TEST REPORT FIRES-FR-143-14-AUNE

Power and communication cables of Fabryka Kabli ELPAR at cable bearing system BAKS

Reg. No. 041/S-159

The Experts on Fire Safety

TEST REPORT

FIRES-FR-143-14-AUNE

Tested property:	Function in fire
Test method:	STN 92 0205: 2014 (ZP-27/2008, DIN 4102-12: 1998-11)
Type of test:	Accredited
Date of issue:	22. 08. 2014
Name of the product:	Power and communication cables of Fabryka Kabli ELPAR at cable bearing system BAKS
Manufacturer:	Fabryka Kabli ELPAR Sp. z o.o., Ul. Laskowska 1, Parczew 21-200, Poland producer of cables BAKS Kazimierz Sielski, ul. Jagodne 5, 05 – 480 Karczew, Poland producer of cable bearing system
Sponsor:	Fabryka Kabli ELPAR Sp. z o.o., Ul. Laskowska 1, Parczew 21-200, Poland
Test carried out:	Fires, s.r.o., Testing laboratory
Task No.:	PR-14-0229
Specimens received:	24. 07. 2014
Date of the test:	31. 07. 2014

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

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1. INTRODUCTION

This test report contains the results of test carried out by laboratory of FIRES, s.r.o., Testing laboratory 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. 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 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 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, plate thermometers according to EN 1363-1 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 are used. Measurement by plate thermometers acc. to EN 1363-1 can be considered as stricter method of temperature control in test furnace in compare with thermocouples used till issue of EN 1363-1. Therefore, it is possible to use results of test according to STN 92 0205 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. Piotr Grabowski	Fabryka Kabli ELPAR Sp. z o.o.
Mr. Krzystof Niedziela	Fabryka Kabli ELPAR Sp. z o.o.
Mr. Zbigniew Waszczuk	Fabryka Kabli ELPAR Sp. z o.o.
Mr. Tomasz Żukowski	BAKS Kazimierz Sielski
Mr. Dariusz Gowroński	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

Identification number	Measuring equipment	Note
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 54 056	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 ELPAR Sp. z o.o. 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 ELPAR Sp. z o.o. and cable bearing system BAKS Kazimierz Sielski company – cable trays, ladders, mesh trays and clips with accessories (consoles, brackets, supports, hangers etc.).

Cables
Used cables by test:

Power cables:
(N)HXH 0,6/1kV 4x1,5RE mm^2 E90 (14x)
(N)HXH 0,6/1kV 4x50RM mm^2 E90 (14x)
(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90 (14x)
(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90 (14x)

Communication cables:
HDGs 300/500V 2x1 mm^2 E90 PH90 (14x)

The length of cables was 5,2 m and 4,0 m from that was exposed to fire.

Cable bearing systems were made of following constructions:

Suspension tracks No. 1 – 4
Tracks are made of three consoles (WPCB700) fixed to ceiling by threaded rods (PG M10) in spacing of 1200 mm. Brackets (WWS/WWSO400) are fixed to consoles by screws (SM M10x80). Holders (UPW/UPWO) are fixed at the end of brackets with screws (SGK M8x14). Brackets are fixed through these holders by threaded rods (PG M10) with washer and nuts (M10) to ceiling by holders (USV/USOV). Holders (USV/USOV) are fixed to ceiling by threaded rods (PG M10). Standard supporting constructions.

Tracks No. 1 and 2:
Cable trays (KCP/KCOP300H60, steel sheet thickness 1,5 mm) fixed together by two junctions (LPP/LPOPH60) and screws (SGK M6x12) on sides and by junction (BL/BLO300) and screws (SGK M6x12) on the bottom. Trays are fixed to brackets by screws (SGK M6x12) and loaded with 10kg.m^{-1}. Cables are fixed to trays by cable clips (UDF).

Tracks No. 3 and 4:
Cable ladders (DGOP400H60, steel sheet thickness 1,5 mm, spacing of transoms 150 mm) fixed together by two junctions (LDC/LDOCH60) and screws (SGK M8x14) on sides. Ladders are fixed to brackets by junctions (ZM/ZMO) and by screws (SGK M8x14) and loaded with 20kg.m^{-1}. Cables are fixed to ladders by cable clamps (UK1/UKO1 – according to cable cross-section).

Suspension tracks No. 5 – 10
Tracks are made of three consoles combined of assembling profile (CWP40H40/05; length of profile 500 mm) and two threaded rods (PG M10) fixed to ceiling by expansion anchors (TRSO M10) in spacing of 1500 mm.

Tracks No. 5 and 6:
Cable mesh trays (KDS/KDSO400H60, steel wire ∅ 4,5 mm) fixed together by junctions (USS/USSO). Mesh trays are fixed to assembling profiles by junctions (ZS/ZSO) and loaded with 20kg.m^{-1}. Cables are fixed to trays by plastic stripes.

Tracks No. 7 and 8:
Cable trays (KGJ/KGOJ400H60, steel sheet thickness 0,9 mm) fixed together by screws (SGK M6x12). Trays are fixed to assembling profiles by screws (SGK M6x12) and loaded with 20kg.m^{-1}. Cables are fixed to trays by plastic stripes.

Tracks No. 9 and 10:
Cable ladders (DUOP400H60, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) fixed together by two junctions (LDC/LDOCH60) and screws (SGK M8x14) on sides. Ladders are fixed to brackets by junctions (ZM/ZMO) and by screws (SGK M8x14) and loaded with 20kg.m^{-1}. Cables are fixed to trays by plastic stripes.

Ceiling track No. 11
Track is made of assembling profiles SDOP400 fixed to ceiling by threaded rods (PG M8) in spacing of 300 mm. Cables are fixed to profiles by cable clamps (UK1/UKO1 – according to cable cross-section).

Ceiling track No. 12
Track is made of single cable clips (UDF) fixed to ceiling by expansion screws (MKR ∅6 x 32) mm in spacing of 300 mm.

All bearing systems were from steel, galvanized according to the Sendzimir method PN-EN 10327:2005.
Cable penetration through the wall of test furnace was sealed by mineral wool Rockwool.
Loading with steel chain and line loads was used as the equivalent load.

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 – 7 pieces. 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	24,5
standard deviation	1,6

Relative air humidity [%]

mean	62,2
standard deviation	4,9

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 3000) mm (length x width x height).

5.2 CONDITIONS OF THE TEST

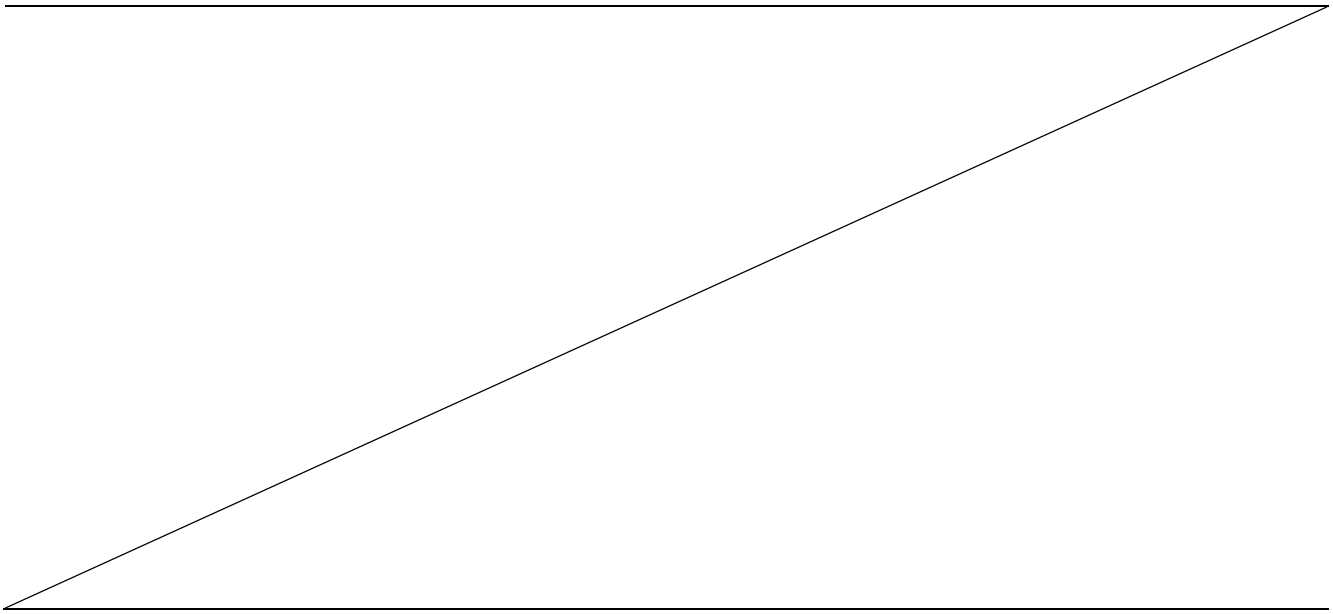
Conditions in the test furnace (temperature – standard temperature/time curve, pressure, content of O_2) as well as in the testing room (ambient temperature) corresponded to EN 1363-1 during the test. Detailed information is part of this test report, or in Quality records of the testing laboratory.

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

Relative air humidity [%]	**Ambient air temperature [°C]**
67,9	22,7

5.3 RESULTS OF THE TEST

Measured values of individual cables are stated in this test report.
During the test there was a gradual deflection of cable bearing system, but no failure or damage of tracks – even during cooling down of the tracks after termination of the test. Deflection of cable bearing system was not measured.



6. CLOSING

Evaluation of the test:

Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
1	2 cables (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90	**10**	41 minutes
2	2 cables (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		90 minutes no failure / interruption
3	2 cables (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90	**8**	46 minutes
4	2 cables (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		90 minutes no failure / interruption
5	2 cables (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90	**12**	90 minutes no failure / interruption
6	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
7	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
8	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90	**9**	90 minutes no failure / interruption
9	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		90 minutes no failure / interruption
10	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		83 minutes
11	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
12	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90	**7**	90 minutes no failure / interruption
13	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		90 minutes no failure / interruption
14	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
15	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
16	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90	**12**	55 minutes
17	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		56 minutes
18	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		90 minutes no failure / interruption
19	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		90 minutes no failure / interruption
20	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90	**6**	39 minutes
21	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		38 minutes
22	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		90 minutes no failure / interruption
23	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		90 minutes no failure / interruption
24	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90	**5**	90 minutes no failure / interruption
25	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		90 minutes no failure / interruption
26	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		80 minutes
27	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
28	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90	**4**	90 minutes no failure / interruption
29	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		90 minutes no failure / interruption
30	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		90 minutes no failure / interruption
31	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		90 minutes no failure / interruption
32	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90	**2**	90 minutes no failure / interruption
33	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		44 minutes
34	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		78 minutes
35	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		83 minutes
36	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90	**11**	90 minutes no failure / interruption
37	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		90 minutes no failure / interruption
38	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
39	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
40	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90	**3**	90 minutes no failure / interruption
41	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		74 minutes
42	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
43	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption

Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
44	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90	**1**	90 minutes no failure / interruption
45	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		90 minutes no failure / interruption
46	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
47	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90		90 minutes no failure / interruption
48	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90	**11**	52 minutes
49	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		90 minutes no failure / interruption
50	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		90 minutes no failure / interruption
51	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90		90 minutes no failure / interruption
52	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90	**12**	90 minutes no failure / interruption
53	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90	**9**	47 minutes
54	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90	**7**	28 minutes
55	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90	**5**	17 minutes
56	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90	**11**	85 minutes
57	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90	**3**	90 minutes no failure / interruption
58	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90	**1**	40 minutes

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

Specimens S1 – S51 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Specimens S52 – S58 were tested by one-phase voltage supply 1 x 110V with LED diodes 3V /0,03W.

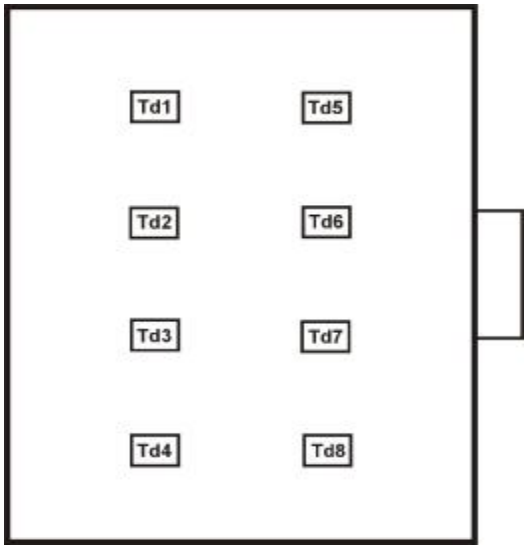
Circuit breakers with rating 3 A were used.

