH-J FE180/E90 4x1,5 RE
30	cable (N)HXH-O FE180/E90 4x50 RM

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	x
	142-L2	81:43
	143-L3	81:43
	144-PEN	x
S37	145-L1	x
	146-L2	54:52
	147-L3	54:52
	148-PEN	x
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 (N)HXH-O FE180/E90 4x50 RM
32	cable (N)HXH-J FE180/E90 4x1,5 RE
33	cable (N)HXH-J FE180/E90 4x1,5 RE
34	cable (N)HXH-O FE180/E90 4x50 RM
35	cable (N)HXH-O FE180/E90 4x50 RM
36	cable (N)HXH-J FE180/E90 4x1,5 RE
37	cable (N)HXH-J FE180/E90 4x1,5 RE
38	cable (N)HXH-O FE180/E90 4x50 RM
39	cable (N)HXH-O FE180/E90 4x50 RM
40	cable (N)HXH-J FE180/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 S41 to S44 - power cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S41	161-L1	63:24
	162-L2	63:24
	163-L3	x
	164-PEN	x
S42	165-L1	no failure / interruption
	166-L2	no failure / interruption
	167-L3	no failure / interruption
	168-PEN	no failure / interruption
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

Specimen No.	Cables
41	cable (N)HXH-J FE180/E90 4x1,5 RE
42	cable (N)HXH-O FE180/E90 4x50 RM
43	cable (N)HXH-O FE180/E90 4x50 RM
44	cable (N)HXH-J FE180/E90 4x1,5 RE + fireboxes PMO1

- 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 specimen 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	68:39
	212-PEN	x
S53A	213-L	no failure / interruption
	214-PEN	no failure / interruption
S53B	215-L	no failure / interruption
	216-PEN	no failure / interruption
S54A	217-L	no failure / interruption
	218-PEN	no failure / interruption
S54B	219-L	-
	220-PEN	-
S55A	221-L	67:32
	222-PEN	x
S55B	223-L	74:03
	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	no failure / interruption
	238-PEN	no failure / interruption
S59B	239-L	no failure / interruption
	240-PEN	no failure / interruption
S60A	241-L	no failure / interruption
	242-PEN	no failure / interruption
S60B	243-L	no failure / interruption
	244-PEN	no failure / interruption
S61A	245-L	no failure / interruption
	246-PEN	no failure / interruption
S61B	247-L	no failure / interruption
	248-PEN	no failure / interruption

Specimen No.	Cables
52	2 cables HTKSH PH90 1x2x1,0 E90
53	2 cables HTKSH PH90 1x2x1,0 E90
54	cable JE-H(St)H Bd 1x2x0,8 FE180/E90 + fireboxes PMO2
55	2 cables HTKSH PH90 1x2x1,0 E90
56	2 cables HTKSH PH90 1x2x1,0 E90
57	2 cables HTKSH PH90 1x2x1,0 E90
58	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90
59	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90
60	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90
61	2 cables JE-H(St)H Bd 1x2x0,8 FE180/E90

- x Conductor was turned off manually after permanent interruption / failure of other conductors in the cable
 Signal cables were tested by three-phase voltage supply 1 x 110V with LED diodes 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 JE-H(St)H Bd 1x2x0,8 FE180/E90
63A	cable HTKSH PH90 1x2x1,0 E90 + fireboxes PMO1
63B	cable JE-H(St)H Bd 1x2x0,8 FE180/E90 + fireboxes PMO1

Signal cables were tested by three-phase voltage supply 1 x 110V with LED diodes 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 before 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.



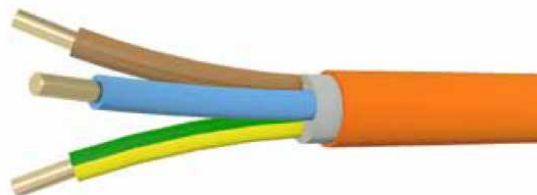
Photo taken after the test.



FLAME-X⁹⁵⁰ (N)HXH FE180/E90 0,6/1 kV

DIN VDE 0266, DIN 4102-12

Halogen-free low
smoke fire resistant
security power cables



FIRE PERFORMANCE

Insulation integrity FE 180:	DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21
System integrity E90:	DIN 4102-12 (90 min.)
Flame propagation:	DIN EN 50266-2-2, VDE 0482-266-2-2, IEC 60332-3-22
Smoke density:	DIN EN 61034-2, VDE 0482-1034-2, IEC 61034-2
Gases evolved during combustion:	DIN EN 50267-2-2, VDE 0482-267-2-2, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 2,5 μS/mm

CONSTRUCTION

Conductors:	bare copper conductor, circular solid class 1 (RE) or stranded circular or circular compacted class 2 (RM) according to EN 60228
Insulation:	special fire resistant cross-linked compound
Inner covering:	special flame-retardant and halogen-free compound
Sheath:	thermoplastic halogen-free compound type HM4 according to HD 604 S1
Colour of sheath:	orange

CHARACTERISTIC

Core identification:	according to HD 308 S2 or EN 50334
----------------------	------------------------------------

	(N)HXH-O FE180/E90	(N)HXH-J FE180/E90
	without protective conductor	with protective conductor
1-core:	black	green-yellow
2-core:	blue, brown	—
3-core:	brown, black, grey	green-yellow, blue, brown
4-core:	blue, brown, black, grey	green-yellow, brown, black, grey
5-core:	blue, brown, black, grey, black	green-yellow, blue, brown, black, grey
more 5-core:	black with numbering	green-yellow, others cores black with numbering
Maximum conductor operating temperature:	+90°C	
Lowest ambient temperature for fixed installation:	-30°C	
Lowest installation temperature:	-5°C	
Maximum short-circuit conductor temperature:	+250°C	
Minimum bending radius:	15D - for single core cable; 12D - for multicore cable (D - overall cable diameter)	
Maximum permissible tensile stress with cable grip for Cu-conductor:	50 N/mm ²	
Application:	Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.	
Standard packing:	500 m on drums. Other forms of packing and delivery are available on request.	





CABLES

Number and cross-sectional area of conductor			Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm ²			mm	kg/km	W/km
1 x 1,5RE			7,4	71	12,1
1 x 2,5RE			7,7	84	7,41
1 x 4RE			8,2	103	4,61
1 x 6RE			8,7	125	3,08
1 x 10RE			9,5	170	1,83
1 x 16RM			10,8	240	1,15
1 x 25RM			12,5	347	0,727
1 x 35RM			13,6	446	0,524
1 x 50RM			15,5	590	0,387
1 x 70RM			17,0	801	0,268
1 x 95RM			19,8	1094	0,193
1 x 120RM			21,2	1333	0,153
1 x 150RM			23,6	1643	0,124
1 x 185RM			25,7	2023	0,0991
1 x 240RM			29,0	2609	0,0754
1 x 300RM			31,6	3237	0,0601
1 x 400RM			36,2	4183	0,0470
2 x 1,5RE			14,1	268	12,1
2 x 2,5RE			14,9	310	7,41
2 x 4RE			15,8	367	4,61
2 x 6RE			16,8	435	3,08
2 x 10RE			18,4	562	1,83
2 x 16RM			21,0	776	1,15
2 x 25RM			24,4	1098	0,727
3 x 1,5RE			14,8	296	12,1
3 x 2,5RE			15,6	347	7,41
3 x 4RE			16,6	417	4,61
3 x 6RE			17,7	503	3,08
3 x 10RE			19,4	665	1,83
3 x 16RM			22,2	932	1,15
3 x 25RM			25,9	1337	0,727
3 x 35RM			28,2	1694	0,524
3 x 50RM			32,8	2296	0,387
3 x 70RM			36,0	3025	0,268
3 x 95RM			41,6	4106	0,193
3 x 120RM			45,1	5002	0,153
3 x 150RM			50,3	6177	0,124
3 x 185RM			55,4	7643	0,0991
3 x 240RM			62,5	9825	0,0754
4 x 1,5RE			16,0	345	12,1
4 x 2,5RE			16,9	407	7,41
4 x 4RE			18,0	495	4,61
4 x 6RE			19,2	603	3,08
4 x 10RE			21,1	809	1,83
4 x 16RM			24,3	1144	1,15



CABLES

Number and cross-sectional area of conductor			Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm ²			mm	kg/km	W/km
4	x	25RM	28,4	1655	0,727
4	x	35RM	31,2	2126	0,524
4	x	50RM	36,3	2879	0,387
4	x	70RM	39,8	3815	0,268
4	x	95RM	46,6	5240	0,193
4	x	120RM	50,1	6355	0,153
4	x	150RM	56,2	7879	0,124
4	x	185RM	61,4	9683	0,0991
4	x	240RM	69,5	12491	0,0754
5	x	1,5RE	17,3	402	12,1
5	x	2,5RE	18,3	478	7,41
5	x	4RE	19,6	586	4,61
5	x	6RE	20,9	717	3,08
5	x	10RE	23,0	969	1,83
5	x	16RM	26,6	1380	1,15
5	x	25RM	31,4	2022	0,727
5	x	35RM	34,6	2619	0,524
5	x	50RM	40,2	3525	0,387
5	x	70RM	44,2	4705	0,268
5	x	95RM	51,5	6428	0,193
5	x	120RM	55,9	7867	0,153
5	x	150RM	62,3	9701	0,124
5	x	185RM	68,4	11968	0,0991
5	x	240RM	77,4	15444	0,0754
7	x	1,5RE	18,7	472	12,1
7	x	2,5RE	19,8	569	7,41
7	x	4RM	22,1	751	4,61
8	x	1,5RE	20,0	523	12,1
10	x	1,5RE	23,2	659	12,1
10	x	1,5RM	24,0	694	12,1
10	x	2,5RE	24,8	801	7,41
12	x	1,5RE	23,9	721	12,1
12	x	2,5RE	25,5	882	7,41
14	x	1,5RE	25,1	798	12,1
14	x	2,5RE	26,8	982	7,41
19	x	1,5RE	27,8	992	12,1
19	x	2,5RE	30,1	1263	7,41
20	x	1,5RE	29,4	1079	12,1
20	x	1,5RM	30,4	1135	12,1



CABLES

Number and cross-sectional area of conductor			Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm ²			mm	kg/km	W/km
24	x	2,5RE	35,4	1612	7,41
30	x	1,5RE	35,0	1510	12,1
30	x	2,5RE	37,5	1885	7,41
3	x	25RM+16RM	27,6	1561	0,727 / 1,15
3	x	35RM+16RM	29,5	1917	0,524 / 1,15
3	x	50RM+25RM	34,5	2631	0,387 / 0,727
3	x	70RM+35RM	37,8	3461	0,268 / 0,524
3	x	95RM+50RM	44,1	4742	0,193 / 0,387
3	x	120RM+70RM	47,7	5822	0,153 / 0,268
3	x	150RM+70RM	51,9	6979	0,124 / 0,268
3	x	185RM+95RM	57,9	8744	0,0991 / 0,193
3	x	240RM+120RM	64,7	11176	0,0754 / 0,153
4	x	35RM+16RM	33,3	2429	0,524 / 1,15
4	x	50RM+25RM	38,6	3279	0,387 / 0,727
4	x	70RM+35RM	42,4	4349	0,268 / 0,524
4	x	95RM+50RM	49,6	5959	0,193 / 0,387
4	x	120RM+70RM	53,5	7305	0,153 / 0,268
4	x	150RM+70RM	59,0	8864	0,124 / 0,268



FLAME-X⁹⁵⁰ (N)HXCH FE180/E90 0,6/1 kV

DIN VDE 0266, DIN 4102-12



Halogen-free low
smoke fire resistant
security power cables
with copper concentric
conductor

FIRE PERFORMANCE

Insulation integrity FE 180:	DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21
System integrity E30:	DIN 4102-12 (90 min.)
Flame propagation:	DIN EN 50266-2-2, VDE 0482-266-2-2, IEC 60332-3-22
Smoke density:	DIN EN 61034-2, VDE 0482-1034-2, IEC 61034-2
Gases evolved during combustion:	DIN EN 50267-2-2, VDE 0482-267-2-2, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 2,5 µS/mm

CONSTRUCTION

Conductors:	bare copper conductor, circular solid class 1 (RE) or stranded circular or circular compacted class 2 (RM) according to EN 60228
Insulation:	special fire resistant cross-linked compound
Inner covering:	special flame-retardant and halogen-free compound
Concentric conductor:	inner layer - round copper wires, outer layer - copper tape
Separator:	tape
Sheath:	thermoplastic halogen-free compound type HM4 according to DIN VDE 0276-604

CHARACTERISTIC

Colour of sheath:	orange
Core identification:	according to HD 308 S2 or EN 50334
2-core:	blue, brown
3-core:	brown, black, grey
3-core*:	blue, brown, black
4-core:	blue, brown, black, grey
5-core:	blue, brown, black, grey, black
≥ 7-core:	black with numbering
*For certain applications only.	
Maximum conductor operating temperature:	+90°C
Lowest ambient temperature for fixed installation:	-30°C
Lowest installation temperature:	-5°C
Maximum short-circuit conductor temperature:	+250°C
Minimum bending radius:	15D - for single core cable; 12D - for multicore cable (D - overall cable diameter)
Maximum permissible tensile stress with cable grip for Cu-conductor:	50 N/mm ² , (total cross-section in mm ² of the conductors (any screen not included)
Application:	Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.
Standard packing:	500 m on drums. Other forms of packing and delivery are available on request.





CABLES

Number and cross-sectional area of conductor			Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm ²			mm	kg/km	W/km
2 x 1,5 RE/1,5			15,9	324	12,1 / 12,1
2 x 2,5 RE//2,5			16,6	374	7,41 / 7,41
2 x 4 RE/4			17,9	453	4,61 / 4,61
2 x 6 RE/6			19,2	541	3,08 / 3,08
2 x 10 RE/10			20,9	708	1,83 / 1,83
2 x 16 RM/16			24,0	988	1,15 / 1,15
2 x 25 RM/16			27,5	1319	0,727 / 1,15
2 x 35 RM/16			29,6	1598	0,524 / 1,15
3 x 1,5 RE/1,5			16,6	354	12,1 / 12,1
3 x 2,5 RE/2,5			17,4	413	7,41 / 7,41
3 x 4 RE/4			18,8	505	4,61 / 4,61
3 x 6 RE/6			20,1	612	3,08 / 3,08
3 x 10 RE/10			21,9	814	1,83 / 1,83
3 x 16 RM/16			25,3	1147	1,15 / 1,15
3 x 25 RM/16			29,0	1561	0,727 / 1,15
3 x 35 RM/16			31,2	1923	0,524 / 1,15
3 x 50 RM/25			35,9	2638	0,387 / 0,727
3 x 70 RM/35			39,6	3481	0,268 / 0,524
3 x 95 RM/50			45,5	4713	0,193 / 0,387
3 x 120 RM/70			49,5	5845	0,153 / 0,268
3 x 150 RM/70			54,8	7045	0,124 / 0,268
3 x 185RM/95			59,9	8773	0,0991 / 0,193
4 x 1,5 RE/1,5			17,8	404	12,1 / 12,1
4 x 2,5 RE/2,5			18,7	476	7,41 / 7,41
4 x 4 RE/4			20,2	587	4,61 / 4,61
4 x 6 RE/6			21,6	715	3,08 / 3,08
4 x 10 RE/10			23,7	961	1,83 / 1,83
4 x 16 RM/16			27,3	1363	1,15 / 1,15
4 x 25 RM/16			31,5	1885	0,727 / 1,15
4 x 35 RM/16			33,6	2357	0,524 / 1,15
4 x 50 RM/25			39,4	3232	0,387 / 0,727
4 x 70 RM/35			43,5	4285	0,268 / 0,524
4 x 95 RM/50			50,4	5869	0,193 / 0,387
4 x 120 RM/70			54,6	7223	0,153 / 0,268
4 x 150 RM/70			60,8	8808	0,124 / 0,268
4 x 185 RM/95			66,1	10872	0,0991 / 0,193
4 x 240 RM/120			74,2	13955	0,0754 / 0,153
5 x 1,5 RE/2,5			19,1	471	12,1 / 7,41
5 x 2,5 RE/2,5			20,1	550	7,41 / 7,41
5 x 4 RE/4			21,7	680	4,61 / 4,61
5 x 6 RE/6			23,0	830	3,08 / 3,08
5 x 10 RE/10			25,6	1125	1,83 / 1,83
5 x 16 RM/16			29,6	1604	1,15 / 1,15
5 x 25 RM/16			33,9	2254	0,727 / 1,15
5 x 35 RM/16			37,3	2881	0,524 / 1,15



CABLES

Number and cross-sectional area of conductor			Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm ²			mm	kg/km	W/km
5	x	50 RM/25	43,3	3890	0,387 / 0,727
5	x	70 RM/35	48,3	5240	0,268 / 0,524
5	x	95 RM/50	55,5	7104	0,193 / 0,387
7	x	1,5 RE/2,5	20,4	544	12,1 / 7,41
7	x	2,5 RE/2,5	21,6	643	7,41 / 7,41
7	x	4 RM/4	24,1	849	4,61 / 4,61
10	x	1,5 RE/2,5	25,0	740	12,1 / 7,41
10	x	2,5 RE/4	26,8	903	7,41 / 4,61
12	x	1,5 RE/2,5	25,7	803	12,1 / 7,41
12	x	2,5 RE/4	27,5	986	7,41 / 4,61
16	x	2,5 RE/6	30,6	1241	7,41 / 3,08
19	x	1,5 RE/4	30,0	1115	12,1 / 4,61
19	x	2,5 RE/6	32,4	1413	7,41 / 3,08
21	x	1,5 RE/6	31,5	1219	12,1 / 3,08
21	x	2,5 RE/10	34,1	1576	7,41 / 1,83
24	x	1,5 RE/6	35,3	1448	12,1 / 3,08
24	x	2,5 RE/10	37,8	1816	7,41 / 1,83



