TEST REPORT FIRES-FR-150-15-AUNE

Cables of company TECHNOKABEL S.A. at cable bearing system BAKS

Reg. No. 041/S-159

The Experts on Fire Safety

TEST REPORT

FIRES-FR-150-15-AUNE

Tested property:	Functional resistance in fire
Test method:	STN 92 0205: 2014 (ZP-27/2008, DIN 4102-12: 1998-11) acc. to cl. 1 of this test report
Type of test:	Accredited
Date of issue:	08. 09. 2015
Name of the product:	Cables of company TECHNOKABEL S.A. at cable bearing system BAKS
Manufacturer:	TECHNOKABEL S.A., Nasielska 55, 04 – 343 Warszawa, Poland (producer of cables) BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland (producer of cable bearing system)
Sponsor:	TECHNOKABEL S.A., Nasielska 55, 04 – 343 Warszawa, Poland
Test carried out by:	FIRES, s.r.o., Testing laboratory
Task No.:	PR-15-0265
Specimens received:	31. 07. 2015
Date of the test:	06. 08. 2015

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 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 92 025 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.

Sponsor's representatives witnessing the test:

Mr. Mariusz Kwiatkowski	TECHNOKABEL S.A.
Mr. Pavel Stradomski	TECHNOKABEL S.A.
Mr. Tomasz Żukowski	BAKS Kazimierz Sielski
Mr. Dawid Bodalski	BAKS Kazimierz Sielski

test directed by	Ing. Štefan Rástocký
test carried out by	Bc. Dávid Šubert
operator	Ing. Marek Gorlický

2. MEASURING EQUIPMENT

Identification number	Measuring equipment	Note
F 90 004	Horizontal test furnace for fire resistance testing	-
F 69 010	PLC system for data acquisition and control TECOMAT TC 700	-
F 40 019	Visual and calculating software to PLC TECOMAT TC 700	-
F 40 017	Control and communication software to PLC TECOMAT TC 700	-
F 40 018	SW Reliance	-
F 40 020	Driver Tecomat - Reliance (SW)	-
F 71 041, F 71 042	Transducer of differential pressure (–50 to + 150) Pa	measurement of pressure inside the test furnace
F 54 064	Digital calliper (0 to 160) mm	-
F 54 056	Racking meter	-
F 69 009	PLC system for data acquisition and climate control TECOMAT TC 604	-

Identification number	Measuring equipment	Note
F 60 001 - F 60 009	Sensors of temperature and relative air humidity	measurement of climatic conditions
F 10 521 - F 10 528	Plate thermometers	measurement of temperature inside the test furnace according to EN 1363-1
F 10 701	Sheathed thermocouple type K Ø 3 mm	measurement of ambient temperature
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 TECHNOKABEL S.A. and BAKS Kazimierz Sielski under supervision of laboratory technician.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMEN STRUCTURE

Test specimen comprised of power and communication halogen free cables of company TECHNOKABEL S.A. and cable bearing system of company BAKS Kazimierz Sielski – cable trays, mesh trays, ladders, cable clips and hangers with accessories (consoles, brackets, supports, hangers, etc.).

Cables
Used cables by test:

Power cables:

NHXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	(5x)
NHXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV	(5x)
(N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV	(10x)
(N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV	(10x)
(N)HXH-J FE180 PH30/E30 3x1,5 RE 0,6/1 kV	(2x)
(N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV	(8x)
(N)HXH-J FE180 PH30/E30 4x50 RM 0,6/1 kV	(6x)
(N)HXH-J FE180 PH90/E90 3x1,5 RE 0,6/1 kV	(2x)
(N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	(25x)
(N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV	(27x)

Communication cables:

HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	(30x)
HTKGs FE180 PH90/E30 2x0,75 mm^2 110 V	(4x)
HDGs FE180 PH90/E30-E90 3x1,5 mm^2 300/500 V	(2x)
HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V	(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 – 3
Tracks are made of four consoles combined of three supports (CWP40H22/05) and two threaded rods (PG M12) fixed together by washers (PP12) and nuts (NS M12). Consoles are fixed to through ceiling panels in spacing of 1500 mm.

Track No. 1:
Cable trays (KBJ400H60, steel sheet thickness 0,9 mm, height 60 mm, width 400 mm) fixed together by nut bolts (SGK M6x12, 8 pcs) and covered by cover (PKJ400) fixed with clips (ZPD H60). Partition (PGJ60) is fixed by screws (SGK M6x12) in distance 100 mm of cable tray side. Trays are fixed to supports by screws (SGK M6x12) and loaded with 20kg.m^{-1}. Cables are not fixed to cable trays.

Track No. 2:
Cable mesh trays (KDS/KDSO400H60, height 60 mm, width 400 mm, steel wire ∅ 4,5 mm) fixed together by junctions (USS/USSO, 5 pcs). Mesh trays are fixed to supports by junctions (ZS/ZSO, 2 pcs) and loaded with 20kg.m^{-1}. Cables are fixed to mesh trays by cable clamps (UKZ1/UKZO1).

Track No. 3:
Cable ladders (DUD400H60, height 60 mm, width 400 mm, steel sheet thickness 1,2 mm, spacing of transoms 300 mm) fixed together by junctions (LDC/LDOCH60, 2 pcs) and nut bolts (SGK M8x14, 8 pcs) on sides. Ladders are fixed to supports by junctions (ZM/ZMO, 2 pcs) and nut bolts (SGK M8x14, 2 pcs) and loaded with 25kg.m^{-1}. Cables are fixed to ladders by cable clamps (UK1/UKO1).

Suspension tracks No. 4, 5 and 7, 8
Tracks are made of four consoles (WPCB900) fixed to ceiling by threaded rods (PG M10) in spacing of 1500 mm. Brackets (WWS/WWSO300) are fixed to consoles by screws (SM M10x70). Consoles are reinforced in place of fixing brackets by spacer (BR55).

Tracks No. 4 and 7:
Cable trays (KCL/KCOL300H60, height 60 mm, width 300 mm, steel sheet thickness 0,7 mm) fixed together by screws (SGK M6x12, 8 pcs). Partition (PGL H60) is fixed by screws (SGK M6x12) in distance 100 mm of cable tray side. Trays are fixed to brackets by screws (SGK M6x12) and loaded with 10kg.m^{-1}. Cables are not fixed to cable trays.

Tracks No. 5 and 8:
Cable mesh trays (KDS/KDSO300H60, height 60 mm, width 300 mm, steel wire ∅ 4,5 mm) fixed together by junctions (USS/USSO, 4 pcs). Mesh trays are fixed to brackets by junctions (ZS/ZSO, 2 pcs) and loaded with 10kg.m^{-1}. Cables are fixed to mesh trays by cable clamps (UKZ1/UKZO1).

Suspension tracks No. 6 and 9
Tracks are made of four consoles (WPCB1200) fixed to ceiling by threaded rods (PG M10) in spacing of 1500 mm. Brackets (WWS/WWSO300) are fixed to consoles by screws (SM M10x70). Consoles are reinforced in place of fixing brackets by spacer (BR55).

Tracks No. 6 and 9:
Cable ladders (DUD300H60, height 60 mm, width 300 mm, steel sheet thickness 1,2 mm, spacing of transoms 300 mm) fixed together by junctions (LDC/LDOCH60, 2 pcs) and nut bolts (SGK M8x14, 8 pcs) on sides. Ladders are fixed to brackets by junctions (ZM/ZMO, 2 pcs) and nut bolts (SGK M8x14, 2 pcs) and loaded with 10kg.m^{-1}. Cables are fixed to ladders by cable clamps (UK1/UKO1).

Suspension track No. 10
Track is made of supports (CWP/CWOP40H40/05) fixed to steel profiles on ceiling by clamps (UDC) and screws (SM M10x40) with washers (NR M10) in spacing of 1500 mm.

Cable ladders (DUD400H60, height 60 mm, width 400 mm, steel sheet thickness 1,2 mm, spacing of transoms 300 mm) fixed together by junctions (LDC/LDOCH60, 2 pcs) and nut bolts (SGK M8x14, 8 pcs) on sides. Partition (PGDJ40) is fixed by screws (SGK M6x12) in distance 100 mm of cable ladder side. Ladders are fixed reversely to supports by hangers (UTM/UTMO) and screws (SM M10x20, SGK M8x14) and loaded with 20kg.m^{-1}. Cables are fixed to ladders by cable clamps (UK1/UKO1) in spacing of 600 mm.

Suspension tracks No. 11 – 16
Tracks are made of consoles (WPCB1200) fixed to ceiling by threaded rods (PG M10) in spacing of 1500 mm. Consoles are reinforced in place of fixing brackets by spacer (BR55). Brackets (WWS/WWSO400) are fixed to consoles by screws (SM M10x70). 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 holders (USV/USOV).

Track No. 11:
Cable trays (KGJ/KGOJ400H60, height 60 mm, width 400 mm, steel sheet thickness 0,9 mm) fixed together by screws (SGK M6x12, 7 pcs). Trays are fixed to brackets by screws (SGK M6x12) and loaded with 20kg.m^{-1}. Cables are not fixed to cable trays.

Track No. 12:
Cable mesh trays (KDS/KDSO400H60, height 60 mm, width 400 mm, steel wire ∅ 4,5 mm) fixed together by junctions (USS/USSO, 5 pcs). Mesh trays are fixed to brackets by junctions (ZS/ZSO, 2 pcs) and loaded with 20kg.m^{-1}. Cables are fixed to mesh trays by cable clamps (UKZ1/UKZO1).

Track No. 13:
Cable ladders (DUD400H60, height 60 mm, width 400 mm, steel sheet thickness 1,2 mm, spacing of transoms 300 mm) fixed together by junctions (LDC/LDOCH60, 2 pcs) and nut bolts (SGK M8x14, 8 pcs) on sides. Ladders are fixed to brackets by junctions (ZM/ZMO, 2 pcs) and nut bolts (SGK M8x14, 2 pcs) and loaded with 25kg.m^{-1}. Cables are fixed to ladders by cable clamps (UK1/UKO1).

Track No. 14:
Cable trays (KFL300H60, height 60 mm, width 300 mm, steel sheet thickness 0,7 mm) fixed together by integrated junctions and one screw (SGK M6x12) on one side. Partition (PGL H60) is fixed by screws (SGK M6x12) in distance 100 mm of cable tray side. Trays are fixed to brackets by screws (SGK M6x12) and loaded with 20kg.m^{-1}. Cables are not fixed to cable trays.

Track No. 15a:
Cable mesh trays (KDS/KDSZ200H60, height 60 mm, width 200 mm, steel wire ∅ 4,5 mm) fixed together by integrated junctions. Mesh trays are fixed to brackets by junctions (ZS/ZSO, 2 pcs) and loaded with 10kg.m^{-1}. Cables are fixed to mesh trays by cable clamps (UKZ1/UKZO1).

Track No. 15b:
Cable mesh trays (KDS/KDSZ100H60, height 60 mm, width 100 mm, steel wire ∅ 4,5 mm) fixed together by integrated junctions. Mesh trays are fixed to brackets by junctions (ZS/ZSO, 2 pcs) and loaded with 10kg.m^{-1}. Cables are fixed to mesh trays by cable clamps (UKZ1/UKZO1).

Track No. 16:
Cable ladders (DFP400H60, height 60 mm, width 400 mm, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) fixed together by integrated junctions. Ladders are fixed to brackets by junctions (ZM/ZMO, 2 pcs) and nut bolts (SGK M8x14, 2 pcs) and loaded with 20kg.m^{-1}. Cables are fixed to ladders by cable clamps (UK1/UKO1).

Suspension track No. 17
Track is made of supports (CWP/CWOP40H40) fixed to trapezoidal steel sheets on ceiling (represent roof construction) by threaded rods (PG M8) and hangers (WT/WTO120M8) in spacing of 1500 mm. Supports are fixed together by junction (LC40H40) and screws (SGK M10x20, 8 pcs) and loaded at place of fixing together by 5kg. Fireboxes PMO1 are fixed directly to side of supports.

Suspension track No. 18
Track is made of cable hangers (OZS/OZSO) fixed to trapezoidal steel sheets on ceiling (represent roof construction) by threaded rods (PG M6) and hangers (WT/WTO120M6) in spacing of 600 mm.

Suspension track No. 19
Track is made of cable hangers (OZM/OZMO) fixed to trapezoidal steel sheets on ceiling (represent roof construction) by threaded rods (PG M6) and hangers (WT/WTO120M6) in spacing of 600 mm.

Suspension track No. 20
Track is made of cable clips (KSA) fixed to trapezoidal steel sheets on ceiling (represent roof construction) by threaded rods (PG M6) and hangers (WT/WTO120M6) in spacing of 600 mm.

Suspension track No. 21
Track is made of cable hangers (OZ/OZO) fixed to steel profiles on ceiling by threaded rods (PG M6) and clamps (ZK8/19) in spacing of 600 mm.

Suspension track No. 22
Track is made of cable clips (KSA) fixed to ceiling by threaded rods (PG M6) in spacing of 600 mm.

Suspension track No. 23
Track is made of supports (CWP/CWOP40H40) fixed to steel profiles on ceiling by threaded rods (PG M8) and clamps (ZK8/19) in spacing of 1500 mm. Supports are fixed together by junction (LC40H40) and screws (SGK M10x20, 8 pcs) and loaded at place of fixing together by 5kg. Fireboxes PMO1 are fixed directly to side of supports.

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.
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 THE 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 and to side walls made of aerated concrete blocks YTONG, 250 mm thick.

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

4.3 INSPECTION OF THE SPECIMENS

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

4.4 CLIMATIC CONDITIONING OF THE SPECIMENS

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

Ambient air temperature [°C]

mean	23,0
standard deviation	1,7

Relative air humidity [%]

mean	51,8
standard deviation	8,1

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.

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

Relative air humidity [%]	Ambient air temperature [°C]
50,5	26,8

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)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	**16**	21 minutes
2	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		18 minutes
3	2 cables (N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV	**15a**	90 minutes no failure / interruption
4	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		25 minutes
5	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV	**14**	90 minutes no failure / interruption
6	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV		90 minutes no failure / interruption
7	2 cables (N)HXH-J FE180 PH30/E30 3x1,5 RE 0,6/1 kV (230V)		90 minutes no failure / interruption
8	cable (N)HXH-J FE180 PH90/E90 3x1,5 RE 0,6/1 kV (230V) + **fireboxes PMO1**	**23**	90 minutes no failure / interruption
9	cable (N)HXH-J FE180 PH90/E90 3x1,5 RE 0,6/1 kV (230V) + **fireboxes PMO1**		90 minutes no failure / interruption
10	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV	**13**	22 minutes
11	2 cables (N)HXH-J FE180 PH30/E30 4x50 RM 0,6/1 kV		61 minutes
12	2 cables (N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV		33 minutes
13	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV		82 minutes
14	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV	**12**	24 minutes
15	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		24 minutes
16	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV		57 minutes
17	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV		90 minutes no failure / interruption
18	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV	**11**	90 minutes no failure / interruption
19	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		90 minutes no failure / interruption
20	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV		90 minutes no failure / interruption
21	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV		90 minutes no failure / interruption

Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
22	3 cables NHXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	**22**	90 minutes no failure / interruption
23	3 cables NHXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		90 minutes no failure / interruption
24	3 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV		90 minutes no failure / interruption
25	3 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		90 minutes no failure / interruption
26	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	**9**	90 minutes no failure / interruption
27	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		25 minutes
28	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV	**8**	79 minutes
29	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV		39 minutes
30	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	**7**	90 minutes no failure / interruption
31	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		90 minutes no failure / interruption
32	2 cables (N)HXH-J FE180 PH30/E30 4x50 RM 0,6/1 kV	**6**	90 minutes no failure / interruption
33	2 cables (N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV		78 minutes
34	2 cables (N)HXH-J FE180 PH30/E30 4x50 RM 0,6/1 kV	**5**	25 minutes
35	2 cables (N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV		90 minutes no failure / interruption
36	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV	**4**	90 minutes no failure / interruption
37	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV		90 minutes no failure / interruption
38	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV	**10**	90 minutes no failure / interruption
39	2 cables NHXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV		90 minutes no failure / interruption
40	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV		61 minutes
41	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		36 minutes
42	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	**21**	90 minutes no failure / interruption
43	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		90 minutes no failure / interruption
44	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	**3**	78 minutes
45	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		68 minutes
46	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	**2**	90 minutes no failure / interruption
47	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		27 minutes
48	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV	**1**	48 minutes
49	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV		90 minutes no failure / interruption
50	cable HDGs FE180 PH90/E30-E90 3x1,5 mm2 300/500 V + **fireboxes PMO1**	**17**	90 minutes no failure / interruption
51	cable HDGs FE180 PH90/E30-E90 3x1,5 mm2 300/500 V + **fireboxes PMO1**		90 minutes no failure / interruption
52	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V	**15b**	71 minutes
53	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	**13**	69 minutes
54	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	**12**	75 minutes
55	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		90 minutes no failure / interruption
56	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	**11**	90 minutes no failure / interruption
57	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		90 minutes no failure / interruption
58	7 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	**22**	90 minutes no failure / interruption
59	4 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		90 minutes no failure / interruption
60	3 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		90 minutes no failure / interruption
61	7 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	**20**	90 minutes no failure / interruption
62	4 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		90 minutes no failure / interruption
63	3 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		90 minutes no failure / interruption
64	2 cables HTKGs FE180 PH90/E30 2x0,75 mm2 110 V	**19**	90 minutes no failure / interruption
65	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		90 minutes no failure / interruption
66	2 cables HTKGs FE180 PH90/E30 2x0,75 mm2 110 V	**18**	90 minutes no failure / interruption
67	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		90 minutes no failure / interruption

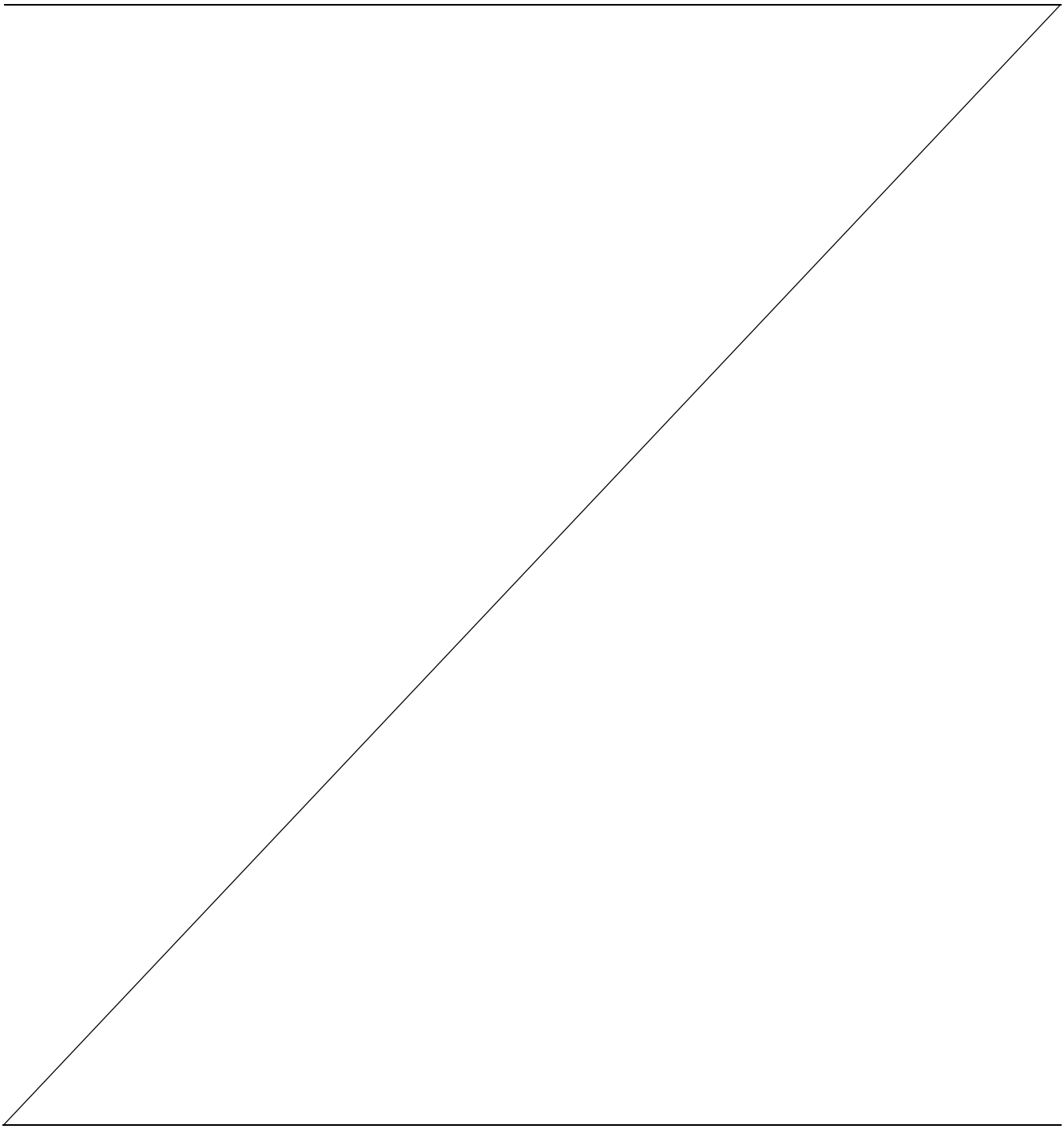
The fire test was discontinued in 94th minute at the request of test sponsor.