Measured values inside the test furnace

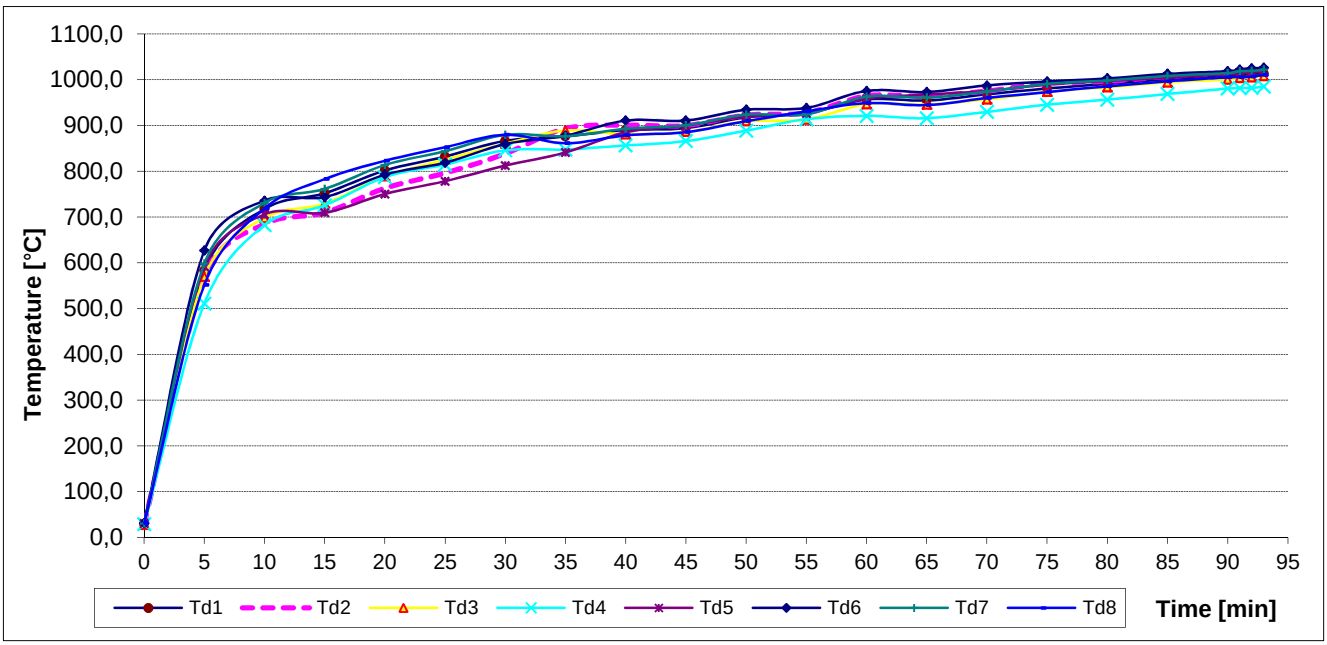
Time	Temperature [°C]											Deviation	Pressure
t [min]	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To	d_e [%]	p [Pa]
0	30,1	28,8	28,0	29,1	30,5	31,1	30,7	31,2	29,9	20,0	22,7	0,0	17,0
5	582,7	572,4	569,9	510,9	591,4	626,8	598,2	551,5	575,5	576,0	23,4	-3,1	17,7
10	717,3	684,6	697,8	682,2	705,6	735,7	730,8	718,3	709,0	678,0	24,0	0,0	19,4
15	752,0	709,5	729,5	725,6	709,2	743,6	761,4	782,8	739,2	739,0	24,3	0,4	17,9
20	801,6	762,9	789,2	787,1	750,3	792,6	813,7	822,9	790,0	781,0	24,4	0,4	19,9
25	832,2	796,1	825,4	814,6	778,3	818,8	843,9	852,5	820,2	815,0	24,6	0,5	18,7
30	866,5	838,4	860,4	845,7	812,5	859,4	879,4	879,7	855,3	842,0	24,9	0,6	17,0
35	876,1	893,5	889,2	847,6	841,1	877,9	876,6	861,3	870,4	865,0	24,9	0,8	18,9
40	889,9	900,7	880,6	856,4	885,2	910,7	892,8	878,5	886,9	885,0	25,1	0,8	19,7
45	894,2	900,0	886,2	866,0	899,9	911,0	900,6	885,5	892,9	902,0	25,1	0,6	19,9
50	917,7	922,8	909,2	888,8	919,4	934,5	923,8	909,5	915,7	918,0	25,1	0,5	17,7
55	927,4	927,6	913,1	913,9	926,4	938,3	924,7	930,8	925,3	932,0	25,4	0,4	17,4
60	957,0	964,7	946,6	921,0	958,4	975,5	962,9	948,9	954,4	945,0	25,3	0,4	19,7
65	954,7	964,3	946,1	915,9	967,8	973,4	961,1	944,5	953,5	957,0	25,3	0,4	18,6
70	968,2	975,4	957,1	929,7	975,3	987,4	974,1	960,1	965,9	968,0	25,3	0,3	18,4
75	980,9	992,0	973,6	945,4	989,5	996,0	990,9	973,0	980,2	979,0	25,2	0,3	19,3
80	990,7	996,5	983,5	956,5	997,3	1002,9	998,2	985,7	988,9	988,0	25,2	0,3	18,6
85	1001,2	1006,8	994,3	968,9	1004,6	1012,7	1008,3	996,5	999,2	997,0	25,1	0,3	18,2
90	1008,1	1014,5	1000,6	980,7	1011,9	1018,6	1014,6	1005,2	1006,8	1006,0	25,1	0,2	18,1
91	1010,6	1019,2	1004,2	981,8	1013,4	1022,3	1018,4	1005,4	1009,4	1008,0	25,2	0,2	19,9
92	1012,4	1022,0	1005,5	982,0	1018,0	1025,0	1019,2	1006,7	1011,4	1009,0	25,4	0,2	18,7
93	1014,7	1022,8	1007,8	985,2	1016,6	1026,0	1021,9	1010,3	1013,2	1011,0	25,3	0,2	18,7

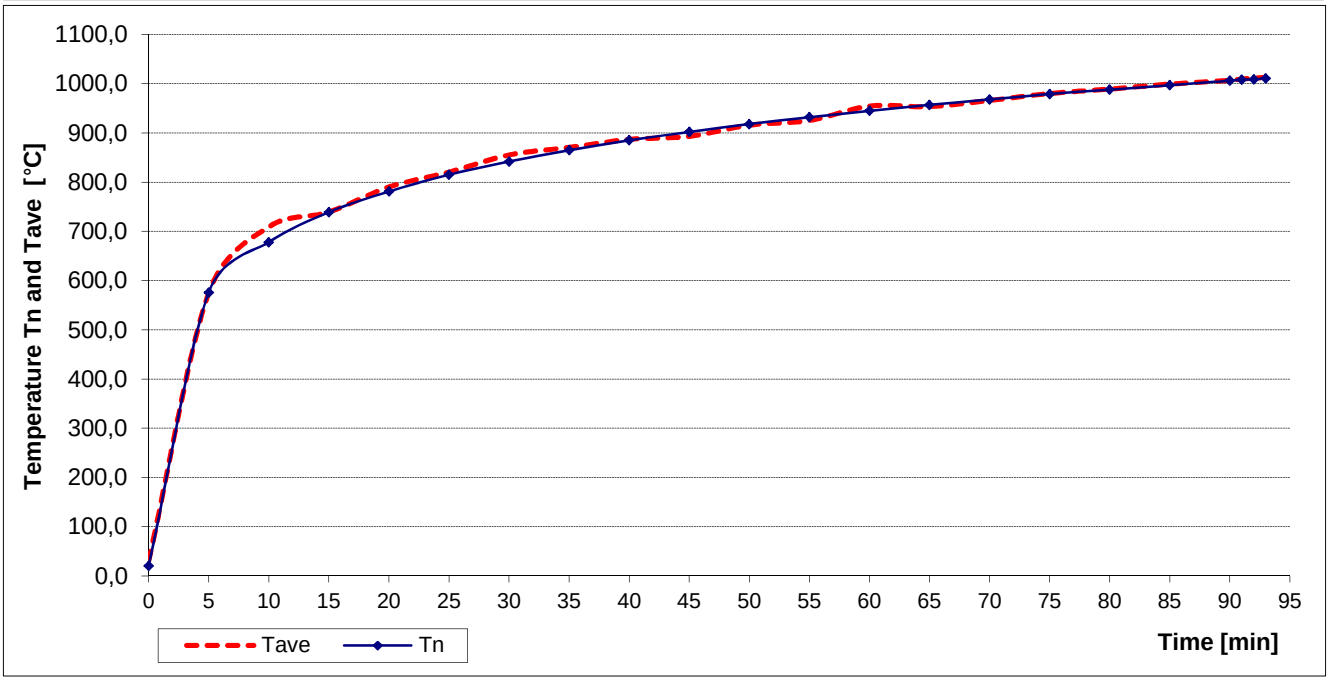
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

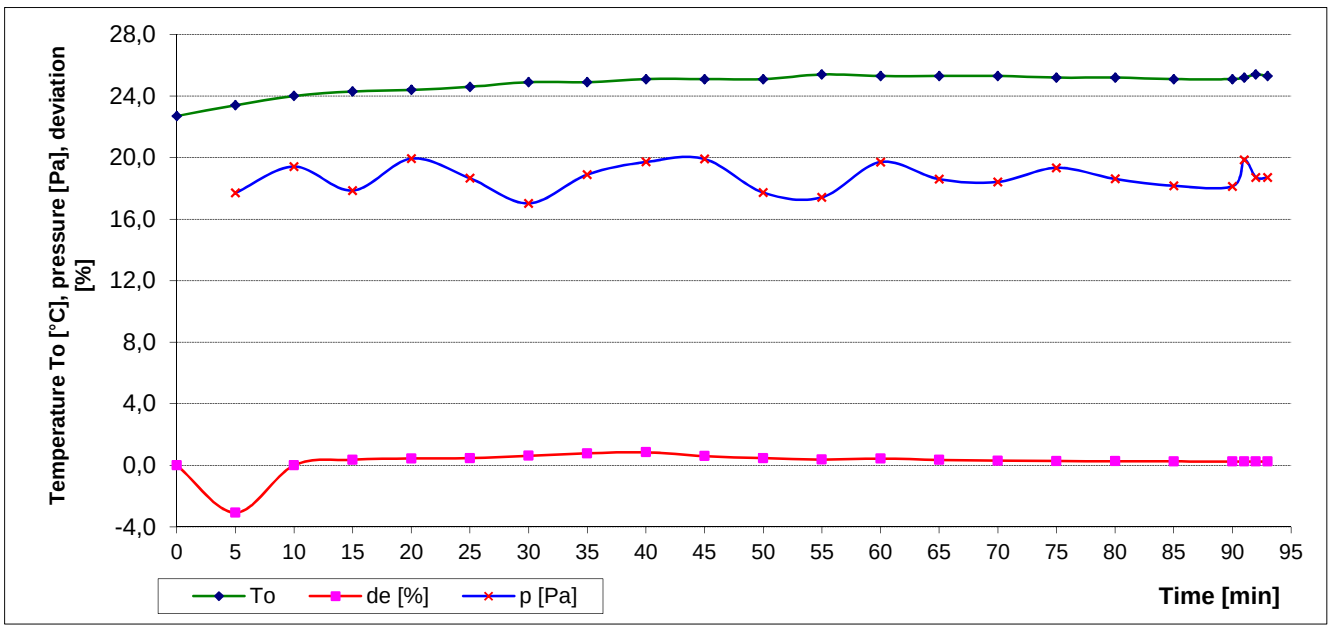
Layout of measuring points inside the test furnace:



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	41:16
	2-L2	x
	3-L3	x
	4-PEN	x
S2	5-L1	no failure / interruption
	6-L2	no failure / interruption
	7-L3	no failure / interruption
	8-PEN	no failure / interruption
S3	9-L1	x
	10-L2	46:27
	11-L3	x
	12-PEN	x
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	83:53
	38-L2	83:53
	39-L3	x
	40-PEN	x

Specimen No.	Cables
1	2 cables (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
2	2 cables (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
3	2 cables (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
4	2 cables (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
5	2 cables (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
6	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
7	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
8	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
9	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
10	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90

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	x
	62-L2	55:02
	63-L3	x
	64-PEN	x
S17	65-L1	56:12
	66-L2	x
	67-L3	x
	68-PEN	x
S18	69-L1	no failure / interruption
	70-L2	no failure / interruption
	71-L3	no failure / interruption
	72-PEN	no failure / interruption
S19	73-L1	no failure / interruption
	74-L2	no failure / interruption
	75-L3	no failure / interruption
	76-PEN	no failure / interruption
S20	77-L1	39:51
	78-L2	x
	79-L3	x
	80-PEN	x

Specimen No.	Cables
11	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
12	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
13	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
14	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
15	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
16	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
17	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
18	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
19	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
20	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90

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 S21 to S30 - power cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S21	81-L1	x
	82-L2	38:22
	83-L3	x
	84-PEN	x
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	80:26
	102-L2	x
	103-L3	x
	104-PEN	x
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 0,6/1kV 4x50/25RM mm^2 E90
22	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
23	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
24	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
25	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
26	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
27	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
28	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
29	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
30	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90

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	44:03
	130-L2	x
	131-L3	x
	132-PEN	x
S34	133-L1	78:33
	134-L2	78:33
	135-L3	78:33
	136-PEN	x
S35	137-L1	83:13
	138-L2	83:13
	139-L3	83:13
	140-PEN	x
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 (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
32	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
33	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
34	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
35	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
36	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
37	cable (N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90
38	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
39	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
40	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90

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 S50 - power cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S41	161-L1	x
	162-L2	74:05
	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
S45	177-L1	no failure / interruption
	178-L2	no failure / interruption
	179-L3	no failure / interruption
	180-PEN	no failure / interruption
S46	181-L1	no failure / interruption
	182-L2	no failure / interruption
	183-L3	no failure / interruption
	184-PEN	no failure / interruption
S47	185-L1	no failure / interruption
	186-L2	no failure / interruption
	187-L3	no failure / interruption
	188-PEN	no failure / interruption
S48	189-L1	52:50
	190-L2	x
	191-L3	x
	192-PEN	x
S49	193-L1	no failure / interruption
	194-L2	no failure / interruption
	195-L3	no failure / interruption
	196-PEN	no failure / interruption
S50	197-L1	no failure / interruption
	198-L2	no failure / interruption
	199-L3	no failure / interruption
	200-PEN	no failure / interruption

Specimen No.	Cables
41	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
42	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
43	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
44	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
45	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90
46	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
47	cable (N)HXH 0,6/1kV 4x1,5RE mm^2 E90
48	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
49	cable (N)HXCH 0,6/1kV 4x50/25RM mm^2 E90
50	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90

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 S51 - power cable

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S51	201-L1	no failure / interruption
	202-L2	no failure / interruption
	203-L3	no failure / interruption
	204-PEN	no failure / interruption

Specimen No.	Cables
51	cable (N)HXH 0,6/1kV 4x50RM mm^2 E90

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

Measured time of tested specimen S52 to S58 - 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	no failure / interruption
	212-PEN	no failure / interruption
S53A	213-L	47:35
	214-PEN	-
S53B	215-L	no failure / interruption
	216-PEN	no failure / interruption
S54A	217-L	31:53
	218-PEN	-
S54B	219-L	28:29
	220-PEN	-
S55A	221-L	17:25
	222-PEN	-
S55B	223-L	31:29
	224-PEN	-
S56A	225-L	85:23
	226-PEN	-
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	40:03
	234-PEN	-
S58B	235-L	48:54
	236-PEN	-

Specimen No.	Cables
52	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90
53	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90
54	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90
55	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90
56	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90
57	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90
58	2 cables HDGs 300/500V 2x1 mm^2 E90 PH90

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 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.