HTKSH FE180 PH90

HTKSHekw FE180 PH90

TF Kable



Kable instalacyjne bezhalogenowe ognioodporne dla urządzeń teletechnicznych oraz przetwarzania danych

W oparciu o PN-92/T-90320 i PN-92/T-90321

Dyrektywa RoHS 2002/95/WE,

Dyrektywa REACH 1907/2006/WE

Dyrektywa niskonapięciowa 2006/95/WE

Rodzaje kabli

HTKSH FE180 PH90

Kabel (K) telekomunikacyjny (T) stacyjny (S) o żyłach miedzianych jednodrutowych, o izolacji z taśmy mikowej i tworzywa bezhalogenowego (H) i powłoce z termoplastycznego tworzywa bezhalogenowego (H), odporny na działanie ognia (FE180, PH90)

HTKSHekw FE180 PH90

Kabel (K) telekomunikacyjny (T) stacyjny (S) o żyłach miedzianych jednodrutowych, o izolacji z taśmy mikowej i tworzywa bezhalogenowego (H), z elektrostatycznym ekranem z folii poliestrowej pokrytej aluminium (ekw) i powłoce z termoplastycznego tworzywa bezhalogenowego (H), odporny na działanie ognia (FE180, PH90),

Konstrukcja

Żyły:

miękkie druty miedziane wg EN 13602

Izolacja:

taśma mikowa oraz termoplastyczne tworzywo bezhalogenowe wg EN 50290-2-26

Pary:

żyły skręcone w pary, pary skręcone w ośrodek,
kable dwuparowe skręcone jako czwórka gwiazdowa
kolory :

Identyfikacja par:

Nr pary	Żyła a	Żyła b
1	BIAŁY	NIEBIESKI
2	BIAŁY	POMARAŃCZOWY

Separator:

folia poliestrowa

Ekran:

folia aluminiowo-poliestrowa z żyłą uziemiającą (dla HTKSHekw)

Żyła uziemiająca:

drut miedziany ocynowany o średnicy min.0,4 mm (dla HTKSHekw)

Powłoka:

termoplastyczne tworzywo bezhalogenowe nierozprzestrzeniające płomienia wg EN 50290-2-27

Kolor powłoki:

czerwony (lub inny zgodnie z życzeniem klienta)

Własności elektryczne

Rezystancja pętli pary: max 75 Ω/km dla 0,8 mm
48 Ω/km dla 1,0 mm
26 Ω/km dla 1,4 mm
15 Ω/km dla 1,8 mm
9 Ω/km dla 2,3 mm

Pojemność robocza:

HTKSH : max 150 nF/km

HTKSHekw : max 200 nF/km

Asymetria pojemności:

HTKSH : max 400 pF/500m

HTKSHekw : max 1200 pF/500m

Rezystancja izolacji w temperaturze 20°C: min.200 MΩ x km

Napięcie pracy: 150/250V

Odporność na rozprzestrzenianie płomienia:

Na pojedynczym kablu : PN-EN 60332-1-2

Na wiązce kablowej: PN-EN 60332-3-24 (kat. C)

Odporność na ogień

Zachowanie funkcji PH90: PN-EN 50200 PH 90, 90 min., 842°C

Zachowanie izolacji podczas działania ognia (FE180): PN-IEC 60331-23: 3h, 750°C

Emisja dymów podczas spalania: PN-EN 61034-2 (IEC 61034-2) transmitancja ≥ 90

Korozyjność gazów: EN 50267-2-2 (IEC 60754-2): pH $\geq 4,3$; przewodność $\leq 100 \mu\text{S}\cdot\text{cm}^{-1}$



HTKSH FE180 PH90

HTKSHekw FE180 PH90



Maksymalna temperatura żyły podczas pracy kabla: +70°C

Minimalna temperatura otoczenia dla kabli ułożonych na stałe: -30°C

Minimalna temperatura otoczenia przy układaniu kabli: -5°C

Maksymalna temperatura żyły podczas zwarcia: +160°C

Minimalny promień gięcia: 10 D (D – średnica zewnętrzna kabla)

Mocowanie kabli: kable muszą być mocowane bezpośrednio do podłoża albo podwieszane do dolnej strony korytek kablowych lub podobnych konstrukcji przy użyciu metalowych klipsów np. stalowych, spełniających wymagania PN-EN 50200. Klipsy wykonane z tworzywa sztucznego nie mogą być używane.
Kable mogą być układane na innych systemach kablowych nośnych np. korytkach, drabinkach, uchwytach pojedynczych, o odporności ogniowej odpowiadającej odporności ogniowej kabla.

Zastosowanie: Kable ognioodporne zapewniają dopływ energii elektrycznej do urządzeń, których działanie w warunkach pożaru jest niezbędne do prowadzenia szybkiej, bezpiecznej akcji ratunkowej: obwody oświetlenia awaryjnego, wyciągi dymu, klimatyzacja, systemy alarmowe, systemy sygnalizacyjne, systemy kontrolne, systemy sterujące, windy osobowe, pompy wody gaszącej, urządzenia wytwarzające kurtynę wodną.
Utrzymują swoją funkcję w warunkach działania ognia przez określony czas (PH90), nie emitują agresywnych, korozyjnych gazów oraz gęstych dymów podczas spalania (tworzywa bezhalogenowe nie zawierają chloru, bromu, fluoru), są odporne na rozprzestrzenianie płomienia.
Kable przeznaczone są do połączeń urządzeń telefonicznych, teletransmisyjnych i przetwarzania danych w instalacjach elektroniki przemysłowej w obiektach o podwyższonych wymaganiach przeciwpożarowych, w których występują duże skupiska ludzi oraz koncentracja dóbr kulturalnych i materialnych o znacznej wartości: szkoły, szpitale, centra handlowe, porty lotnicze, hotele, supermarkety, tunele podziemne, wielokondygnacyjne budynki mieszkalne, stacje kolei podziemnych, garaże podziemne, hale sportowo-widowiskowe, stadiony, kina, teatry, muzea, biurowce, centra edukacyjne, kompleksy przemysłowe.
Kable przeznaczone są do instalacji na stałe wewnątrz budynków zgodnie z ROZPORZĄDZENIEM MINISTRA INFRASTRUKTURY z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie. (Dz. U. z dnia 15 czerwca 2002 r.).
Kable nie są dopuszczone do instalacji elektroenergetycznych oraz do układania w ziemi..

Standardowe Na bębnoch po 500 m.

opakowanie: Istnieje możliwość oferowania innych długości odcinków i rodzajów opakowań.

HTKSH FE180 PH90

HTKSHekw FE180 PH90

Liczba par i średnica żyły n x 2 x mm	Przybliżona średnica kabla mm	Przybliżona waga kabla kg/km	Obciążalność ogniowa kWh/m	Liczba par i średnica żyły n x 2 x mm	Przybliżona średnica kabla mm	Przybliżona waga kabla kg/km	Obciążalność ogniowa kWh/m
1 x 2 x 0,8	6,6	44	0,18	1 x 2 x 0,8	6,8	51	0,18
2 x 2 x 0,8	7,4	69	0,24	2 x 2 x 0,8	7,6	76	0,25
1 x 2 x 1,0	7,0	54	0,19	1 x 2 x 1,0	7,2	59	0,20
2 x 2 x 1,0	8,0	86	0,27	2 x 2 x 1,0	8,2	92	0,28
1 x 2 x 1,4	7,8	73	0,22	1 x 2 x 1,4	8,0	79	0,23
2 x 2 x 1,4	9,3	125	0,32	2 x 2 x 1,4	9,5	130	0,33
1 x 2 x 1,8	8,6	98	0,25	1 x 2 x 1,8	8,8	103	0,26
2 x 2 x 1,8	10,7	174	0,37	2 x 2 x 1,8	10,9	176	0,38
1 x 2 x 2,3	10,8	154	0,40	1 x 2 x 2,3	11,0	161	0,41
2 x 2 x 2,3	14,3	288	0,69	2 x 2 x 2,3	14,5	296	0,70

TELE-FONIKA KABLE Sp. z o.o. S.K.A. 30-663 Kraków, ul. Wielicka 114, POLAND

Company site: 30-663 Kraków, ul. Wielicka 114
Export Office: 30-663 Kraków, ul. Wielicka 114
export@tfkable.pl
www.tfkable.pl

tel.: +48 32 397 63 00
tel.: +48 12 652 59 05

fax: +48 32 397 63 03
fax: +48 12 652 59 28

HTKSH_PH90/09-2011/B



FLAME-X 950

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

Adapted to DIN VDE 0815



Halogen- free low smoke fire resistant
wiring cables for telecommunication
and data processing systems

CONSTRUCTION

Conductors:	bare solid copper conductor 0,8 mm
Insulation:	special core insulation with mica tape and halogen-free cross-linked compound type HI1 acc. to DIN VDE 0207-23
Pair:	two cores twisted to pair and each 4 pairs consist to unit
Separator:	polyester tape
Screen:	aluminium/polyester laminated tape and solid copper drain wire
Drain wire:	solid tinned annealed copper wire 0,8 mm
Sheath:	thermoplastic halogen-free, flame retardant compound type HM2 acc. to DIN VDE 0207-24
Colour of sheath:	grey, orange or red

Identification of pairs:	Pair no.	a-wire	b-wire
	1	blue	red
	2	grey	yellow
	3	green	brown
	4	white	black

Two-pair cables shall be cabled in quad formation and colour coded: blue, yellow, red, grey

TECHNICAL DATA

Operating voltage: peak voltage max. 225V (not for purposes of high current and power installation)

Loop resistance: maximum 73,2 Ω /km

Insulation resistance at temperature 20°C: minimum 100 M Ω x km

Mutual capacitance: maximum 120 nF/km at 800 Hz (this values may be extended at 20% with a make-up up to 4 pairs)

Capacitance unbalance: maximum 200 pF/100 m at 800 Hz (20% of the values, but one value up to 400 pF is allowed)

Test voltage 50 Hz: core/core – 500V; core/screen – 2000V

Temperature range:

flexing: - 5°C to + 50°C

fixed installation - 30°C to + 70°C

Minimum bending radius: 6 x D (D is the overall diameter of the cable)

Insulation integrity FE 180: DIN VDE 0472-814 (800°C, 180 minutes), IEC 60331

System integrity E90: DIN VDE 4102-12 (90 min.)

Flame retardant: VDE 0482-266-2-4, DIN EN 50266-2-4 (IEC 60332-3 Category C)

Smoke density: VDE 0482-1034-2, DIN EN 61034-2 (IEC 61034-2: light transmittance values > 70%)

Gases evolved during combustion: VDE 0482-267-2-2, DIN EN 50267-2-2(IEC 60754-2: pH $\geq$ 3,5; conductivity $\leq$ 100 μ S·cm⁻¹)

Application:

Fire resistant, halogen-free static screened installation cables for telecommunication purpose. The static screen prevents strong interference impulse. Suitable for fixed installation everywhere, where in case of fire human life and material assets are to be protected, e.g. in industrial complexes, public buildings, hotels, airports, under ground railway networks, hospitals. Not for purposes of high current and power installation.

Standard length cable

packing: 500 m on drums. Other forms of packing and delivery are available on request.

FLAME-X 950

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

Adapted to DIN VDE 0815

Number pairs and diameter of conductor n x 2 x mm	Approximate overall diameter mm	Approximate net weight of cable kg/km
1 x 2 x 0,8	10,5	105
2 x 2 x 0,8	11,9	151
4 x 2 x 0,8	18,3	277



DRAWINGS

Nr Baks	Nr FIRES	Pozycja	Symbol kabla	Konstrukcja mocowania, odległość, obciążenie
1		1	(N)HXH-O FE180/E90 4x50 RM	Korytko KGJ/KGOJ 400H 60/3 B-400/ 1.5 m / 20kg/m / grubość blachy 0,9 mm Mocowanie: Ceownik CWP/CWOP40H40/05, pręt gwintowany PG M10
2			(N)HXH-O FE180/E90 4x50 RM	
3			(N)HXH-J FE180/E90 4x1,5 RE	
4			(N)HXH-J FE180/E90 4x1,5 RE	
5			JE-H(St)H Bd 1x2x0,8 FE180/E90	
6			JE-H(St)H Bd 1x2x0,8 FE180/E90	
7		2	(N)HXH-O FE180/E90 4x50 RM	Korytko KGL/KGOL 300H 60/3 B-300/ 1.5 m / 20kg/m / grubość blachy 0,7 mm Mocowanie: Ceownik CWP/CWOP40H40/05, pręt gwintowany PG M10
8			(N)HXH-O FE180/E90 4x50 RM	
9			(N)HXH-J FE180/E90 4x1,5 RE	
10			(N)HXH-J FE180/E90 4x1,5 RE	
11			JE-H(St)H Bd 1x2x0,8 FE180/E90	
12			JE-H(St)H Bd 1x2x0,8 FE180/E90	
13		3	(N)HXH-O FE180/E90 4x50 RM	Korytko KGJ/KGOJ 400H 60/3 B-400/ 1.2 m / 20kg/m / grubość blachy 0,9 mm Mocowanie: Ceownik CWP/CWOP40H40/07, obejma rury Ø 34. Podłoga podniesiona na ruszcie stalowym z profilu C 40x40x2. Wspornik rura stalowa Ø 34x6,3x1300. Płyta podłogowa KNAUF EHB 600x600x36
14			(N)HXH-O FE180/E90 4x50 RM	
15			(N)HXH-J FE180/E90 4x1,5 RE	
16			(N)HXH-J FE180/E90 4x1,5 RE	
17			JE-H(St)H Bd 1x2x0,8 FE180/E90	
18			JE-H(St)H Bd 1x2x0,8 FE180/E90	
19		4	(N)HXH-O FE180/E90 4x50 RM	Drabinka DGOP 400H 60/3 B-400/ 1.2 m / 20kg/m / grubość blachy 1,5 mm Mocowanie: Ceownik CWP/CWOP40H40/07, obejma rury Ø 34. Podłoga podniesiona na ruszcie stalowym z profilu C 40x40x2. Wspornik rura stalowa Ø 34x6,3x1300. Płyta podłogowa KNAUF EHB 600x600x36
20			(N)HXH-O FE180/E90 4x50 RM	
21			(N)HXH-J FE180/E90 4x1,5 RE	
22			(N)HXH-J FE180/E90 4x1,5 RE	
23			JE-H(St)H Bd 1x2x0,8 FE180/E90	
24			JE-H(St)H Bd 1x2x0,8 FE180/E90	
25		5	(N)HXH-O FE180/E90 4x50 RM	Korytko siatkowe KDS/KDSO 400H60/3 B-400 1.2 m / 20kg/m / grubość drutu Ø 4,5 mm Mocowanie: Ceownik CWP/CWOP40H40/07, obejma rury Ø 34. Podłoga podniesiona na ruszcie stalowym z profilu C 40x40x2. Wspornik rura stalowa Ø 34x6,3x1300. Płyta podłogowa KNAUF EHB 600x600x36
26			(N)HXH-O FE180/E90 4x50 RM	
27			(N)HXH-J FE180/E90 4x1,5 RE	
28			(N)HXH-J FE180/E90 4x1,5 RE	
29			JE-H(St)H Bd 1x2x0,8 FE180/E90	
30			JE-H(St)H Bd 1x2x0,8 FE180/E90	
31		6	(N)HXCH-O FE180/E90 4x50/25 RM	Korytko KGJ/KGOJ 400H 60/3 B-400/ 1.2m / 20kg/m / grubość blachy 0,9 mm Mocowanie: Ceownik CWP/CWOP40H40/07, obejma rury Ø 34. Podłoga podniesiona na ruszcie stalowym z profilu C 40x40x2. Wspornik rura stalowa Ø 34x6,3x1300. Płyta podłogowa KNAUF EHB 600x600x36
32			(N)HXCH-O FE180/E90 4x50/25 RM	
33			(N)HXCH-O FE180/E90 4x1,5/1,5 RE	
34			(N)HXCH-O FE180/E90 4x1,5/1,5 RE	
35			HTKSH PH90 1x2x1,0 E90	
36			HTKSH PH90 1x2x1,0 E90	

