

TEST REPORT FIRES-FR-077-16-AUNE

Cable bearing system BAKS and fixing accessories HILTI with power and communication cables of TECHNOKABEL

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TEST REPORT

FIRES-FR-077-16-AUNE

Tested property: Functional resistance in fire
STN 92 0205: 2014

Test method: (ČSN 73 0895: 2016, DIN 4102-12: 1998-11) acc. to cl. 1 of this test report

Type of test: Accredited

Date of issue: 30. 05. 2016

Name of the product: Cable bearing system BAKS and fixing accessories HILTI with power and communication cables of TECHNOKABEL

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

Hilti Poland Sp. z o.o., ul. Pulawska 491, 02 – 844 Warszawa, Poland
(producer of fixing accessories)

Technokabel S.A., Nasielska 55, 04 – 343 Warszawa, Poland
(producer of cables)

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

Test carried out by: FIRES, s.r.o., Testing laboratory

Task No.: PR-16-0158

Specimens received: 07. 04. 2016

Date of the test: 14. 04. 2016

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 ČSN 73 0895: 2016 and DIN 4102-12: 1998-11.

Deviations from standard at the test according to ČSN 73 0895: 2016: This test was carried out according to standard STN 92 0205 and meets also all requirements of ČSN 73 0895: 2016 and test results can be directly used for classification of tested cables according to ČSN 73 0895: 2016. 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. Winiarczyk Łukasz	BAKS Kazimierz Sielski
Mr. Dariusz Gowronski	BAKS Kazimierz Sielski
Mr. Mariusz Kwiatkowski	TECHNOKABEL S.A.
Mr. Pavel Stradomski	TECHNOKABEL S.A.
Mr. Artur Storożuk	Hilti (Poland) Sp. z o.o.

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

2. MEASURING EQUIPMENT

Identification number	Measuring equipment	Note
F 90 004	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 54 020	Digital calliper (0 to 200) 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 96 015	Test signal panel	-
F 60 001 - F 60 009	Sensors of temperature and relative air humidity	measurement of climatic conditions
F 13 521 - F 13 528	Plate thermometers	measurement of temperature inside the test furnace according to EN 1363-1
F 13 701	Sheathed thermocouple type K Ø 3 mm	measurement of ambient temperature
F 57 005	Digital stop-watch	-

3. PREPARATION OF THE SPECIMENS

Testing laboratory noted down production data of specimens from certified production. Data are stored in archive of FIRES, s.r.o.

Place of production of cable bearing system	BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland
Number of certificate ISO 9001	01 100 1331984
Issuing Body	TÜV Rheinland
Date of issuing	19. 05. 2014
Place of production of cables	Technokabel S.A., Nasielska 55, 04 – 343 Warszawa, Poland
Number of certificate ISO 9001	12 100 23870 TMS
Issuing Body	TÜV SÜD Management Service GmbH
Date of issuing	02. 11. 2013
Place of fixing accessories	Hilti Aktiengesellschaft, 9494 Schaan, Liechtenstein
Number of certificate ISO 9001	12455
Issuing Body	Swiss Association for Quality and Management Systems SQS
Date of issuing	01. 07. 2013

Individual materials of specimens (consoles, brackets, threaded rods, cables, etc.) were delivered to the testing laboratory by test sponsor. Assembling of the specimens (assembling of cable bearing systems and mounting of cables and additional weights into the bearing systems) and its installation to supporting construction of was carried out by workers of test sponsor under supervision.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMENS STRUCTURE

Test specimens comprised from cable bearing system of company BAKS Kazimierz Sielski (cable trays, mesh trays, ladders with accessories) with fixing accessories HILTI and power and communication cables of company Technokabel S.A.

Cables used by test:

Power cables:

NHXXH-J FE180 PH90/E90 0.6/1 kV
 (N)HXCH FE180 PH90/E90 0.6/1 kV
 (N)HXH-J FE180 PH30/E30 0.6/1 kV
 (N)HXH-J FE180 PH90/E90 0.6/1 kV
 (N)HXCH-J-SERVO FE180 PH90/E90 0.6/1 kV
 (N)HXCH-J-SERVO-W FE180 PH90/E90 0.6/1 kV



Communication cables:

HTKSH FE180 PH90/E30-E90
 HTKSHekw FE180 PH90/E30-E90
 HDGs FE180 PH90/E30-E90
 HLGsekw FE180 PH90/E30-E90
 HDGszo-W FE180 PH90/E30-E90

Cable bearing systems were made of following constructions:

Suspension track No. 1

Supporting construction is made of segments (approx. 200 mm long) of steel profiles (shape of profile "H" 110 mm height, 145 mm width and 10 mm thick). Each segment is fixed to ceiling by 4 pcs of stud anchors HST2 in spacing of 1500 mm.