CABLES

FABRYKA KABLI

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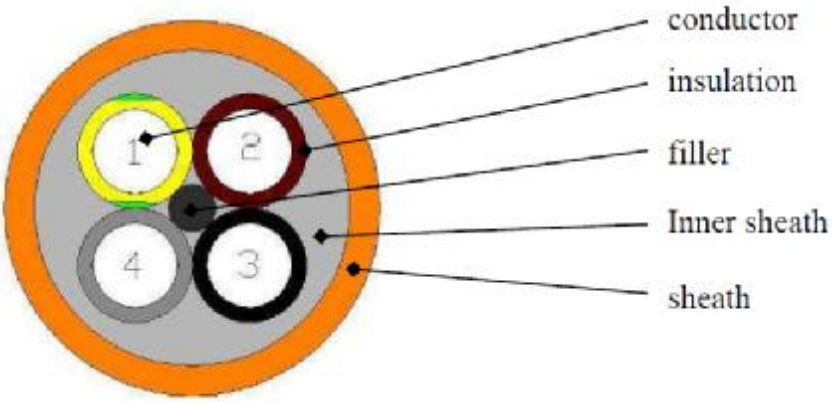
(N)HXH-J(O)

Fire resistant halogen free power cables



TECHNICAL DATA:

CONSTRUCTION:	
Conductors:	Copper solid or stranded PN-EN 60228:2007
Insulation:	Cross-linked halogen free ceramic forming polymer compound acc. to DIN VDE 0266
Filler:	flame resistant, halogen free polymer compound
Inner sheath:	flame resistant, halogen free polymer compound
Sheath:	flame resistant, halogen free polymer compound acc. to DIN VDE 0276-604
Operating temperature:	-30℃ to +70℃
Temperature of laying:	-5℃ to +60℃
Bending radius multi core:	15 x D single core 12 x D multi core D- outer diameter
Nominal voltage:	0,6/1 k V
Voltage test:	4000 V; 50 Hz
Fire resistance:	E90
Behaviour in fire:	PN-EN 50226:2006; IEC 60332-3
Application:	Safety cables are used in all locations where a special protection fire and fire damage in necessary from human life and equipment and where strict safety regulations have to met and large emergency running time is necessery. They may be used indoor and outdoor, but not directly in earth and water. They are considered as protectively insulated.

Conductor cross-section	
n	mm^2
1÷4	1,5÷240
5÷7	1,5÷70
7÷10	1,5÷25
10÷24	1,5÷2,5

CABLES

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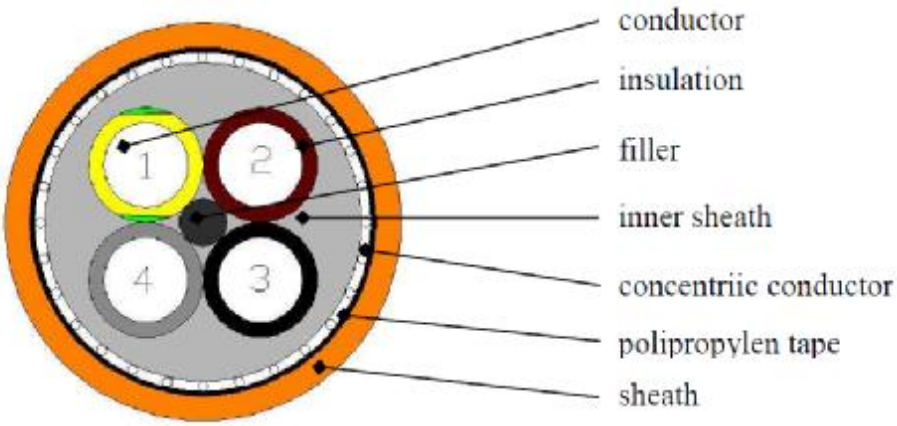
(N)HXCH-J(O)

Fire resistant halogen free power cables



TECHNICAL DATA:

CONSTRUCTION:	
Conductors:	Copper solid or stranded PN-EN 60228:2007
Insulation:	Cross-linked halogen free ceramic forming polymer compound acc. to DIN VDE 0266
Filler:	flame resistant, halogen free polymer compound
Inner sheath:	flame resistant, halogen free polymer compound
Concentriic conductor:	made of copper wires counter-wrapped
Polipropylen tape:	Polipropylen tape
Sheath:	flame resistant, halogen free polymer compound acc. to DIN VDE 0276-604
Operating temperature:	-30℃ to +70℃
Temperature of laying:	-5℃ to +50℃
Bending radius multi core:	15 x D single core 12 x D multi core D- outer diameter
Nominal voltage:	0,6/1 k V
Voltage test:	4000 V; 50 Hz
Fire resistance:	E90
Behaviour in fire:	PN-EN 50226:2006; IEC 60332-3
Application:	Safety cables are used in all locations where a special protection fire and fire damage in necessary from human life and equipment and where strict safety regulations have to met and large emergency running time is necessery. They may be used indoor and outdoor, but not directly in earth and water. They are considered as protectively insulated.

Conductor cross-section	
n	mm^2
1÷4	1,5/1,5÷240/70
5÷7	1,5/1,5÷4/4
10÷24	1,5/2,5÷2,5/10

CABLES

HDGs(żo) 300/500V
FE180/PH90

NORMA: NF-ELPAR-02:2007

STANDARD: NF-ELPAR-02:2007

KABLE BEZHALOGENOWE, OGNIOODPORNE
HALOGEN-FREE, FLAME-RESISTANT CABLES

INFORMACJE TECHNICZNE	
Objaśnienia symboliki literowej kabla	HDGs(żo) PH90 - kabel elektroenergetyczny o żyłach miedzianych o izolacji z gumy silikonowej ceramizującej (Gs) i powłoce z tworzywa bezhalogenowego (H) z żyłą ochronną (żo) z funkcja PH90
Żyły	jednodrutowe miedziane kl. 1
Izolacja	mieszanka silikonowa ceramizująca
Powłoka	tworzywo bezhalogenowe
Kolory izolacji	- z żyłą ochronną (żo): 3-żyły zielono-żółta, niebieska, brązowa 4-żyły zielono-żółta, brązowa, czarna, szara 5-żył: zielono-żółta, niebieska, brązowa, czarna, szara więcej niż 5 żył: w warstwie zewnętrznejzielono-żółta (żyła licznikowa), niebieska, (żyła kierunkowa) i pozostałe żyły - ta sama dowolna barwa z wyjątkiem zielono-żółtej, żółtej, brązowej i niebieskiej - w innych warstwach: brązowa (żyła licznikowa),niebieska (żyła kierunkowa), pozostałe żyły - ta sama dowolna barwa z wyjątkiem zielono-żółtej, brązowej i niebieskiej. - bez żyły ochronnej: 2-żyły niebieska, brązowa 3-żyły czarna brązowa, szara 4-żyły niebieska, brązowa, czarna, szara 5-żył: niebieska, brązowa, czarna, szara, czarna - więcej niż 5 żył - w każdej warstwie: brązowa, (żyła licznikowa), niebieska, (żyła kierunkowa) i pozostałe żyły - ta sama, dowolna barwa z wyjątkiem zielono-żółtej, brązowej i niebieskiej
Temperatura pracy	-25°C do +90°C
Napięcie znamionowe	300/500V
Zastosowanie	kable ognioodporne mają zastosowanie w miejscach, gdzie musi być zapewnione funkcjonowanie urządzeń podczas trwania pożaru, specjalne tworzywa i sposób montażu kabli zapewniają dopływ energii elektrycznej przez przynajmniej 90 min, a trwałość izolacji kabli wynosi 180 min. przy temp. 750°C, kable stosuje się w instalacjach oświetlenia awaryjnego, wyciągach dymu, systemach alarmowych, sygnalizacyjnych DSO, sygnalizacji pożaru i automatyce pożarniczej
Pakowanie	bębny lub krążki o długości 100 i 200 m oraz inne formy, zgodnie z życzeniem klienta

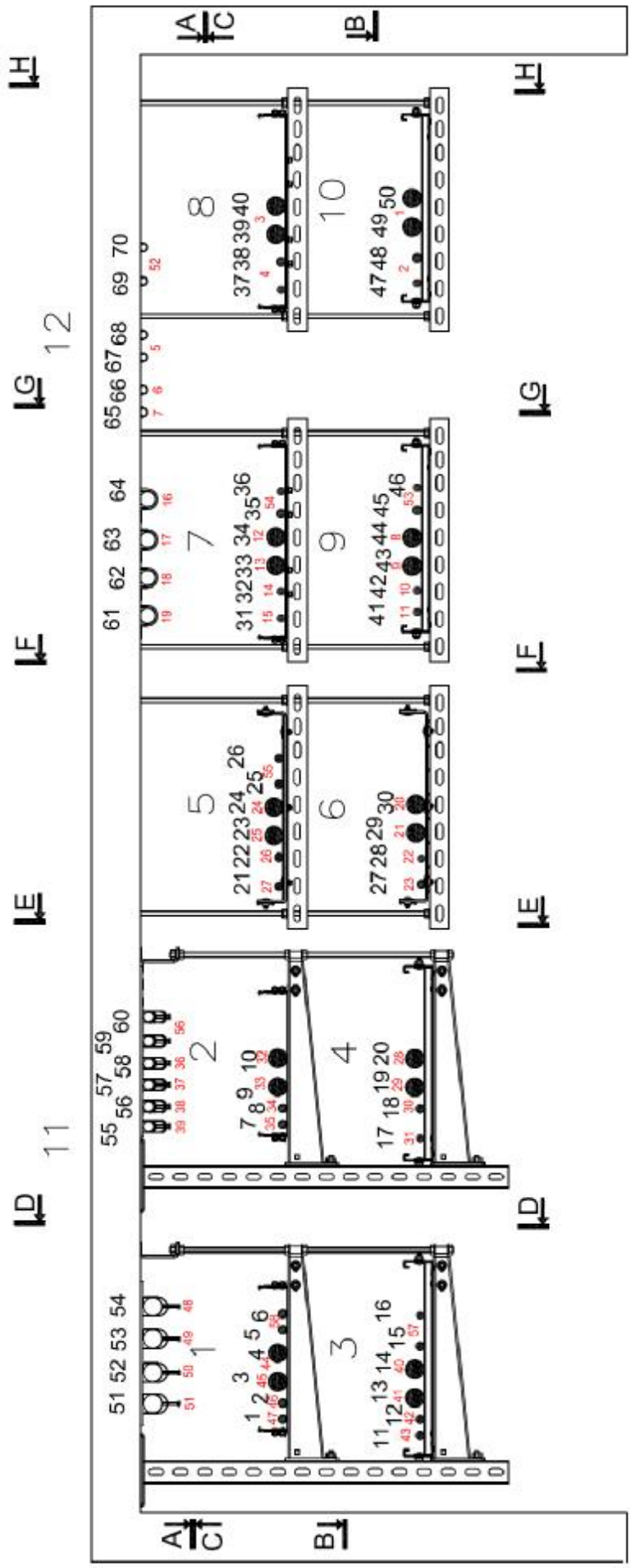
TECHNICAL INFORMATION	
Cable symbol explanation	HDGs(żo) PH90 – power cable with copper conductors and in ceramising silicone rubber insulation (Gs) and halogen-free plastic sheath (H) with protective conductor (żo) with PH90 function
Conductors	single-wire copper, class 1
Insulation	ceramising silicone mixture
Sheath	halogen-free plastics
Insulation colours	- with protective conductor (żo): 3-core: green and yellow, blue, brown 4-core: green and yellow, brown, black, grey 5-core: green and yellow, blue, brown, blacck, grey more than 5-core: in outer layer green and yellow (meter conductor), blue, (directional conductor) and remaining conductors - the same optional colour with the exception of: green and yellow, yellow, brown and blue - in other layers:brown (meter conductor) blue, (directional conductor), the remaining conductors - the same optional colour with the exception of: green and yellow, brown and blue - without protective conductor: 2-core: blue, brown 3-core: black, brown, grey 4-core: blue, brown, black, grey 5-core: blue, brown, black, grey, black - more than 5-core: in each layer: brown (meter conductor) blue, (directional conductor), the remaining conductors - the same optional colour with the exception of: green and yellow, brown and blue
Operating temperature	-25°C to +90°C
Nominal voltage	300/500V
Application	fire resistant cables are used in places where it is necessary that devices should operate during a fire, special materials and the way of cables installation ensure the supply of electrical power for at least 90 min., cables insulation resistance is 180 min. at temperatures of 750°C, cables are used in emergency lighting installations, smoke extractors, alarm systems, signaling DSO systems, fire alarms and fire automation
Packing	drums or coils of the length of 100, 200 m and others, according to customer's wishes