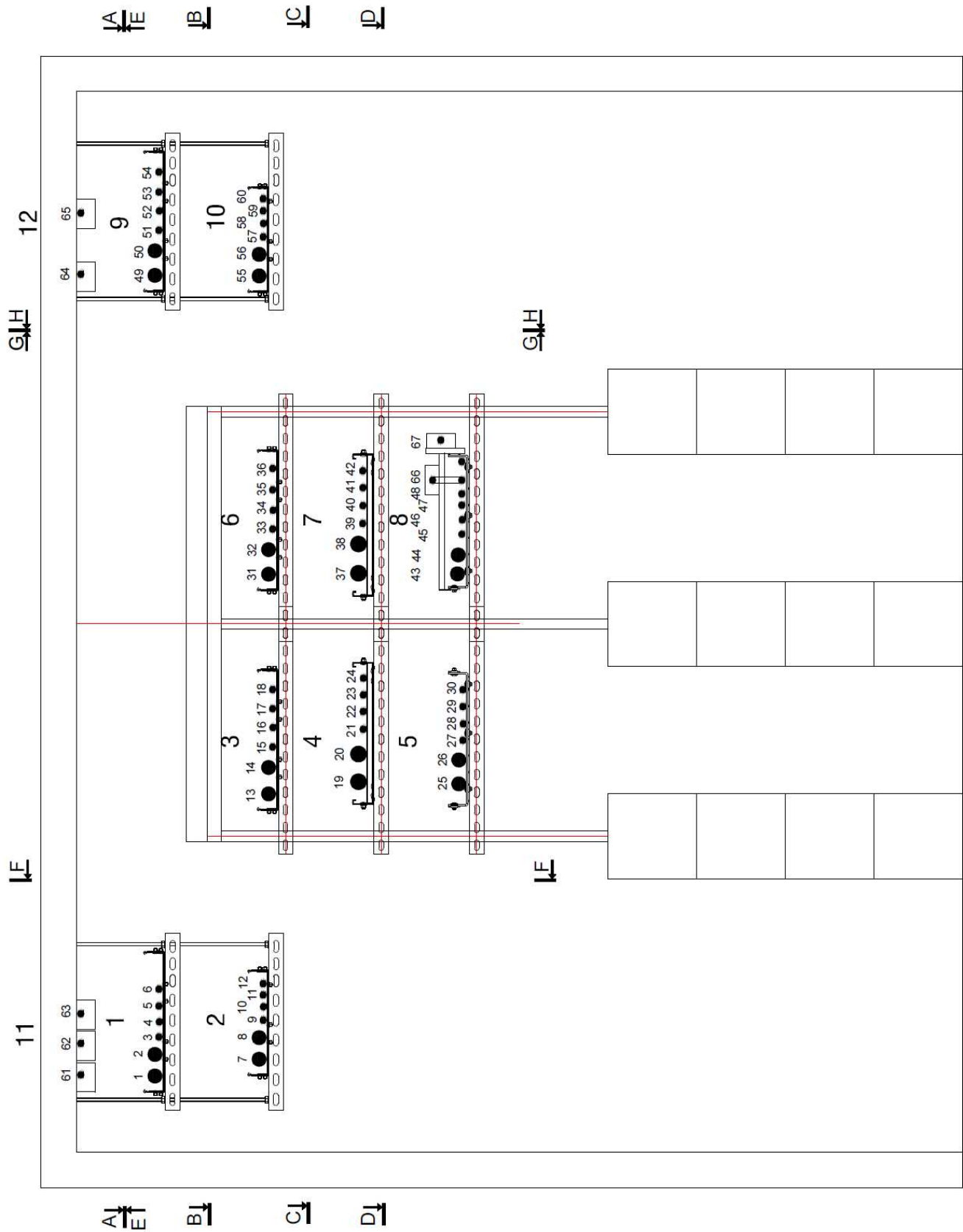


DRAWINGS

Nr Baks	Nr FIRES	Pozycja	Symbol kabla	Konstrukcja mocowania, odległość, obciążenie		
37		7	(N)HXCH-O FE180/E90 4x50/25 RM	Drabinka DGOP 400H 60/3 B-400/ 1.2 m / 20kg/m / grubość blachy 1,5 mm Mocowanie: Ceownik Mocowanie: CeownikCWP/CWOP40H40/07, obejma rury Ø 34.Podłoga podniesiona na ruszcie stalowym z profili C 40x40x2. Wspornik rura stalowa Ø 34x6,3x1300. Płyta podłogowa KNAUF EHB 600x600x36		
38			(N)HXCH-O FE180/E90 4x50/25 RM			
39			(N)HXCH-O FE180/E90 4x1,5/1,5 RE			
40			(N)HXCH-O FE180/E90 4x1,5/1,5 RE			
41			HTKSH PH90 1x2x1,0 E90			
42			HTKSH PH90 1x2x1,0 E90			
43		8	(N)HXCH-O FE180/E90 4x50/25 RM	Korytko siatkowe KDS/ KDSO 400H60/3 B-400 1.2 m /20kg/m / grubość drutu Ø 4,5 mm Mocowanie: CeownikCWP/CWOP40H40/07, obejma rury Ø 34.Podłoga podniesiona na ruszcie stalowym z profili C 40x40x2. Wspornik rura stalowa Ø 34x6,3x1300. Płyta podłogowa KNAUF EHB 600x600x36		
44			(N)HXCH-O FE180/E90 4x50/25 RM			
45			(N)HXCH-O FE180/E90 4x1,5/1,5 RE			
46			(N)HXCH-O FE180/E90 4x1,5/1,5 RE			
47			HTKSH PH90 1x2x1,0 E90			
48			HTKSH PH90 1x2x1,0 E90			
66			(N)HXH-J FE 180 /E90 4x 1,5RE	Puszki PMO1+ uchwyt puszki		
67			(N)HXH-J FE 180 /E90 4x 1,5RE			
49		9	(N)HXCH-O FE180/E90 4x50/25 RM	Korytko KGJ/KGOJ 400H 60/3 B-400/ 1.5 m / 20kg/m / grubość blachy 0,9 mm Mocowanie: Ceownik CWP/CWOP40H40/05, pręt gwintowany PG M10		
50			(N)HXCH-O FE180/E90 4x50/25 RM			
51			(N)HXCH-O FE180/E90 4x1,5/1,5 RE			
52			(N)HXCH-O FE180/E90 4x1,5/1,5 RE			
53			HTKSH PH90 1x2x1,0 E90			
54			HTKSH PH90 1x2x1,0 E90			
55		10	(N)HXCH-O FE180/E90 4x50/25 RM	Korytko KGL/KGOL 300H 60/... B-300/ 1.5 m / 20kg/m / grubość blachy 0,7 mm Mocowanie: Ceownik CWP/CWOP40H40/05, pręt gwintowany PG M10		
56			(N)HXCH-O FE180/E90 4x50/25 RM			
57			(N)HXCH-O FE180/E90 4x1,5/1,5 RE			
58			(N)HXCH-O FE180/E90 4x1,5/1,5 RE			
59			HTKSH PH90 1x2x1,0 E90			
60			HTKSH PH90 1x2x1,0 E90			
61		11	(N)HXH-J FE180/E90 4x1,5 RE	Obejma kablowa KSA Mocowanie co 300mm + puszki PMO1		
62			JE-H(St)H Bd 1x2x0,8 FE180/E90			
63			HTKSH PH90 1x2x1,0 E90			
64		12	(N)HXH-J FE180/E90 4x1,5 RE	Obejma kablowa KSA Mocowanie co 300mm + puszki PMO2		
65			JE-H(St)H Bd 1x2x0,8 FE180/E90			
No.	Cable type			Average O.D.	Cable Weight	Number
1	(N)HXH-O FE180/E90 4x50 RM			36,0 mm	3,00 kg/m	10x
2	(N)HXH-J FE180/E90 4x1,5 RE			14,0 mm	0,26 kg/m	14x
3	(N)HXCH-O FE180/E90 4x50/25 RM			38,5 mm	3,30 kg/m	10x
4	(N)HXCH-O FE180/E90 4x1,5/1,5 RE			14,5 mm	0,30 kg/m	10x
5	JE-H(St)H Bd 1x2x0,8 FE180/E90			8,5 mm	0,09 kg/m	12x
6	HTKSH PH90 1x2x1,0 E90			7,0 mm	0,05 kg/m	11x

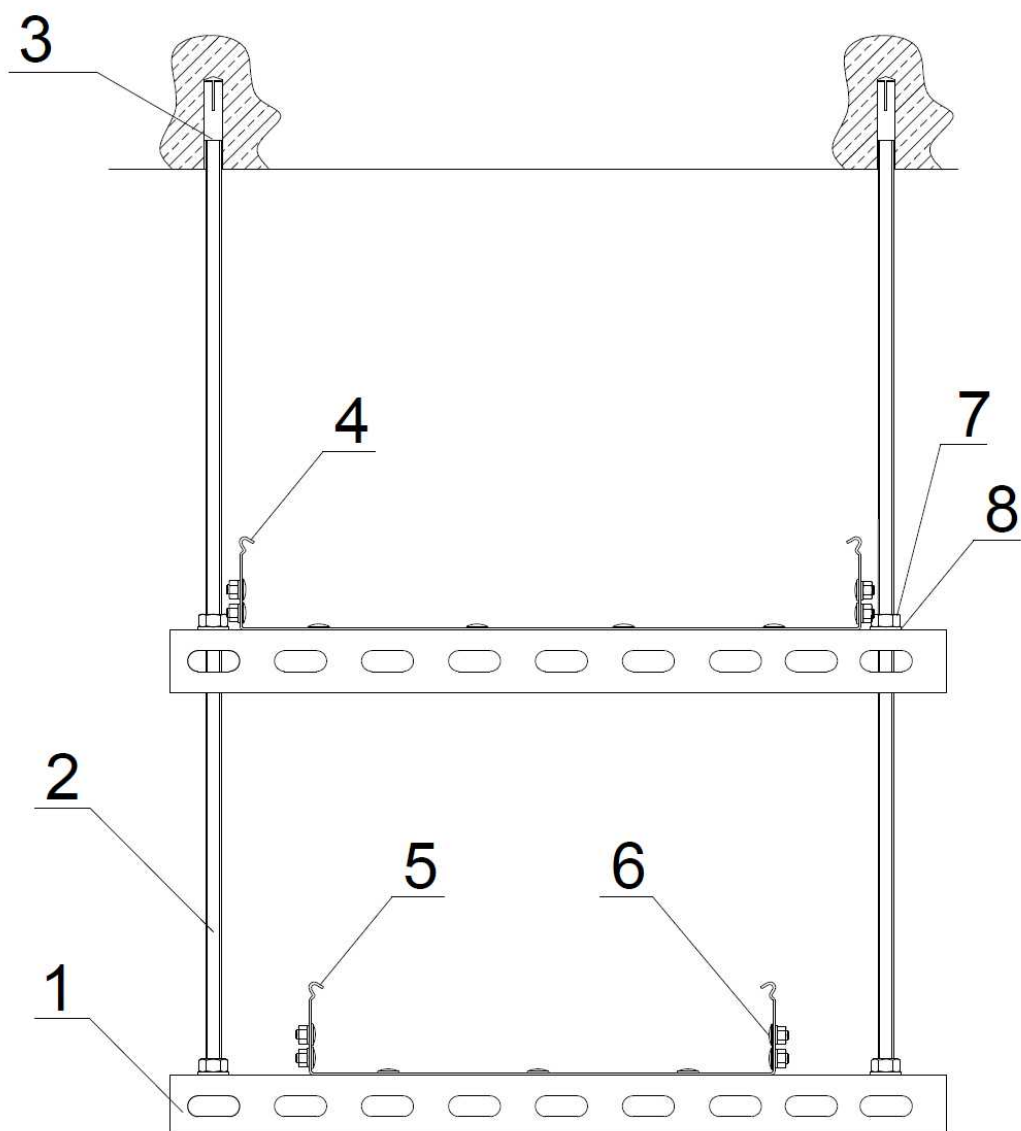


DRAWINGS





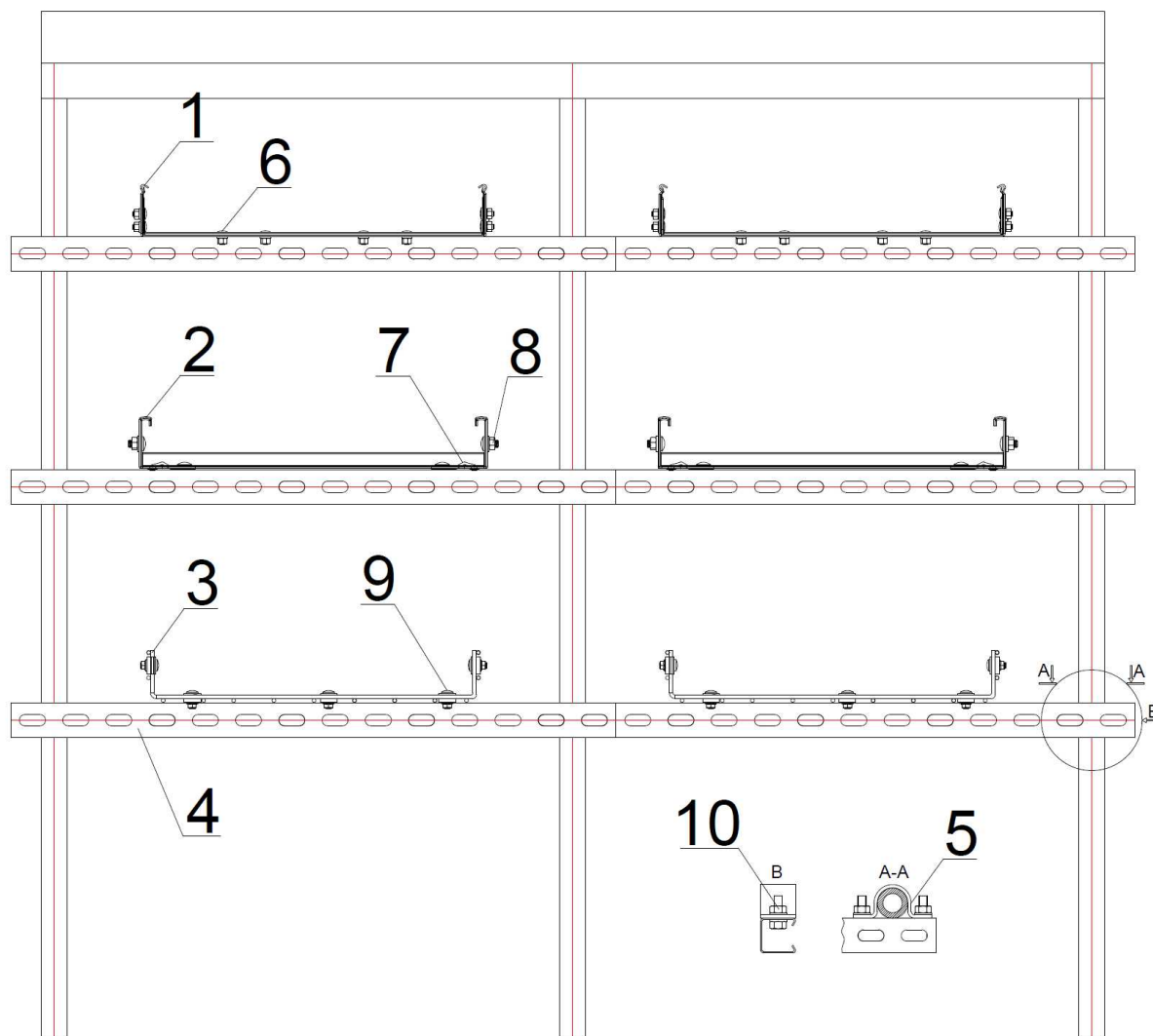
DRAWINGS



8	Podkładka	PP10	8
7	Nakrętka	NSM10	8
6	Śruba z łbem grzybkowym	SGNM6x12	15
5	Korytko	KGL/KGOL300H60/3	1
4	Korytko	KGJ/KGOJ400H60/3	1
3	Tuleja rozporowa stalowa	TRSOM10	2
2	Pręt gwintowany	PGM10/...	2
1	Ceownik wzmacniony	CWP/CWOP40H40/05	2
L.p.	Nazwa	Symbol	Szt.