Cable ladders (DUP/DUOP400H60, height 60 mm, width 400 mm, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) fixed together by junctions (LDC/LDOCH60, 2 pcs) and nut bolts (SGKM8x14, 8 pcs) on sides. Ladders are fixed conversely to steel profiles by supports (CWP/CWOP40H40), fastening brackets (UTM/UTMO), beam clamps (UDC) and screw sets (SMM10x40 + NRM10). Ladders are loaded with 20kg.m⁻¹. Cables are fixed to ladders by cable clamps (UK1/UKO1) in spacing of 600 mm.

Suspension tracks No. 2 and 3

Tracks are made of three consoles combined of two supports (CWP/CWOP40H40) and two threaded rods (PGM10) fixed together by washers (PP10) and nuts (NSM10). Consoles are fixed to ceiling by screw anchors with internally threaded head (HILTI HUS3-I Flex 6 x 35 M10) in spacing of 1700 mm.

Track No. 2:

Cable trays (KCP/KCOP400H60, height 60 mm, width 400 mm, steel sheet thickness 1,5 mm) fixed together by junctions (LPP/LPOPH60, 2pcs) and nut bolts (SGKM6x12, 16pcs) on sides and by junction (BL/BLO400) and nut bolts (SGKM6x12, 8pcs) on the bottom. Trays are fixed to supports by nut bolts (SGKM6x12, 2pcs) and loaded with 10kg.m⁻¹. Cables are fixed to cable trays by plastic stripes only.

Track No. 3:

Cable ladders (DUP/DUOP400H60, height 60 mm, width 400 mm, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) fixed together by junctions (LDC/LDOCH60, 2pcs) and nut bolts (SGKM8x14, 8pcs) on sides. Ladders are fixed to supports by clamps (ZM/ZMO, 2pcs) and nut bolts (SGKM8x14, 2pcs) and loaded with 20kg.m⁻¹. Cables are fixed to cable trays by plastic stripes only.

Suspension tracks No. 4 – 6

Tracks are made of four consoles combined of two supports (CWP/CWOP40H40) and two threaded rods (PGM10) fixed together by washers (PP10) and nuts (NSM10). Consoles are fixed to ceiling by screw anchors with internally threaded head (HILTI HUS3-I Flex 6 x 35 M10) in spacing of 1500 mm.

Track No. 4:

Cable mesh trays (KDSZ60H60, height 60 mm, width 60 mm, steel wire Ø 4,5 mm) fixed together by integrated coupling. Mesh trays are fixed to supports by support brackets (USK) with nut bolts (SGKM6x12) and loaded with 2kg.m⁻¹. Cables are fixed to cable trays by plastic stripes only.

Track No. 5:

Cable mesh trays (KDSZ400H60, height 60 mm, width 400 mm, steel wire Ø 4,5 mm) fixed together by integrated coupling. Mesh trays are fixed to supports by clamping pieces (ZS/ZSO, 2 pcs) and loaded with 20kg.m⁻¹. Cables are fixed to cable trays by cable clamps (UKZ1/UKZO1).

Track No. 6:

Cable trays (KCP/KCOP600H60, height 60 mm, width 600 mm, steel sheet thickness 1,5 mm) fixed together by junctions (LPP/LPOPH60, 2 pcs) with nut bolts (SGKM6x12, 16 pcs) on sides and by junction (BL/BLO600) with nut bolts (SGKM6x12, 8 pcs) on the bottom. Partition (PGL60) is fixed by nut bolts (SGKM6x12) in distance of 100 mm of cable tray side. Trays are fixed to supports by nut bolts (SGKM6x12, 2 pcs) and loaded with 25kg.m⁻¹. Cables are fixed to cable trays plastic stripes only.



Suspension track No. 7

Track is made of four consoles combined of support (CWP/CWOP40H40) and two threaded rods (PGM10) fixed together by washers (PP10) and nuts (NSM10). Consoles are fixed to ceiling by screw anchors with internally threaded head (HILTI HUS3-I Flex 6 x 35 M10) in spacing of 1500 mm.