Specimens S1 – S49 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Specimens S7, S8, S9, S50 and S51 were tested by three-phase voltage supply 1 x 230V with bulbs 240V / 60 W.
Specimens S52 – S67 were tested by one-phase voltage supply 1 x 110V with LED diodes 3V /0,03W.

Circuit breakers with rating 3 A were used.

7. DIRECT APPLICATION OF TEST RESULTS

Direct field of application is valid in accordance with STN 92 0205: 2014 (cl. 7), ZP-27/2008 (cl. 11) and DIN 4102-12: 1998-11 (clause 8). Validity of individual items of field of direct application shall be determined in classification process.

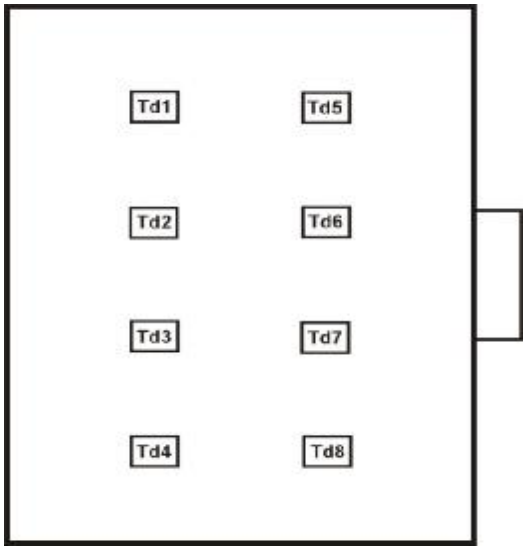


Measured values inside the test furnace

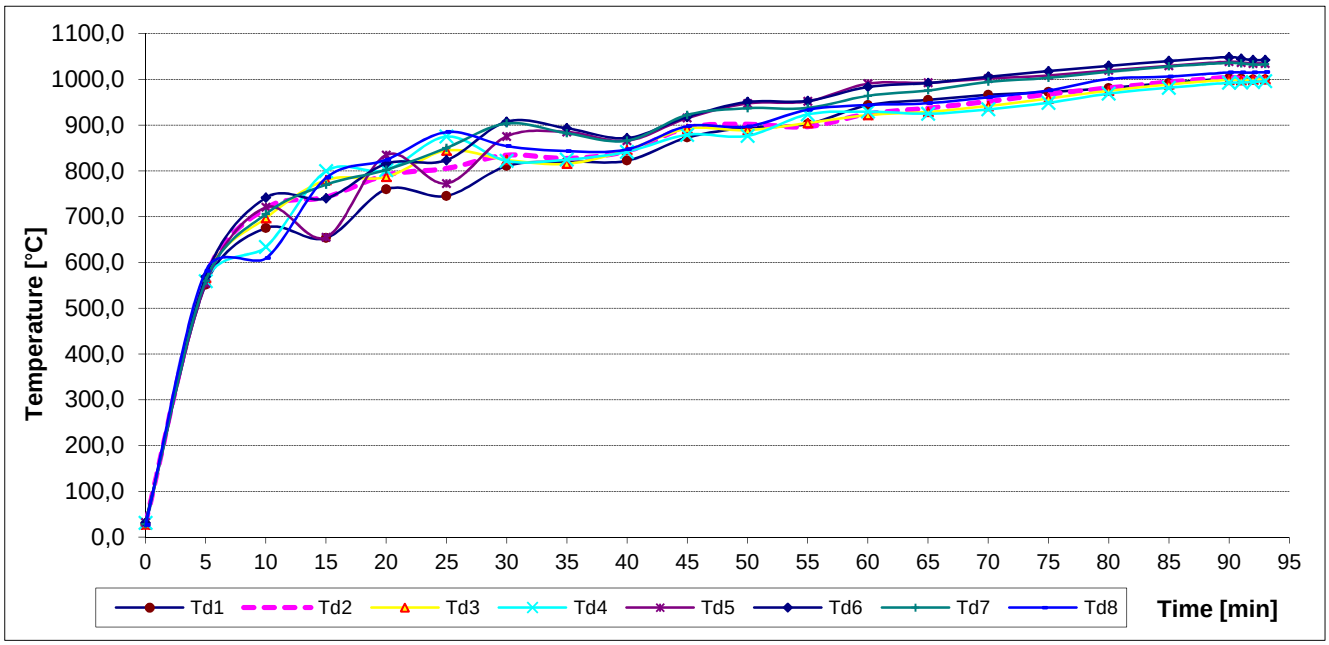
Time	Temperature [°C]											Deviation	Pressure
t [min]	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To	d_e [%]	p [Pa]
0	27,7	29,9	28,0	31,0	32,0	31,5	28,4	26,2	29,3	20,0	26,2	0,0	18,4
5	551,7	568,8	566,7	558,9	554,1	569,0	559,9	581,8	563,9	576,0	26,6	-4,6	17,3
10	675,1	718,6	696,8	633,9	720,4	741,4	705,8	609,2	687,7	678,0	26,9	-1,6	18,0
15	653,4	742,8	779,9	799,4	655,0	740,1	770,0	784,8	740,7	739,0	27,1	-0,8	17,8
20	759,9	791,0	787,0	802,0	834,9	815,8	802,4	824,5	802,2	781,0	27,7	-0,3	18,6
25	745,3	805,4	844,7	875,0	772,7	823,6	850,4	884,8	825,2	815,0	28,0	0,4	17,5
30	810,7	834,7	824,1	821,8	875,6	907,6	903,7	854,3	854,1	842,0	28,1	0,7	18,2
35	820,4	827,5	815,5	824,8	885,1	893,3	882,6	843,3	849,1	865,0	28,3	0,5	19,3
40	822,5	843,4	845,6	842,0	866,2	871,8	866,2	847,0	850,6	885,0	28,4	0,1	20,0
45	873,0	894,7	892,4	878,9	915,6	918,1	922,4	897,7	899,1	902,0	28,4	-0,1	18,2
50	894,5	902,0	889,2	876,8	947,3	950,6	937,0	897,0	911,8	918,0	28,5	-0,3	18,8
55	902,8	896,8	904,7	923,4	952,1	953,0	937,6	933,6	925,5	932,0	28,6	-0,2	19,6
60	943,7	924,8	922,1	929,5	990,7	983,5	964,1	944,1	950,3	945,0	28,7	-0,2	17,7
65	955,3	937,2	929,1	925,0	992,5	992,0	975,9	948,0	956,9	957,0	28,7	-0,2	18,7
70	966,2	951,9	942,0	934,6	1002,0	1005,7	994,5	961,0	969,7	968,0	28,8	-0,2	18,1
75	972,4	967,8	958,3	948,9	1008,6	1018,0	1003,4	975,7	981,6	979,0	28,9	-0,1	18,9
80	981,2	981,2	975,2	969,0	1019,8	1029,5	1016,8	1000,9	996,7	988,0	29,0	-0,1	18,0
85	992,4	994,2	989,0	981,8	1029,6	1040,1	1028,1	1006,2	1007,7	997,0	29,1	0,0	20,0
90	1002,7	1004,4	999,3	992,6	1038,8	1048,9	1036,2	1015,2	1017,3	1006,0	29,4	0,1	19,1
91	1002,1	1002,0	998,5	993,2	1037,0	1045,3	1034,7	1015,0	1016,0	1008,0	29,5	0,1	18,1
92	999,7	1000,6	1000,0	994,3	1035,0	1042,6	1032,3	1014,9	1014,9	1009,0	29,6	0,1	19,6
93	999,9	1001,5	1000,4	996,1	1035,0	1042,5	1033,0	1015,8	1015,5	1011,0	29,7	0,1	19,1

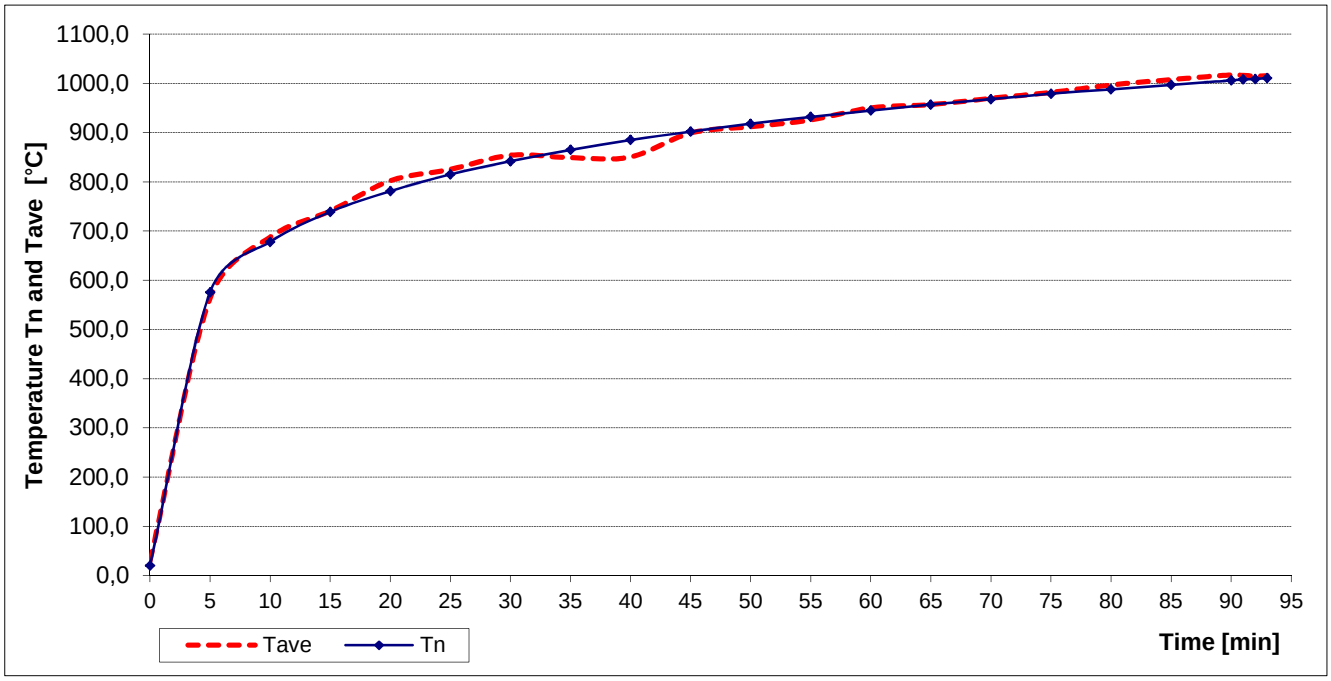
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

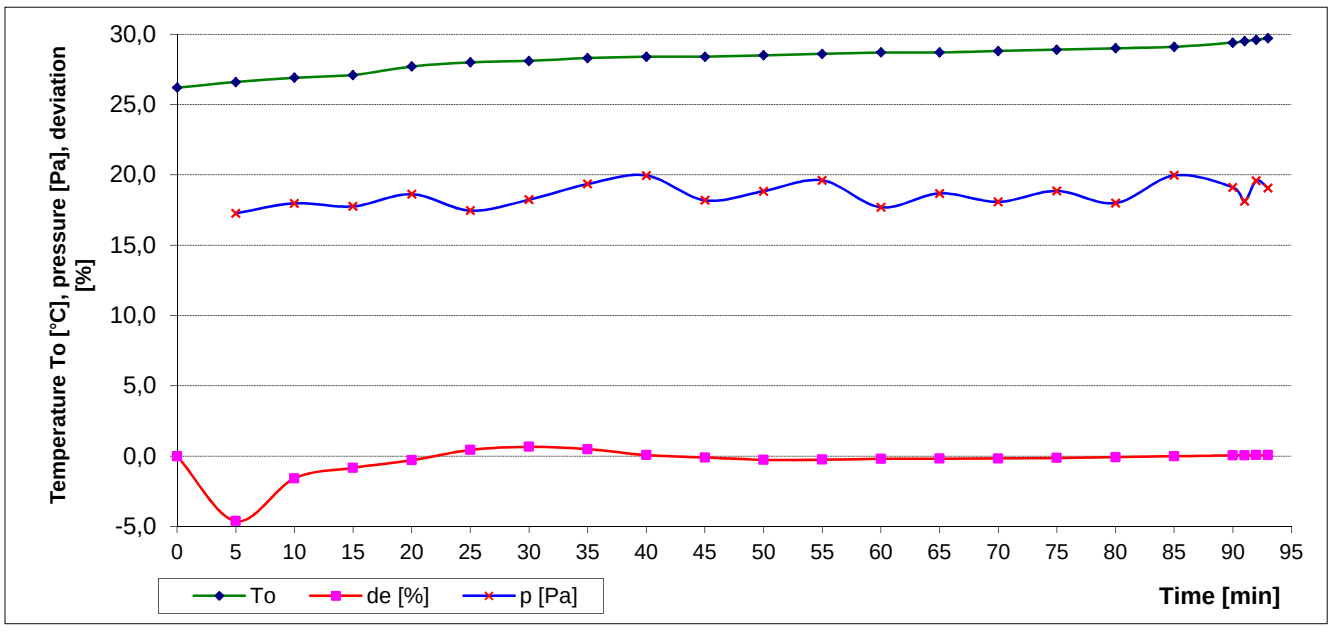
Layout of measuring points inside the test furnace:



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	x
	2-L2	21:50
	3-L3	x
	4-PEN	x
S2	5-L1	x
	6-L2	18:37
	7-L3	x
	8-PEN	x
S3	9-L1	no failure / interruption
	10-L2	no failure / interruption
	11-L3	no failure / interruption
	12-PEN	no failure / interruption
S4	13-L1	25:46
	14-L2	x
	15-L3	x
	16-PEN	x
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	-
	27-L3	-
	28-PEN	no failure / interruption
S8	29-L1	no failure / interruption
	30-L2	-
	31-L3	-
	32-PEN	no failure / interruption
S9	33-L1	no failure / interruption
	34-L2	-
	35-L3	-
	36-PEN	no failure / interruption
S10	37-L1	x
	38-L2	x
	39-L3	25:15
	40-PEN	x

Specimen No.	Cables
1	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
2	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
3	2 cables (N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV
4	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
5	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
6	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
7	2 cables (N)HXH-J FE180 PH30/E30 3x1,5 RE 0,6/1 kV (230V)
8	cable (N)HXH-J FE180 PH90/E90 3x1,5 RE 0,6/1 kV (230V) + fireboxes PMO1
9	cable (N)HXH-J FE180 PH90/E90 3x1,5 RE 0,6/1 kV (230V) + fireboxes PMO1
10	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV

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	x
	42-L2	64:49
	43-L3	x
	44-PEN	x
S12	45-L1	33:01
	46-L2	33:01
	47-L3	x
	48-PEN	x
S13	49-L1	82:52
	50-L2	x
	51-L3	x
	52-PEN	x
S14	53-L1	x
	54-L2	x
	55-L3	24:30
	56-PEN	x
S15	57-L1	x
	58-L2	24:13
	59-L3	x
	60-PEN	x
S16	61-L1	57:51
	62-L2	x
	63-L3	57:51
	64-PEN	x
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	2 cables (N)HXH-J FE180 PH30/E30 4x50 RM 0,6/1 kV
12	2 cables (N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV
13	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV
14	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV
15	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
16	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
17	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV
18	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV
19	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
20	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV

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	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	25:46
	106-L2	x
	107-L3	x
	108-PEN	x
S28	109-L1	x
	110-L2	79:19
	111-L3	x
	112-PEN	x
S29	113-L1	x
	114-L2	39:28
	115-L3	x
	116-PEN	x
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	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV
22	3 cables NHXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
23	3 cables NHXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
24	3 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
25	3 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
26	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
27	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
28	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV
29	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV
30	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV

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	x
	130-L2	78:33
	131-L3	x
	132-PEN	x
S34	133-L1	x
	134-L2	25:50
	135-L3	x
	136-PEN	x
S35	137-L1	no failure / interruption
	138-L2	no failure / interruption
	139-L3	no failure / interruption
	140-PEN	no failure / interruption
S36	141-L1	no failure / interruption
	142-L2	no failure / interruption
	143-L3	no failure / interruption
	144-PEN	no failure / interruption
S37	145-L1	no failure / interruption
	146-L2	no failure / interruption
	147-L3	no failure / interruption
	148-PEN	no failure / interruption
S38	149-L1	no failure / interruption
	150-L2	no failure / interruption
	151-L3	no failure / interruption
	152-PEN	no failure / interruption
S39	153-L1	no failure / interruption
	154-L2	no failure / interruption
	155-L3	no failure / interruption
	156-PEN	no failure / interruption
S40	157-L1	x
	158-L2	61:43
	159-L3	61:43
	160-PEN	x

Specimen No.	Cables
31	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
32	2 cables (N)HXH-J FE180 PH30/E30 4x50 RM 0,6/1 kV
33	2 cables (N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV
34	2 cables (N)HXH-J FE180 PH30/E30 4x50 RM 0,6/1 kV
35	2 cables (N)HXH-J FE180 PH30/E30 4x1,5 RE 0,6/1 kV
36	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1 kV
37	2 cables (N)HXCH FE180 PH90/E90 4x1,5/1,5 RE 0,6/1 kV
38	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
39	2 cables NHXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
40	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV

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	x
	163-L3	36:40
	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	x
	174-L2	78:10
	175-L3	78:10
	176-PEN	x
S45	177-L1	x
	178-L2	x
	179-L3	68:32
	180-PEN	x
S46	181-L1	no failure / interruption
	182-L2	no failure / interruption
	183-L3	no failure / interruption
	184-PEN	no failure / interruption
S47	185-L1	27:38
	186-L2	x
	187-L3	x
	188-PEN	x
S48	189-L1	48:44
	190-L2	x
	191-L3	48:44
	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	-
	199-L3	-
	200-PEN	no failure / interruption

Specimen No.	Cables
41	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
42	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
43	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
44	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
45	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
46	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
47	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
48	2 cables (N)HXH-J FE180 PH90/E90 4x1,5 RE 0,6/1 kV
49	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1 kV
50	cable HDGs FE180 PH90/E30-E90 3x1,5 mm2 300/500 V + 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 S51 - power cable

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

Specimen No.	Cables
51	cable HDGs FE180 PH90/E30-E90 3x1,5 mm2 300/500 V + 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	71:04
	210-PEN	-
S52B	211-L	86:54
	212-PEN	-
S53A	213-L	69:32
	214-PEN	-
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	75:05
	220-PEN	-
S55A	221-L	no failure / interruption
	222-PEN	no failure / interruption
S55B	223-L	no failure / interruption
	224-PEN	no failure / interruption
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	-
	236-PEN	-
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	-
	244-PEN	-
S61A	245-L	no failure / interruption
	246-PEN	no failure / interruption
S61B	247-L	-
	248-PEN	-

Specimen No.	Cables
52	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V
53	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V
54	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V
55	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V
56	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V
57	2 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V
58A	7 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V
59	4 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V
60A	3 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V
61A	7 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V

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

Measured time of tested specimens from S62 to S67 - 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	-
	256-PEN	-
S64A	257-L	no failure / interruption
	258-PEN	no failure / interruption
S64B	259-L	no failure / interruption
	260-PEN	no failure / interruption
S65A	261-L	no failure / interruption
	262-PEN	no failure / interruption
S65B	263-L	no failure / interruption
	264-PEN	no failure / interruption
S66A	265-L	no failure / interruption
	266-PEN	no failure / interruption
S66B	267-L	no failure / interruption
	268-PEN	no failure / interruption
S67A	269-L	no failure / interruption
	270-PEN	no failure / interruption
S67B	271-L	no failure / interruption
	272-PEN	no failure / interruption

Specimen No.	Cables
62	4 cables HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V
63A	3 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V
64	2 cables HTKGs FE180 PH90/E30 2x0,75 mm2 110 V
65	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V
66	2 cables HTKGs FE180 PH90/E30 2x0,75 mm2 110 V
67	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V

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.

Photo taken before the test.