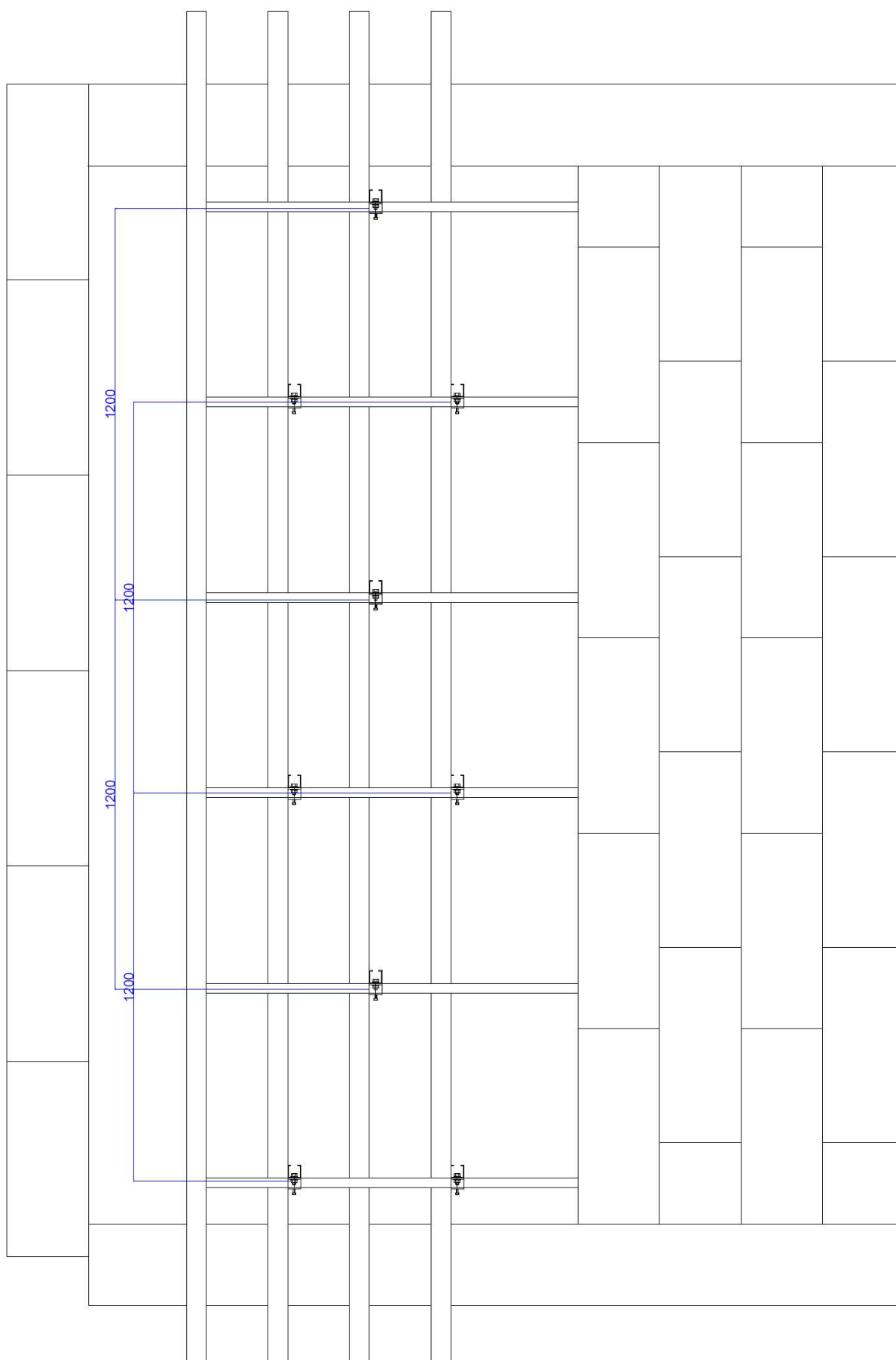
DRAWINGS



10	Śruba	SMM10x30	2
9	Uchwyt śrubowy	USS/USO	10
8	Śruba z łbem grzybkowym	SGNM8x14	8
7	Zacisk mocujący	ZM/ZMO	4
6	Śruba z łbem grzybkowym	SGNM6x12	16
5	Obejma rury Ø35		1
4	Ceownik wzmacniony	CWP/CWOP40H40/07	2
3	Korytko siatkowe	KDS/KDSO400H60/3	2
2	Drabinka	DGOP400H60/3	2
1	Korytko	KGJ/KGOJ400H60/3	2
L.p.	Nazwa	Symbol	Szt.



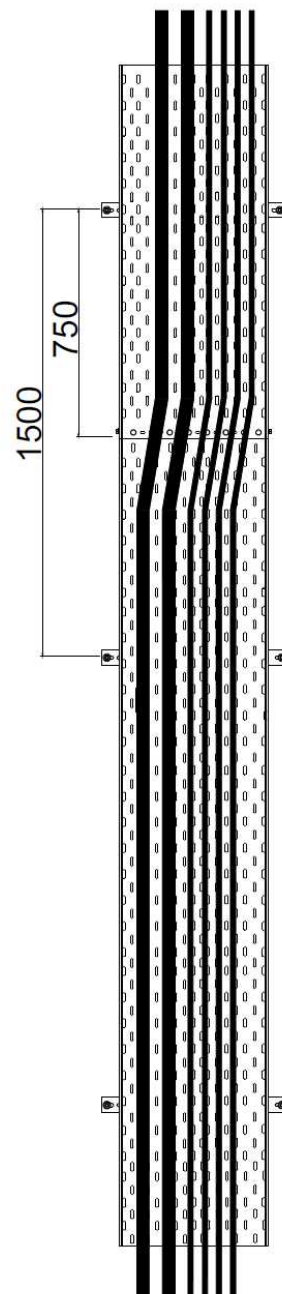
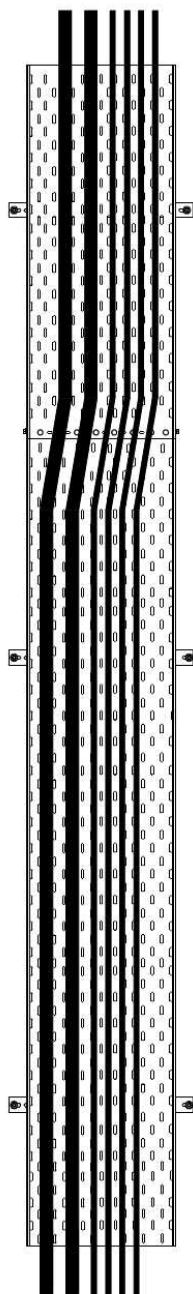
DRAWINGS