CABLES

HDGs(żo) 300/500V
FE180/PH90

Liczba i przekrój znamionowy żył Number and nominal cross-section of conductors (n x mm²)	Przybliżona średnica zewnętrzna kabla Approximate cable full diameter (mm)	Przybliżona masa kabla Approximate cable full diameter (kg/km)
2 x 1	5,7	47
2 x 1,5	6,5	62
2 x 2,5	8,1	97
2 x 4	9,0	131
3 x 1	6,0	63
3 x 1,5	7,0	83
3 x 2,5	8,7	130
3 x 4	9,9	183
4 x 1	6,8	82
4 x 1,5	8,1	113
4 x 2,5	9,7	170
4 x 4	10,8	234
5 x 1	7,7	105
5 x 1,5	8,9	140
5 x 2,5	10,7	211
5 x 4	11,9	292
7 x 1	8,4	133
7 x 1,5	9,9	183
7 x 2,5	11,7	272
10 x 1	10,9	191
10 x 1,5	12,6	255
10 x 2,5	15,6	404
12 x 1	11,3	220
12 x 1,5	13,1	296
12 x 2,5	16,2	468
16 x 1	12,6	281
16 x 1,5	15,2	402
16 x 2,5	18,6	629
20 x 1	14,6	364
20 x 1,5	17,5	515
20 x 2,5	20,7	768
24 x 1	16,2	430
24 x 1,5	19,4	607
24 x 2,5	23,6	942
30 x 1	17,7	543
30 x 1,5	20,5	730
30 x 2,5	24,9	1137
37 x 1	19,1	649
37 x 1,5	22,7	909
37 x 2,5	26,9	1369

DRAWINGS



DRAWINGS

No	No FIRES	Cable type	Position	Description of construction
1	**47**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90	**1**	Cable trays KCP/KCOP 300H60, 1.2 m / 10kg.m^{-1}, steel thickness 1,5 mm Construction: Consoles WPCB700, brackets WWS/WWSO400, threaded rods PGM10, hangers USV/USOV
2	**46**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
3	**45**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
4	**44**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
5	**58**	HDGs 300/500V 2x1 mm^2 E90 PH90		
6		HDGs 300/500V 2x1 mm^2 E90 PH90		
7	**35**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90	**2**	
8	**34**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
9	**33**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
10	**32**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
11	**43**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90	**3**	Cable ladders DGOP 400H60 1.2 m / 20kg.m^{-1}, steel thickness 1,5 mm Construction: Consoles WPCB700, brackets WWS/WWSO400, threaded rods PGM10, hangers USV/USOV
12	**42**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
13	**41**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
14	**40**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
15	**57**	HDGs 300/500V 2x1 mm^2 E90 PH90		
16		HDGs 300/500V 2x1 mm^2 E90 PH90		
17	**31**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90	**4**	
18	**30**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
19	**29**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
20	**28**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
21	**27**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90	**5**	Cable mesh trays KDSO 400H60 1.5 m / 20kg.m^{-1}, steel wire ∅ 4,5 mm Construction: Assembling profiles CWP/CWOP40H40/05, threaded rods PG M10, expansion anchors TRSO M10
22	**26**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
23	**25**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
24	**24**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
25	**55**	HDGs 300/500V 2x1 mm^2 E90 PH90		
26		HDGs 300/500V 2x1 mm^2 E90 PH90		
27	**23**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90	**6**	
28	**22**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
29	**21**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
30	**20**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
31	**15**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90	**7**	Cable trays KGJ/KGOJ 400H60 1.5 m / 20kg.m^{-1}, steel thickness 0,9 mm Construction: Assembling profiles CWP/CWOP40H40/05, threaded rods PG M10, expansion anchors TRSO M10
32	**14**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
33	**13**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
34	**12**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
35	**54**	HDGs 300/500V 2x1 mm^2 E90 PH90		
36		HDGs 300/500V 2x1 mm^2 E90 PH90		
37	**4**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90	**8**	
38		(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
39	**3**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
40		(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
41	**11**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90	**9**	Cable ladders DUOP 400H60 1.5 m / 20kg.m^{-1}, steel thickness 1,5 mm Construction: Assembling profiles CWP/CWOP40H40/05, threaded rods PG M10, expansion anchors TRSO M10
42	**10**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
43	**9**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
44	**8**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
45	**53**	HDGs 300/500V 2x1 mm^2 E90 PH90		
46		HDGs 300/500V 2x1 mm^2 E90 PH90		
47	**2**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90	**10**	
48		(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
49	**1**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
50		(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
51	**51**	(N)HXH 0,6/1kV 4x50RM mm^2 E90	**11**	Cable clamps UKO1 + assembling profiles SDOP 400 Spacing of 300 mm
52	**50**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
53	**49**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
54	**48**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
55	**39**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
56	**38**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
57	**37**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
58	**36**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
59	**56**	HDGs 300/500V 2x1 mm^2 E90 PH90		
60		HDGs 300/500V 2x1 mm^2 E90 PH90		

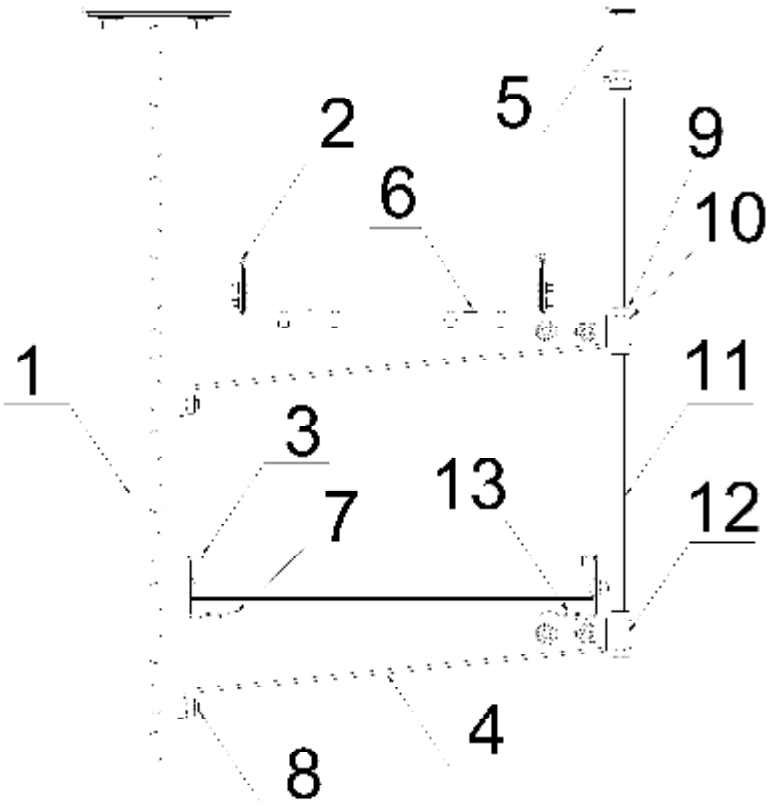
DRAWINGS

No	No FIRES	Cable type	Position	Description of construction
61	**19**	(N)HXH 0,6/1kV 4x50RM mm^2 E90	**12**	Cable clips UDF in spacing of 300mm
62	**18**	(N)HXH 0,6/1kV 4x50RM mm^2 E90		
63	**17**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
64	**16**	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90		
65	**7**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
66	**6**	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90		
67	**5**	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
68		(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90		
69	**52**	HDGs 300/500V 2x1 mm^2 E90 PH90		
70		HDGs 300/500V 2x1 mm^2 E90 PH90		

No.	Cable type	Outer Diameter [mm]	Cable weight [g/m]	Amount [pcs]
1	(N)HXH 0,6/1kV 4x50RM mm^2 E90	38,1+/- 0,5	3135	14
2	(N)HXH 0,6/1kV 4x1,5RE mm^2 E90	15,8+/-0,5	345	14
3	(N)HXCH 0,6/1kV 4x50/25RM mm^2 E90	40,9+/-0,5	3365	14
4	(N)HXCH 0,6/1kV 4x1,5/1,5RE mm^2 E90	16,5+/-0,5	410	14
5	HDGs 300/500V 2x1 mm^2 E90 PH90	8,4+/-0,5	45	14
			Total	**70**
			Power cables	**56**
			Communication cables	**14**

DRAWINGS

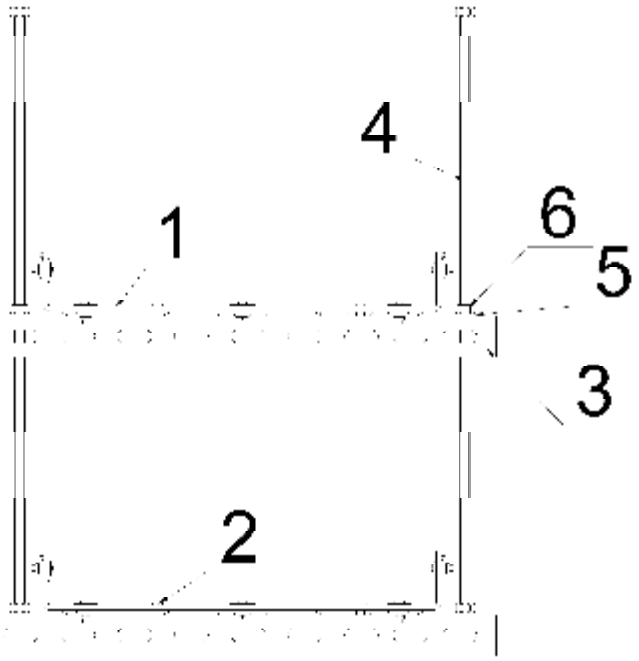
ELPAR-BAKS 31.07.2014



13	Zacisk mocujący	ZMO	2
12	Uchwyt	UPWO	2
11	Pręt gwintowany	PGM10 /...	1
10	Podkładka	PP 10	6
9	Nakrętka	NS M10	6
7	Śruba	SM M10x30	4
6	Śruba	SGK M8x14	6
8	Śruba	SGK M6x12	2
5	Uchwyt sufitowy	USOV	1
4	Wysiegnik	WWS400	2
3	Drabinka	DGOP400I l60/3	1
2	Korytko	KCOP300H60/3	1
1	Wspornik sufitowy	WPCB700	1
P	Nazwa	Symbol	Szt.

DRAWINGS

ELPAR-BAKS 31.07.2014



L.p.	Nazwa	Symbol	Szt.
	Nakrętka	NS M10	12
	Podkładka	PP 10	12
	Pręt gwintowany	PGM10 /...	2
	Ceownik	CWP/CWOP40H40 /05	2
	Zacisk śrubowy	ZS/ZSO	4
	Koryto siatkowe	KDS/KDSO400H60	2

DRAWINGS

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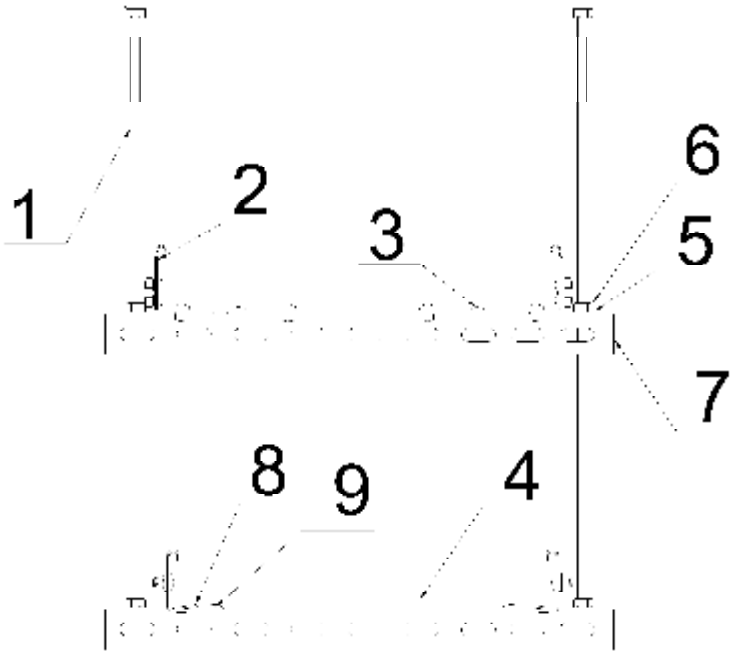
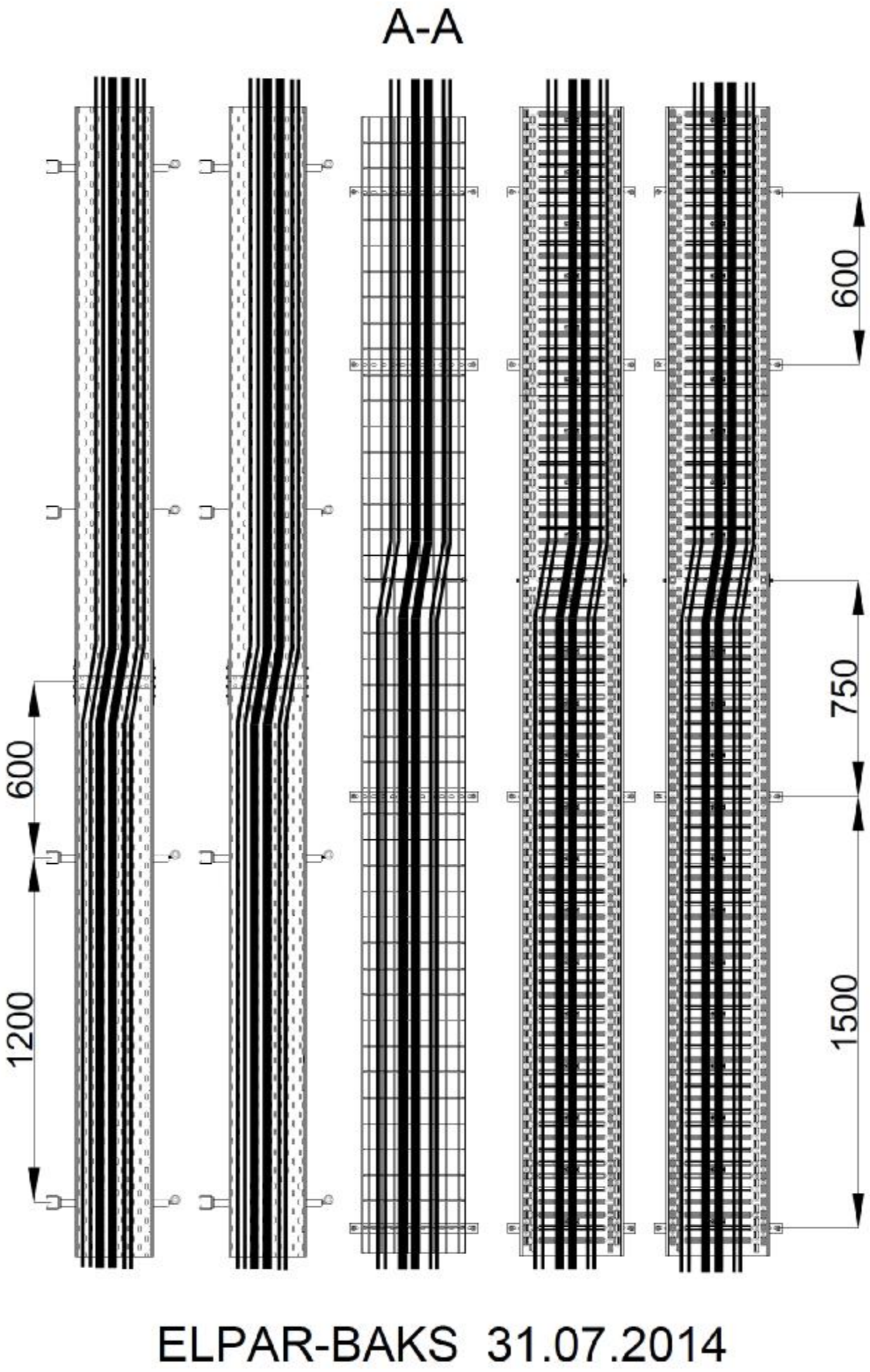