Cable ladders (DUP/DUOP600H60, height 60 mm, width 600 mm, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) fixed together by junctions (LDC/LDOCH60, 2 pcs) and nut bolts (SGKM8x14, 8 pcs) on sides. Partition (PGDJ40) is fixed by screws (SRM6x16) in distance of 100 mm of ladder side. Ladders are fixed to supports by clamps (ZM/ZMO, 2 pcs) and nut bolts (SGKM8x14, 2 pcs) and loaded with 30kg.m⁻¹. Cables are fixed to ladders by cable clamps (UK1/UKO1).

Suspension tracks No. 8 and 9

Tracks are made of four consoles (WPCB1000) fixed to ceiling by stud anchors (HILTI HST3 M10x90) in spacing of 1500 mm. Brackets (WWS/WWSO300) are fixed to consoles by nut bolts (SMM10x70) and washers (PP10). Consoles are reinforced in place of fixing brackets by spacer (BR55).

Track No. 8:

Cable trays (KFL300H60, height 60 mm, width 300 mm, steel sheet thickness 0,7 mm) fixed together by integrated coupling. Partition (PGL60) is fixed by nut bolts (SGKM6x12) inside the cable trays. Trays are fixed to brackets by nut bolts (SGKM6x12, 2 pcs) and loaded with 10kg.m⁻¹. Connection boxes PMO1 are fixed by nut bolts (SGKM6x12, 2 pcs) directly to cable trays side. Cables are fixed to cable trays by plastic stripes only.

Track No. 9:

Cable ladders (DFP300H60, height 60 mm, width 300 mm, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) fixed together by integrated couplings. Partition (PGDJ40) is fixed by nut bolts (SRM6x16) inside the ladder. Ladders are fixed to brackets by clamps (ZM/ZMO, 2pcs) and nut bolts (SGKM8x14, 2 pcs) and loaded with 10kg.m⁻¹. Cables are fixed to ladders by cable clamps (UK1/UKO1).

Suspension tracks No. 10 – 12

Tracks are made of four consoles combined of three supports (CWP/CWOP40H40) and two threaded rods (PGM10) fixed together by washers (PP10) and nuts (NSM10). Consoles are fixed to ceiling by screw anchors with internally threaded head (HILTI HUS3-I Flex 6 x 35 M10) in spacing of 1500 mm.

Track No. 10:

Cable trays (KFJ400H60, height 60 mm, width 400 mm, steel sheet thickness 1,0 mm) fixed together by integrated coupling. Partition (PGL60) is fixed by nut bolts (SGKM6x12) inside the cable trays. Trays are fixed to supports by nut bolts (SGKM6x12, 2 pcs) and loaded with 20kg.m⁻¹. Cables are fixed to cable trays by plastic stripes only.

Track No. 11:

Cable ladders (DFP400H60, height 60 mm, width 400 mm, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) fixed together by integrated couplings. Ladders are fixed to supports by clamps (ZM/ZMO, 2pcs) and nut bolts (SGKM8x14, 2 pcs) and loaded with 20kg.m⁻¹. Cables are fixed to ladders by cable clamps (UK1/UKO1).

Track No. 12:

Cable trays (KBJ400H60, height 60 mm, width 400 mm, steel sheet thickness 0,9 mm) fixed together by nut bolts (SGKM6x12, 8pcs). Trays are fixed to supports by screws (SGKM6x12, 2 pcs) and loaded with 20kg.m⁻¹. Cables are not fixed to trays.

Ceiling tracks No. 13a and 13c

Tracks are made of single cable clips (HILTI X-FB MX) shot by battery-actuated fastening tool (BX3) to ceiling by steel nails (HILTI X-P 17 B3 MX) in spacing of 600 mm.

Ceiling tracks No. 13b and 13d

Tracks are made of single cable clips (HILTI X-FB MX) shot by battery-actuated fastening tool (BX3) to ceiling by steel nails (HILTI X-P 17 B3 MX) in spacing of 300 mm.

Ceiling track No. 13e

Track is made of double cable clips (HILTI X-DFB MX) shot by battery-actuated fastening tool (BX3) to ceiling by steel nails (HILTI X-P 17 B3 MX) in spacing of 600 mm.