DRAWINGS

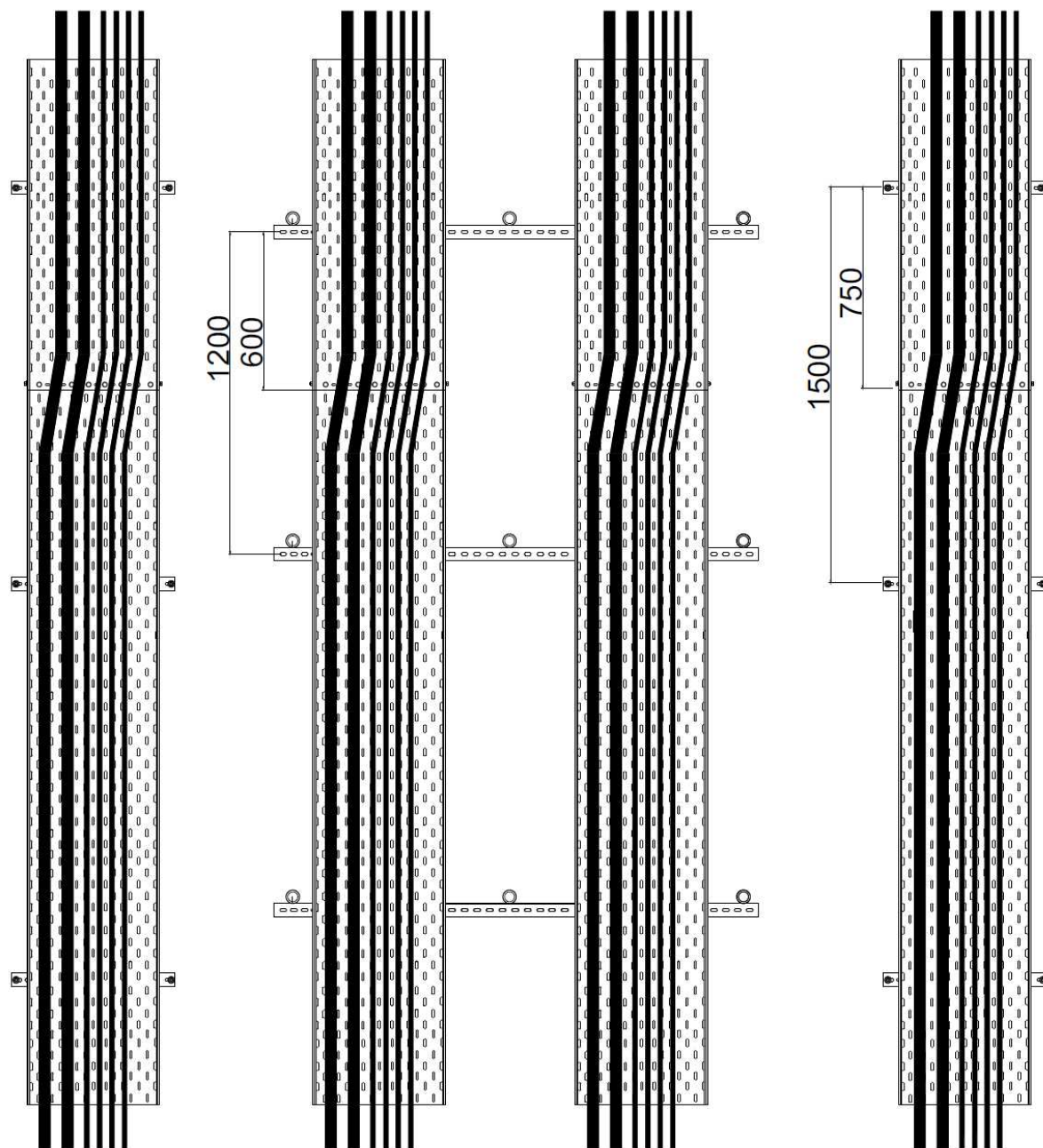
A-A





DRAWINGS

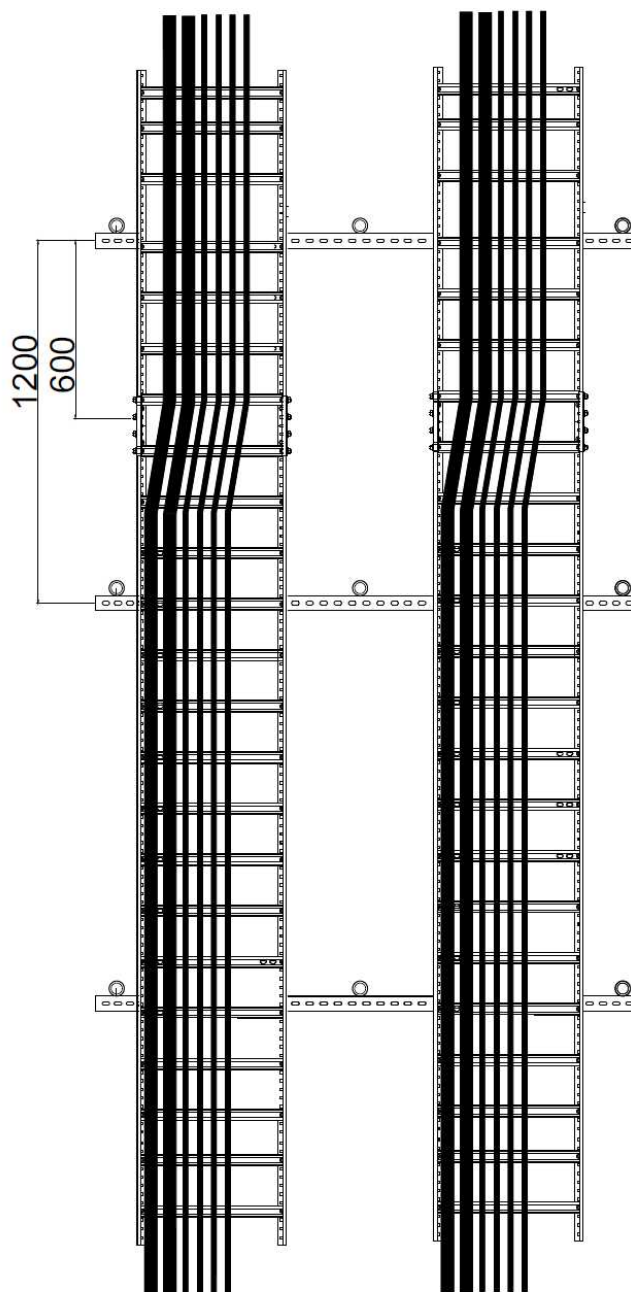
B-B





DRAWINGS

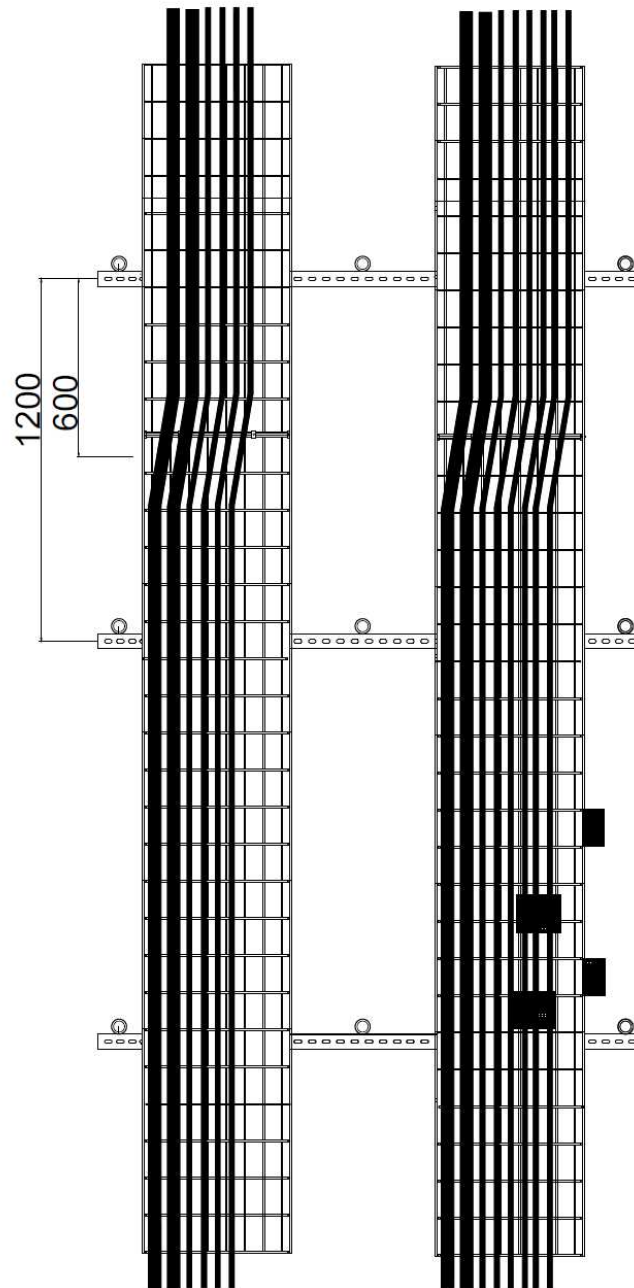
C-C

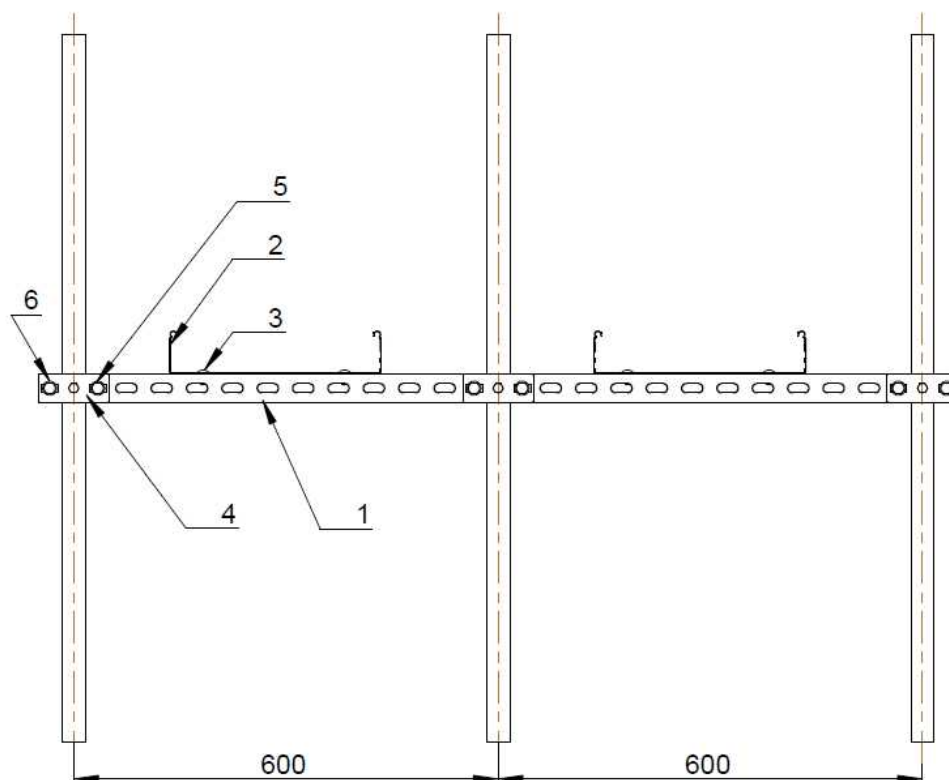




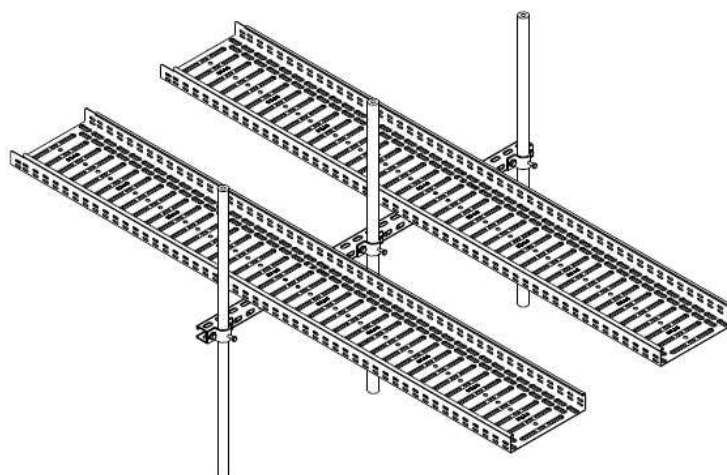
DRAWINGS

D-D

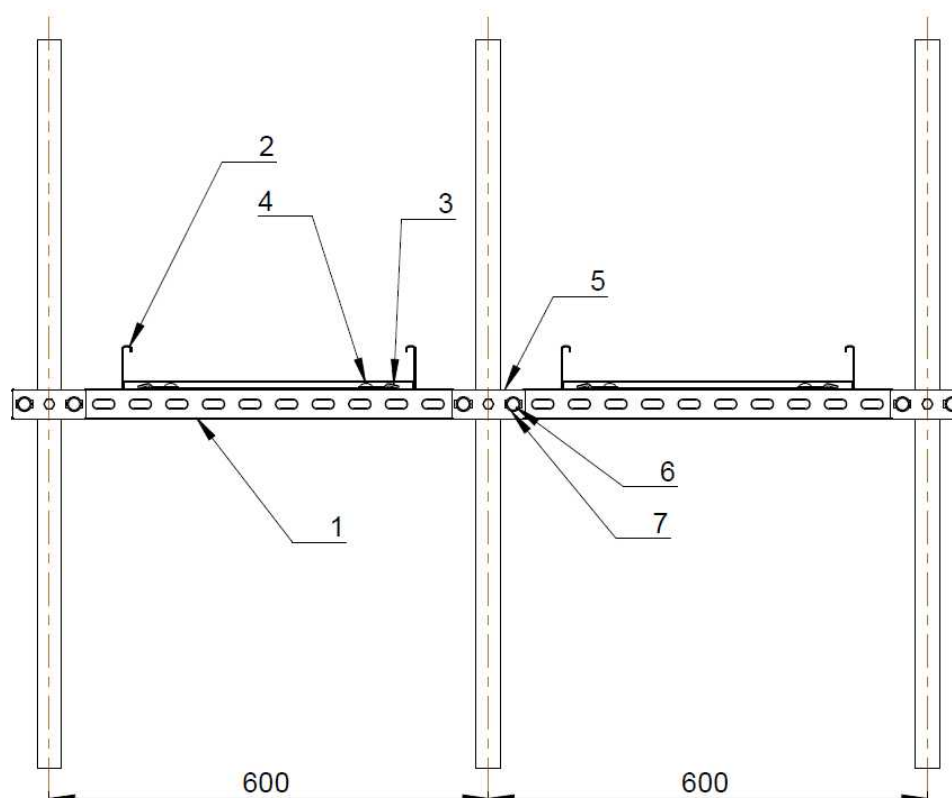




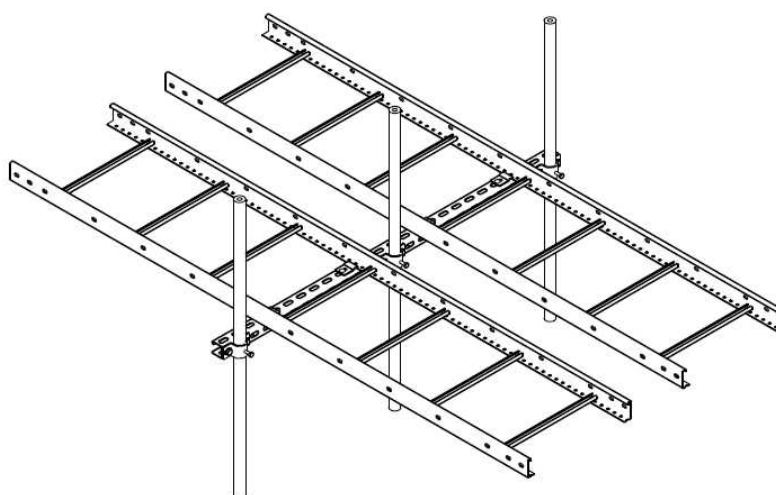
6	Podkładka	PP10	6
5	Śruba (komplet)	SMM10x20	6
4	Obejma rury	OBR35	3
3	Śruba (komplet)	SGM6x12	10
2	Korytko	KGJ/KGOJ400H60/3	1
1	Ceownik	CWP/CWOP40H40/13	1
LP	Nazwa	Symbol	Szt.



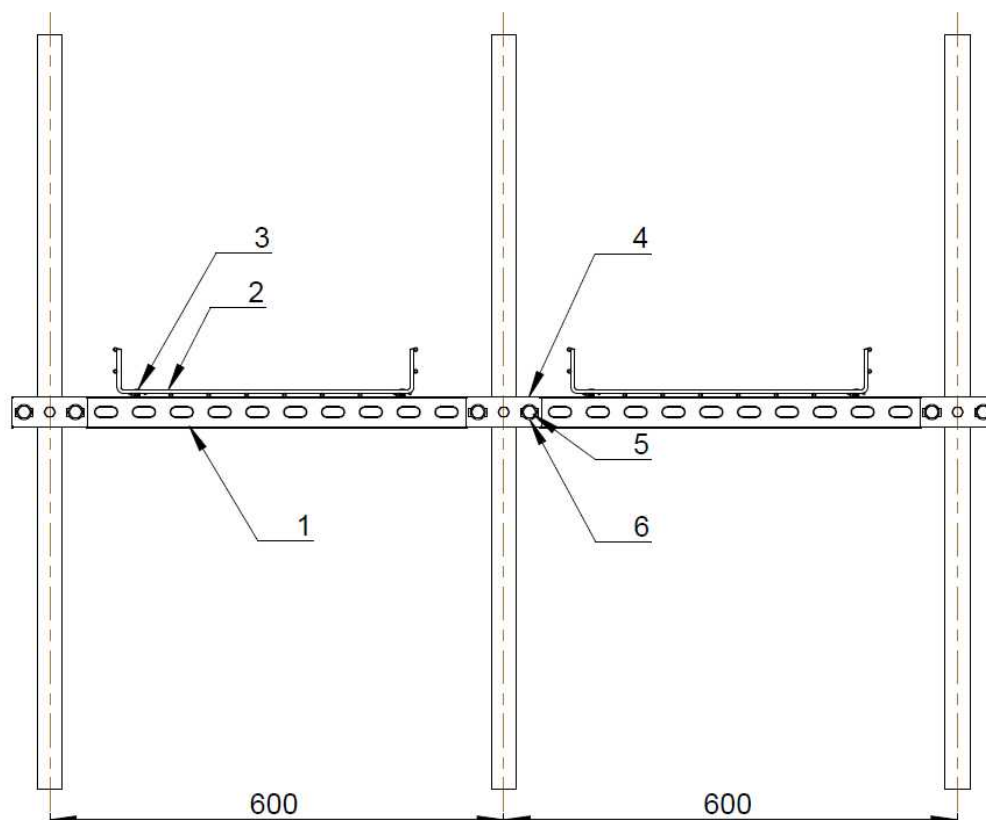
SCALE 1:20



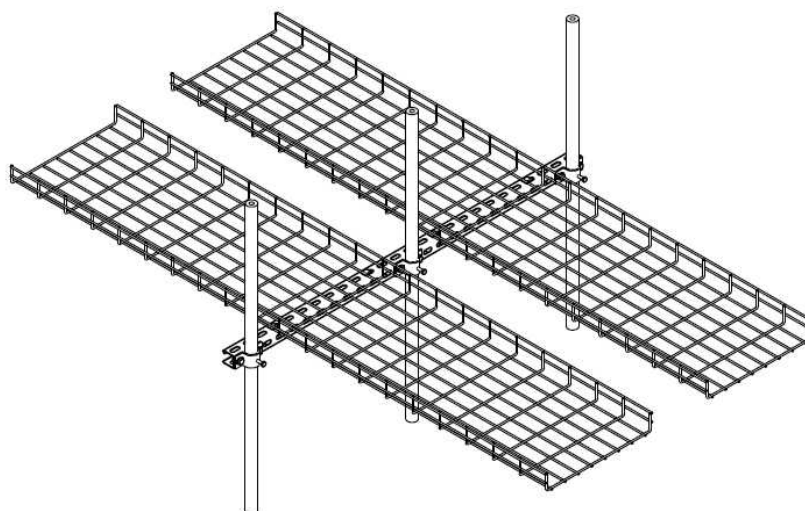
7	Podkładka	PP10	6
6	Śruba (komplet)	SMM10x20	6
5	Obejma rury	OBR35	3
4	Śruba (komplet)	SGNM8x14	4
3	Zacisk mocujący	ZM/ZMO	10
2	Drabinka	DGP/DGOP400H60/3	1
1	Ceownik	CWP/CWOP40H40/13	1
LP	Nazwa	Symbol	Szt.



SCALE 1:20



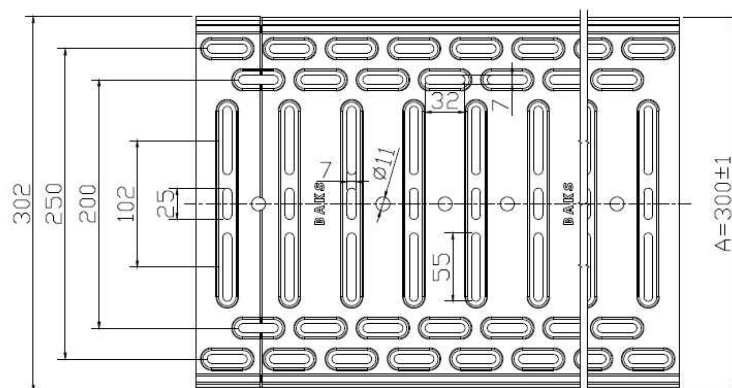
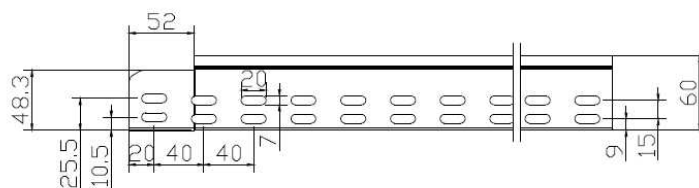
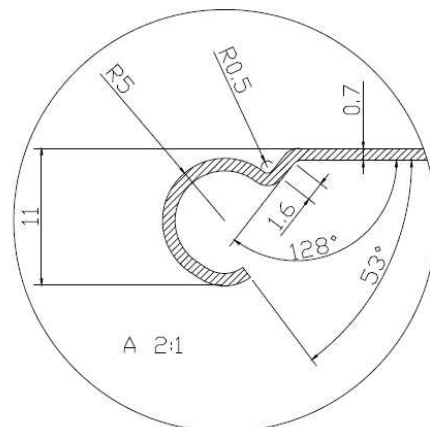
6	Podkładka	PP10	6
5	Śruba (komplet)	SMM10x20	6
4	Obejma rury	OBR35	3
3	Zacisk śrubowy	ZS/ZSO	2
2	Korytko siatkowe	KDS/KDSO400H60/3	1
1	Ceownik	CWP/CWOP40H40/13	1
LP	Nazwa	Symbol	Szt.



SCALE 1:20

DRAWINGS

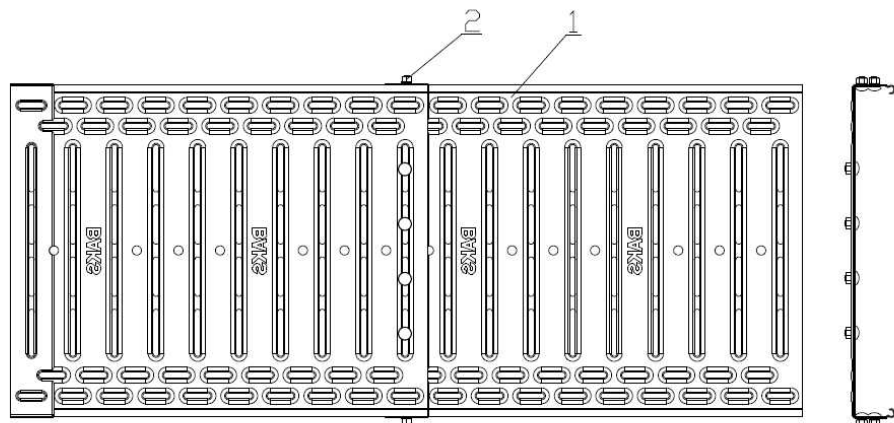
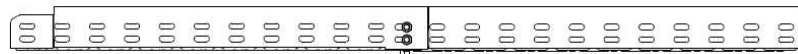
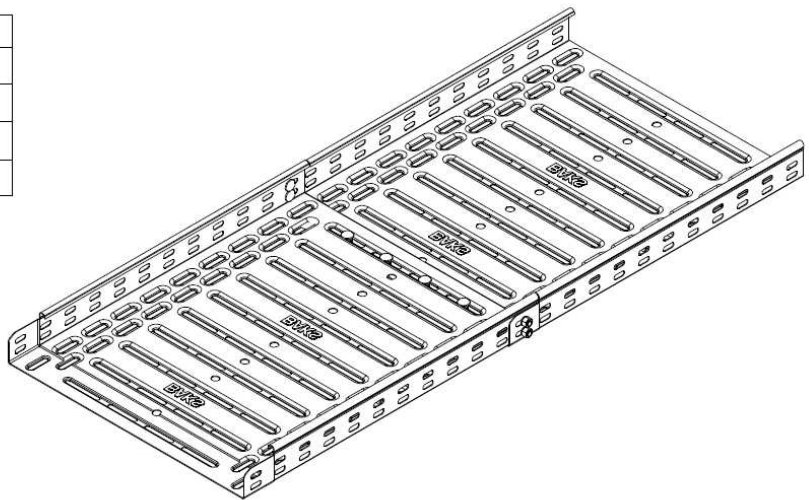
Typ	Szerokość A(mm)	Długość L(mm)
KGL/KGDL100H60/3	100	3000
KGL/KGDL200H60/3	200	3000
KGL/KGDL300H60/3	300	3000



	Długość wykładów niezależnych		Materiał	Gatunek	Masa Ukgj	Podziałka	Format A4
				Nr normy			
				półfabrykat (nr normy)		1:5	Arkusz
Projektował	Nazwisko	Podpis	Data	Nazwa rysunku			
Rysował				KGL/KGDL...H60/3			
Sprawił				Nr programu maszynowego			
Zatwierdził				Nr rysunku			
Profesjonalne Systemy Tras Kablowych							Nr zmiany

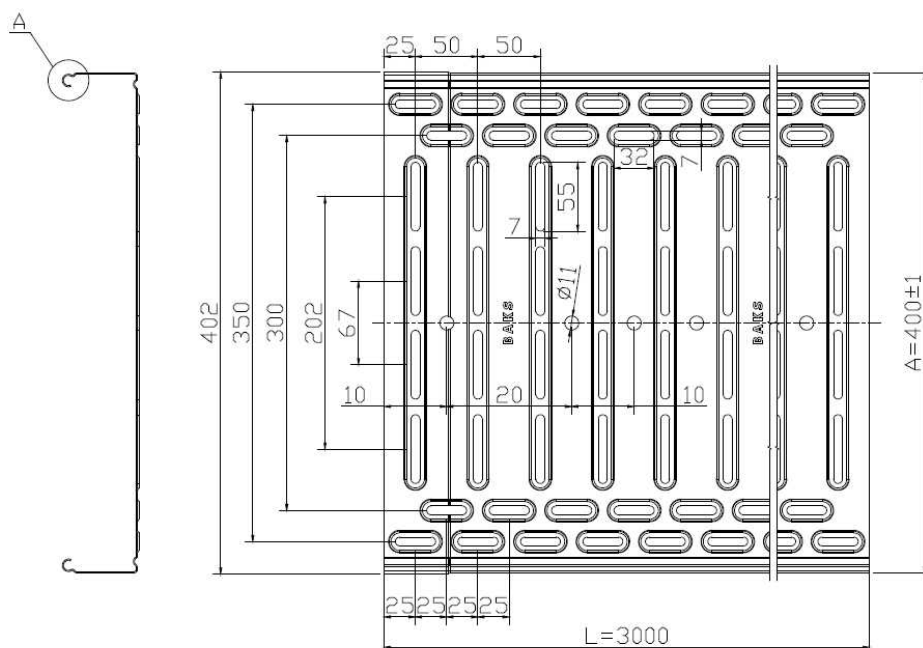
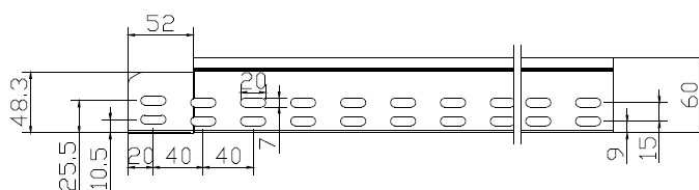
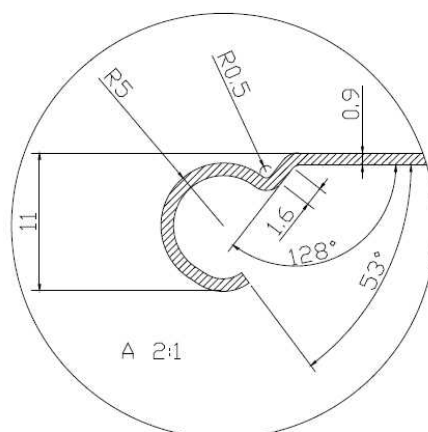
DRAWINGS