L.p.	Nazwa	Symbol	Szt.
	Śruba	NS M8x14	4
	Zacisk mocujący	ZM/ZMO	2
	Ceownik	CWP/CWOP40H40 /05	2
	Nakrętka	NS M10	12
	Podkładka	PP 10	12
	Drabinka	DUOP400H60 /3	1
	Śruba	NS M6x12	8
	Korytko	KGJ/KGOJ400H60	1
	Pręt gwintowany	PGM10 /...	2

DRAWINGS



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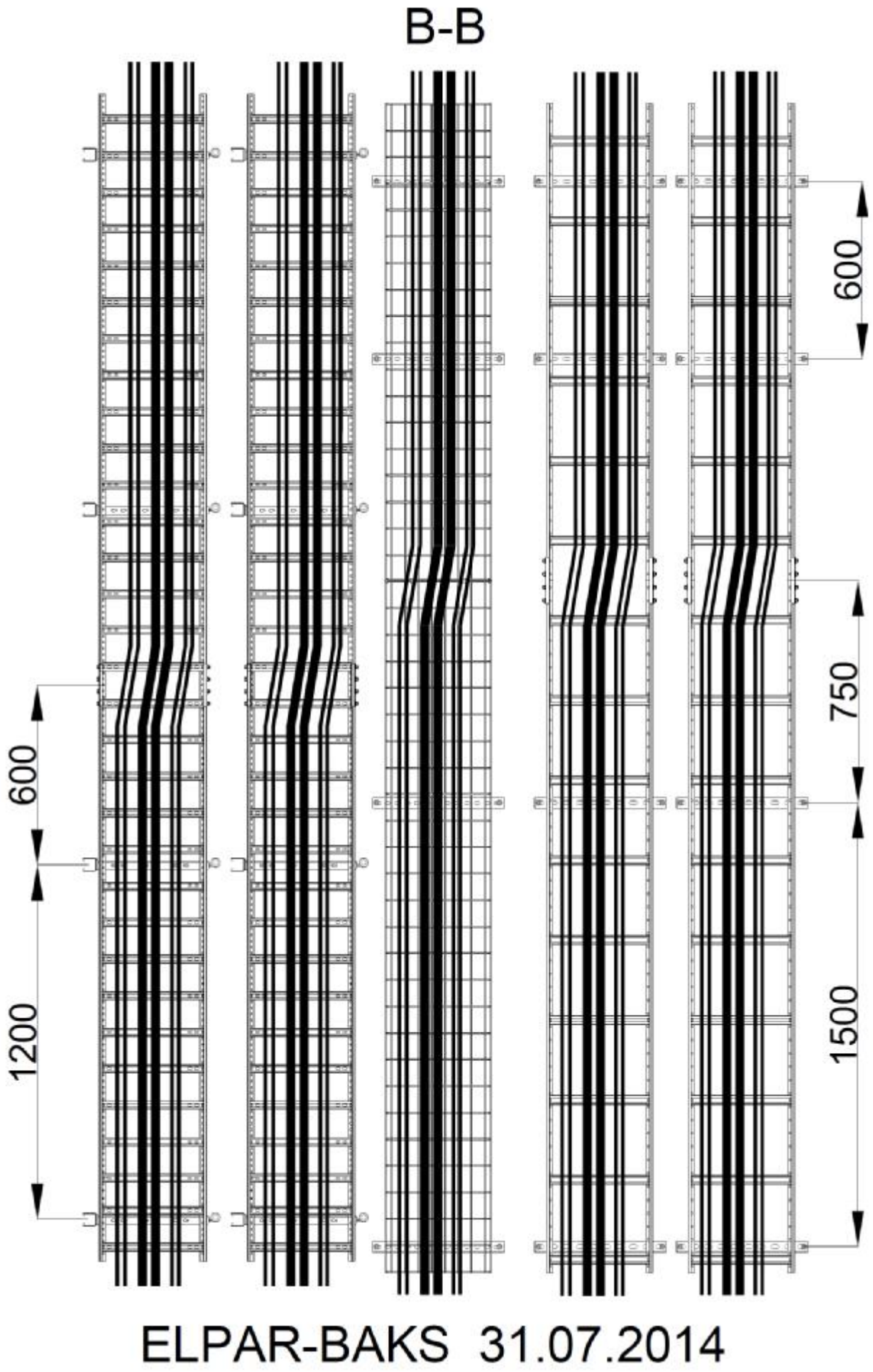

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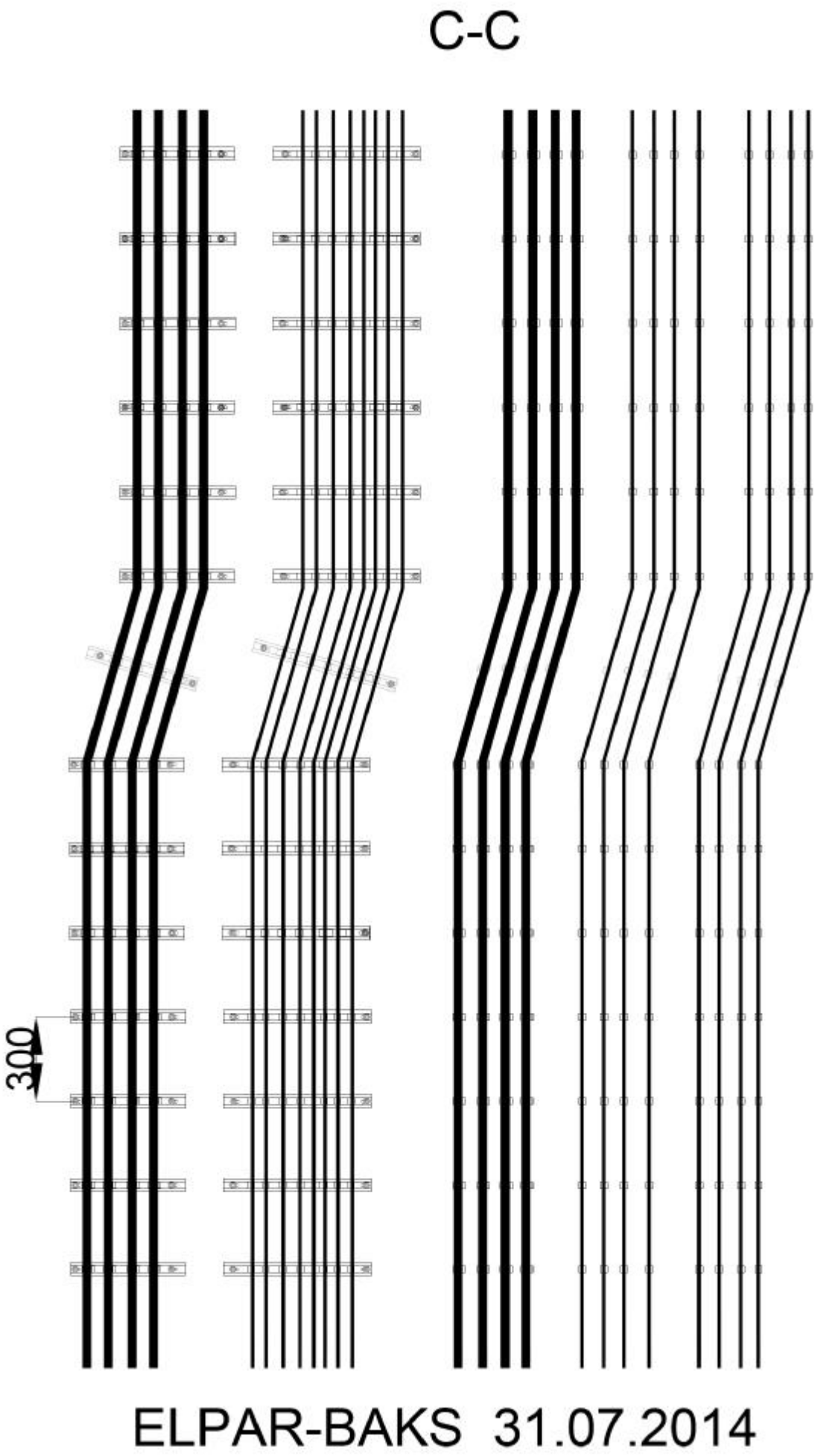
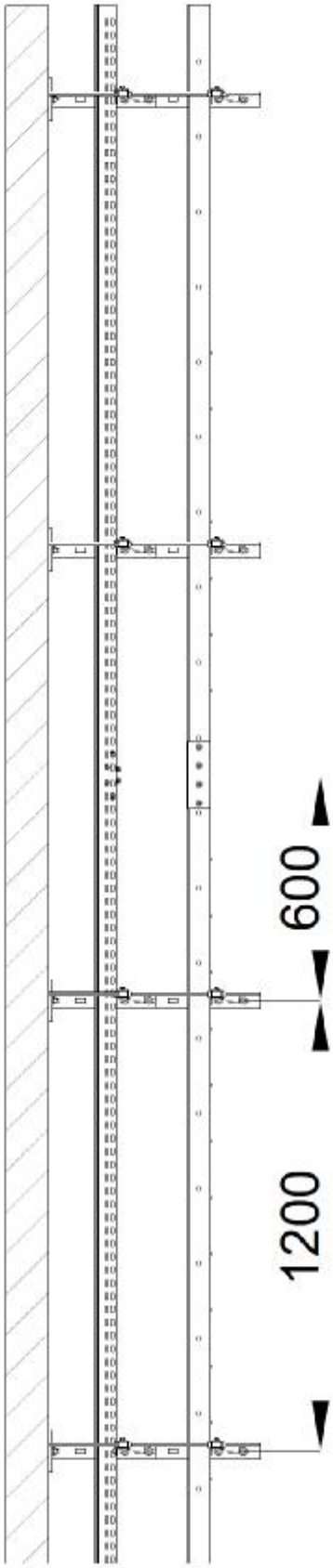


D-D



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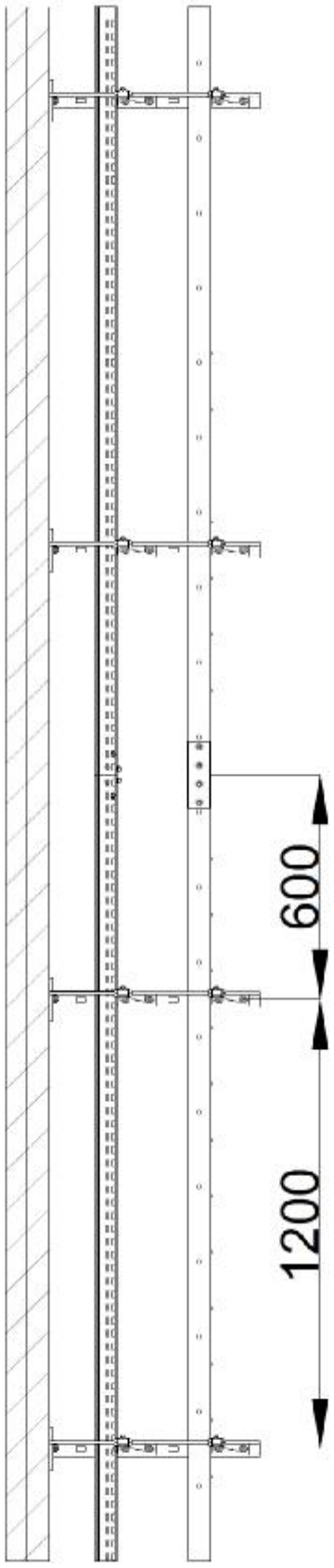
DRAWINGS