Ceiling track No. 14

Track is made of cable clips (KSA) fixed to ceiling by screw anchors with internally threaded head (HILTI HUS3-I Flex 6 x 35 M6) and threaded rods (PGM6) in spacing of 600 mm. (3 cables placed in one clip)

Ceiling track No. 15

Track is made of cable hangers (OZO) fixed to ceiling by screw anchors with internally threaded head (HILTI HUS3-I Flex 6 x 35 M6) and threaded rods (PGM6) in spacing of 600 mm.

Suspension tracks No. 16 and 17

Supporting construction is made of segments (approx. 300 mm long) of 1,5 mm thick steel sheet bent to trapezoidal wave profile. Individual segments are fixed to ceiling by 6pcs of stud anchors M8 in spacing of 1500 mm.

Track No. 16:

Track is made of supports (CWP/CWOP40H40) fixed together by junction (LC40H40) and screws (SGKM10x20, 6 pcs). Supports are fixed to steel profiles on ceiling by trapezoidal hanger (WT/WTO120M8) and threaded rods (PGM8). Each track is additionally loaded at mid-length of span by weight (3,5kg) which represents illumination. Connection boxes PMO1 are fixed by nut bolts (SGKM6x12, 2 pcs) directly to supports. Cables are laid inside the supports without bending.

Track No. 17:

Cable trays (KFL50H60, height 60 mm, width 50 mm, steel sheet thickness 0,7 mm) fixed together by integrated coupling. Trays are fixed to steel profiles on ceiling by trapezoidal hanger (WT/WTO120M6) and threaded rods (PGM6) and loaded with 5kg.m^{-1} . Cables are laid at trays without bending and fixed to trays by plastic stripes only.

Ceiling tracks No. 18

Supporting construction is made of consoles to which are welded steel plates 5,0 mm thick. Consoles are fixed to ceiling by stud anchors in spacing of 600 mm.

Track No. 18a:

Cables are fixed to steel plates by beam clips (ZSK1).

Track No. 18b:

Track is made of single cable clips (HILTI X-FB MX) shot by battery-actuated fastening tool (BX3) to steel plates with steel nails (HILTI X-P 17 B3 MX) in spacing of 600 mm.

Wall track No. 19a

Track is made of double cable clips (HILTI X-DFB MX) shot by battery-actuated fastening tool (BX3) to wall made of full bricks (bulk density 1500kg.m^{-3}) with steel nails (HILTI X-P 30 B3 P7) in spacing of 300 mm.

Wall track No. 19b

Track is made of cable clips (HILTI X-FB MX and X-DFB MX) shot by battery-actuated fastening tool (BX3) to wall made of SILKA blocks (bulk density 2000kg.m^{-3}) with steel nails (HILTI X-C 24 B3 MX) in spacing of 300 mm.

Wall track No. 19c

Track is made of cable clips (HILTI X-FB MX and X-DFB MX) shot by battery-actuated fastening tool (BX3) to wall made of YTONG blocks (bulk density 613kg.m^{-3}) with steel nails (HILTI X-P 36 B3 P7) in spacing of 300 mm.

All support systems are made of galvanized steel, according to Sendzimir method PN-EN 10-346 and PN-EN ISO 1461.

Steel chain, line loads and cables were 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 specimens verification. Parameters which were verified 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 concrete panels made of common shocked concrete of class B 16/20, 150 mm thick – 4 pieces and side walls whereupon one of them is made of aerated concrete blocks YTONG, 250 mm thick and the second one is made of following materials (bottom – up): YTONG blocks with bulk density 613kg.m^{-3} , SILKA blocks with bulk density 2000kg.m^{-3} and red full bricks with bulk density 1500kg.m^{-3} .

Cable penetration through the wall of test furnace was sealed by mineral wool and sprayed insulation material Tecwool.

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

4.3 VERIFICATION OF THE SPECIMENS

The conformity of the drawings and the test specimens was verified before and after the fire resistance test. It was possible to carry out this verification on the test specimen. 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 (basic dimensions) and also the way of specimens fixation to supporting construction were subject of this verification.