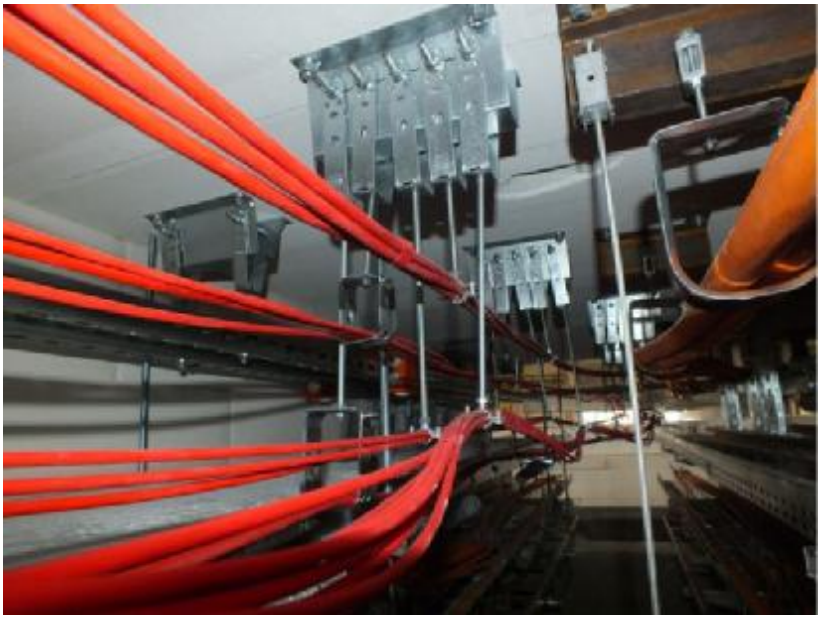


Photo taken before the test.

Photo taken before the test.

Photo taken before the test.

Photo taken before the test.

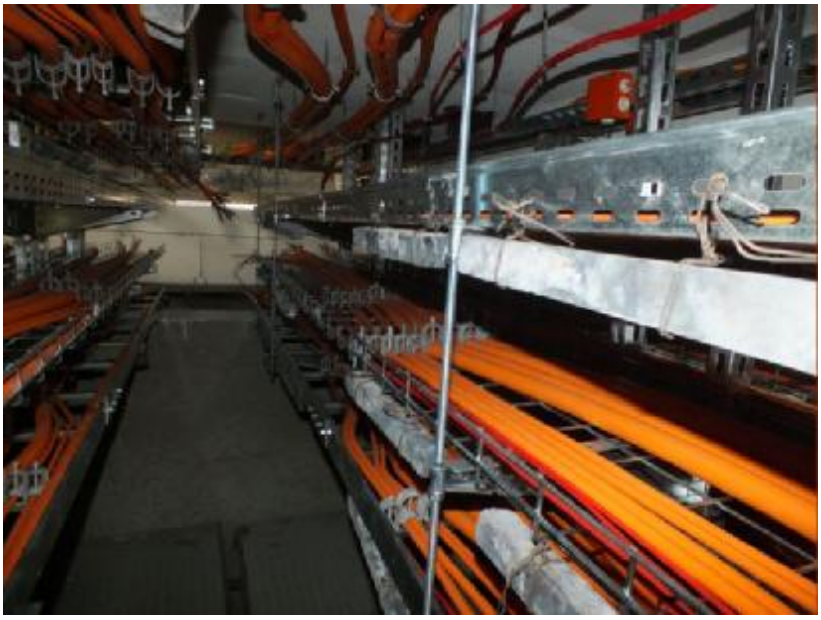


Photo taken before the test.

Photo taken after the test.

Photo taken after the test.

Photo taken after the test.

Photo taken after the test.

Photo taken after the test.

Photo taken after the test.

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(N)HXH FE180 PH30/E30 0.6/1 kV; (N)HXH-J FE180 PH30/E30 0.6/1 kV

FIRE RESISTANT HALOGEN FREE POWER CABLES

APPLICATIONS

(N)HXH FE180 PH30/E30 0.6/1 kV and **(N)HXH-J FE180 PH30/E30 0.6/1 kV** fire resistant power cables, insulated and sheathed with halogen free compounds, are intended for power supply to fire protection equipment which is to operate in fire conditions (e.g. water pumps in fire extinguishing systems, smoke removing fans).

Halogen free cables shall be applied in locations where, in case of fire, higher safety for human beings and expensive electronic equipment is required.

Functions of the cables are maintained – power is supplied to equipment which must operate in fire conditions and during fire fighting. The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

The cables are certified by Scientific and Research Development Centre for Fire Protection (Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej) at Józefów.

The cables are suitable for indoor and outdoor installations.

CONSTRUCTION

conductor	–	bare copper, solid or stranded, according to PN-EN 60228, EN 60228, **RE** - single wire round conductor; **RM** - multiwire round conductor
insulation	–	double insulation ,cross-linked silicone rubber - colours in accordance with PN-HD 308,
filler	–	filler made of halogen free compound,
inner sheath	–	inner sheath made of halogen free compound,
sheath	–	orange, cable sheath made of halogen free compound according to HD 604 S1 and VDE 0276-604 –HM4, (oxygen index bigger than 35%).

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(N)HXH FE180 PH30/E30 0.6/1 kV; (N)HXH-J FE180 PH30/E30 0.6/1 kV

CHARACTERISTICS

The cables maintain their functions for 30 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Operating voltage	0.6/1 kV
Voltage test	4.0 kV rms
Insulation resistivity at 90°C, minimum	10^{11} Ω·cm
Inductance, approximate	0.7 mH/km
Conductor temperature limit	
in work conditions	+ 90°C
at short-circuit	+ 250°C
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 61034-2, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from -30 to +90°C
during installation	from -5 to +50°C
Minimum bending radius:	single core cables -15 x cable diameter multi core cables -12 x cable diameter
Cable combustibility	flame retardant
Circuit integrity*	
E30	DIN 4102-12
PH30	PN-EN 50200 or PN-EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Combustibility tests	PN-EN 50266-2-4, IEC 60332-3-24 PN-EN 50200 and PN-EN 50362
Reference standards	AT-0603-0064/2010/2012, WT-TK-44 DIN VDE 0266, PN-HD 604 S1

*Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)	Fire load
mm²	mm	kg/km	kg/km	kWh/m
1 x 16 RE	8,8	154	240	0,39
1 x 25 RM	10,8	240	360	0,42
1 x 35 RM	11,8	336	470	0,43
1 x 50 RM	13,4	480	630	0,59
1 x 70 RM	15,2	672	885	0,65
1 x 95 RM	17,3	912	1260	0,78
1 x 120 RM	18,8	1152	1500	0,88
2 x 1,5 RE	9,7	28,8	142	0,74
2 x 2,5 RE	10,5	48	175	0,82
2 x 4 RE	11,4	77	225	0,93
2 x 6 RE	12,4	115	280	1,03
2 x 10 RE	14,0	192	395	1,22
2 x 16 RE	16,0	307	555	1,37
2 x 25 RM	19,9	480	850	1,86
3 x 1,5 RE	10,2	43,2	168	0,79
3 x 2,5 RE	11,0	72	210	0,85
3 x 4 RE	12,0	115	275	0,99
3 x 6 RE	13,1	173	350	1,07
3 x 10 RE	14,8	288	500	1,26
3 x 16 RM	17,6	461	770	1,52
3 x 25 RM	21,4	720	1110	1,88
4 x 1,5 RE	11,1	58	200	0,87

Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)	Fire load
mm²	mm	kg/km	kg/km	kWh/m
4 x 2,5 RE	12,0	96	255	0,96
4 x 4 RE	13,1	154	335	1,06
4 x 6 RE	14,3	230	435	1,18
4 x 10 RE	16,5	384	630	1,40
4 x 16 RM	19,4	614	970	1,73
4 x 25 RM	23,6	960	1400	2,56
4 x 35 RM	26,3	1344	1840	3,03
4 x 50 RM	30,1	1920	2470	3,35
5 x 1,5 RE	12,1	72	240	0,98
5 x 2,5 RE	13,1	120	305	1,06
5 x 4 RE	14,3	192	400	1,16
5 x 6 RE	15,9	288	530	1,29
5 x 10 RE	18,0	480	765	1,57
5 x 16 RM	21,5	768	1190	1,88
5 x 25 RM	26,2	1200	1720	3,00
5 x 35 RM	29,0	1680	2250	3,24
5 x 50 RM	33,4	2400	3050	3,68
7 x 1,5 RE	13,1	101	280	1,07

Other cross-sections and conductor counts available on request.
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(N)HXH FE180 PH90/E90 0.6/1 kV; (N)HXH-J FE180 PH90/E90 0.6/1 kV

FIRE RESISTANT HALOGEN FREE POWER CABLES

APPLICATIONS

(N)HXH FE180 PH90/E90 0.6/1 kV and **(N)HXH-J FE180 PH90/E90 0.6/1 kV** fire resistant power cables, insulated and sheathed with halogen free compounds, are intended for power supply to fire protection equipment which is to operate in fire conditions (e.g. water pumps in fire extinguishing systems, smoke removing fans).

Halogen free cables shall be applied in locations where, in case of fire, higher safety for human beings and expensive electronic equipment is required.

Functions of the cables are maintained – power is supplied to equipment which must operate in fire conditions and during fire fighting. The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

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The cables are suitable for indoor and outdoor installations.

CONSTRUCTION

conductor	–	bare copper, solid or stranded, according to PN-EN 60228, EN 60228, **RE** - single wire round conductor; **RM** - multiwire round conductor
insulation	–	double insulation ,cross-linked silicone rubber - colours in accordance with PN-HD 308,
filler	–	filler made of halogen free compound,
inner sheath	–	inner sheath made of halogen free compound,
sheath	–	orange, cable sheath made of halogen free compound according to HD 604 S1 and VDE 0276-604 –HM4, (oxygen index bigger than 35%).

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(N)HXH FE180 PH90/E90 0.6/1 kV; (N)HXH-J FE180 PH90/E90 0.6/1 kV

CHARACTERISTICS

The cables maintain their functions for 90 minutes, meeting requirements of DIN 4102-12 and PN-EN 50200 standards

Operating voltage	0.6/1 kV
Voltage test	4.0 kV rms
Insulation resistivity at 90°C, minimum	10^{11} Ω·cm
Inductance, approximate	0.7 mH/km
Conductor temperature limit	
in work conditions	+ 90°C
at short-circuit	+ 250°C
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 61034-2, IEC 61034-2	
light transmittance, minimum	94%

Operating temperature range	
during operation	from -30 to +90°C
during installation	from -5 to +50°C
Minimum bending radius:	single core cables -15 x cable diameter multi core cables -12 x cable diameter
Cable combustibility	flame retardant
Circuit integrity *	
E90	DIN 4102-12
PH90	PN-EN 50200 or PN-EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Combustibility tests	PN-EN 50266-2-4, IEC 60332-3-24 PN-EN 50200 and PN-EN 50362
Reference standards	AT-0603-0064/2010/2012, WT-TK-44 DIN VDE 0266, PN-HD 604 S1

* Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)	Fire load
mm²	mm	kg/km	kg/km	kWh/m
1 x 16 RE	8,8	154	240	0,39
1 x 25 RM	10,8	240	360	0,42
1 x 35 RM	11,8	336	470	0,43
1 x 50 RM	13,4	480	630	0,59
1 x 70 RM	15,2	672	885	0,65
1 x 95 RM	17,3	912	1260	0,78
1 x 120 RM	18,8	1152	1500	0,88
2 x 1,5 RE	9,7	28,8	142	0,74
2 x 2,5 RE	10,5	48	175	0,82
2 x 4 RE	11,4	77	225	0,93
2 x 6 RE	12,4	115	280	1,03
2 x 10 RE	14,0	192	395	1,22
2 x 16 RE	16,0	307	555	1,37
2 x 25 RM	19,9	480	850	1,86
3 x 1,5 RE	10,2	43,2	168	0,79
3 x 2,5 RE	11,0	72	210	0,85
3 x 4 RE	12,0	115	275	0,99
3 x 6 RE	13,1	173	350	1,07
3 x 10 RE	14,8	288	500	1,26
3 x 16 RM	17,6	461	770	1,52
3 x 25 RM	21,4	720	1110	1,88
4 x 1,5 RE	11,1	58	200	0,87

Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)	Fire load
mm²	mm	kg/km	kg/km	kWh/m
4 x 2,5 RE	12,0	96	255	0,96
4 x 4 RE	13,1	154	335	1,06
4 x 6 RE	14,3	230	435	1,18
4 x 10 RE	16,5	384	630	1,40
4 x 16 RM	19,4	614	970	1,73
4 x 25 RM	23,6	960	1400	2,56
4 x 35 RM	26,3	1344	1840	3,03
4 x 50 RM	30,1	1920	2470	3,35
5 x 1,5 RE	12,1	72	240	0,98
5 x 2,5 RE	13,1	120	305	1,06
5 x 4 RE	14,3	192	400	1,16
5 x 6 RE	15,9	288	530	1,29
5 x 10 RE	18,0	480	765	1,57
5 x 16 RM	21,5	768	1190	1,88
5 x 25 RM	26,2	1200	1720	3,00
5 x 35 RM	29,0	1680	2250	3,24
5 x 50 RM	33,4	2400	3050	3,68
7 x 1,5 RE	13,1	101	280	1,07

Other cross-sections and conductor counts available on request.
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(N)HXCH FE180 PH90/E90 0,6/1 kV

KABLE ELEKTROENERGETYCZNE OGNIOODPORNE, BEZHALOGENOWE

ZASTOSOWANIE

Kable elektroenergetyczne ognioodporne **(N)HXCH FE180 PH90/E90 0,6/1 kV** o izolacji i powłoce z tworzyw bezhalogenowych, przeznaczone są do zasilania urządzeń przeciwpożarowych, których działanie przewidziane jest w warunkach pożaru (np. zasilania pomp wodnych instalacji przeciwpożarowych, wentylatorów oddymiających).

Kable powinny być instalowane w budynkach i obiektach o podwyższonych wymaganiach przeciwpożarowych, gdzie niezbędne jest większe bezpieczeństwo ludzi i kosztownych urządzeń elektronicznych (tunele metra, szpitale, centra handlowe, supermarkety, kina, teatry, stadiony oraz inne budynki użyteczności publicznej). **Kable zapewniają podtrzymanie funkcji elektrycznych instalacji przez 90 minut**, tj. zapewnienie dopływu energii elektrycznej do urządzeń, których działanie jest niezbędne podczas ewakuacji ludzi i gaszenia pożaru (np. zasilania pomp wodnych instalacji przeciwpożarowych, wentylatorów oddymiających, klap dymowych, oświetlenia bezpieczeństwa i ewakuacyjnego, wind strażackich).

Kable posiadają **Certyfikat Zgodności i Świadectwo Dopuszczenia** wystawione przez Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej w Józefowie.

Kable nie rozprzestrzeniają płomienia, emisja dymu jest bardzo niska, a emitowane gazy są nietoksyczne i niekorozyjne.

Wykorzystywane są do ułożenia na stałe wewnątrz i na zewnątrz budynków. Dla instalacji zewnętrznych musi być zapewniona osłona przed promieniowaniem ultrafioletowym (UV). Przy zastosowaniu dodatkowego zabezpieczenia kable mogą być układane w wodzie i bezpośrednio w ziemi.

BUDOWA

- żyły z miękkich drutów miedzianych wg PN-EN 60228,
  RE - jednodrutowe okrągłe klasy 1,
  RM - wielodrutowe okrągłe klasy 2,
- izolacja żył wykonana ze specjalnej usieciowanej gumy silikonowej, kolory izolacji żył:
  wg normy PN-HD 308,
  lub czarny z nadrukowanymi białymi numerami żył,
- żyły izolowane skręcone warstwowo w ośrodek,
- powłoka wypełniająca wykonana z materiału bezhalogenowego,
- żyła współosiowa wykonana w postaci obwoju z drutów miedzianych gołych oraz spirali przeciwskrętnej z taśmy miedzianej,
- żyła współosiowa owinięta taśmą poliestrową,
- powłoka kabla wykonana z materiału bezhalogenowego (HFFR) o własnościach wg PN-HD 604 S1 i VDE 0276-604 - HM4, (indeks tlenowy > 35%) w kolorze pomarańczowym.

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(N)HXCH FE180 PH90/E90 0,6/1 kV

DANE TECHNICZNE

Napięcie pracy U_o/U	0,6/1 kV
Próba napięciowa	4 kV sk
Minimalna rezystancja izolacji w temp. 90°C	10^{11} Ω·cm
Indukcyjność, około	0,7 mH/km
Maksymalna dopuszczalna temperatura przy żyle	
w warunkach pracy	+ 90°C
przy zwarciu	+ 250°C
Zakres temperatur pracy	
podczas pracy	od - 30 do + 90°C
podczas układania	od - 5 do + 50°C
Minimalny promień gięcia	15 x średnica kabla

Korozyjność wydziel. gazów	PN-EN 50267-2-3, IEC 60754-2
pH, około	6,8
konduktywność, około	0,4 µS/mm
Gęstość dymu	PN-EN 50268-2-3, IEC 61034-2
przepuszczalność światła, min.	94 %
Palność kabla	nie rozprzestrzeniający płomienia
Próby palności	PN-EN 60332-1-2, IEC 60332-1, PN-EN 50266-2-4, IEC 60332-3-24,
Podtrzymanie funkcji:	
E90	DIN 4102-12
PH90	PN-EN 50200 lub EN 50362
Trwałość izolacji FE180	IEC 60331-21; IEC 60331-11
Wykonanie wg normy	AT-0603-0064/2010/2012, WT-TK-44, DIN VDE 0266, PN-HD 604 S1

Instalacja kabla - powinna być przeprowadzona na certyfikowanym systemie zamocowań kabli. Zalecamy stosowanie tylko certyfikowanych systemów nośnych przebadanych łącznie z kablami wg normy DIN 4102 część 12.

CE = przewód spełnia wymagania dyrektywy niskonapięciowej 2006/95/WE

Numer wyrobu	Liczba żył x przekrój żył	Średnica zewnętrzna (około)	Indeks miedziowy	Masa kabla (około)
	mm²	mm	kg/km	kg/km
	3 x 1,5 RE/1,5	14,1	58	285
	3 x 2,5 RE/2,5	15,0	96	335
	3 x 4,0 RE/4,0	16,0	154	420
	3 x 6,0 RE/6,0	17,8	230	535
	3 x 10 RE/10	20,2	384	760
	3 x 16 RE/16	22,5	614	1040
	3 x 25 RM/16	26,0	874	1430
	3 x 35 RM/16	28,5	1162	1790
	3 x 50 RM/25	32,1	1680	2410
	4 x 1,5 RE/1,5	14,9	72	325
	4 x 2,5 RE/2,5	16,0	120	390
	4 x 4,0 RE/4,0	17,1	192	490

Numer wyrobu	Liczba żył x przekrój żył	Średnica zewnętrzna (około)	Indeks miedziowy	Masa kabla (około)
	mm²	mm	kg/km	kg/km
	4 x 6,0 RE/6,0	18,7	288	615
	4 x 10 RE/10	21,1	480	870
	4 x 16 RE/16	24,3	768	1250
	4 x 25 RM/16	28,4	1114	1740
	4 x 35 RE/16	31,2	1498	2200
	4 x 50 RM/25	35,5	2160	3000
	7 x 1,5 RE/2,5	17,1	125	435
	7 x 2,5 RE/2,5	18,2	192	530
	12 x 1,5 RE/2,5	21,3	197	635
	12 x 2,5 RE/4,0	22,9	326	800

Na zamówienie klienta wykonujemy kable o innych przekrojach i innej liczbie żył.
TECHNOKABEL S.A. zastrzega sobie prawo do zmiany specyfikacji bez wcześniejszego uprzedzenia.

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NHXH FE180 PH90/E90 0,6/1 kV, NHXH-J FE180 PH90/E90 0,6/1 kV

KABLE ELEKTROENERGETYCZNE OGNIOODPORNE, BEZHALOGENOWE

ZASTOSOWANIE

Kable elektroenergetyczne ognioodporne **NHXH FE180 PH90/E90 0,6/1 kV** i **NHXH-J FE180 PH90/E90 0,6/1 kV** o izolacji i powłoce z tworzyw bezhalogenowych, przeznaczone są do stosowania w instalacjach gdzie wymagane jest zapewnienie bezpieczeństwa ludzi i wyposażenia ze szczególnym uwzględnieniem instalacji przeciwpożarowych.

Kable powinny być instalowane w budynkach i obiektach o podwyższonych wymaganiach przeciwpożarowych, gdzie niezbędne jest większe bezpieczeństwo ludzi i kosztownych urządzeń elektronicznych (tunele metra, szpitale, centra handlowe, supermarkety, kina, teatry, stadiony oraz inne budynki użyteczności publicznej). **Kable zapewniają podtrzymanie funkcji elektrycznych instalacji przez 90 minut**, tj. zapewnienie dopływu energii elektrycznej do urządzeń, których działanie jest niezbędne podczas ewakuacji ludzi i gaszenia pożaru (np. zasilania pomp wodnych instalacji przeciwpożarowych, wentylatorów oddymiających, klap dymowych, oświetlenia bezpieczeństwa i ewakuacyjnego, wind strażackich).