Poz.1		Poz.2
A	Typ	Ilość
100	KGL/KGDL100H60/3	6
200	KGL/KGDL200H60/3	7
300	KGL/KGDL300H60/3	8



2	Śruba z łbem grzybkowym	SGN M6x12		8	
1	Korytka	KGL/KGDL300H60/3		2	
L.p.	Nazwa	Symbol	Materiał	Szt.	Nr katalogowy
	Długość wykładki niezłazowanej		Główny		Masa B-gł
			Materiał		Podziałka
			Nr normy		Format A4
Projektował					Arkusze 1
Rysował					Arkusze 1
Sprawił					
Zatwierdził					
				Połączenie KGL/KGDL300H60/3	
				Nr programu maszynowego w rysunku	
				Nr zmiany	

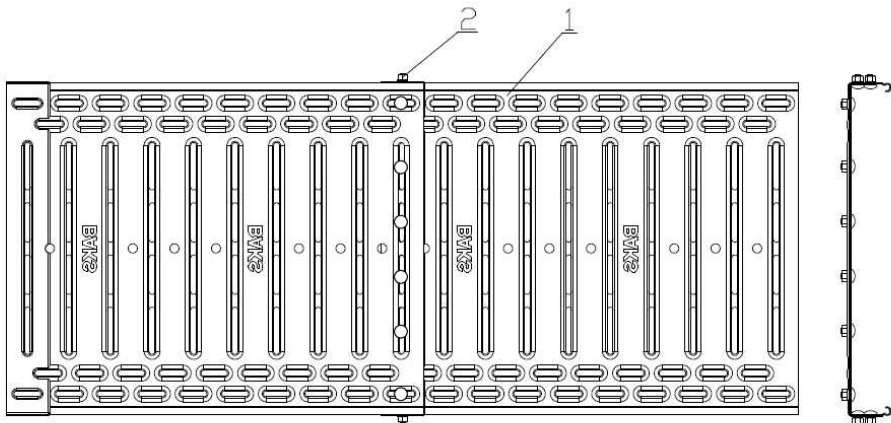
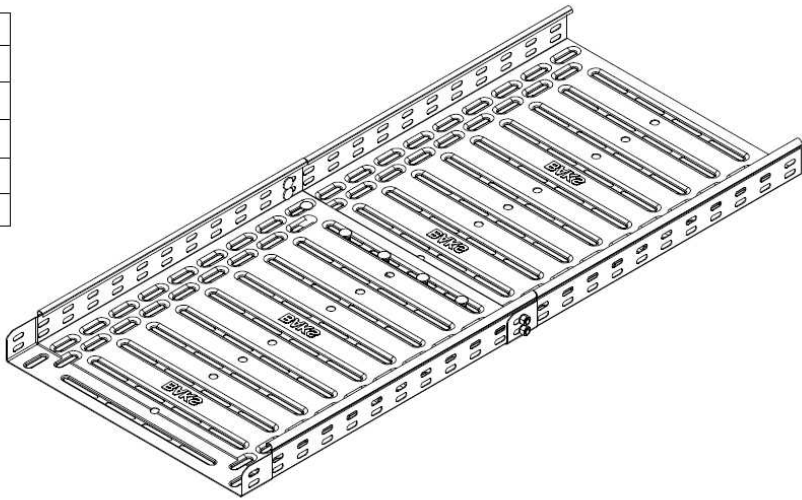
Typ	Szerokość A(mm)	Długość L(mm)
KGJ/KGQJ100H60/3	100	3000
KGJ/KGQJ200H60/3	200	3000
KGJ/KGQJ300H60/3	300	3000
KGJ/KGQJ400H60/3	400	3000



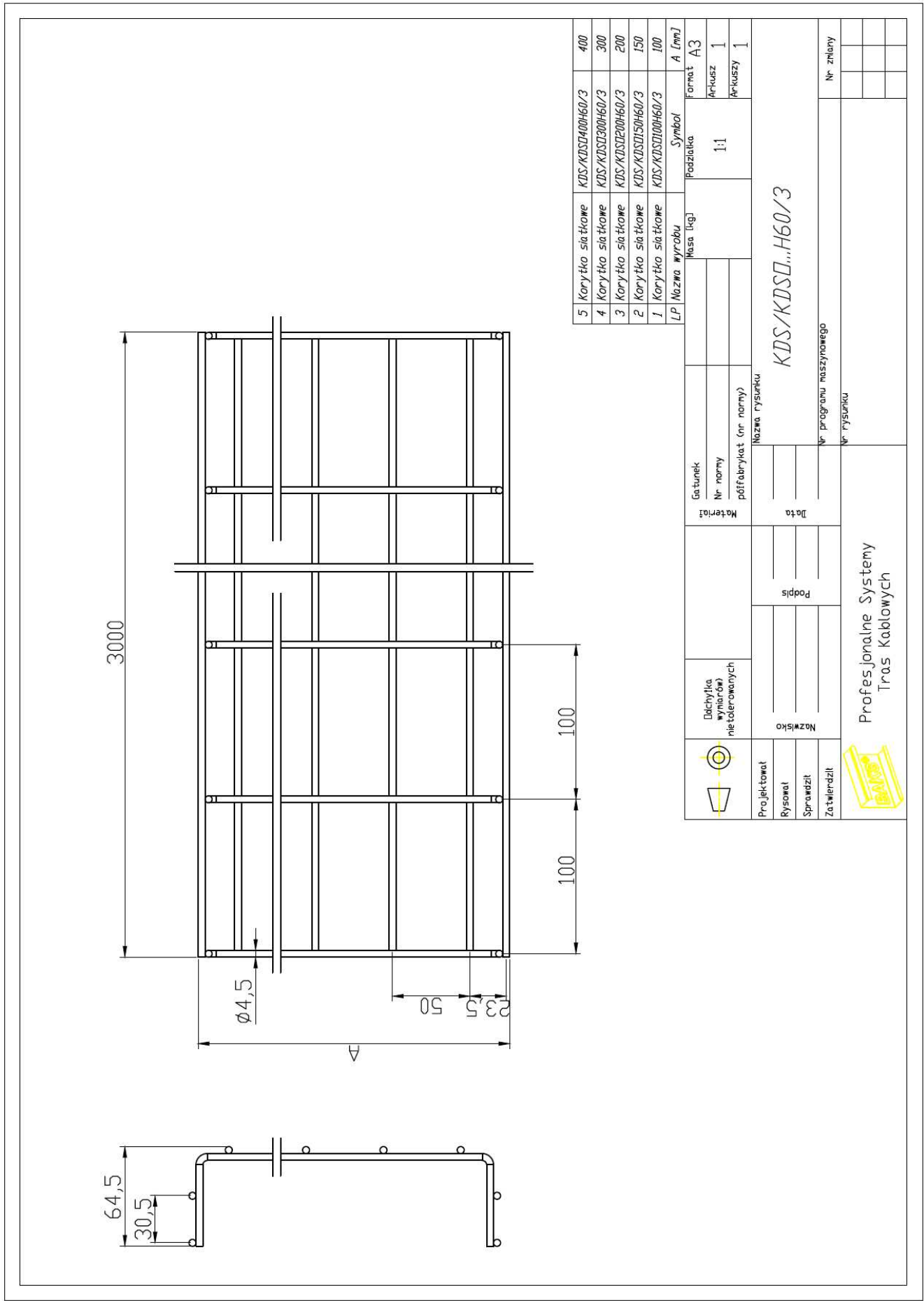
	Odchylka wynalorów nietolerowanych		Materiał Gatunek Nr normy półfabrykat (nr normy)		Masa lkgj	Podziałka 1:5	Format A4 Arkusz Arkuszy
	Projektował	Nazwisko _____ _____ _____ _____	Podpis _____ _____ _____ _____	Data _____ _____ _____ _____	Nazwa rysunku KGJ/KGJ...H60/3		
	Rysował				Nr programu nazwinyowego _____ _____ _____ _____		
Sprawił							
Zatwierdził	Nr rysunku _____ _____ _____ _____						
 Profesjonalne Systemy Tras Kablowych					_____ _____ _____ _____		

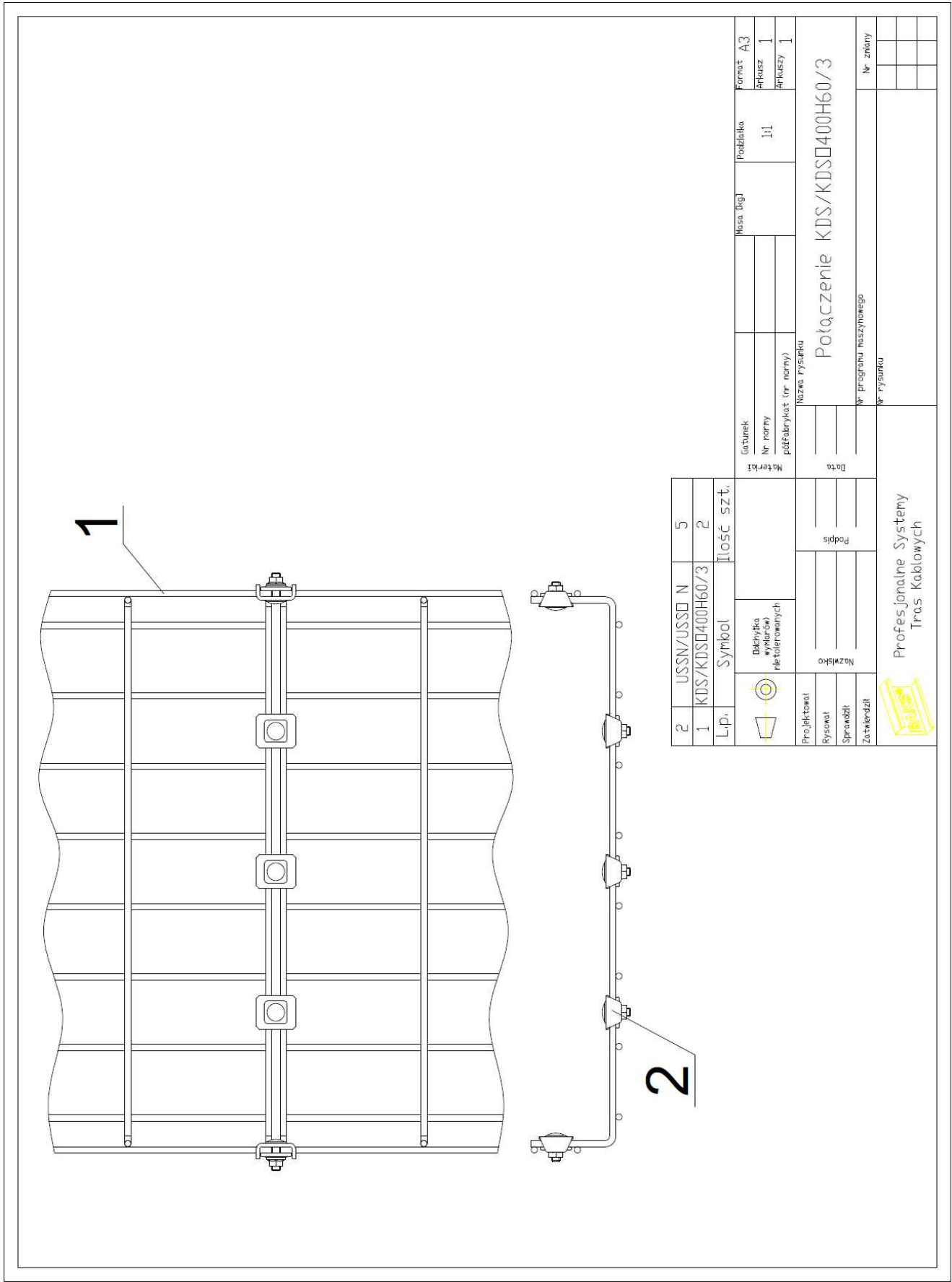


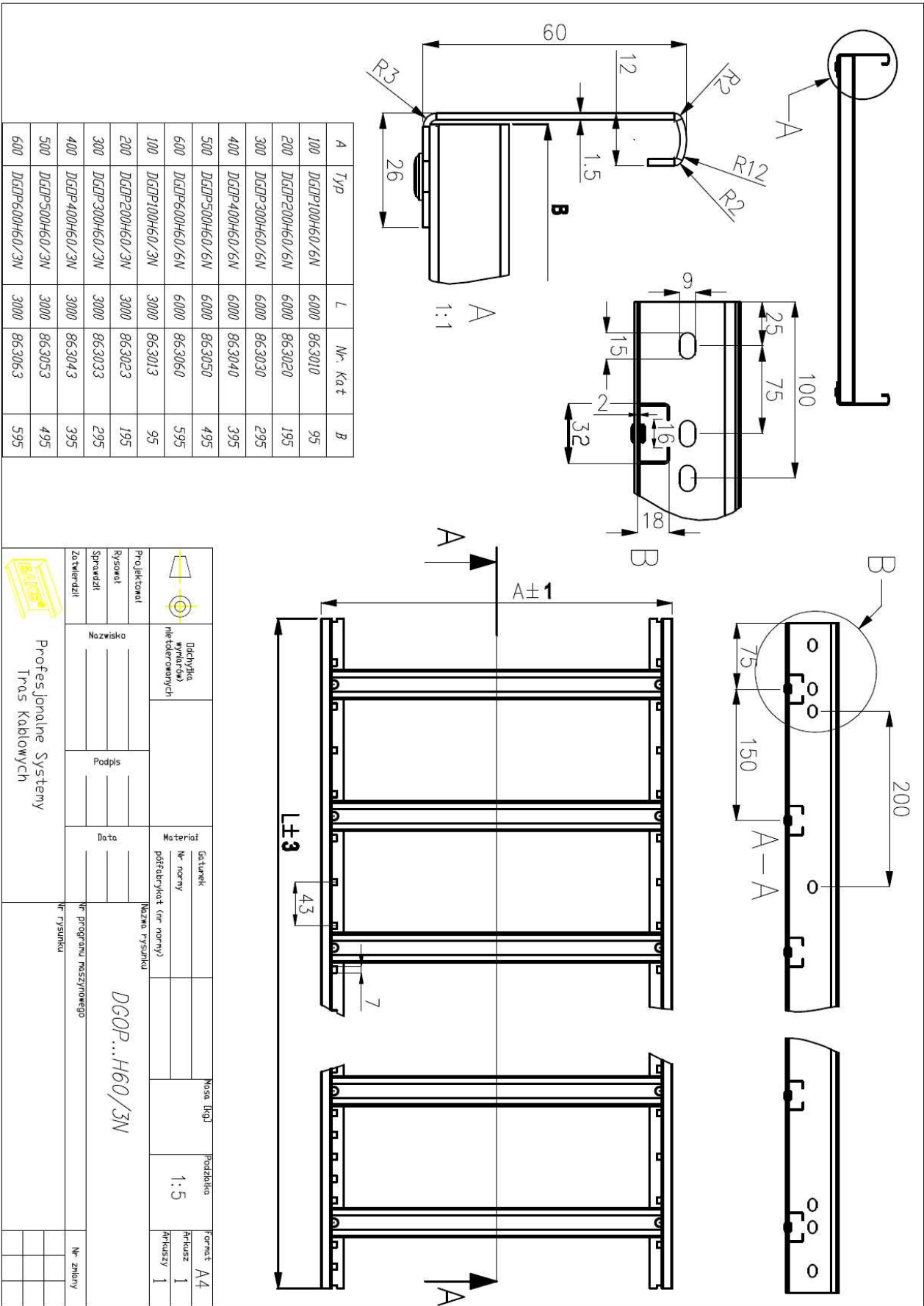
Poz.1		Poz.2
A	Typ	Ilość
100	KGJ/KGDJ100H60/3	6
200	KGJ/KGDJ200H60/3	7
300	KGJ/KGDJ300H60/3	8
400	KGJ/KGDJ400H60/3	10