4.4 CLIMATIC CONDITIONING OF THE SPECIMENS

Test specimens were stored in the hall of testing laboratory and were conditioned according to EN 1363-1 under the following climatic conditions:

Ambient air temperature [°C]

mean	19,2
standard deviation	1,4

Relative air humidity [%]

mean	47,1
standard deviation	4,6

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

5. CARRYING OUT OF THE TEST

5.1 CONDITIONS OF THE TEST

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

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

Relative air humidity [%]	Ambient air temperature [°C]
48,2	21,0

5.2 RESULTS OF THE TEST

Measured values are stated in this test report.

During the test there was a gradual deflection of cable bearing system, but no collapse of construction – 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 NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	19c	120 minutes no failure / interruption
2	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		120 minutes no failure / interruption
3	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV 2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	19b	71 minutes
4	2 cables (N)HXCH-J-SERVO-W FE180 PH90/E90 4x1.5 RE 0.6/1 kV	12	71 minutes
5	2 cables (N)HXCH-J-SERVO-W FE180 PH90/E90 4x50 RM 0.6/1 kV		82 minutes
6	2 cables (N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV	11	120 minutes no failure / interruption
7	2 cables (N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		55 minutes
8	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV	10	80 minutes
9	2 cables (N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		119 minutes
10	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		120 minutes no failure / interruption
11	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		115 minutes
12	2 cables (N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV	18a	120 minutes no failure / interruption
13	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		120 minutes no failure / interruption
14	2 cables (N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV	17	120 minutes no failure / interruption
15	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		120 minutes no failure / interruption
16	cable (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV + connection boxes PMO1	16	57 minutes
17	cable HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V + connection boxes PMO1		105 minutes
18	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	9	76 minutes
19	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		109 minutes
20	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	8	120 minutes no failure / interruption
21	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		120 minutes no failure / interruption
22	cable NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV + connection boxes PMO1		120 minutes no failure / interruption
23	2 cables (N)HXCH-J-SERVO-W FE180 PH90/E90 4x50 RM 0.6/1 kV	15	120 minutes no failure / interruption
24	2 cables (N)HXCH-J-SERVO-W FE180 PH90/E90 4x1.5 RE 0.6/1 kV		100 minutes
25	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	7	65 minutes
26	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		17 minutes
27	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		48 minutes
28	2 cables (N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		76 minutes
29	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV	6	51 minutes
30	2 cables (N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		120 minutes no failure / interruption
31	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		120 minutes no failure / interruption
32	2 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		15 minutes
33	2 cables (N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		120 minutes no failure / interruption
34	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		120 minutes no failure / interruption
35	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	5	100 minutes
36	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		44 minutes
37	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV 2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	4	112 minutes



Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
38	6 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV	14	47 minutes
39	6 cables (N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		15 minutes
40	6 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		120 minutes no failure / interruption
41	6 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		101 minutes
42	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	3	98 minutes
43	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		61 minutes
44	2 cables NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	2	98 minutes
45	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		120 minutes no failure / interruption
46	2 cables NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		120 minutes no failure / interruption
47	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		118 minutes
48	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	1	120 minutes no failure / interruption
49	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		113 minutes
50	2 cables (N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	13a	120 minutes no failure / interruption
51	2 cables (N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		120 minutes no failure / interruption
52	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	19c	95 minutes
53	2 cables HDGs FE180 PH90/E30-E90 2x1mm ² 300/500 V		116 minutes
54	2 cables HDGszo-W FE180 PH90/E30-E90 3x1mm ² 300/500 V	19b	120 minutes no failure / interruption
55	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		120 minutes no failure / interruption
56	2 cables HTKShkw FE180 PH90/E30-E90 1x2x0,8 mm 240 V	19a	120 minutes no failure / interruption
57	2 cables HDGs FE180 PH90/E30-E90 2x1mm ² 300/500 V		120 minutes no failure / interruption
58	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V		120 minutes no failure / interruption
59	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	10	113 minutes
60	2 cables HDGs FE180 PH90/E30-E90 2x1mm ² 300/500 V	18b	120 minutes no failure / interruption
61	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	9	70 minutes
62	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	8	87 minutes
63	2 cables HDGszo-W FE180 PH90/E30-E90 3x1mm ² 300/500 V	15	120 minutes no failure / interruption
64	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	5	97 minutes
65	2 cables HDGszo-W FE180 PH90/E30-E90 3x1mm ² 300/500 V	4	78 minutes
66	2 cables HTKShkw FE180 PH90/E30-E90 1x2x0,8 mm 240 V	3	91 minutes
67	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	2	73 minutes
68	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	1	110 minutes
69	2 cables HDGs FE180 PH90/E30-E90 2x1mm ² 300/500 V		117 minutes
70	2 cables HLGsekw FE180 PH90/E30-E90 2x1mm ² 300/500 V	13e	107 minutes
71	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	13d	114 minutes
72	2 cables HTKSH FE180 PH90/E30-E90 1x2x0,8 mm 240 V	13c	120 minutes no failure / interruption
73	2 cables HDGs FE180 PH90/E30-E90 2x1mm ² 300/500 V	13b	120 minutes no failure / interruption
74	2 cables HDGs FE180 PH90/E30-E90 2x1mm ² 300/500 V	13a	120 minutes no failure / interruption