Kable posiadają **Certyfikat Zgodności i Świadectwo Dopuszczenia** wystawione przez Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej w Józefowie.

Kable nie rozprzestrzeniają płomienia, emisja dymu jest bardzo niska, a emitowane gazy są nietoksyczne i niekorozyjne.

Wykorzystywane są do ułożenia na stałe wewnątrz i na zewnątrz budynków. Dla instalacji zewnętrznych musi być zapewniona osłona przed promieniowaniem ultrafioletowym (UV). Przy zastosowaniu dodatkowego zabezpieczenia przed wodą i wilgocią, kable mogą być układane w wodzie i bezpośrednio w ziemi.

BUDOWA

- żyły z miękkich drutów miedzianych wg PN-EN 60228,
  RE - jednodrutowe okrągłe klasy 1,
  RM - wielodrutowe okrągłe klasy 2,
- izolacja żył wykonana z taśmy mikowej i tworzywa bezhalogenowego usieciowanego, kolory izolacji żył:
  wg normy PN-HD 308,
  lub czarny z nadrukowanymi białymi numerami żył,
  w kablu NHXH-J FE180 PH90/E90 0,6/1 kV zielono-żółta żyła ochronna umieszczona w warstwie zewnętrznej,
- żyły izolowane skręcone warstwowo w ośrodek,
- powłoka wypełniająca wykonana z materiału bezhalogenowego,
- powłoka kabla wykonana z materiału bezhalogenowego (HFFR) o własnościach wg PN-HD 604 S1 i VDE 0276-604 - HM4, (indeks tlenowy > 35%) w kolorze pomarańczowym.

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NHXH FE180 PH90/E90 0,6/1 kV, NHXH-J FE180 PH90/E90 0,6/1 kV

DANE TECHNICZNE

Napięcie pracy U_o/U	0,6/1 kV
Próba napięciowa	4 kV sk
Minimalna rezystancja izolacji w temp. 90°C	10^{11} Ω·cm
Indukcyjność, około	0,7 mH/km
Maksymalna dopuszczalna temperatura przy żyle	
w warunkach pracy	+ 90°C
przy zwarciu	+ 250°C
Zakres temperatur pracy	
podczas pracy	od - 30 do + 90°C
podczas układania	od - 5 do + 50°C
Minimalny promień gięcia	
kable jednożyłowe	15 x średnica kabla
kable wielożyłowe	12 x średnica kabla

Korozyjność wydziel. gazów	bardzo mała, bezhalogenowy PN-EN 50267-2-3, IEC 60754-2
pH, około	6,8
konduktywność, około	0,4 µS/mm
Gęstość dymu	niska gęstość dymu PN-EN 61034-2, IEC 61034-2
przepuszczalność światła, min.	94 %
Palność kabla	nie rozprzestrzeniający płomienia, o zmniejszonej palności
Próby palności	PN-EN 60332-1-2, IEC 60332-1, PN-EN 60332-3-24, IEC 60332-3-24,
Podtrzymanie funkcji:	
E90	DIN 4102-12
PH90	PN-EN 50200 lub EN 50362
Trwałość izolacji FE180	IEC 60331-21; IEC 60331-11
Wykonanie wg normy	AT-0603-0064/2010/2012, WT-TK-44, DIN VDE 0266, PN-HD 604 S1

Instalacja kabla - powinna być przeprowadzona na certyfikowanym systemie zamocowań kabli. Zalecamy stosowanie tylko certyfikowanych systemów nośnych przebadanych łącznie z kablami wg normy DIN 4102 część 12.

CE = przewód spełnia wymagania dyrektywy niskonapięciowej 2006/95/WE

Liczba żył x przekrój żył	Średnica zewnętrzna (około)	Indeks miedziowy	Masa kabla (około)	Ciepło spalania
mm²	mm	kg/km	kg/km	kWh/m
1 x 6 RE	7,3	58	103	0,30
1 x 10 RE	8,1	96	146	0,34
1 x 16 RE	9,0	154	210	0,36
1 x 25 RM	11,0	240	310	0,47
1 x 35 RM	12,0	336	405	0,49
1 x 50 RM	13,3	480	535	0,49
1 x 70 RM	15,4	672	750	0,54
1 x 95 RM	17,1	912	1040	0,56
1 x 120 RM	18,8	1152	1240	0,58
1 x 150 RM	20,7	1440	1550	0,61
1 x 185 RM	22,8	1776	1920	0,82
1 x 240 RM	25,3	2304	2480	0,97
1 x 300 RM	27,9	2880	3050	1,04
1 x 400 RM	31,2	3840	4150	1,47
2 x 1,5 RE	10,0	28,8	153	0,79
2 x 2,5 RE	10,8	48,0	187	0,88
2 x 4 RE	11,7	77,0	240	0,98
2 x 6 RE	12,7	115	295	1,11
2 x 10 RE	14,3	192	410	1,29
2 x 16 RE	16,3	307	580	1,57
2 x 25 RM	20,5	480	895	2,34
3 x 1,5 RE	10,6	43,2	173	0,86
3 x 2,5 RE	11,4	72	215	0,94
3 x 4 RE	12,4	115	280	1,04
3 x 6 RE	13,5	173	355	1,14
3 x 10 RE	15,4	288	510	1,33
3 x 16 RM	18,0	461	770	1,60
3 x 25 RM	21,8	720	1120	2,41
3 x 35 RM	24,0	1008	1440	2,80
3 x 50 RM	27,0	1440	1910	2,98
3 x 70 RM	31,3	2016	2660	4,18
3 x 95 RM	35,0	2736	3650	5,26
3 x120 RM	38,8	3456	4400	5,66
4 x 1,0 RE	10,9	38,4	176	0,84
4 x 1,5 RE	11,5	58,0	210	0,95

Liczba żył x przekrój żył	Średnica zewnętrzna (około)	Indeks miedziowy	Masa kabla (około)	Ciepło spalania
mm²	mm	kg/km	kg/km	kWh/m
4 x 2,5 RE	12,4	96,0	260	1,03
4 x 4 RE	13,5	154	340	1,14
4 x 6 RE	14,7	230	435	1,25
4 x 10 RE	16,8	384	635	1,49
4 x 16 RM	19,8	614	965	1,78
4 x 25 RM	24,1	960	1400	2,74
4 x 35 RM	26,7	1344	1830	3,05
4 x 50 RM	29,8	1920	2420	3,31
4 x 70 RM	34,6	2688	3400	4,55
4 x 95 RM	38,9	3648	4700	5,44
5 x 1,5 RE	12,5	72	245	1,05
5 x 2,5 RE	13,5	120	310	1,33
5 x 4 RE	14,8	192	410	1,27
5 x 6 RE	16,3	288	535	1,43
5 x 10 RE	18,5	480	770	1,68
5 x 16 RM	21,9	768	1190	1,95
5 x 25 RM	26,7	1200	1720	3,02
5 x 35 RM	29,4	1680	2240	3,54
5 x 50 RM	33,1	2400	2980	3,76
5 x 70 RM	38,5	3360	4200	4,92
5 x 95 RM	43,3	4560	5800	6,57
7 x 1,5 RE	13,6	101	295	1,18
7 x 2,5 RE	14,7	168	380	1,29
7 x 4,0 RE	16,3	269	515	1,45
12 x 1,5 RE	17,8	173	475	1,71
12 x 2,5 RE	19,4	288	620	1,90
14 x 1,5 RE	18,7	202	530	1,79
19 x 1,5 RE	21,0	274	685	2,20
19 x 2,5 RE	22,9	456	900	2,38
24 x 1,5 RE	24,5	346	860	2,83
24 x 2,5 RE	27,0	576	1150	3,09
30 x 1,5 RE	26,2	432	1030	3,20
30 x 2,5 RE	28,6	720	1360	3,50

Na zamówienie klienta wykonujemy kable o innych przekrojach i innej liczbie żył.
TECHNOKABEL S.A. zastrzega sobie prawo do zmiany specyfikacji bez wcześniejszego uprzedzenia.

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HDGs(żo) FE180 PH90/E30-E90, HDGsekw(żo) FE180 PH90/E30-E90 HLGs(żo) FE180 PH90/E30-E90, HLGsekw(żo) FE180 PH90/E30-E90

FIRE RESISTANT HALOGEN FREE POWER CABLES

APPLICATIONS

HDGs(żo) FE180 PH90/E30-E90 300/500 V, HLGs(żo) FE180 PH90/E30-E90 300/500 V fire resistant cables and **HDGsekw(żo) FE180 PH90/E30-E90 300/500 V, HLGsekw(żo) FE180 PH90/E30-E90 300/500 V** screened fire resistant cables, are intended for power supply to fire protection equipment which is to operate in fire conditions. The cables are suitable for installation in alarm, signalling, transmission, sound warning and similar systems.

Halogen free cables shall be applied in locations where, in case of fire, higher safety for human beings and expensive electronic equipment is required.

Functions of the cables are maintained – power is supplied to equipment which must operate in fire conditions and during fire fighting. The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

The cables are certified by Scientific and Research Development Centre for Fire Protection (Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej) at Józefów.

An overall electrostatic shield **(ekw)** in screened cables protects cable circuits against interference by external electric fields.

CONSTRUCTION

- bare copper, single wire **(D)** or stranded multi wire **(L)**, round conductors meeting requirements of class 1 or 5 per PN-EN 60228,
- special silicone rubber insulation,
- identification colour code according to PN-HD 308 S2,
- insulated conductors laid-up in layers,
- cable core wrapped in polyester tape - in **HDGsekw** and **HLGsekw**,
- overall electrostatic shield incorporating aluminium-polyester tape and stranded annealed tinned copper drain wire - in **HDGsekw** and **HLGsekw**,
- red cable sheath of halogen free compound.

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HDGs(żo) FE180 PH90/E30-E90, HDGsekw(żo) FE180 PH90/E30-E90
HLGs(żo) FE180 PH90/E30-E90, HLGsekw(żo) FE180 PH90/E30-E90

CHARACTERISTICS

Conductor diameter	mm	**1,0**	**1,1**	**1,4**	**1,8**	**2,3**	**2,8**
Conductor cross-section	mm^2	**0,75**	**1**	**1,5**	**2,5**	**4**	**6**
DC conductor resistance at 20°C, maximum	Ω/km	26,0	19,5	13,3	7,98	4,95	3,30
Capacitance between conductors at 1 kHz, – maximum	nF/km	120	120	120	120	120	120
– average		70	70	80	80	100	100

Operating voltage U_o/U	300/500 V
Voltage test	2 kVrms
Insulation resistivity at 20°C, minimum	500 MΩ·km
Inductance, approximate	0,7 mH/km
Conductor temperature limit in work conditions	+ 85°C
in short-circuit (max 5 s)	+ 250°C
Operating temperature range during operation	from - 25 to + 85°C
during installation	from -10 to + 50°C
Minimum bending radius HDGs(ekw) cables	10 x cable diameter
HLGs(ekw)cables	6 x cable diameter

Corrosivity of emitted gases	very low, halogen free PN-EN 50267-2-3, IEC 60754-2
pH, aprox.	6,8
conductivity, aprox.	0,4 µS/cm
Smoke density per	low smoke density PN-EN 50268-2-3, IEC 61034-2
light transmittance, minimum	94 %
Cable combustibility	flame retardant
Combustibility tests	PN-EN 60332-1-2, IEC 60332-1, PN-EN 60332-3-22, IEC 60332-3-22 (cat.A)
Circuit integrity*	
E30-E90	DIN 4102-12
PH90	PN-EN 50200 or EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Reference standards	AT-603-0248/2009/2014 and WT-TK-46

Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

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HDGs FE180 PH90/E30-E90, HDGsekw FE180 PH90/E30-E90
HLGs FE180 PH90/E30-E90, HLGsekw FE180 PH90/E30-E90

Cable type	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
HDGs	2 x 0,75	6,4	14,4	50
HDGs	2 x 1	6,6	19,2	55
HDGs	2 x 1,5	7,5	28,8	75
HDGs	2 x 2,5	8,9	48	105
HDGs	2 x 4	9,8	77	140
HDGs	2 x 6	11,8	115	196
HDGs	3 x 0,75	6,5	21,6	52
HDGs	3 x 1	6,8	28,8	66
HDGs	3 x 1,5	8,2	43,2	95
HDGs	3 x 2,5	9,4	72	137
HDGs	3 x 4	10,6	115	191
HDGs	3 x 6	12,5	173	275
HDGs	4 x 0,75	7,3	28,8	67
HDGs	4 x 1	7,6	38,4	88
HDGs	4 x 1,5	8,9	58	122
HDGs	4 x 2,5	10,4	96	180
HDGs	4 x 4	11,6	154	235
HDGs	4 x 6	13,6	230	340
HDGs	5 x 0,75	8,1	36	86
HDGs	5 x 1	8,4	48	121
HDGs	5 x 1,5	9,7	72	151
HDGs	5 x 2,5	11,4	120	220

Cable type	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
HDGs	5 x 4	12,7	192	305
HDGs	5 x 6	14,9	288	420
HDGs	7 x 1,5	10,7	101	190
HDGs	7 x 2,5	12,4	168	285
HLGs	2 x 1	6,8	19,2	55
HLGs	2 x 1,5	8,0	28,8	75
HLGs	2 x 2,5	9,4	48	110
HLGs	3 x 1	7,2	28,8	72
HLGs	3 x 1,5	8,5	43,2	99
HLGs	3 x 2,5	9,9	72	149
HDGs	4 x 1	8,0	38,4	94
HDGs	4 x 1,5	9,4	58	130
HDGsekw	2 x 1	6,6	26,4	59
HDGsekw	2 x 1,5	7,7	36,0	77
HDGsekw	2 x 2,5	9,1	55,0	114
HDGsekw	3 x 1,5	8,1	50,0	101
HDGsekw	3 x 2,5	9,6	79,0	149
HLGsekw	2 x 1	7,0	19,2	73
HLGsekw	2 x 1,5	8,0	36	81
HLGsekw	2 x 4	10,5	86	148

Other cross-sections and conductor counts available on request.
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HTKGs FE180 PH90/E30 110 V, HTKGsekw FE180 PH90/E30 110 V

FIRE RESISTANT HALOGEN FREE ALARM CABLES

APPLICATIONS

HTKGs FE180 PH90/E30 110V, fire resistant cables and **HTKGsekw FE180 PH90/E30 110 V** screened fire resistant cables, are intended for power supply to fire protection equipment which is to operate in fire conditions. The cables are suitable for installation in alarm, signalling, transmission, sound warning and similar systems.

Halogen free cables shall be applied in locations where, in case of fire, higher safety for human beings and expensive electronic equipment is required.

Functions of the cables are maintained – power is supplied to equipment which must operate in fire conditions and during fire fighting. The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

An overall electrostatic shield **(ekw)** in screened cables protects cable circuits against interference by external electric fields.

CONSTRUCTION

– bare copper, single wire, round conductors meeting requirements of class 1 per PN-EN 60228,

– special silicone rubber insulation,

– identification colour code according to PN-HD 308 S2,

– insulated conductors laid-up in layers,

– cable core wrapped in polyester tape - in **HTKGsekw**,

– overall electrostatic shield incorporating aluminium-polyester tape and stranded annealed tinned copper drain wire - in **HTKGsekw**,

– red cable sheath of halogen free compound.

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CABLES

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HTKGs FE180 PH90/E30 110 V, HTKGsekw FE180 PH90/E30 110 V

CHARACTERISTICS

Conductor cross-section		mm^2	0.5	0.75
Conductor diameter		mm	0.8	1.0
DC conductor resistance at 20°C, maximum		Ω/km	36	24.5
Capacitance between conductors at 1 kHz	maximum	nF/km	120	120
	average		70	70

Operating voltage U_o/U	110 V
Voltage test	1.5 kVrms
Insulation resistivity at 20°C, minimum	500 MΩ·km
Inductance, approximate	0,7 mH/km
Conductor temperature limit	
in work conditions	+ 85°C
in short-circuit (max 5 s)	+ 250°C
Operating temperature range	
during operation	from - 25 to + 85°C
during installation	from -10 to + 50°C
Minimum bending radius HTKGs(ekw) cables	10 x cable diameter

Corrosivity of emitted gases	very low, halogen free PN-EN 50267-2-3, IEC 60754-2
pH, aprox.	6,8
conductivity, aprox.	0,4 µS/cm
Smoke density	low smoke density PN-EN 50268-2-3, IEC 61034-2
Cable combustibility	flame retardant
Combustibility tests	PN-EN 60332-1-2, IEC 60332-1, PN-EN 60332-3-22, IEC 60332-3-22 (cat.A)
Circuit integrity*	
E30	DIN 4102-12
PH90	PN-EN 50200 or EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11

*Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Cable type	Number of conductors x conductor diameter	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm^2	mm	kg/km	kg/km
HTKGs	2 x 0.5	4.2	9.6	22
HTKGs	2 x 0.75	4.6	14.4	29
HTKGsekw	2 x 0.5	4.4	13.4	26
HTKGsekw	2 x 0.75	4.8	18.2	33

Other cross-sections and conductor counts available on request.
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HTKSH FE180 PH90/E30-E90, HTKSHekw FE180 PH90/E30-E90

FIRE RESISTANT HALOGEN FREE CABLES

APPLICATIONS

HTKSH FE180 PH90/E30-E90 and HTKSHekw FE180 PH90/E30-E90 fire resistant and halogen free cables are intended for installation in alarm, signalling, transmission, sound warning and similar systems, also for data processing systems and for analogue or digital data transmission in industrial electronics and control applications in objects of sharp fire protection requirements, particularly in fire alarm and fire automatic control systems.

Halogen free cables are applied in locations where, in case of fire, higher safety for human beings and expensive electronic equipment is required.

Functions of the cables are maintained – data are transmitted and power is supplied to equipment which must operate in fire conditions and during fire fighting (e.g. emergency lighting). The cables are flame retardant and their smoke emission is low, emitted fumes are non toxic and non corrosive.

Cable circuits are protected by an overall electrostatic shield against external electric field interferences.

The cables are suitable for indoor installations.

CONSTRUCTION

conductor	–	bare copper, solid,
insulation	–	mica tape and halogen free compound insulation - colours in accordance with PN-92/T-90321 standard,
pair	–	insulated conductors twisted into pairs,
cable core	–	pairs laid-up into a cable core,
separator	–	polyester tape,
shielding	–	overall electrostatic shield incorporating a plastic laminated metal foil and a tinned copper drain wire – only in **HTKSHekw FE180 PH90/E30-E90**,
sheath	–	red, cable sheath made of halogen free compound according to EN 50290-2-27 and VDE 0250-214 – HM2.

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HTKSH FE180 PH90/E30-E90, HTKSHekw FE180 PH90/E30-E90

CHARACTERISTICS

Cable type			HTKSH FE180 PH90/E30-E90						HTKSHekw FE180 PH90/E30-E90					
Conductor diameter		mm	0.8	1.0	1.4	1.8	2.3	2.8	0.8	1.0	1.4	1.8	2.3	2.8
Conductor cross-section		mm^2	0.5	0.75	1.5	2.5	4	6	0.5	0.75	1.5	2.5	4	6
DC loop resistance at 20°C, maximum		Ω/km	75	48	24.5	14.9	9.3	6.3	75	48	24.5	14.9	9.3	6.3
Capacitance between conductors at 1 kHz	maximum	nF/km	120	120	120	120	120	120	200	200	200	200	200	200
	average		60	70	70	70	100	100	90	130	130	130	150	150

Operating voltage	240 V
Voltage test	1.5 kV rms
Insulation resistance, minimum	500 MΩ·km
Inductance, approximate	0.7 mH/km
Corrosivity of emitted gases per PN-EN 50267-2-3, IEC 60754-2	
pH, approximate	6.8
conductivity, approximate	0.4 µS/mm
Smoke density per PN-EN 50268-2-3, IEC 61034-2	

Operating temperature range	
during operation	from - 30 to + 80°C
during installation	from - 5 to + 50°C
Minimum bending radius	10 x cable diameter
Cable combustibility	flame retardant
Fire resistance	90 minutes at 842°C
Combustibility tests	PN-EN 60332-1-2, IEC 60332-1, PN-EN 60332-3-22, IEC 60332-3-22(cat.A)
Circuit integrity*	
E30-E90	DIN 4102-12
PH90	PN-EN 50200 or EN 50362
Insulation integrity FE180	IEC 60331-21; IEC 60331-11
Reference standards	WT-TK-43, PN - 92/T-90321

* Circuit integrity is dependent on installation method.