E-E



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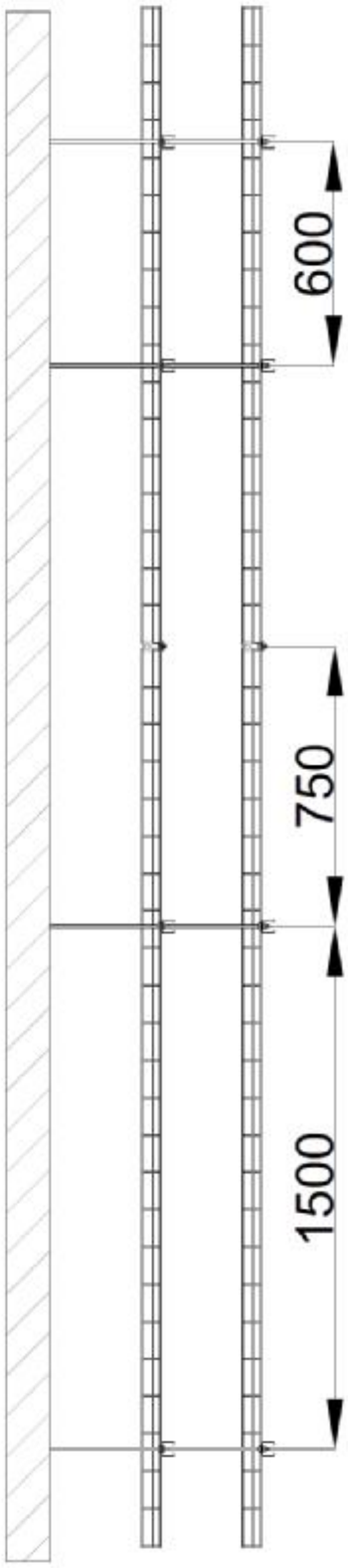
DRAWINGS

F-F



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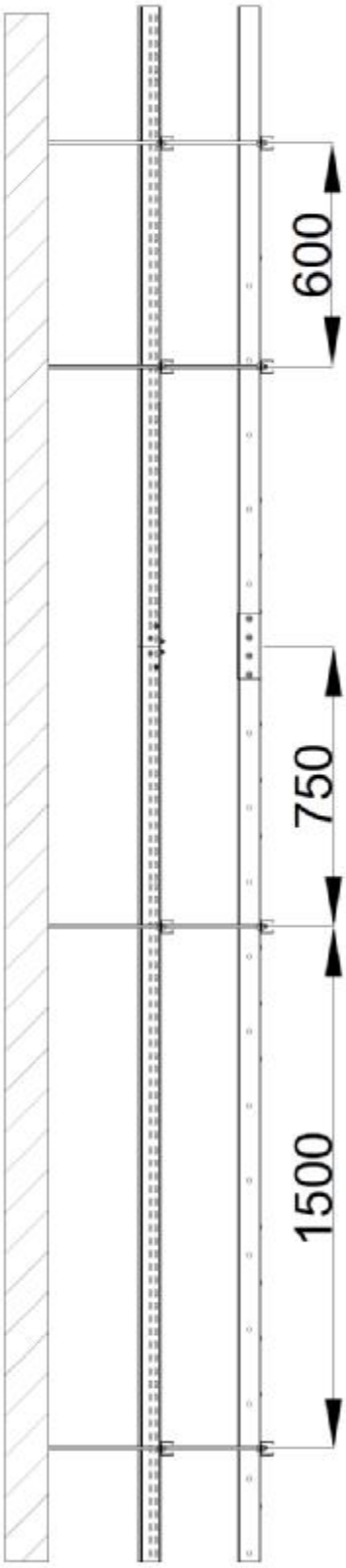
DRAWINGS

G-G



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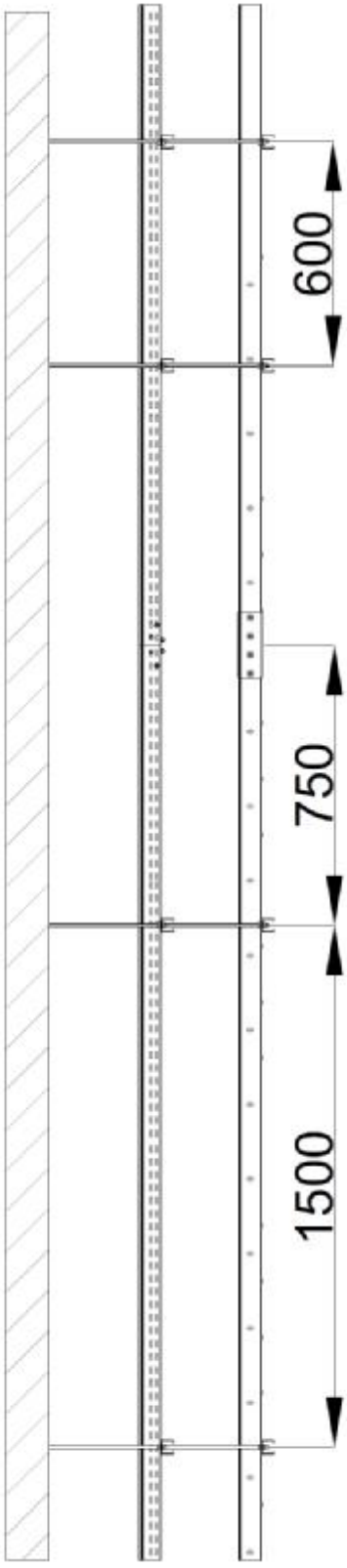
DRAWINGS

H-H



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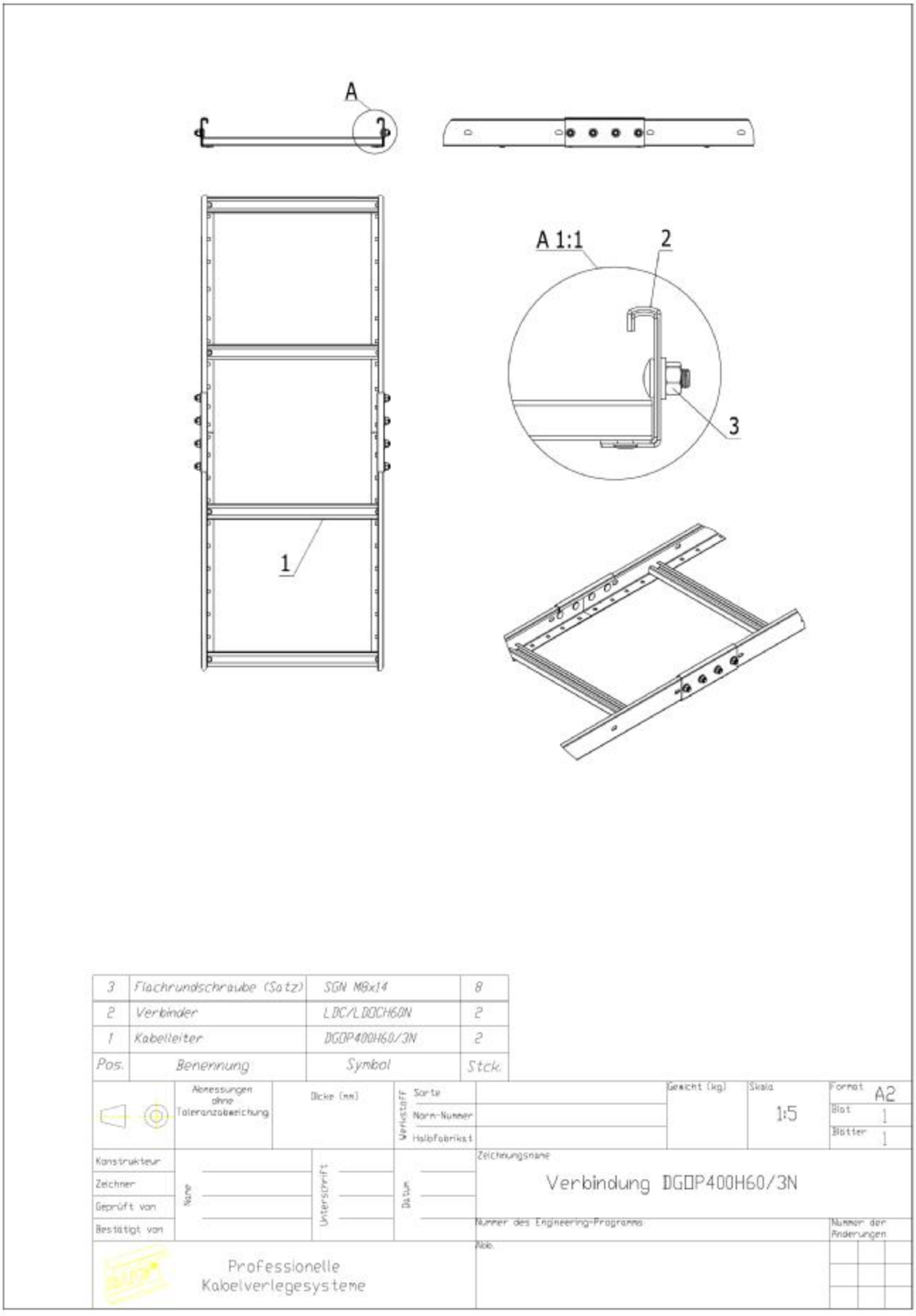
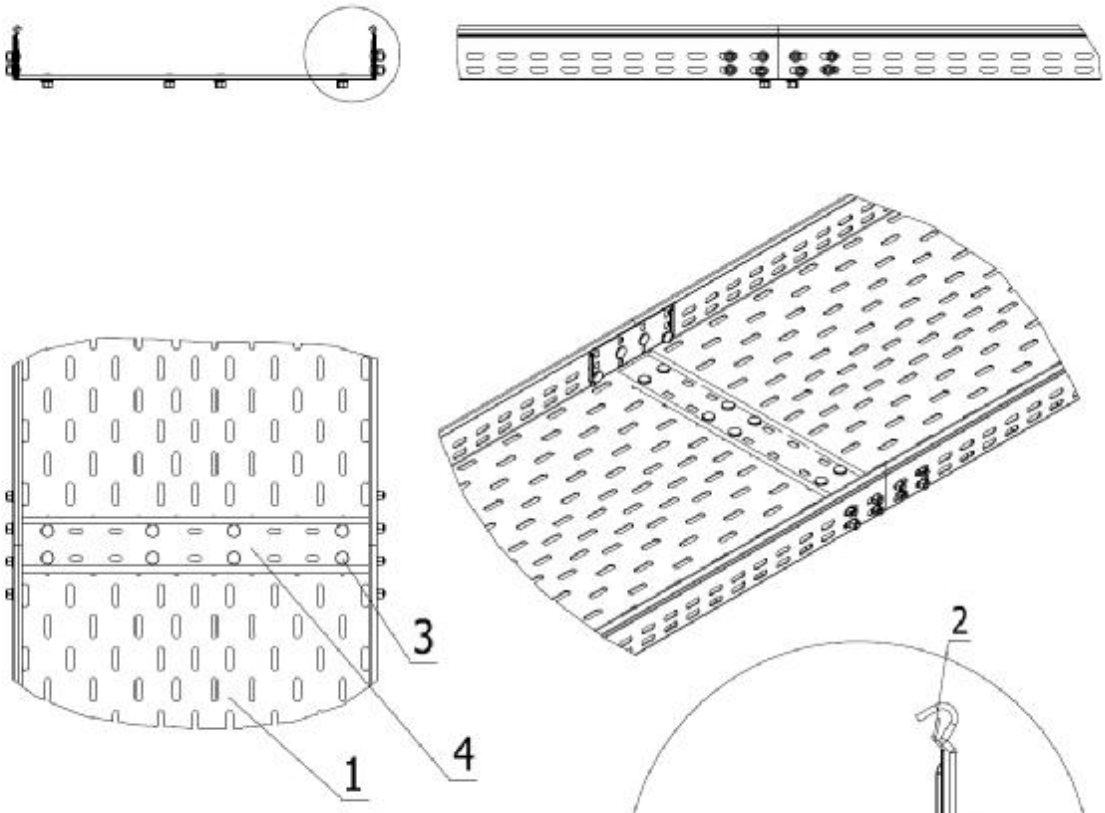


Pos.	Benennung	Symbol	Stck.
3	Flachrundschraube (Satz)	SGN M8x14	8
2	Verbinder	LDC/LDDCH60N	2
1	Kabelleiter	DGDP400H60/3N	2

Abmessungen ohne Toleranzabweichung	Dicke (mm)	Werkstoff: Sorte / Norm-Nummer / Halbfabrikat		Gewicht (kg)	Skala 1:5	Format A2	Blatt 1 / Blätter 1
Konstrukteur	Name	Unterschrift	Datum	Zeichnungsname: Verbindung DGDP400H60/3N			
Zeichner							
Geprüft von				Nummer des Engineering-Programms		Nummer der Änderungen	
Bestätigt von				Abb.			