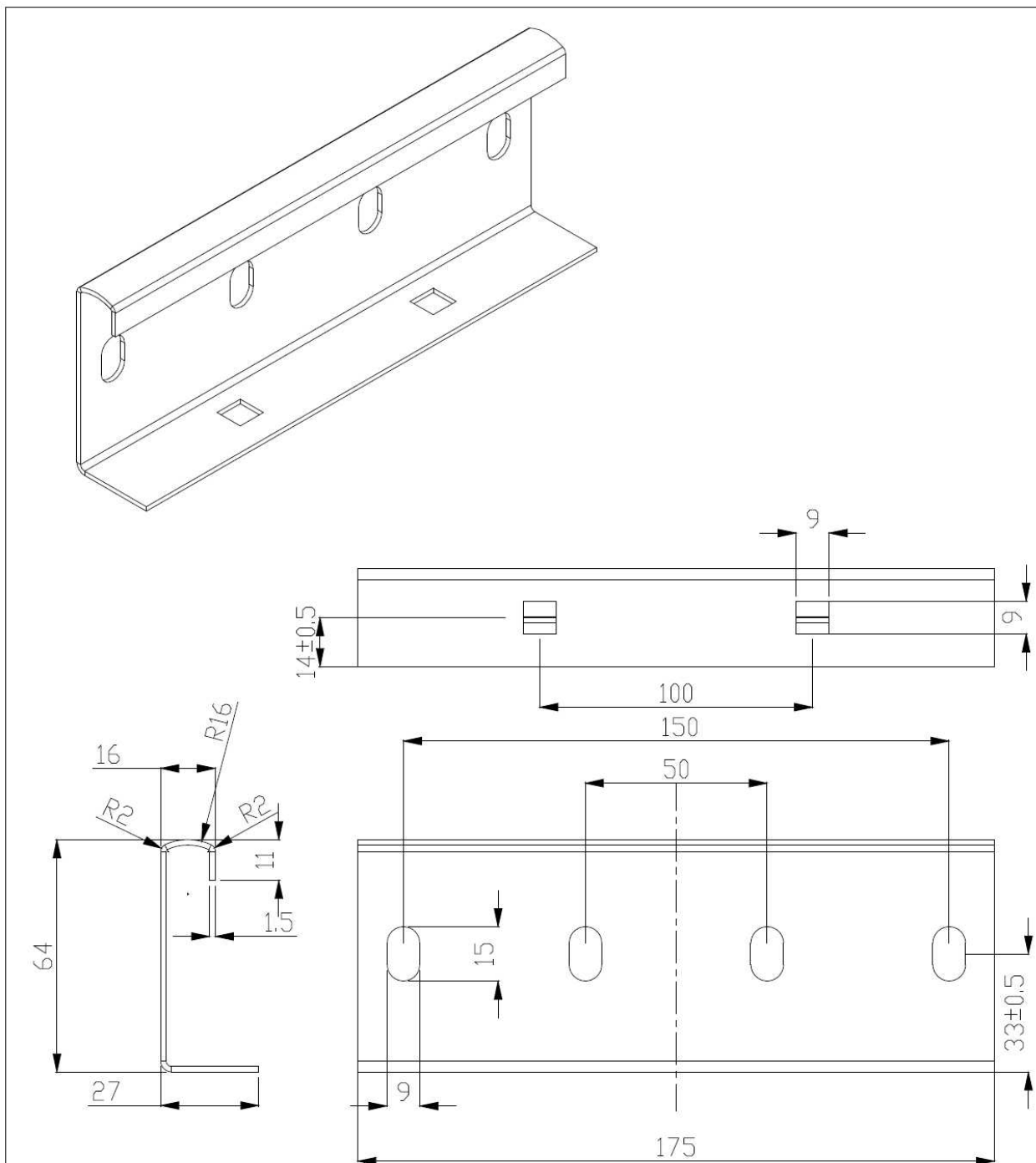
2	Śruba z łbem grzybkowym	SGN M6x12		10	
1	Korytka	KGJ/KGDJ400H60/3		2	
L.p.	Nazwa	Symbol	Material	Szt.	Nr katalogowy
	Długość wykonania niezłomanych		Gatunek Nr normy poFabrykat (nr normy)	Masa (kg)	Podziałka
Projektował					Formot A4
Rysował					Arkusz 1
Sprawdził					Arkuszy 1
Zatwierdził					
Profesjonalne Systemy Tras Kablowych				Nr zrealizacji	





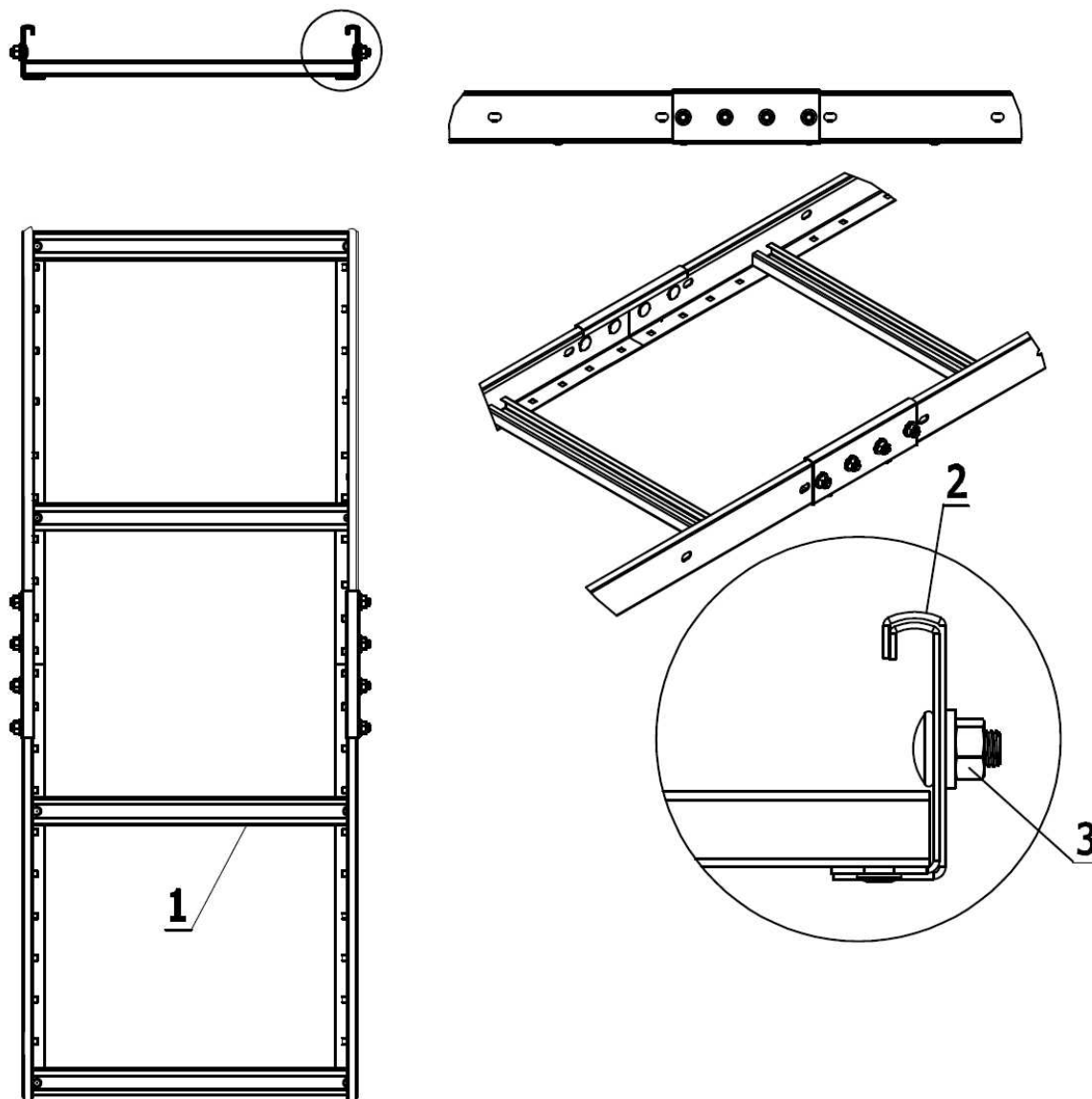


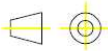
DRAWINGS



	Odczytka wymiarów nieolerowanych		Materiał	Gatunek	Masa [kg]	Podziałka	Format	A4
				Nr normy			Arkusze	
				półfabrykat (nr normy)			Arkuszy	
Projektował		J.GROCHOWSKI	Data	20.10.05	Nazwa rysunku <i>LDC/L DOCH60N</i>			
Rysował		J.Grochowski		20.10.05				
Sprawdził		T.WŁODARCZYK		20.10.05				
Zatwierdził		JKLICZEK		20.10.05				
				Nr programu Naszywanego		Nr zmiany		

DRAWINGS



3	Śruba	SGN M8x14		8	
2	Łącznik	LDCH60N		2	
1	Drabinka	DGDP600H60/3N		2	
Pos.	Benennung	Zeichnung-Nr	Material	Stck.	Katalogs Nr.
	Dłochyłka wymiarów nietolerowanych		Gatunek		Masa [kg]
			Nr normy		Podziałka
			półfabrykat (nr normy)		Format A4
					Arkusz 1
					Arkuszy 1
Projektował				Nazwa rysunku	
Rysował	Nazwisko	Podpis	Data	DGDP600H60/3N	
Sprawdził					
Zatwierdził				Nr programu maszynowego	Nr zmiany
				Nr rysunku	
	Profesjonalne Systemy Tras Kablowych				

System E-30, E-90 - Puszki łączeniowo-rozgałęźne



Puszka łączeniowo-rozgałęźna



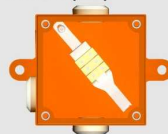
PMO1 (5/6)



PMO1 (5/3)



PMO1 (3/3)



PMO1

SYMBOL	nr katalogowy	szk.
PMO1(5/6)	801100	1
PMO1(5/3)	801200	1
PMO1(3/3)	801300	1

PMO1 E

PMO1(5/6) E	801101	1
PMO1(5/3) E	801201	1
PMO1(3/3) E	801301	1

INFORMACJA TECHNICZNA

Stosowana jako puszka:

- przelotowa o przekroju kabla od 0,5 mm² do 6 mm²,
- rozgałęźna o przekroju kabla od 0,5 mm² do 1,5 mm².

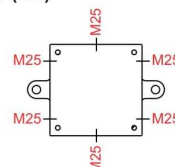
Puszka wykonywana jest w wersji:

- PMO1 5/6 - 5 kostek zaciskowych, 6 dławików gumowych
- PMO1 5/3 - 5 kostek zaciskowych, 3 dławiki gumowe
- PMO1 3/3 - 3 kostki zaciskowe, 3 dławiki gumowe
- PMO1 5/6 E - 5 kostek zaciskowych, 6 dławików gumowych
- PMO1 5/3 E - 5 kostek zaciskowych, 3 dławiki gumowe
- PMO1 3/3 E - 3 kostki zaciskowe, 3 dławiki gumowe

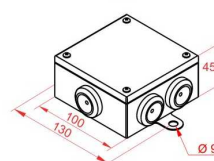
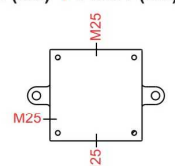
Maksymalne przekroje żył i ich ilość mieszcząca się w gnieździe kostki:

5 x 0,5 mm ²	1 x 2,5 mm ²
5 x 0,75 mm ²	1 x 4 mm ²
4 x 1 mm ²	1 x 6 mm ²
3 x 1,5 mm ²	

PMO1 (5/6)



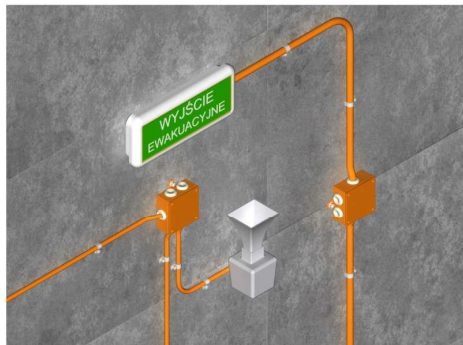
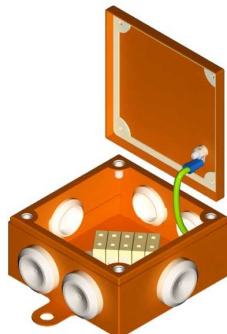
PMO1 (5/3) | PMO1 (3/3)



ZASTOSOWANIE

Puszka łączeniowa i rozgałęźna, U_i=400 V, z trwałym zachowaniem funkcji łączenia E30 / E60 / E90 wg DIN 4102 część 12. Stopień ochrony IP54, zakres uszczelnienia od 7 mm do 18,5 mm. Mocowanie poprzez zewnętrzne uchwytty montażowe: do betonu za pomocą kołków stalowych SR0M6x30, do drabinek i korytek kablowych za pomocą śruby SGK6x12.

Puszka łączeniowo-rozgałęźna



PMO2 (5/6)



PMO2 (5/3)



PMO2 (3/3)



PMO2

SYMBOL	nr katalogowy	szk.
PMO2(5/6)	802010	1
PMO2(5/3)	802020	1
PMO2(3/3)	802030	1

PMO2 E

PMO2(5/6) E	802011	1
PMO2(5/3) E	802021	1
PMO2(3/3) E	802031	1

INFORMACJA TECHNICZNA

Stosowana jako puszka:

- przelotowa o przekroju kabla od 1,0 mm² do 10 mm²,
- rozgałęźna o przekroju kabla od 1,0 mm² do 4 mm².

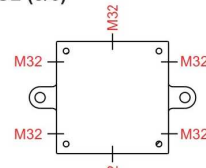
Puszka wykonywana jest w wersji:

- PMO2 5/6 - 5 kostek zaciskowych, 6 dławików gumowych
- PMO2 5/3 - 5 kostek zaciskowych, 3 dławiki gumowe
- PMO2 3/3 - 3 kostki zaciskowe, 3 dławiki gumowe
- PMO2 5/6 E - 5 kostek zaciskowych, 6 dławików gumowych
- PMO2 5/3 E - 5 kostek zaciskowych, 3 dławiki gumowe
- PMO2 3/3 E - 3 kostki zaciskowe, 3 dławiki gumowe

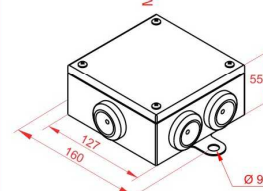
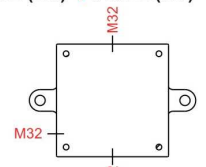
Maksymalne przekroje żył i ich ilość mieszcząca się w gnieździe kostki:

6 x 1 mm ²	2 x 4 mm ²
6 x 1,5 mm ²	1 x 6 mm ²
4 x 2,5 mm ²	1 x 10 mm ²

PMO2 (5/6)



PMO2 (5/3) | PMO2 (3/3)



ZASTOSOWANIE

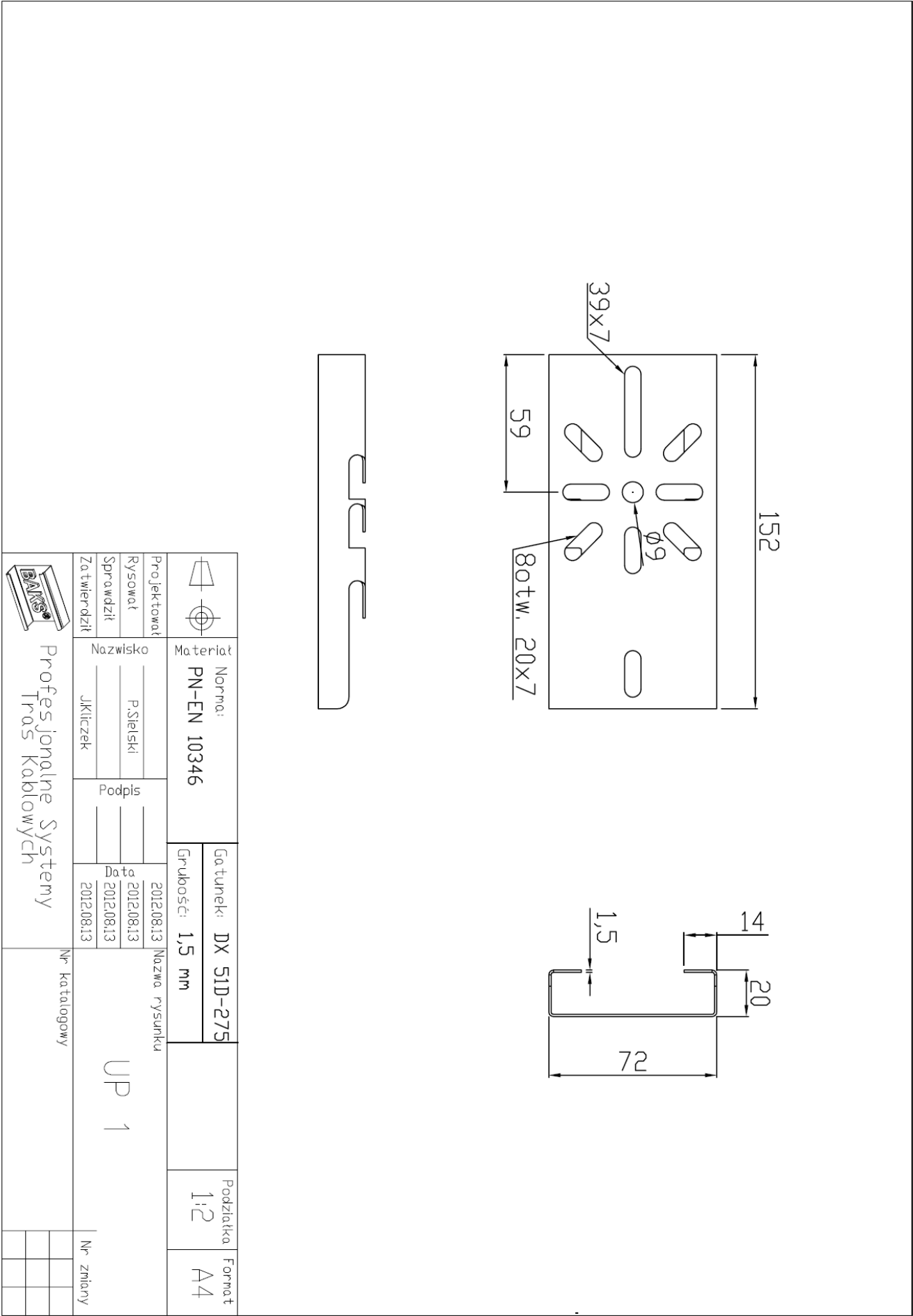
Puszka łączeniowa i rozgałęźna, U_i=400 V, z trwałym zachowaniem funkcji łączenia E30 / E60 / E90 wg DIN 4102 część 12. Stopień ochrony IP54, zakres uszczelnienia od 11 mm do 24 mm. Mocowanie poprzez zewnętrzne uchwytty montażowe: do betonu za pomocą kołków stalowych SR0M6x30, do drabinek i korytek kablowych za pomocą śruby SGK6x12.