CE = the cable meets requirements of the low voltage directive 2006/95/WE

Cable type	Number of pairs (x 2) x conductor diameter	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm	mm	kg/km	kg/km
HTKSH	1 x 2 x 0.8	5.1	9.6	30
HTKSH	2 x 2 x 0.8	7.8	19.2	58
HTKSH	40 x 2 x 0.8	25	384	740
HTKSH	50 x 2 x 0.8	26.6	480	1010
HTKSH	1 x 2 x 1.0	5.5	15.4	37
HTKSH	2 x 2 x 1.0	8.4	30.7	72
HTKSH	1 x 2 x 1.4	6.2	28.8	29
HTKSH	2 x 2 x 1.4	9.7	58	105
HTKSH	3 x 2 x 1.4	10.3	86	142
HTKSH	1 x 2 x 1.8	8.0	48	87
HTKSH	1 x 2 x 2.3	8.7	80	123
HTKSH	1 x 2 x 2.8	9.8	118	169

Cable type	Number of pairs (x 2) x conductor diameter	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm	mm	kg/km	kg/km
HTKSHekw	1 x 2 x 0.8	5.2	10.8	33
HTKSHekw	30 x 2 x 0.8	18	290	480
HTKSHekw	1 x 2 x 1.0	5.6	16.6	40
HTKSHekw	2 x 2 x 1.0	8.5	31.9	75
HTKSHekw	1 x 2 x 1.4	6.3	30	57
HTKSHekw	2 x 2 x 1.4	9.8	59	108
HTKSHekw	6 x 2 x 1.4	14.0	174	275
HTKSHekw	1 x 2 x 1.8	8.1	49.2	90
HTKSHekw	1 x 2 x 2.3	9,0	78	122
HTKSHekw	2 x 2 x 2.3	14.2	155	240
HTKSHekw	1 x 2 x 2.8	10.0	116	163

Cable type	Ciepło spalania (około) kWh/m
HTKSH 1 x 2 x 0.8	0.09
HTKSH 2 x 2 x 0.8	0.17
HTKSH 1 x 2 x 1.0	0.10
HTKSH 2 x 2 x 1.0	0.19
HTKSH 1 x 2 x 1.4	0.12
HTKSH 2 x 2 x 1.4	0.22
HTKSH 3 x 2 x 1.4	0.26

Cable type	Ciepło spalania (około) kWh/m
HTKSH 1 x 2 x 1.8	0.19
HTKSH 1 x 2 x 2.3	0.22
HTKSH 1 x 2 x 2.8	0.26
HTKSHekw 1 x 2 x 0.8	0.09
HTKSHekw 1 x 2 x 1.0	0.10
HTKSHekw 1 x 2 x 1.4	0.12
HTKSHekw 1 x 2 x 1.8	0.20

Other diameters and conductor counts available on request.
TECHNOKABEL S.A reserves the right to change specifications without prior notice.

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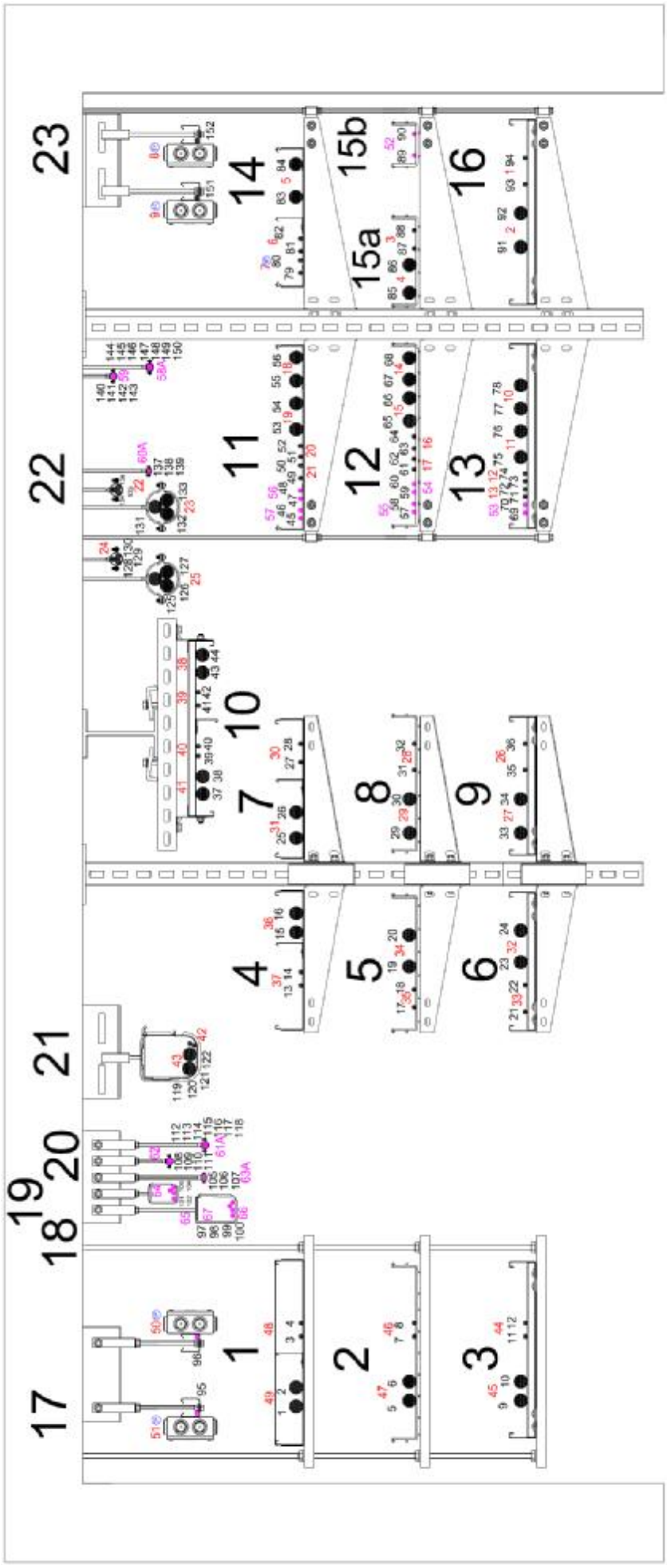
DRAWINGS



DRAWINGS

No	No FIRES	Cable type	Position	Description of construction
1	49	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	1	Cable trays KBJ400H60 + cover and partition/1.5 m /20kg/m /steel thickness 0,9 mm Construction: supports CWP/CWOP40H22/05, threaded rods PGM12.
2		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
3	48	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
4		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
5	47	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	2	Cable mesh trays KDS/KDSO400H60 1.5 m / 20kg/m Construction: supports CWP/CWOP40H22/05, threaded rods PGM12.
6		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
7	46	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
8		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
9	45	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	3	Cable ladders DUD400H60 1.5 m / 25kg/m / steel thickness 1,2 mm Construction: supports CWP/CWOP40H22/05, threaded rods PGM12.
10		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
11	44	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
12		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
13	37	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV	4	Cable trays KCL/KCOL300H60 + partition 1.5 m /10kg/m /steel thickness 0,7 mm Construction: consoles WPCB 900, brackets WWS300.
14		(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
15	36	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
16		(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
17	35	(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV	5	Cable mesh trays KDS/KDSO300H60/ 1.5 m / 10kg/m Construction: consoles WPCB 900, brackets WWS300.
18		(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		
19	34	(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		
20		(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		
21	33	(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV	6	Cable ladders DUD300H60 1.5 m / 10kg/m / steel thickness 1,2 mm Construction: consoles WPCB 1200, brackets WWS300.
22		(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		
23	32	(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		
24		(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		
25	31	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	7	Cable trays KCL/KCOL300H60 + partition 1.5 m /10kg/m / steel thickness 0,7 mm Construction: consoles WPCB 900, brackets WWS300.
26		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
27	30	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
28		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
29	29	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV	8	Cable mesh trays KDS/KDSO300H60 1.5 m / 10kg/m Construction: consoles WPCB 900, brackets WWS300.
30		(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
31	28	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
32		(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
33	27	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	9	Cable ladders DUD300H60 1.5 m / 10kg/m / steel thickness 1,2 mm Construction: consoles WPCB 1200, brackets WWS300.
34		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
35	26	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
36		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
37	41	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	10	Reversal cable ladders DUD400H60 + partition 1.5 m / 20kg/m / steel thickness 1,2 mm Construction: hangers UTM, supports CWOP40H40, clamps UDC, screw set SRM
38		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
39	40	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
40		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
41	39	NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
42		NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
43	38	NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
44		NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		

DRAWINGS

No	No FIRES	Cable type	Position	Description of construction
45	57	HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V	11	Cable trays KGJ/KGOJ400H60 1.5 m /20kg/m / steel thickness 0,9 mm Construction: Consoles WPCB 1200, brackets WWS400, threaded rods PGM10.
46		HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V		
47	56	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
48		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
49	21	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
50		(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
51	20	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
52		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
53	19	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
54		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
55	18	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
56		(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
57	55	HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V	12	Cable mesh trays KDS/KDSO400H60 1.5 m / 20kg/m Construction: Consoles WPCB 1200, brackets WWS400, threaded rods PGM10.
58		HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V		
59	54	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
60		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
61	17	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
62		(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
63	16	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
64		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
65	15	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
66		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
67	14	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
68		(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
69	53	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V	13	Cable ladders DUD400H60 1.5 m / 25kg/m / steel thickness 1,2 mm Construction: Consoles WPCB 1200, brackets WWS400, threaded rods PGM10.
70		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
71	13	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
72		(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
73	12	(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		
74		(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		
75	11	(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		
76		(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		
77	10	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
78		(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
79	7	(N)HXH-J FE180 PH30/E30 3x1.5 RE 0.6/1 kV	14	Cable trays KFL300H60 + cover and partition 1.5 m /20kg/m / steel thickness 0,7 mm Construction: Consoles WPCB 1200, brackets WWS400, threaded rods PGM10.
80		(N)HXH-J FE180 PH30/E30 3x1.5 RE 0.6/1 kV		
81	6	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
82		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
83	5	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
84		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		

DRAWINGS

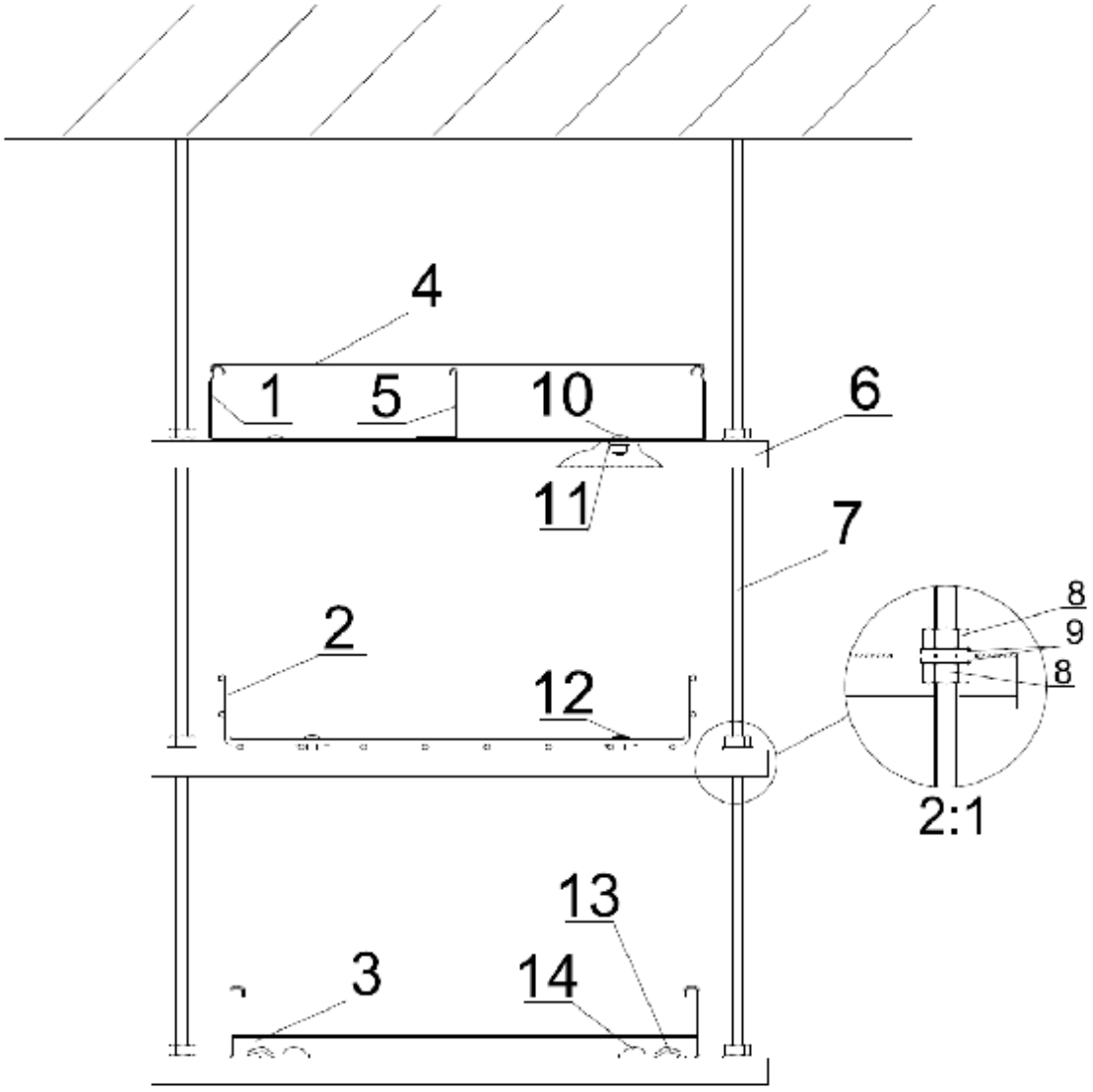
No	No FIRES	Cable type	Position	Description of construction
85	4	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	15a	Cable mesh trays KDSZ200H60 1.5 m / 10kg/m Construction: Consoles WPCB 1200, brackets WWS400, threaded rods PGM10.
86		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
87	3	(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		
88		(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		
89	52	HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V	15b	Cable mesh trays KDSZ200H60, 1.5 m / 10kg/m Construction: Consoles WPCB 1200, brackets WWS400, threaded rods PGM10.
90		HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V		
91	2	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	16	Cable ladders DFP400H60 1.5 m / 20kg/m / steel thickness 1,5 mm Construction: Consoles WPCB 1200, brackets WWS400, threaded rods PGM10.
92		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
93	1	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
94		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
95	51	HDGs FE180 PH90/E30-E90 3x1.5 mm^2 **- 230 V**	17	Cable fireboxes PM01. Cable laid at supports CWOP fixed by threaded rods PGM8 to trapezoidal steel sheet in spacing of 1500 mm. Loading 5kg.
96	50	HDGs FE180 PH90/E30-E90 3x1.5 mm^2 **- 230 V**		
97	67	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V	18	Cable hangers OZSO, threaded rods PGM6 fixed to trapezoidal steel sheet in spacing of 600 mm
98		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
99	66	HTKGs FE180 PH90/E30 2x0.75 mm 110V		
100		HTKGs FE180 PH90/E30 2x0.75 mm 110V		
101	65	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V	19	Cable hangers OZMO, threaded rods PGM6 fixed to trapezoidal steel sheet in spacing of 600 mm
102		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
103	64	HTKGs FE180 PH90/E30 2x0.75 mm 110V		
104		HTKGs FE180 PH90/E30 2x0.75 mm 110V		
105	63A	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V	20	3 cable at one cable clamp KSA (Ø 9 mm). Fixed to trapezoidal steel sheet in spacing of 600 mm.
106		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
107		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
108	62	HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V		4 cables at one cable clamp KSA (Ø 12 mm). Fixed to trapezoidal steel sheet in spacing of 600 mm.
109		HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V		
110		HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V		
111		HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500 V		
112	61A	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		7 cables at one cable clamp KSA (Ø 18 mm). Fixed to trapezoidal steel sheet in spacing of 600 mm.
113		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
114		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
115		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
116		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
117		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
118		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
119	43	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	21	Cable hangers OZO, threaded rods PGM6 fixed to steel profile in spacing of 600 mm.
120		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
121	42	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
122		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		

DRAWINGS

No	No FIRES	Cable type	Position	Description of construction
125	25	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	22	3 cable at one cable clamp KSA fixed to ceiling in spacing of 600 mm
126		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
127		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
128	24	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
129		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
130		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
131	23	NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
132		NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
133		NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
134	22	NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
135		NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
136		NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
137	60A	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		3 cable at one cable clamp KSA (Ø 9 mm) fixed to ceiling in spacing of 600 mm
138		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
139		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
140	59	HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		4 cable at one cable clamp KSA (Ø 12 mm) fixed to ceiling in spacing of 600 mm
141		HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		
142		HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		
143		HDGs FE180 PH90/E30-E90 2x1 mm2 300/500 V		
144	58A	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		7 cable at one cable clamp KSA (Ø 18 mm) fixed to ceiling in spacing of 600 mm
145		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
146		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
147		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
148		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
149		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
150		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240V		
151	9	HDGs FE180 PH90/E30-E90 3x1.5 mm^2 300/ 500 V - **230 V**	23	Cable fireboxes PM01. Cable laid at supports CWOP fixed by threaded rods PGM8 to trapezoidal steel sheet in spacing of 1500 mm. Loading 5kg.
152	8	HDGs FE180 PH90/E30-E90 3x1.5 mm^2 300/ 500 V - **230 V**		

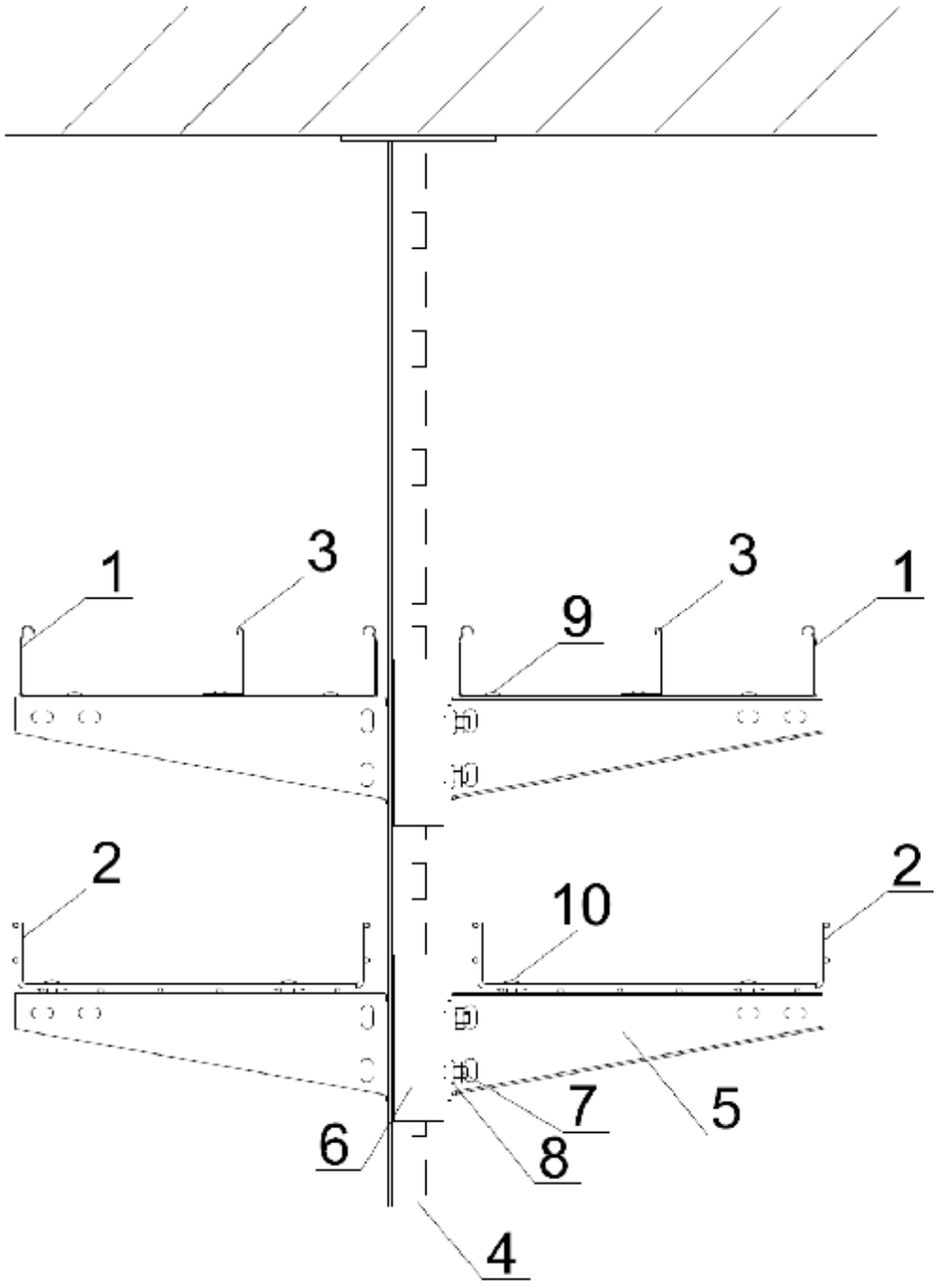
No	Cable type	Cable diameter measured by laboratory	Cable weight [kg/m]	Amount
1	NHXH-J FE180 PH90/E90 4x1.5 RE 0,6/1kV	11,5 mm	0.2	5
2	NHXH-J FE180 PH90/E90 4x50 RM 0,6/1kV	30,2 mm	2.4	5
3	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0,6/1kV	14,5 mm	0.3	10
4	(N)HXCH FE180 PH90/E90 4x50/25 RM 0,6/1kV	35,2 mm	3.0	10
5	(N)HXH-J FE180 PH30/E30 3x1.5 RE 0,6/1kV	10,0 mm	0,2	2
6	(N)HXH-J FE180 PH30/E30 4x1.5 RE 0,6/1kV	11,0 mm	0.2	8
7	(N)HXH-J FE180 PH30/E30 4x50 RM 0,6/1kV	30,2 mm	2.4	6
8	(N)HXH-J FE180 PH90/E90 3x1.5 RE 0,6/1kV	10,0 mm	0.2	2
9	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0,6/1kV	11,0 mm	0.2	25
10	(N)HXH-J FE180 PH90/E90 4x50 RM 0,6/1kV	30,4 mm	2.4	27
11	HTKSH PH90 1x2x0,8 mm 240V	4,9 mm	0.1	30
12	HTKGs FE180 PH90/E30 2x0.75 mm 110V	4,5 mm	0.1	4
13	HDGs FE180 PH90/E30-E90 3x1.5 mm^2 300/500V	8,0 mm	0.1	2
14	HDGs FE180 PH90/E30-E90 2x1 mm^2 300/500V	6,5 mm	0.1	14
			TOTAL	150