Professionelle Kabelverlegesysteme

DRAWINGS



Poz.1		Poz.4
A	Typ	Typ
100	KCP/KCDP100H60/3N-F	BL/BLD100N
200	KCP/KCDP200H60/3N-F	BL/BLD200N
300	KCP/KCDP300H60/3N-F	BL/BLD300N
400	KCP/KCDP400H60/3N-F	BL/BLD400N

Lp.	Nazwa	Symbol	Materiał	Szt.	Nr katalogowy
4	Blacha łącznikowa	BL/BLD400N		1	
3	Śruba z łbem grzybkowym	SGN M6x12		24	
2	Łącznik	LPP/LPDPH60N		2	
1	Koryto	KCP/KCDP400H60/3N		2	

Dachylko wymiarów nietolerowanych

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

Masa [kg] | Podziałka: 7:50 | Format: A4 | Arkusz: 1 | Arkuszy: 1

Projektował				Nazwa rysunku: Połączenie KCP/KCDP400H60/3N
Rysował	J.Grochowski			
Sprawdził				Nr programu maszynowego
Zatwierdził				Nr rysunku

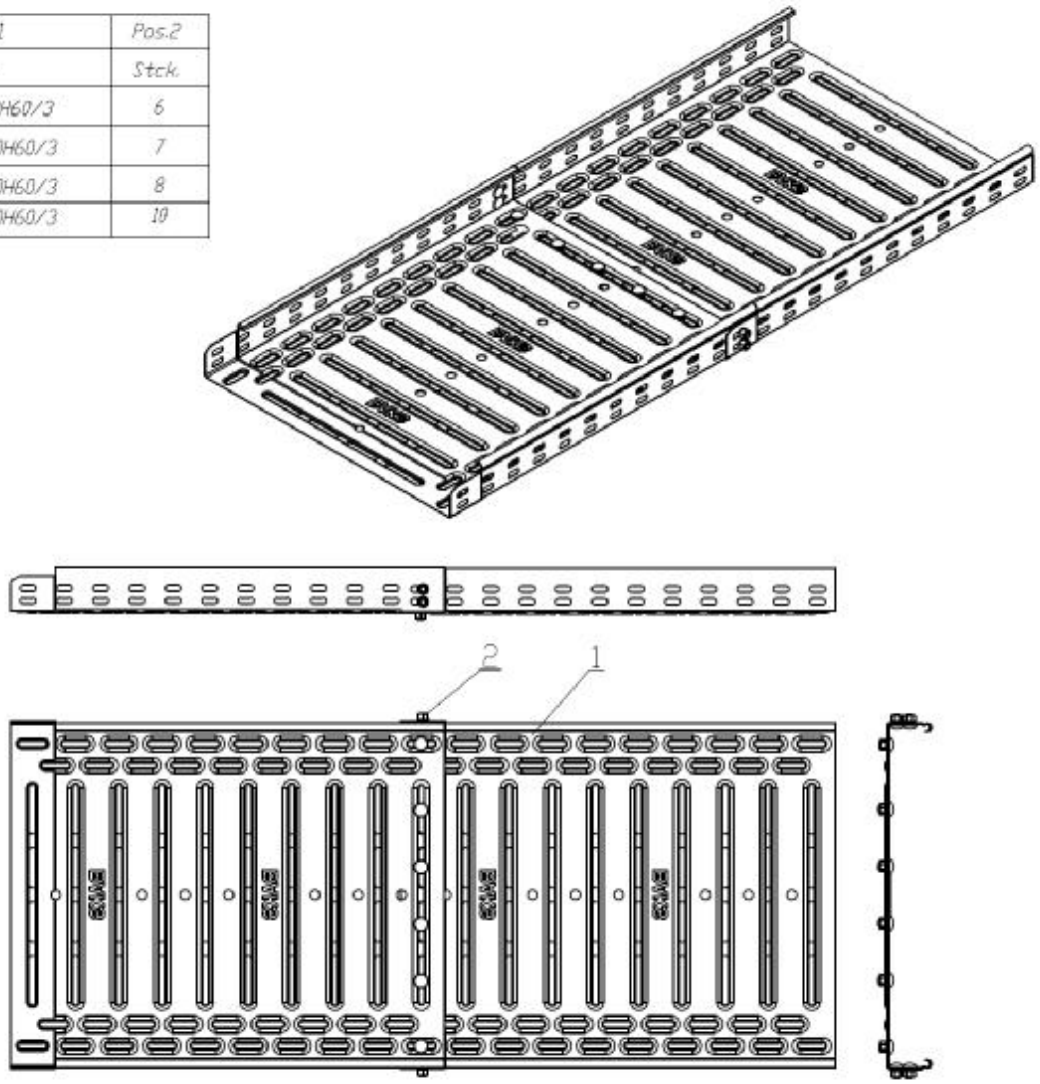
Nazwisko | Podpis | Data

Nr zmiany

Profesjonalne Systemy Tras Kablowych

DRAWINGS

Pos.1		Pos.2
A(mm)	Symbol	Stck.
100	KGUJ100H60/3	6
200	KGUJ200H60/3	7
300	KGUJ300H60/3	8
400	KGUJ400H60/3	10

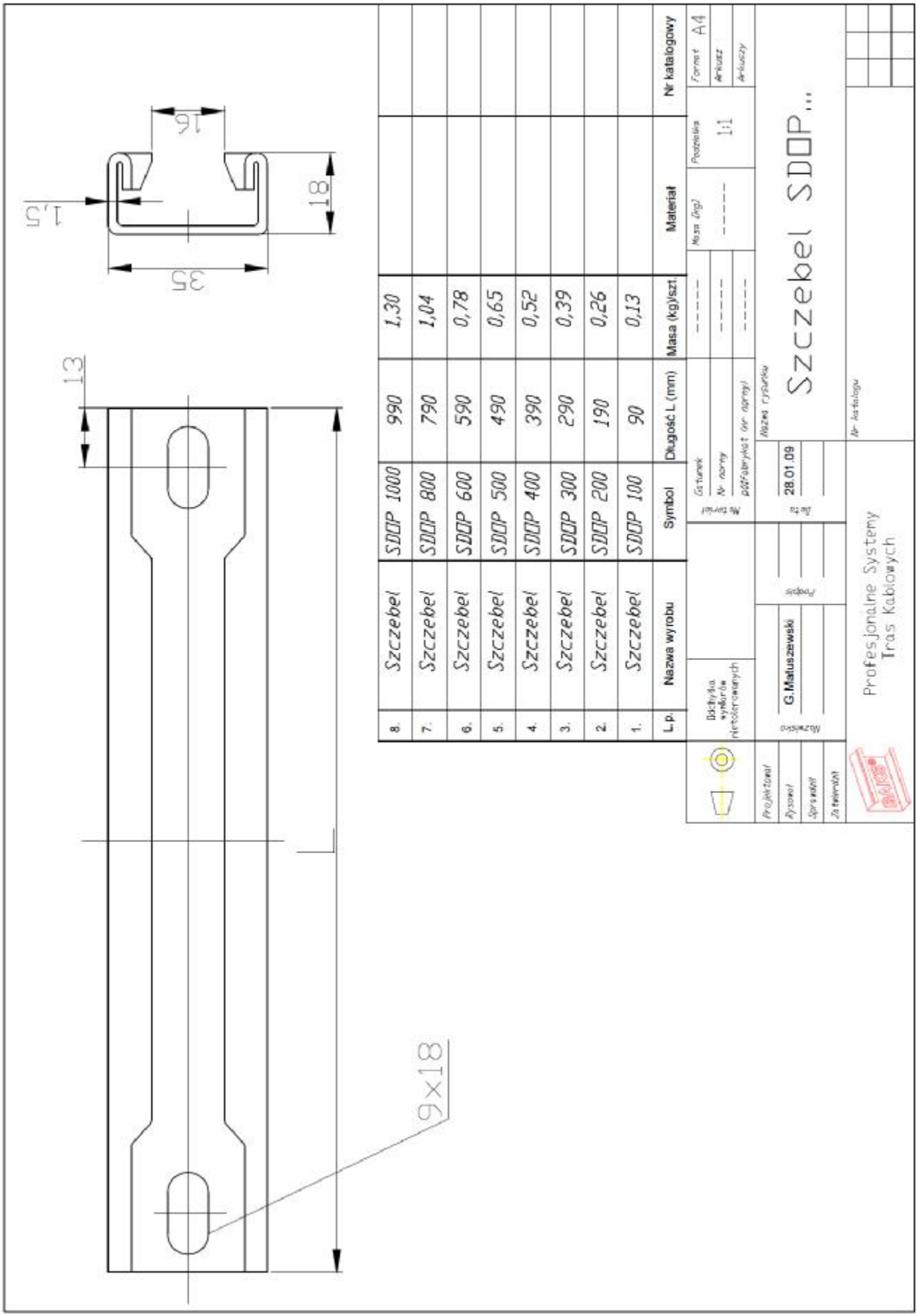


Pos.	Benennung	Symbol	Stck.
2	Flachrundschraube (Satz)	SGK M6x12	10
1	Kabelrinne	KGUJ400H60/3	2

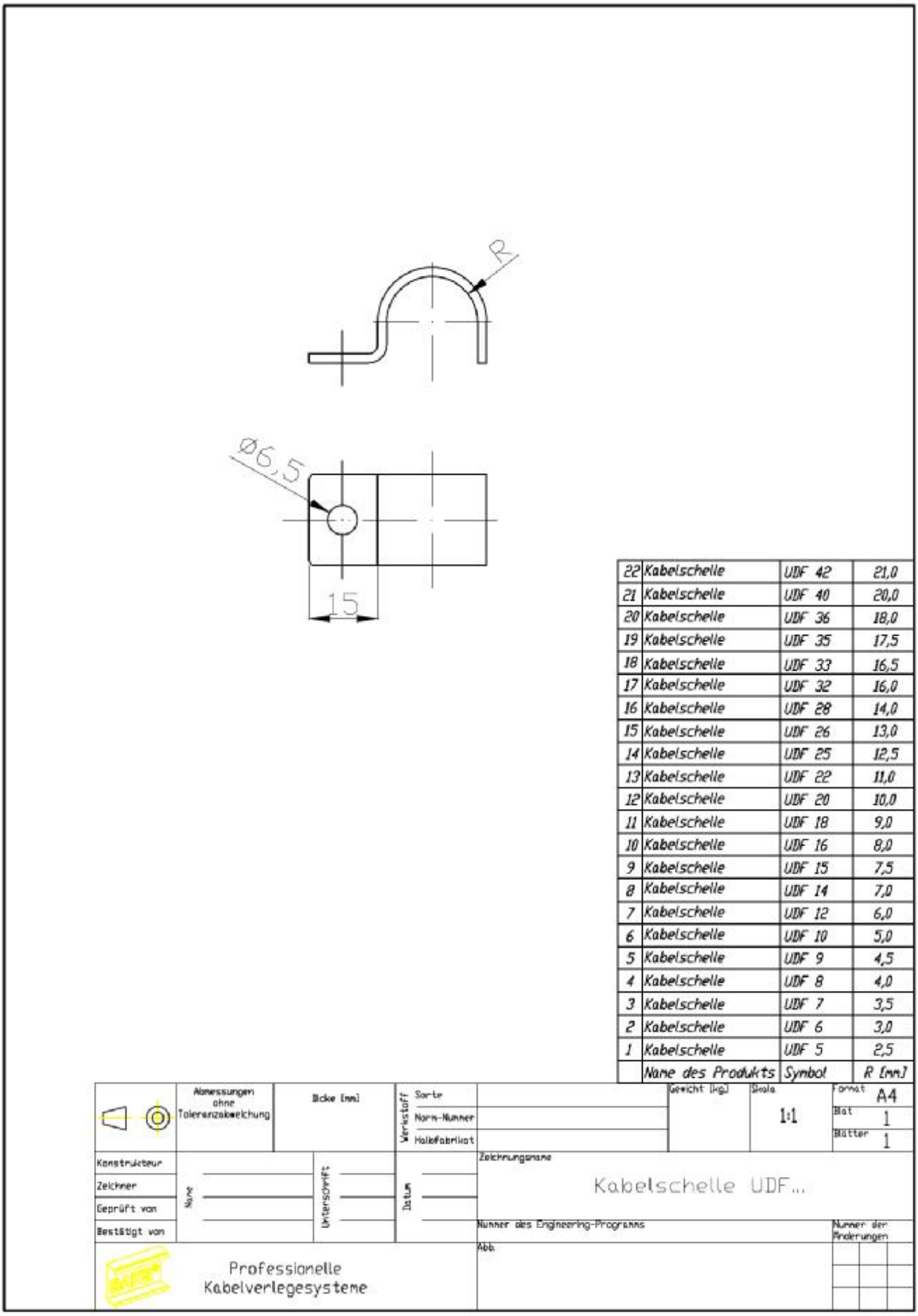
	Abmessungen ohne Toleranzabweichung	Dicke [mm]	Werkstoff: Sorte / Norm-Nummer / Halbfabrikat	Gewicht [kg]	Skala 1:5	Format A2	Blatt 1 / Blätter 1
Konstrukteur	Name	Unterschrift	Datum	Zeichnungsname: Verbindung KGUJ400H60/3			
Zeichner							
Geprüft von				Nummer des Engineering-Programms		Nummer der Änderungen	
Bestätigt von				Abb.			