MATERIAŁ

PMO1, PMO2, - blacha stalowa, malowana proszkowo RAL 2003
PMO1 E, PMO2 E, - blacha kwasoodporna, 1.4301 malowana proszkowo RAL 2003
Kostka zaciskowa wykonana jest ze specjalnej ceramiki odpornej na wysokie temperatury, dławik wykonany jest z tworzywa bezhalogenowego mocowanie poprzez zewnętrzne uchwytty montażowe

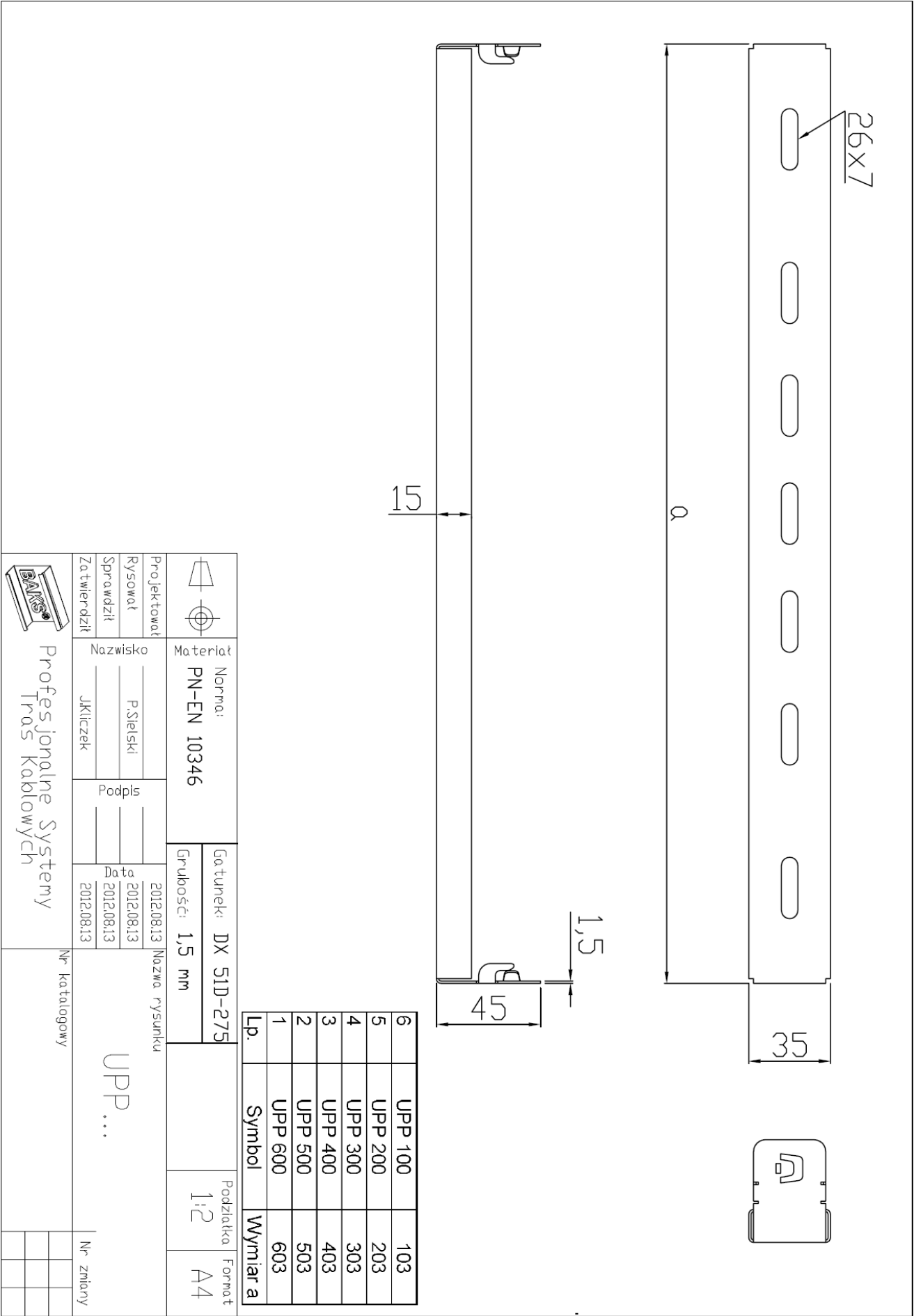


DRAWINGS

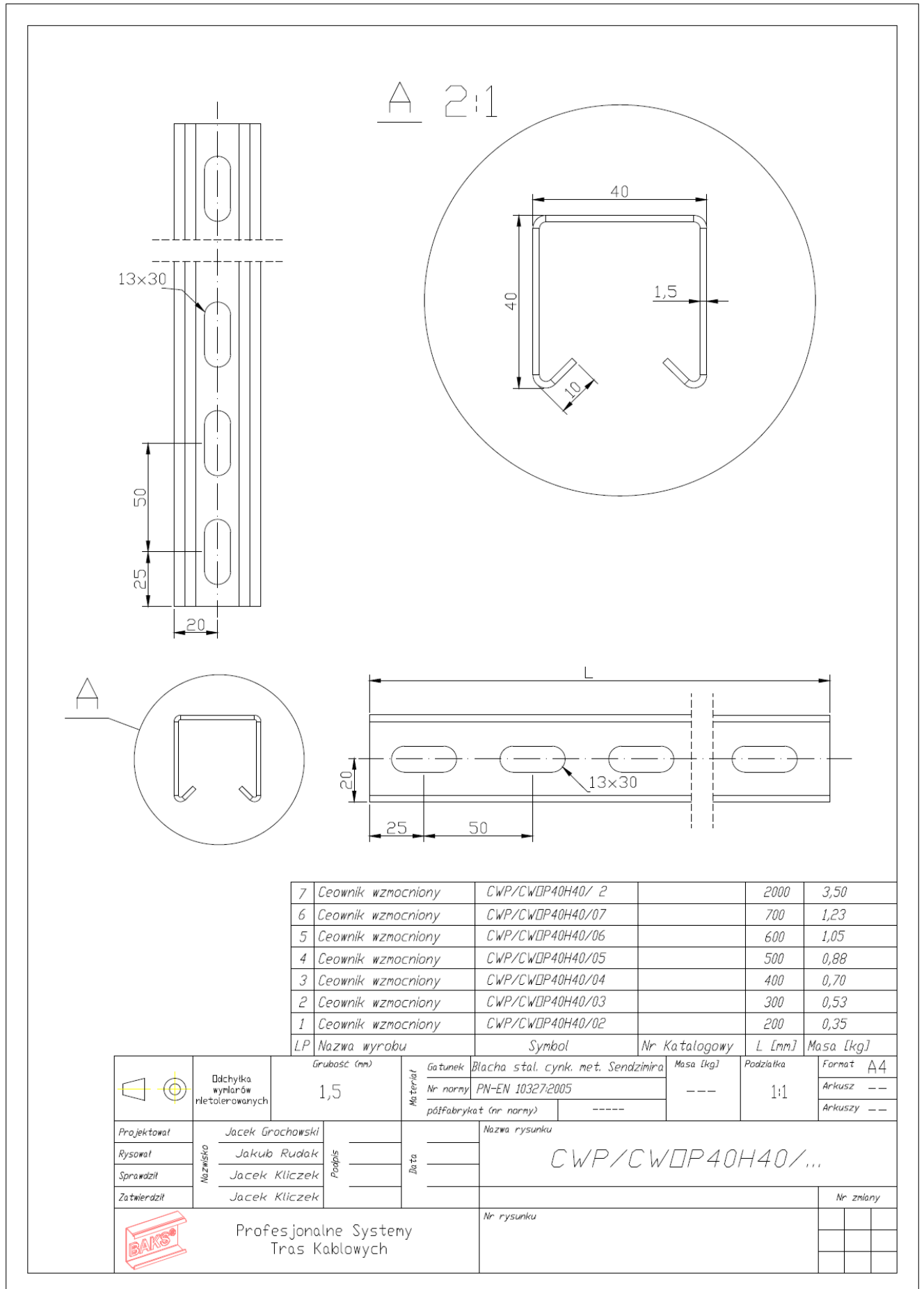


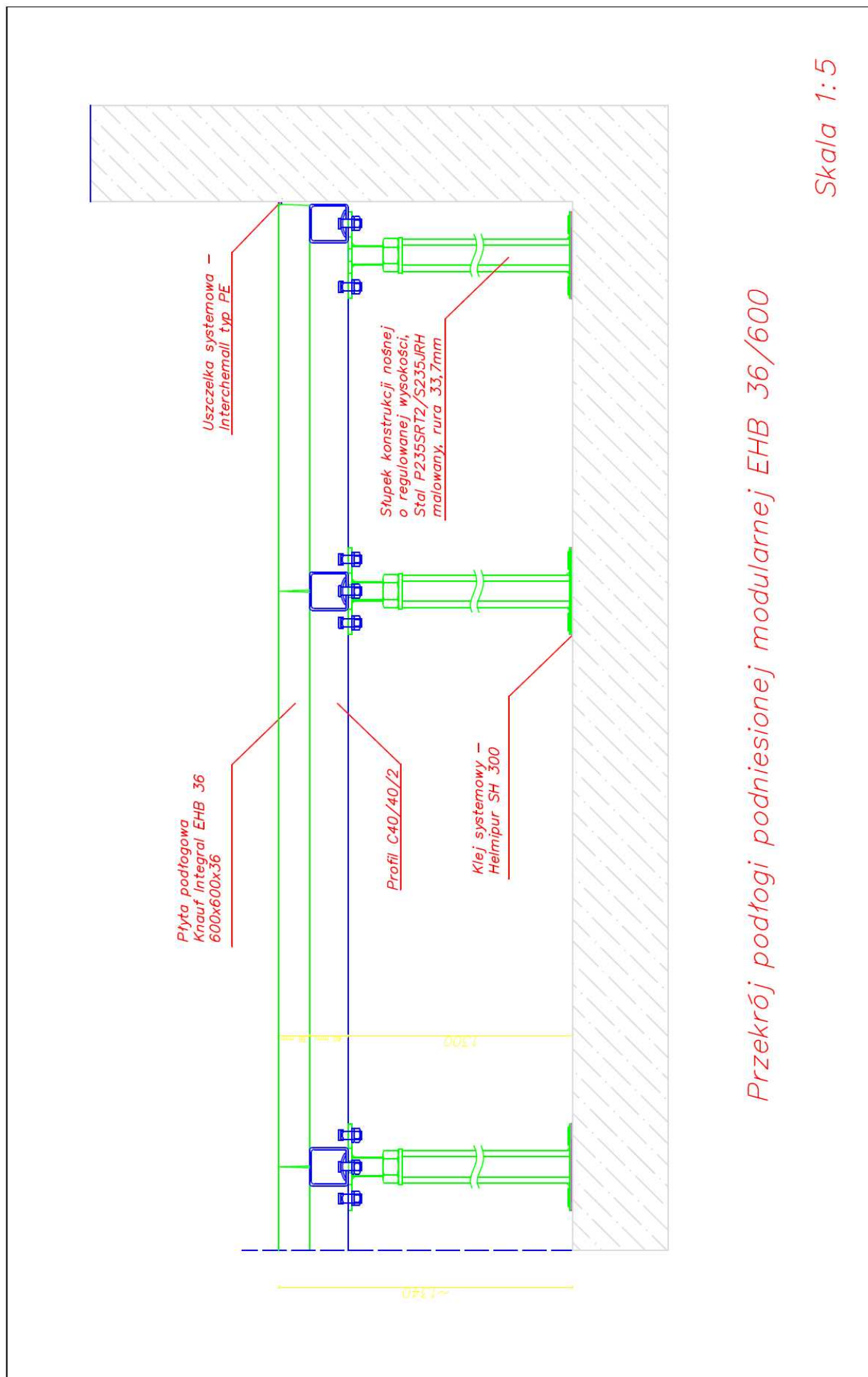


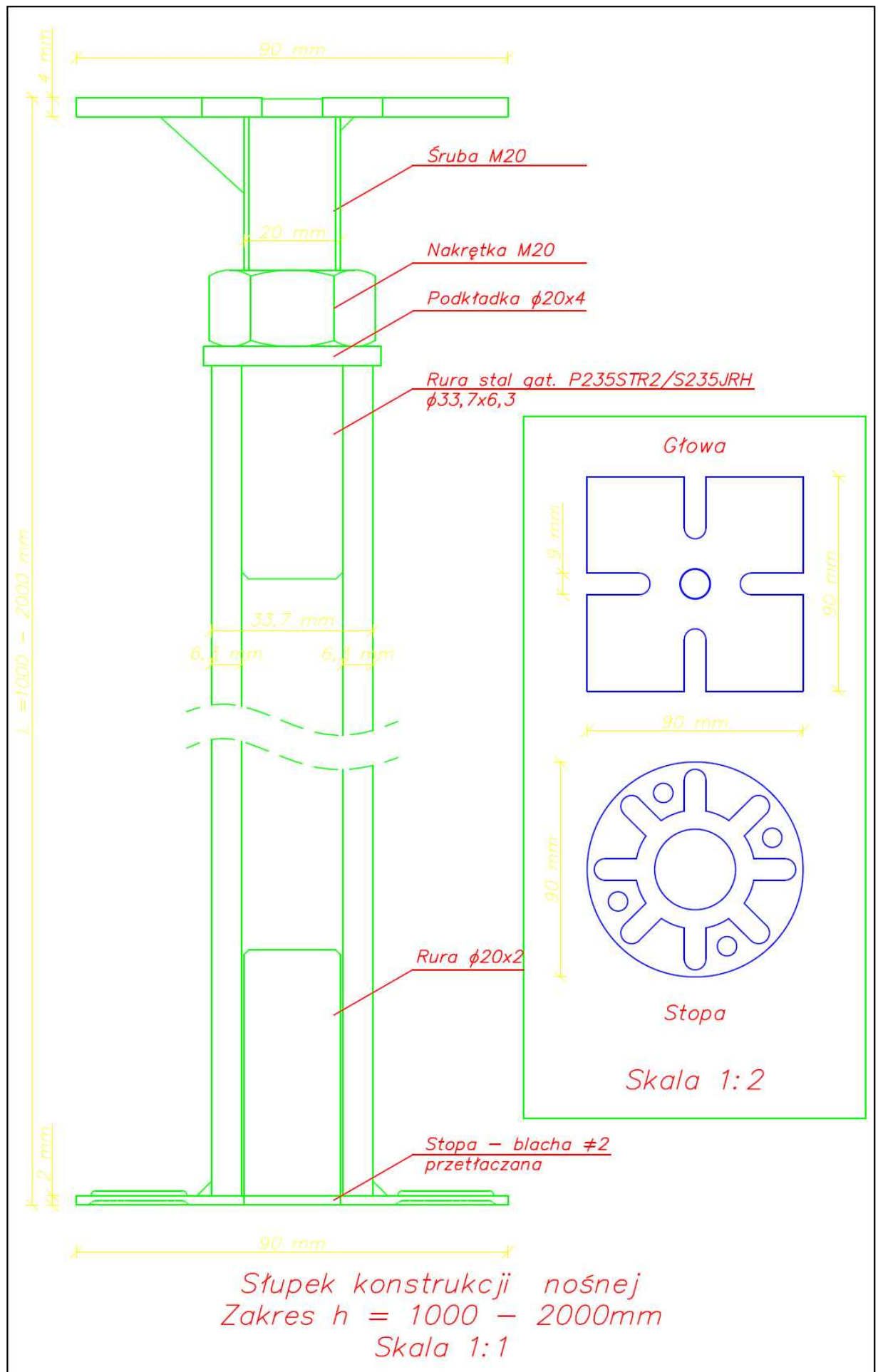
DRAWINGS



Page: 56/59









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 STN 92 0205:2012. 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:

Prepared by:

Ing. Štefan Rástocký
leader of the testing laboratory



Bc. Dávid Šubert
technician of the testing laboratory

8. NORMATIVE REFERENCES

STN EN 1363-1: 2001	Fire resistance tests. Part 1: General requirements
STN 92 0205:2012	Fire behaviour of construction products and building constructions. Circuit integrity maintenance of cable systems. Requirements, testing and classification.
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
ZP-27/2008 PAVUS	Test method for determination of functionality class of cables and cable loadbearing constructions - cable circuits in case of fire

THE END OF THE TEST REPORT