DRAWINGS



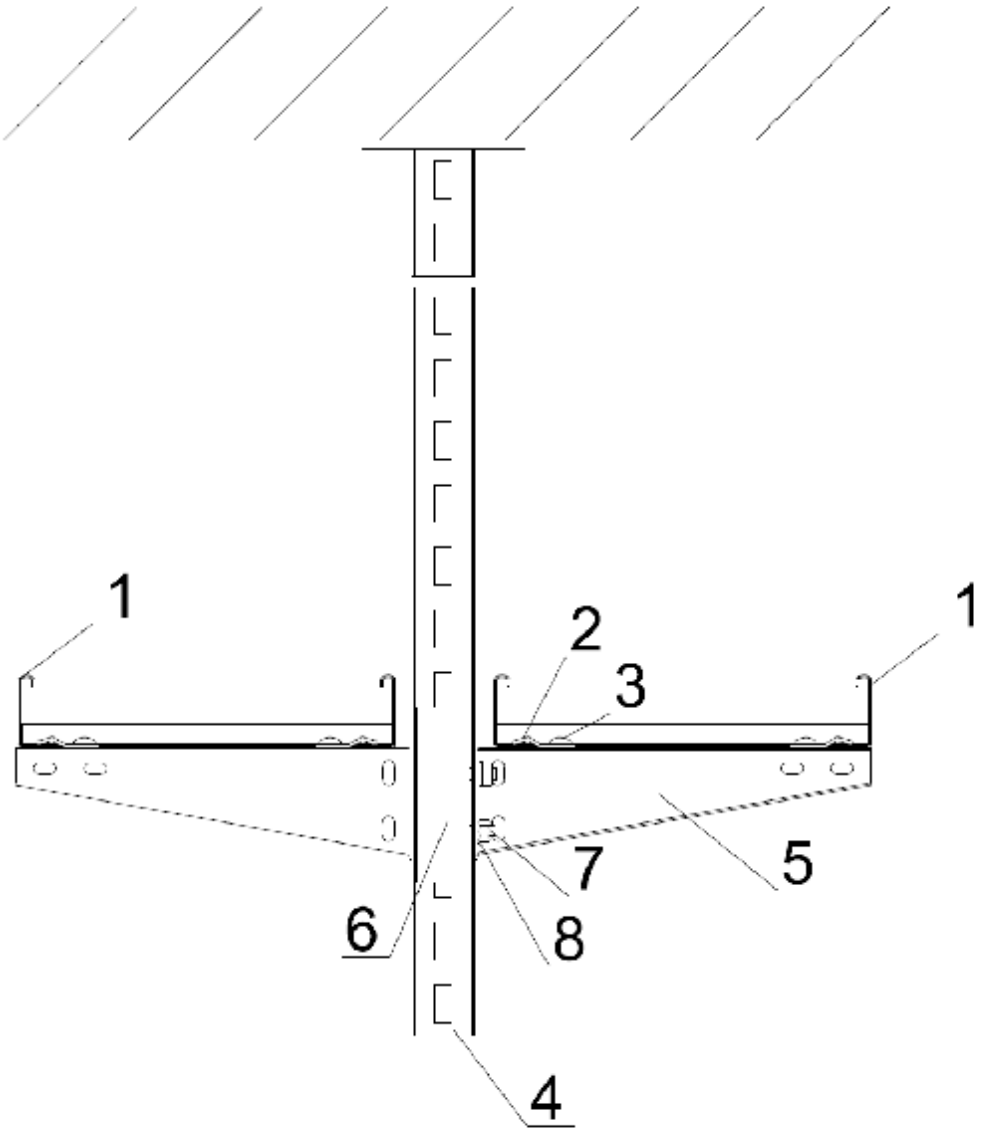
L.p.	Nazwa	Symbol	Szt.
14	Śruba z łbem grzybkowym	SGKM8x14	2
13	Zacisk mocujący	ZM/ZMO	2
12	Zacisk śrubowy	ZS/ZSO	2
11	Podkładka powiększona	PW6	2
10	Śruba z łbem grzybkowym	SGKM6X12	2
9	Podkładka	PP12	12
8	Nakrętka sześciokątna	NSM12	12
7	Pręt gwintowny	PGM12/...	2
6	Ceownik wzmocniony	CWP40H22/...	3
5	Przegroda	PGJ60/...N	1
4	Pokrywa	PKJ400/...	1
3	Drabina kablowa	DUD400H60/...N	1
2	Koryto siatkowe	KDS/KDSO400H60/...	1
1	Koryto	KBJ400H60/...N	1

DRAWINGS



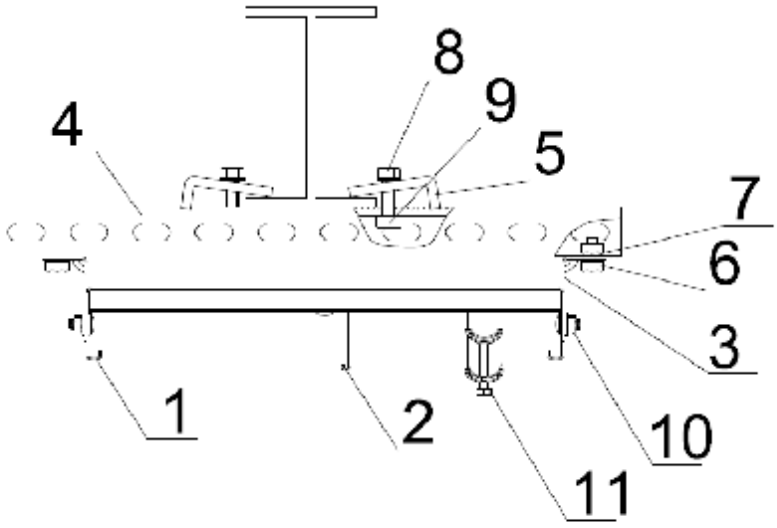
L.p.	Nazwa	Symbol	Szt.
10	Zacisk śrubowy	ZS/ZSO	4
9	Śruba z łbem grzybkowym	SGKM6x12	4
8	Podkładka	PP10	4
7	Śruba (kpl)	SMM10x70	4
6	Blacha rozporowa	BR55	2
5	Wysięgnik wzmocniony	WWS/WWSO300	4
4	Wspornik sufitowy	WPCB...	1
3	Przegroda	PGLH60/...	2
2	Koryto siatkowe	KDS/KDSO300H60/...	2
1	Koryto	KCL/KCOL300H60/...	2

DRAWINGS



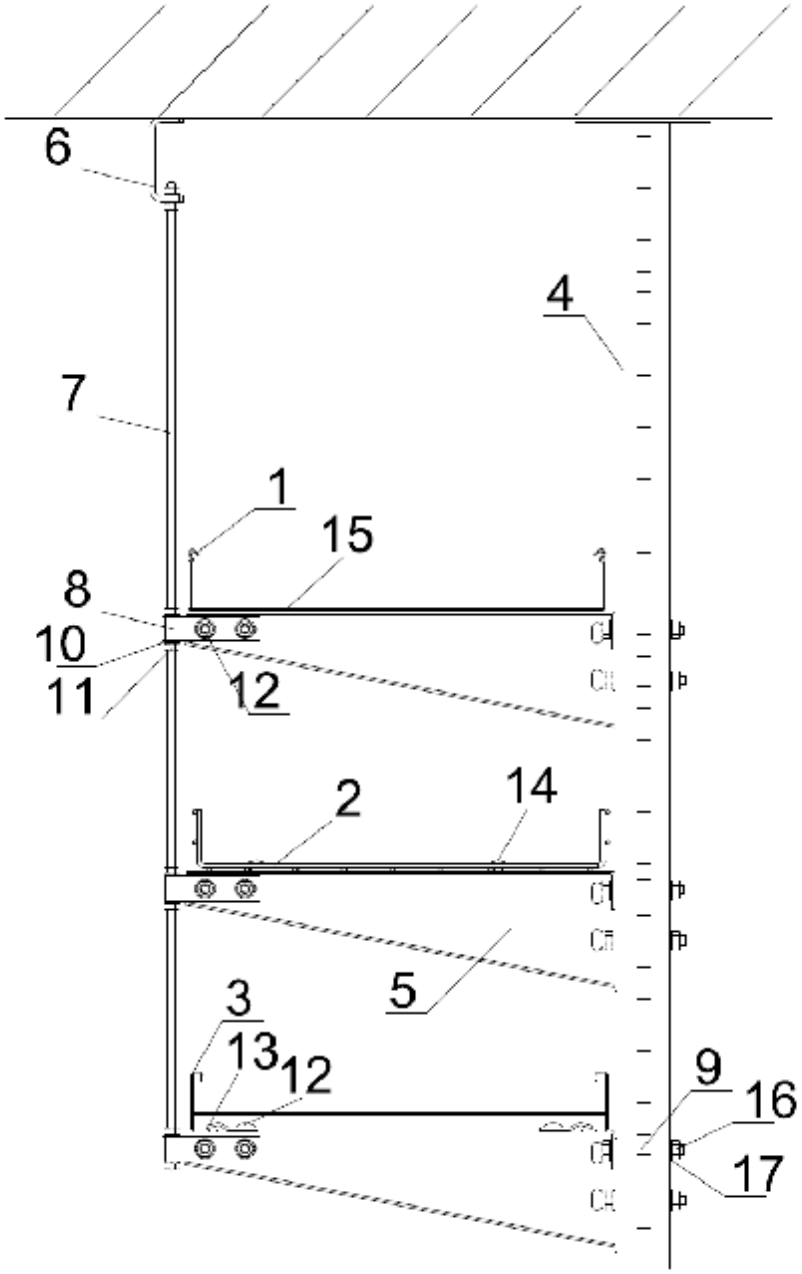
L.p.	Nazwa	Symbol	Szt.
8	Podkładka	PP10	2
7	Śruba (kpl.)	SMM10x70	2
6	Blacha rozporowa	BR55	1
5	Wysięgnik wzmocniony	WWS/WWSO300	2
4	Wspornik sufitowy	WPCB...	1
3	Śruba z łbem grzybkowym	SGKM8x14	4
2	Zacisk mocujący	ZM/ZMO	4
1	Drabina	DUD300H60/...	2

DRAWINGS



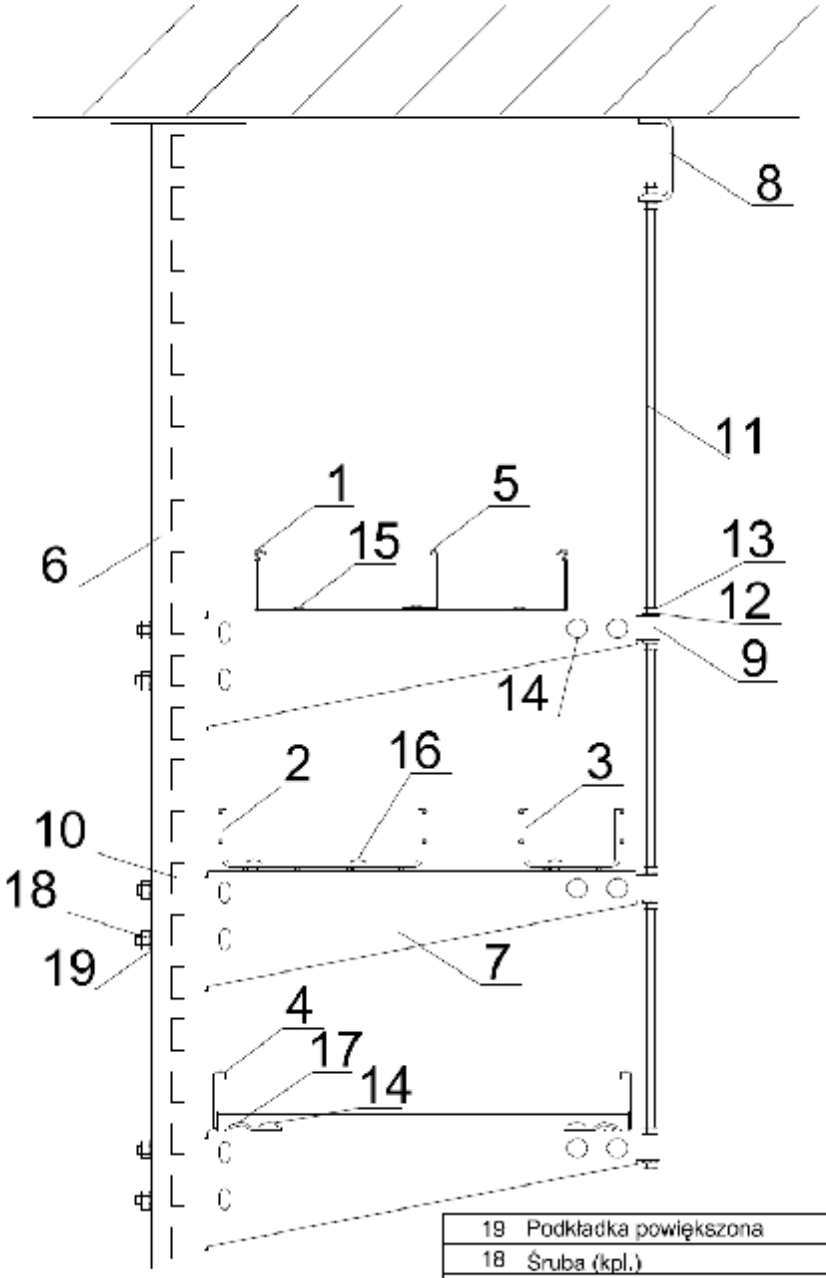
L.p.	Nazwa	Symbol	Szt.
11	Uchwyt kablowy	UK1/UKO1...	
10	Śruba z łbem grzybkowym	SGKM8x14	2
9	Nakrętka rombowa	NRM10	2
8	Śruba	SMM10x40	2
7	Podkładka	PP10	2
6	Śruba (kpl.)	SMM10x20	2
5	Uchwyt dociskowy	UDC	2
4	Ceownik wzmocniony	CWP/CWOP40H40/...	1
3	Uchwyt trójkątny	UTM/UTMO	2
2	Przegroda	PGDJ40/...	1
1	Drabina	DUD400H60/...	1

DRAWINGS



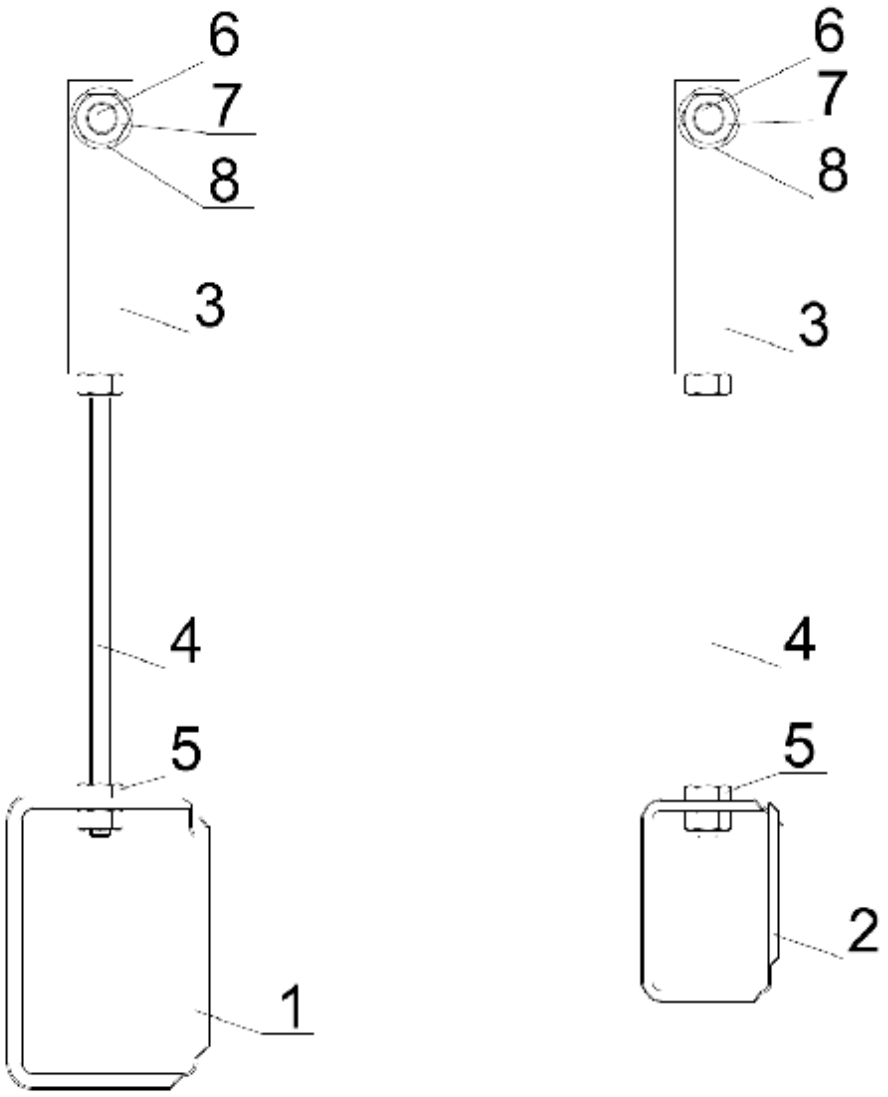
L.p.	Nazwa	Symbol	Szt.
17	Podkładka powiększona	PW10	6
16	Śruba (kpl.)	SMM10x70	6
15	Śruba z łbem grzybkowym	SGKM6x12	2
14	Zacisk śrubowy	ZS/ZSO	2
13	Zacisk mocujący	ZM/ZMO	2
12	Śruba z łbem grzybkowym	SGKM8x14	8
11	Nakrętka	NSM10	8
10	Podkładka	PP10	8
9	Blacha rozporowa	BR55	3
8	Uchwyt	UPW/UPWO	3
7	Pręt gwintowany	PGM10/...	1
6	Uchwyt sufitowy	USV/USOV	1
5	Wysięgnik wzmocniony	WWS/WWSO400	3
4	Wspornik sufitowy	WPCB...	1
3	Drabina	DUD400H60/...	1
2	Koryto siatkowe	KDS/KDSO400H60/...	1
1	Koryto	KGJ/KGOJ400H60/...	1

DRAWINGS



L.p.	Nazwa	Symbol	Szt.
19	Podkładka powiększona	PW10	6
18	Śruba (kpl.)	SMM10x70	6
17	Zacisk mocujący	ZM/ZMO	2
16	Zacisk śrubowy	ZS/ZSO	3
15	Śruba z łbem grzybkowym	SGKM6x12	2
14	Śruba z łbem grzybkowym	SGKM8x14	8
13	Nakrętka	NSM10	8
12	Podkładka	PP10	8
11	Pręt gwintowany	PGM10/...	1
10	Blacha rozporowa	BR55	3
9	Uchwyt	UPW/UPWO	3
8	Uchwyt sufitowy	USV/USOV	1
7	Wysięgnik wzmocniony	WWS/WWSO400	3
6	Wspornik sufitowy	WPCB...	1
5	Przegroda	PGLH60	1
4	Drabinka	DFP400H60/...	1
3	Koryto siatkowe	KDSZ100H60/...	1
2	Koryto siatkowe	KDSZ200H60/...	1
1	Koryto	KFL300H60/...	1