Professionelle Kabelverlegesysteme

DRAWINGS


Szczebel SDOP...
Profesjonalne Systemy Tras Kablowych
G.Maluszewski
28.01.09
Nr katalogu
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
1:1
Format A4
13
18
35
1,5
9x18
L

DRAWINGS



22	Kabelschelle	UDF 42	21,0
21	Kabelschelle	UDF 40	20,0
20	Kabelschelle	UDF 36	18,0
19	Kabelschelle	UDF 35	17,5
18	Kabelschelle	UDF 33	16,5
17	Kabelschelle	UDF 32	16,0
16	Kabelschelle	UDF 28	14,0
15	Kabelschelle	UDF 26	13,0
14	Kabelschelle	UDF 25	12,5
13	Kabelschelle	UDF 22	11,0
12	Kabelschelle	UDF 20	10,0
11	Kabelschelle	UDF 18	9,0
10	Kabelschelle	UDF 16	8,0
9	Kabelschelle	UDF 15	7,5
8	Kabelschelle	UDF 14	7,0
7	Kabelschelle	UDF 12	6,0
6	Kabelschelle	UDF 10	5,0
5	Kabelschelle	UDF 9	4,5
4	Kabelschelle	UDF 8	4,0
3	Kabelschelle	UDF 7	3,5
2	Kabelschelle	UDF 6	3,0
1	Kabelschelle	UDF 5	2,5
	Name des Produkts	Symbol	R [mm]

Abmessungen ohne Toleranzabweichung | Dicke [mm] | Werkstoff: Sorte, Norm-Nummer, Halbfabrikat | Gewicht [kg] | Skala 1:1 | Format A4 | Blat 1 | Blätter 1

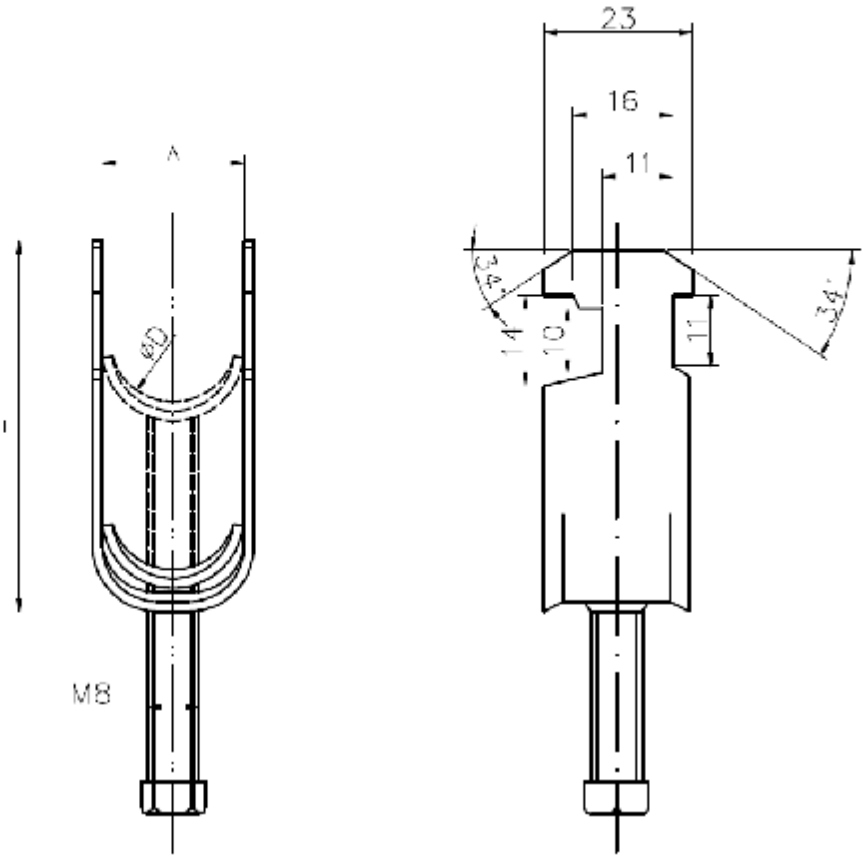
Konstrukteur | Zeichner | Geprüft von | Bestätigt von | Name | Unterschrift | Datum

Zeichnungsname: Kabelschelle UDF...

Nummer des Engineering-Programms | Nummer der Änderungen | Abb.

Professionelle Kabelverlegesysteme

DRAWINGS



UKO1/64–70	72	116	70
UKO1/58–64	66	103	64
UKO1/46–52	54	97	52
UKO1/40–46	48	86	46
UKO1/34–40	42	78	40
UKO1/28–34	36	71	34
UKO1/22–28	30	61	28
UKO1/16–22	24	57	22
SYMBOL	A	l	ØD

Tolerancje wymiarów nieobrobionych

Materiał: Galvano
Nr normy
półfabrykat (nr normy)

Masa [kg]

Format A4
Arkusz 1
Arkuszy 1

1:1

Projektował
Rysował
Sprawdził
Zatwierdził

Nazwisko

Podpis

Data

Nazwa rysunku

UKO1

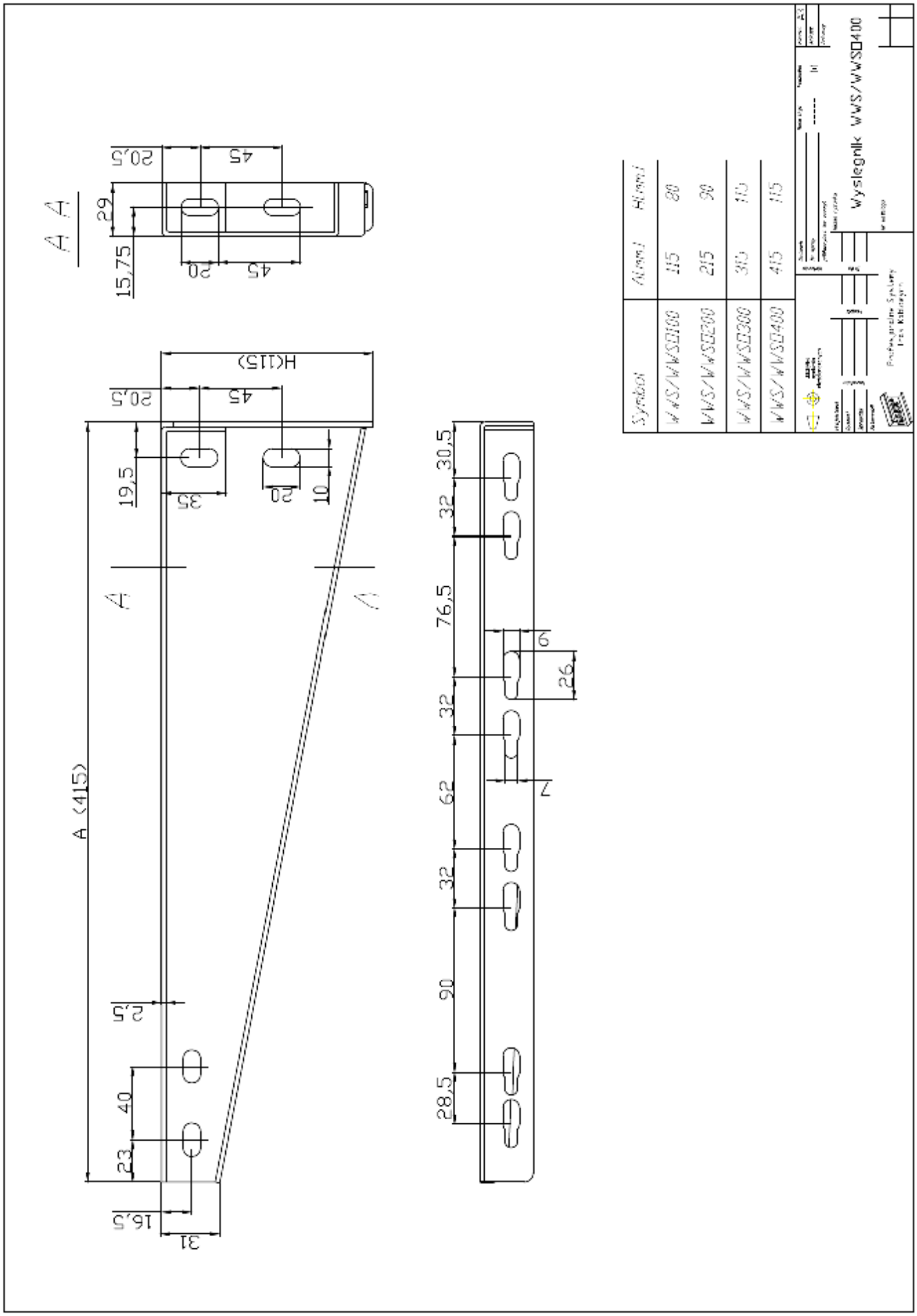
Nr programu maszynowego ---

Nr zmiany

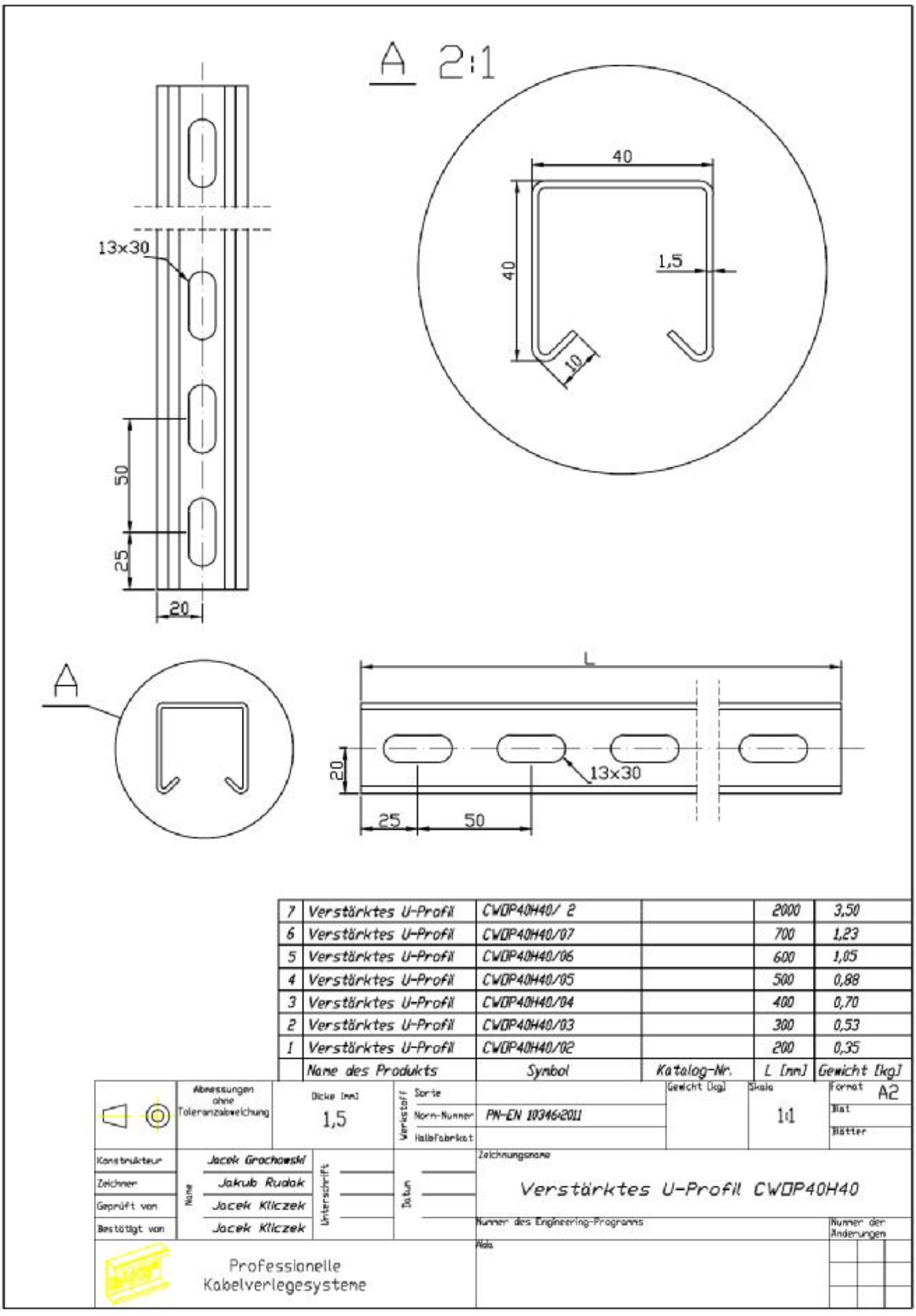
Nr rysunku

Profesjonalne Systemy Tras Kablowych

DRAWINGS


Wysięgnik WWS/WWSD400
Symbol
A (mm)
H (mm)
WWS/WWSD200
115
80
WWS/WWSD300
215
90
WWS/WWSD300
315
110
WWS/WWSD400
415
115
A (415)
H(115)
45
20,5
29
15,75
20
45
19,5
35
20
10
5,2
40
23
16,5
31
30,5
32
76,5
32
62
32
90
28,5
6
26
7

DRAWINGS



7	Verstärktes U-Profil	CWOP40H40/ 2		2000	3,50
6	Verstärktes U-Profil	CWOP40H40/07		700	1,23
5	Verstärktes U-Profil	CWOP40H40/06		600	1,05
4	Verstärktes U-Profil	CWOP40H40/05		500	0,88
3	Verstärktes U-Profil	CWOP40H40/04		400	0,70
2	Verstärktes U-Profil	CWOP40H40/03		300	0,53
1	Verstärktes U-Profil	CWOP40H40/02		200	0,35
	Name des Produkts	Symbol	Katalog-Nr.	L [mm]	Gewicht [kg]

Abmessungen ohne Toleranzabweichung	Dicke [mm] 1,5	Werkstoff: Sorte		Gewicht [kg]	Skala 1:1
		Norm-Nummer	PN-EN 10346:2011		Format A2
		Halbfabrikat			Blatt / Blätter

Konstrukteur	Name: Jacek Grachowski	Unterschrift	Datum	Zeichnungsname: Verstärktes U-Profil CWOP40H40
Zeichner	Jakub Rudak			
Geprüft von	Jacek Kliczek			
Bestätigt von	Jacek Kliczek			Nummer des Engineering-Programms / Nr. / Nummer der Änderungen

Professionelle Kabelverlegesysteme

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 EN 1363-1, and where appropriate STN 92 0205. 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

EN 1363-1: 2012	Fire resistance tests. Part 1: General requirements
STN 92 0205:2014	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