DRAWINGS



L.p.	Nazwa	Symbol
8	Podkładka	PP8
7	Nakrętka	NSM8
6	Pręt gwintowany	PGM8/...
5	Nakrętka	NSM6
4	Pręt gwintowany	PGM6/...
3	Wieszak trapezowy	WT/WTO120M6
2	Obejma kablowa	OZM/OZMO
1	Obejma kablowa	OZS/OZSO

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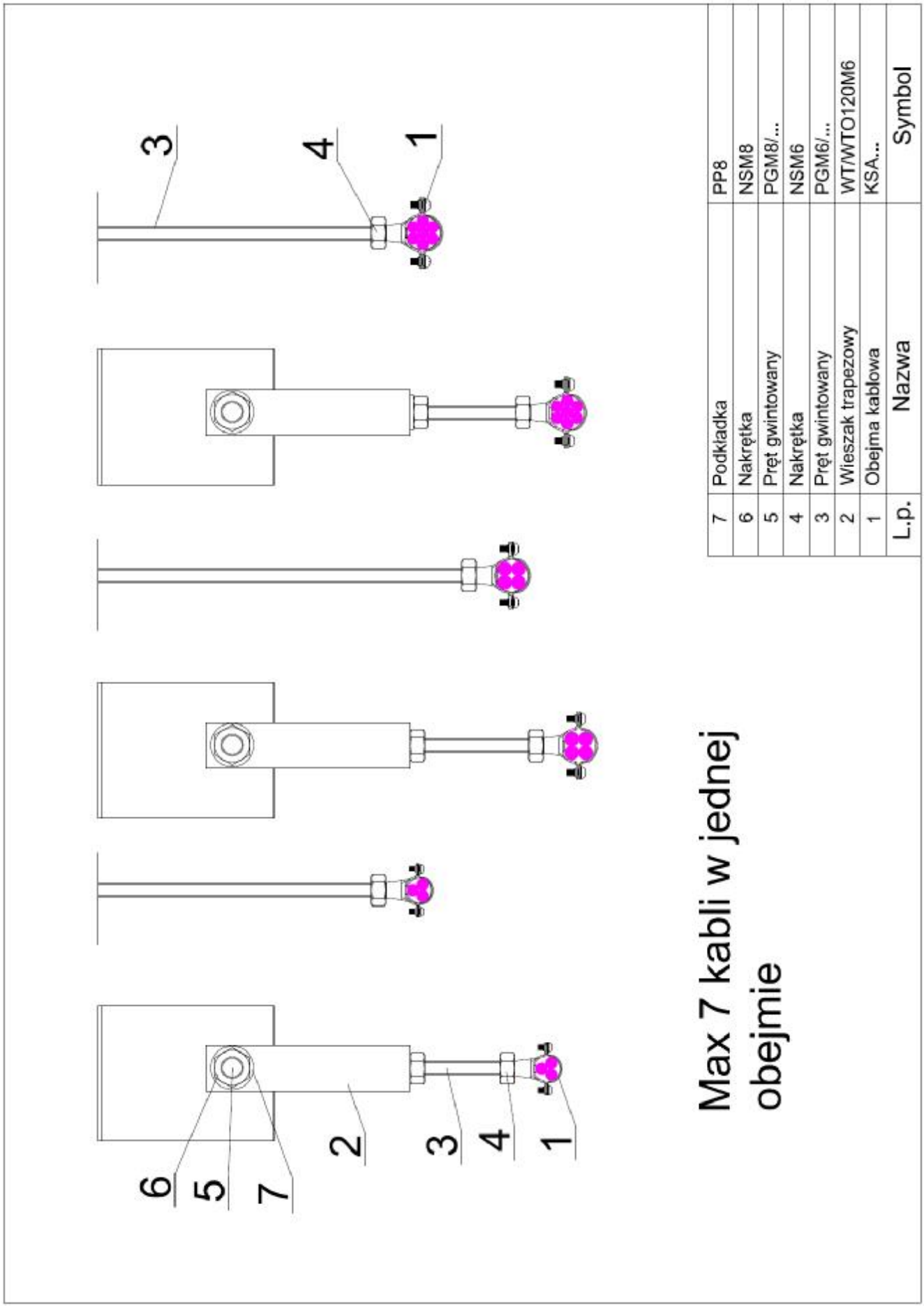
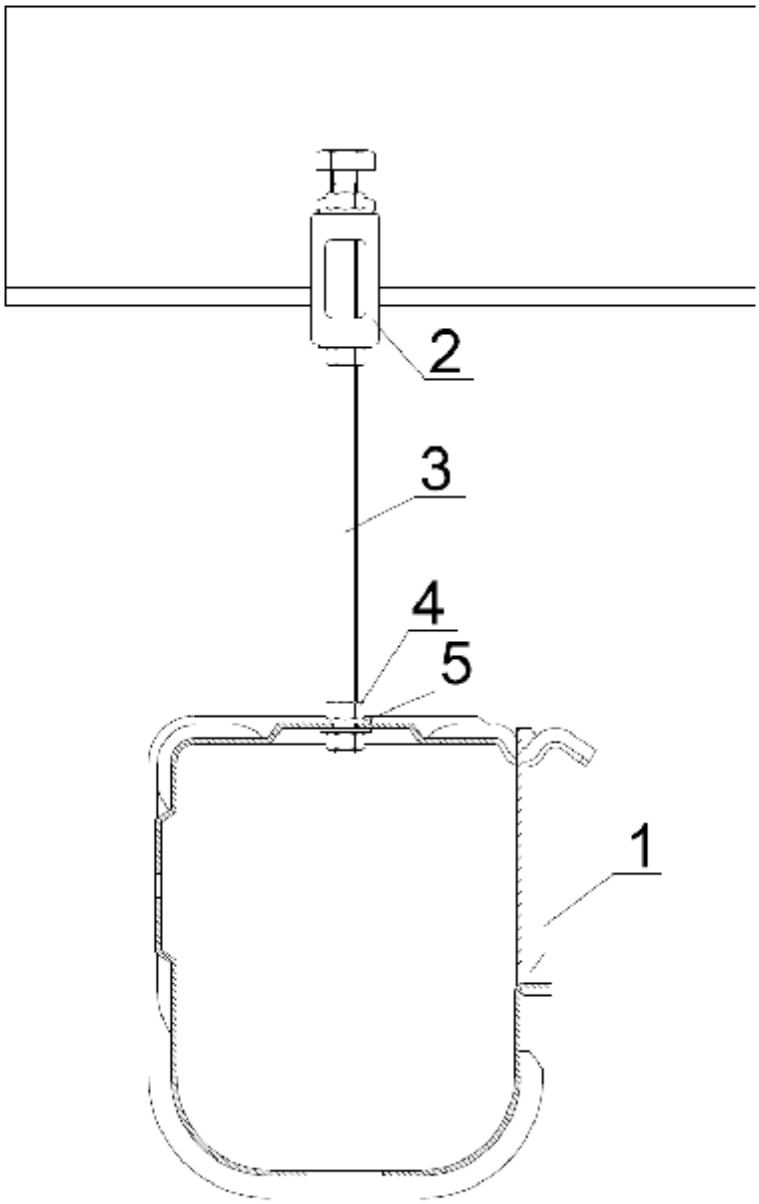


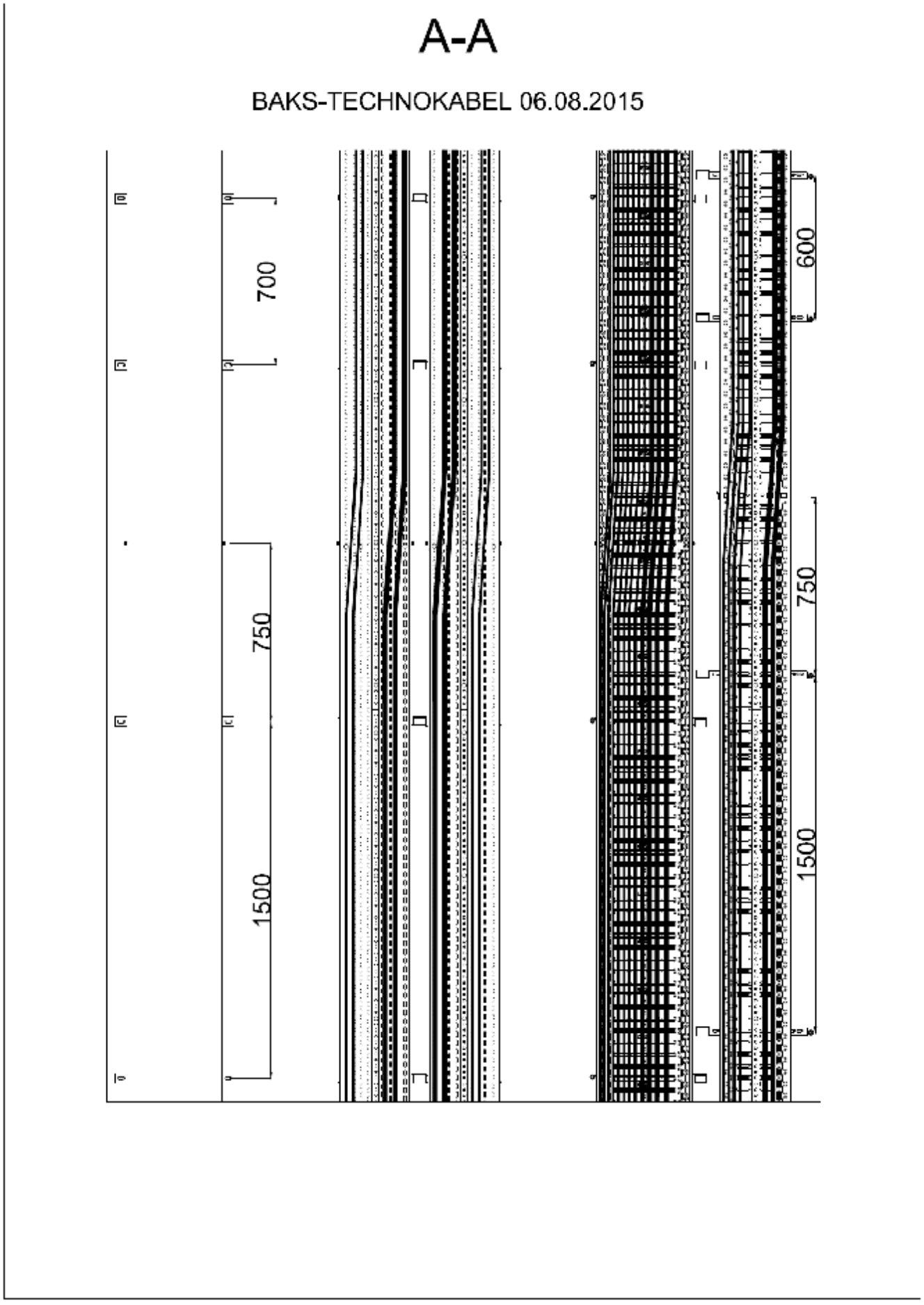
L.p.	Nazwa	Symbol
1	Obejma kablowa	KSA...
2	Wieszak trapezowy	WT/WTO120M6
3	Pręt gwintowany	PGM6/...
4	Nakrętka	NSM6
5	Pręt gwintowany	PGM8/...
6	Nakrętka	NSM8
7	Podkładka	PP8

DRAWINGS



L.p.	Nazwa	Symbol	Szt.
5	Podkładka	PP6	3
4	Nakrętka	NSM6	4
3	Pręt gwintowany	PGM6/...	2
2	Zacisk	ZK8/19	2
1	Obejma kablowa	OZ/OZO	1

DRAWINGS



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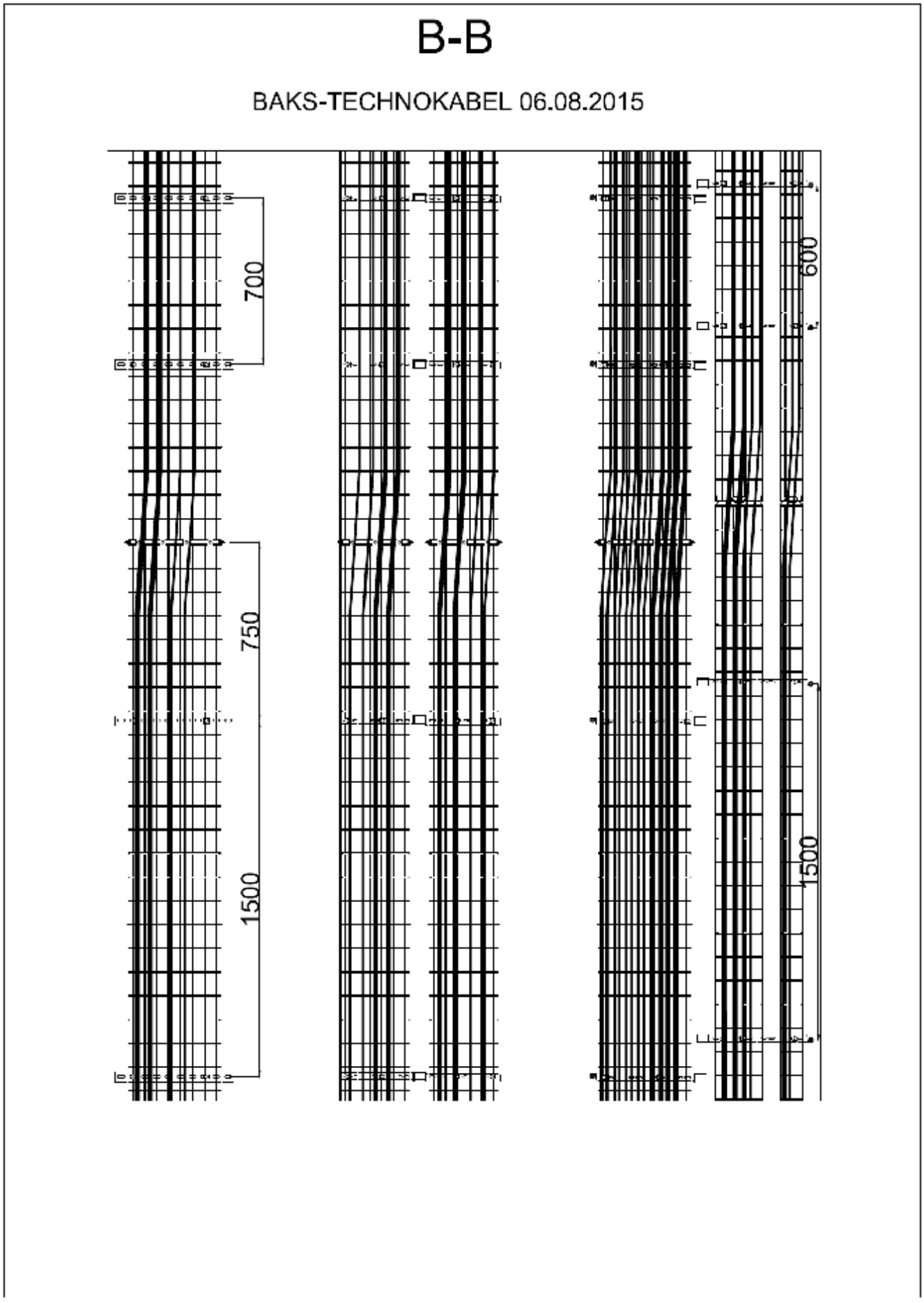

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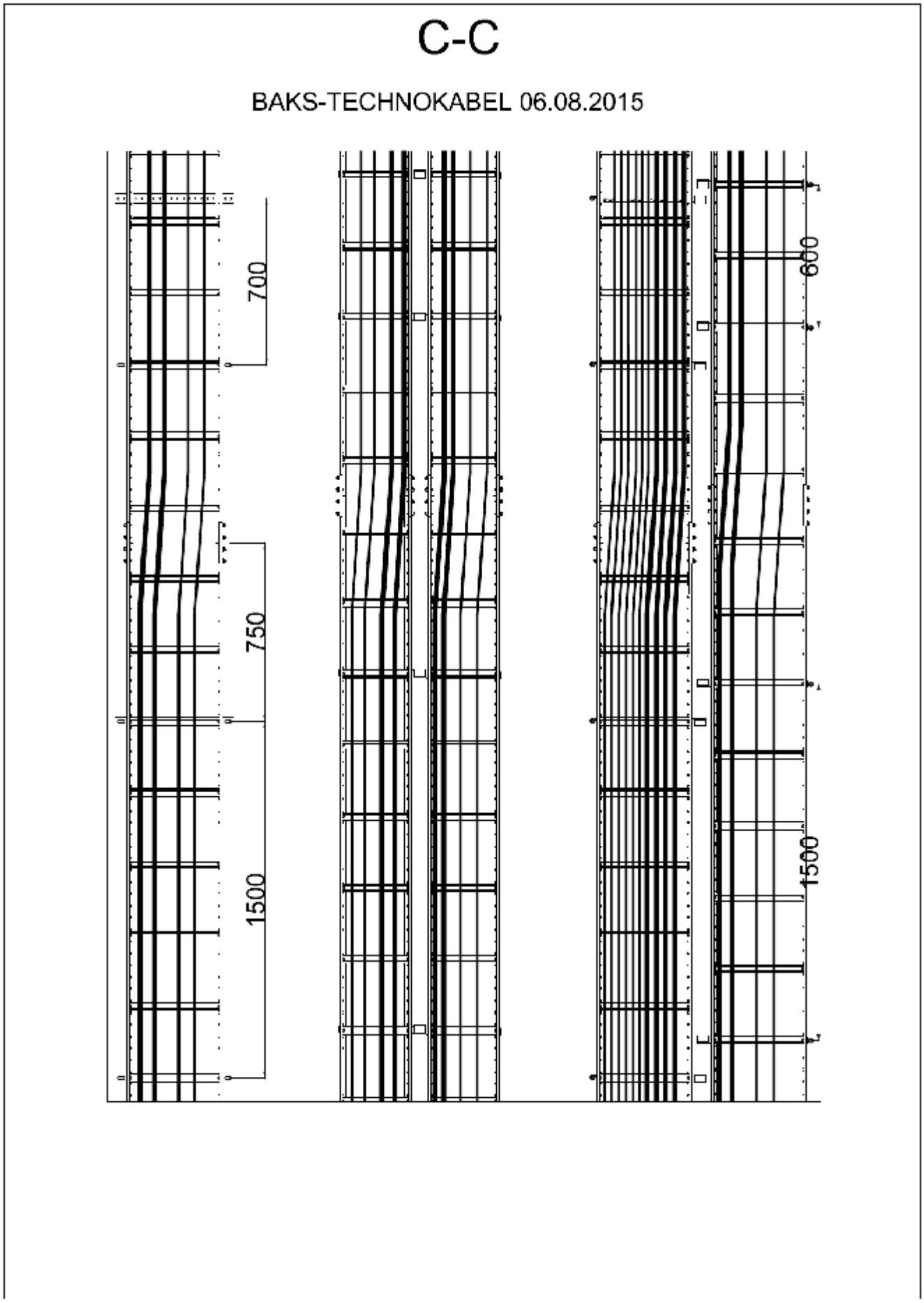

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D-D

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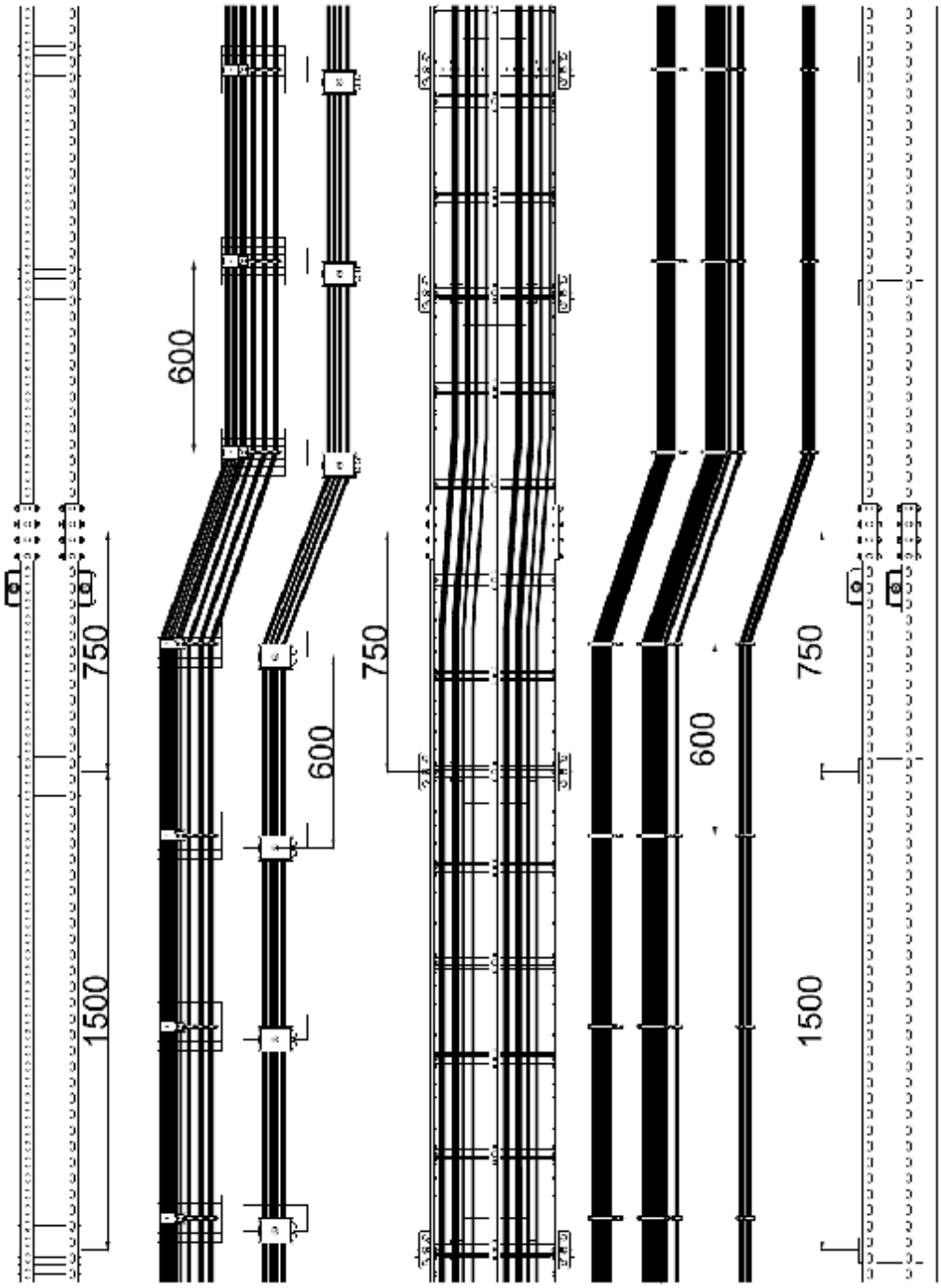

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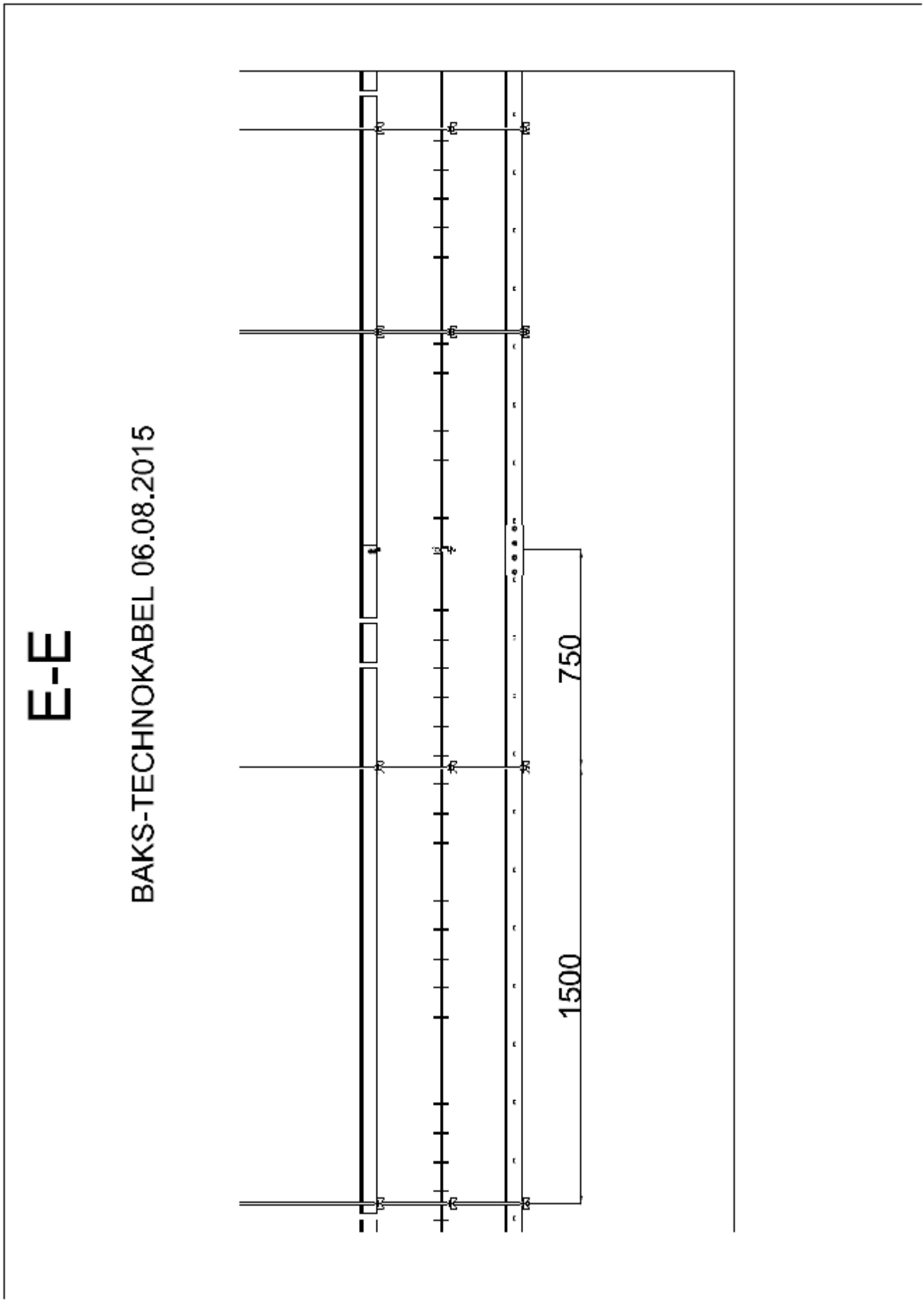

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F-F

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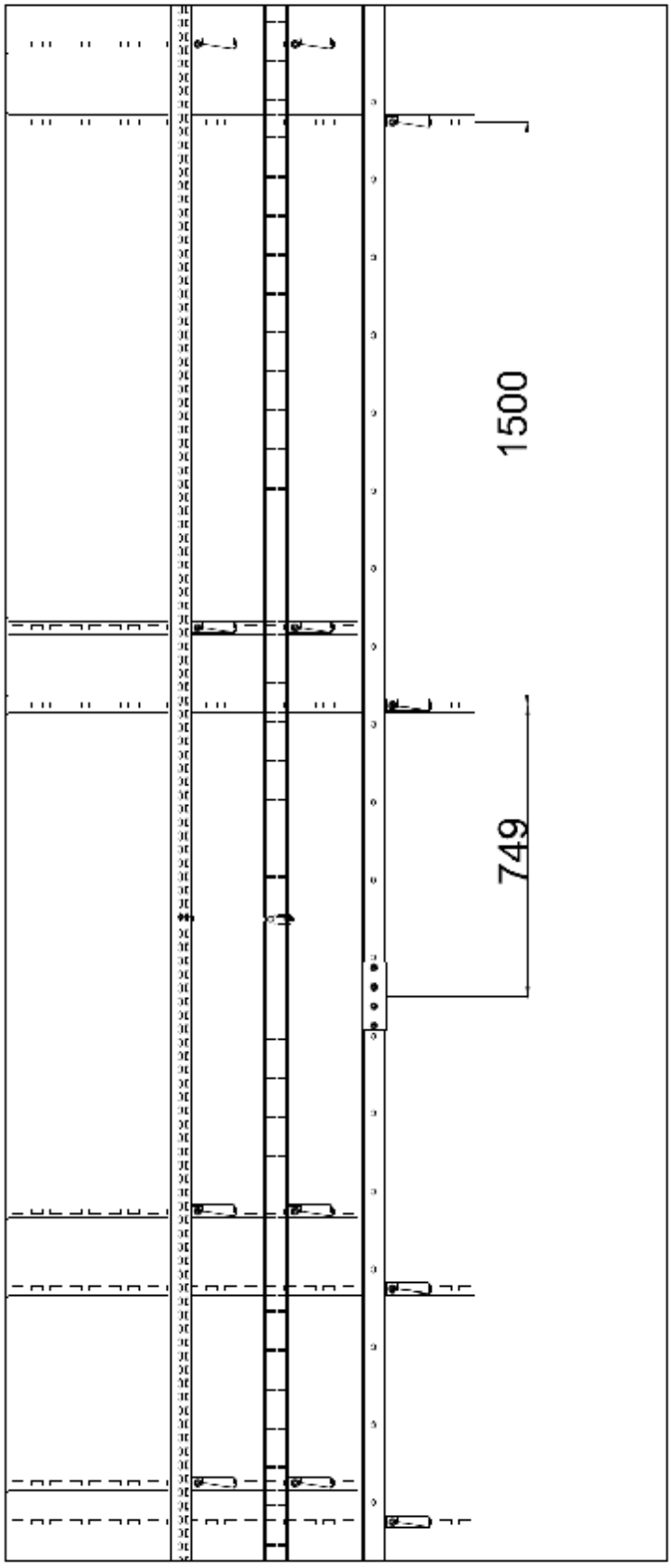

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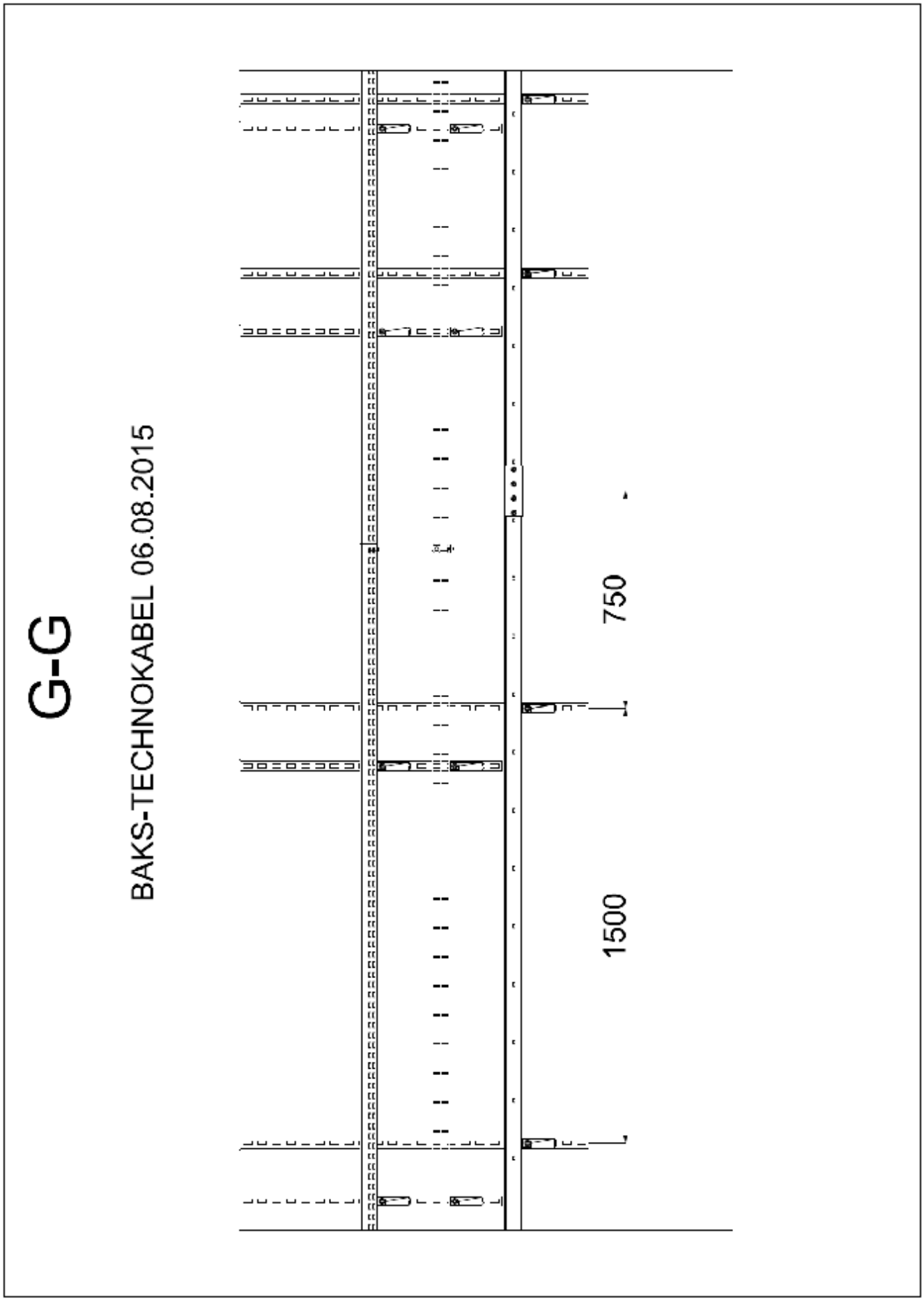

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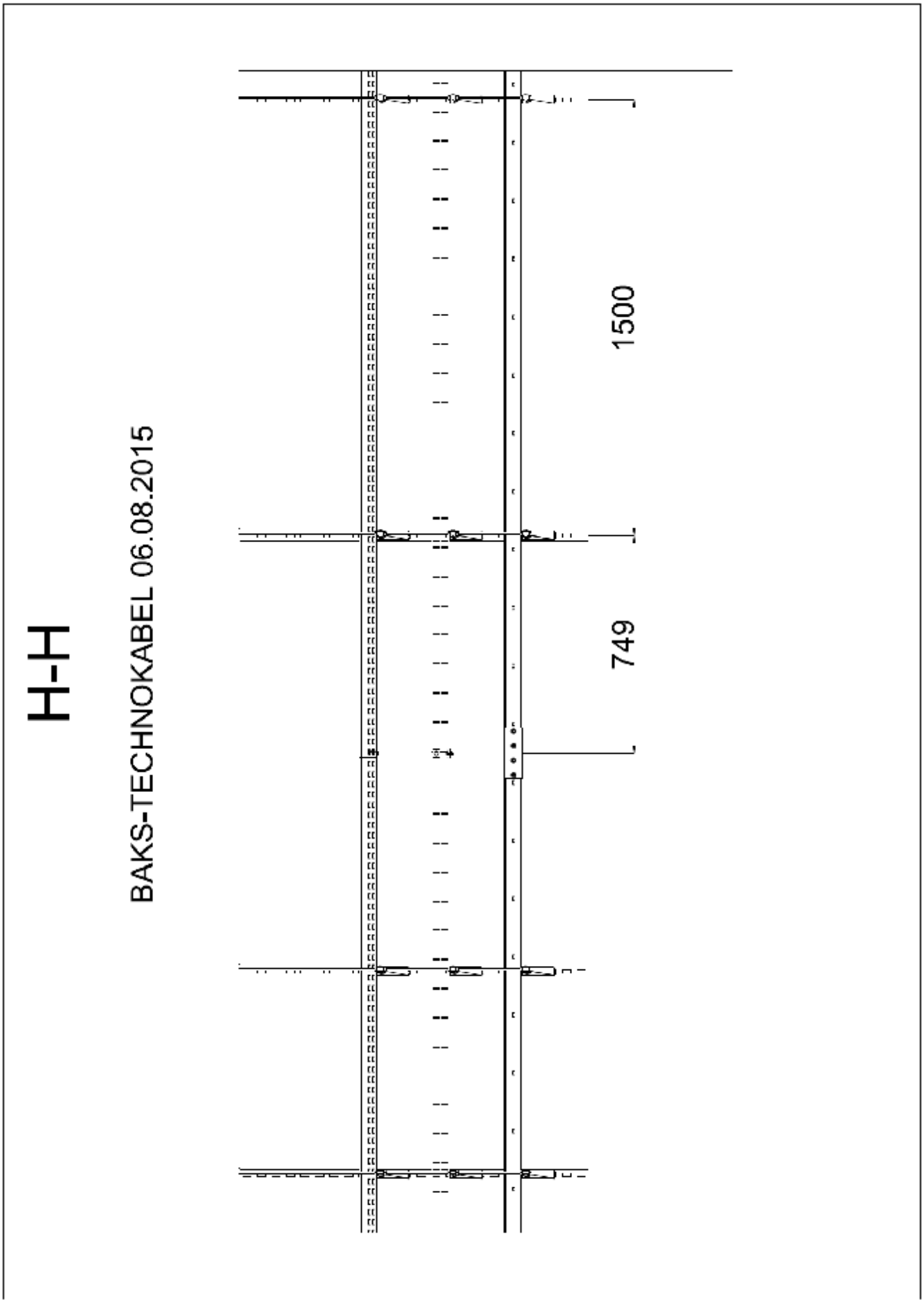

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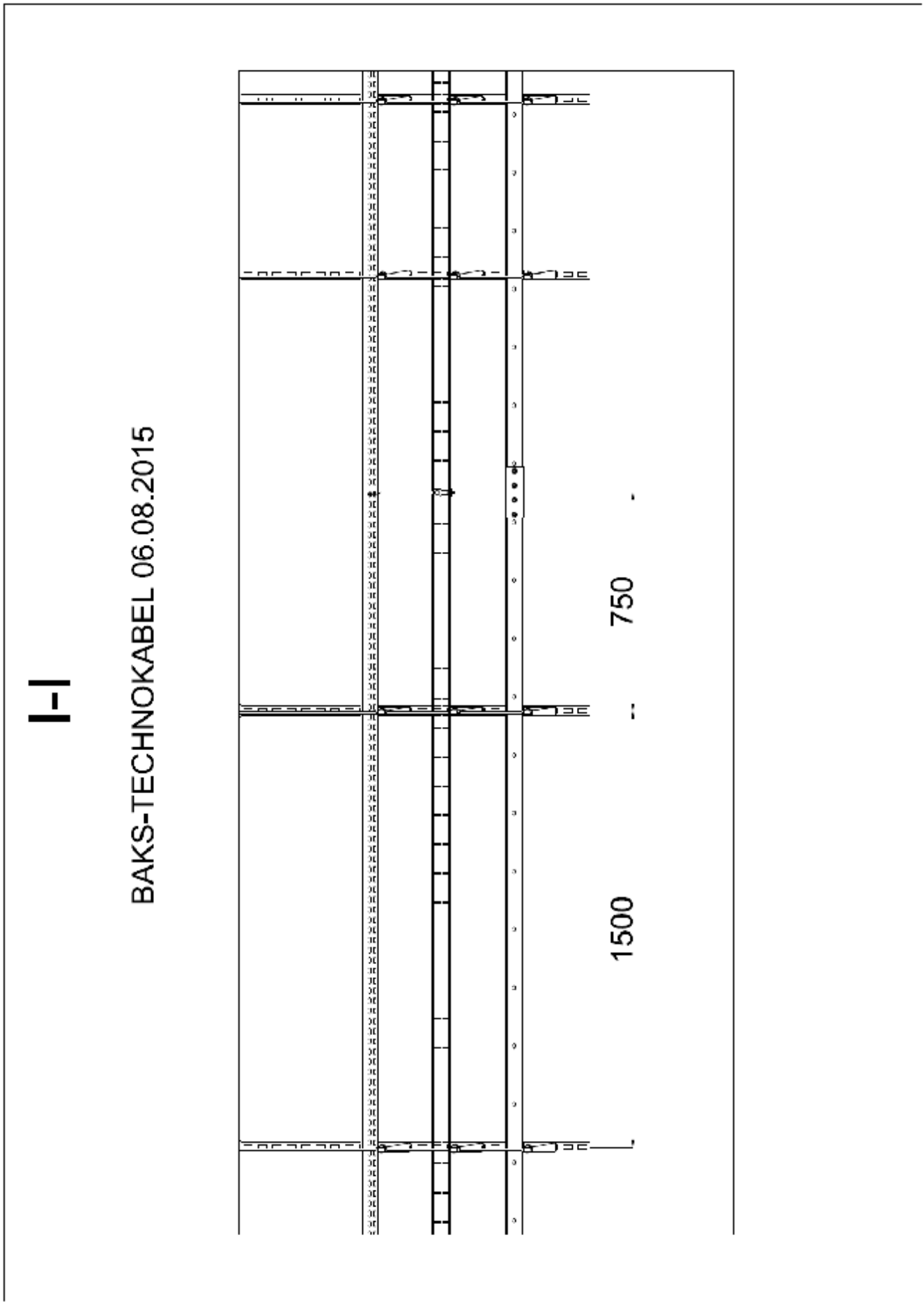

8. FINAL PROVISION

§ 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

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Prepared by:

Bc. Dávid Šubert
technician of the testing laboratory

9. 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