The fire test was terminated in the 121st minute upon request of test sponsor.

Specimens S1 – S51 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.

Specimens S52 – S74 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 t [min]	Temperature [°C]										Deviation d _e [%]	Pressure [Pa] p1
	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To	
0	30,3	30,2	28,8	27,0	30,0	31,4	30,9	29,4	29,8	20,0	21,0	0,0
5	574,2	561,4	577,7	520,9	588,9	624,2	614,8	536,9	574,9	576,0	21,1	-3,0
10	642,1	618,0	707,0	675,7	675,7	630,6	678,0	677,6	663,1	678,0	21,1	-2,7
15	701,6	659,0	757,7	739,6	735,7	693,2	747,8	752,6	723,4	739,0	21,2	-2,5
20	751,7	716,8	808,5	788,1	788,1	748,8	804,2	789,6	774,5	781,0	21,2	-2,2
25	795,6	751,7	844,6	848,4	827,5	786,3	842,4	848,8	818,2	815,0	21,3	-1,7
30	838,9	807,2	890,9	887,6	872,1	827,6	886,6	882,0	861,6	842,0	21,3	-1,1
35	884,9	878,4	920,3	907,8	908,4	882,4	920,0	893,8	899,5	865,0	21,4	-0,2
40	895,9	880,1	895,0	872,3	904,4	928,5	922,3	879,2	897,2	885,0	21,4	0,1
45	909,2	925,5	942,8	926,0	922,1	893,7	914,3	908,3	917,7	902,0	21,5	0,3
50	911,0	920,9	902,7	871,8	911,1	946,9	919,6	865,3	906,2	918,0	21,5	0,2
55	933,1	948,4	926,6	896,6	932,7	968,4	938,5	882,5	928,4	932,0	21,6	0,0
60	924,5	929,1	931,9	911,5	928,1	947,6	927,8	896,9	924,7	945,0	21,6	-0,1
65	950,9	959,3	956,5	945,7	953,8	963,7	954,1	929,6	951,7	957,0	21,7	-0,2
70	968,5	977,5	972,5	965,9	970,5	979,7	970,5	948,4	969,2	968,0	21,7	-0,2
75	972,9	983,3	980,2	965,1	978,9	985,8	983,6	949,6	974,9	979,0	21,8	-0,2
80	979,9	988,0	985,9	978,2	984,6	993,3	988,0	958,4	982,0	988,0	21,9	-0,2
85	984,6	991,6	991,4	984,2	989,4	995,3	992,3	966,8	986,9	997,0	21,9	-0,2
90	1001,8	1007,2	1009,6	1002,5	1006,7	1011,7	1008,8	986,5	1004,4	1006,0	21,9	-0,3
95	1016,0	1016,1	1023,4	1018,1	1021,9	1028,1	1026,4	1003,9	1019,2	1014,0	22,0	-0,2
100	1025,0	1026,8	1032,5	1027,5	1030,2	1035,3	1033,1	1012,9	1027,9	1022,0	22,1	-0,2
105	1034,8	1035,2	1042,0	1037,0	1040,3	1045,8	1044,2	1023,4	1037,8	1029,0	22,2	-0,1
110	1042,4	1043,0	1050,7	1044,4	1048,0	1052,4	1051,0	1031,8	1045,5	1036,0	22,2	-0,1
115	1052,1	1055,1	1059,0	1051,2	1056,6	1060,9	1058,7	1040,3	1054,2	1043,0	22,2	0,0
120	1055,6	1061,4	1062,1	1046,1	1061,2	1066,4	1065,9	1039,1	1057,2	1049,0	22,2	0,0

Tave Average temperature in the test furnace calculated from individual thermometers

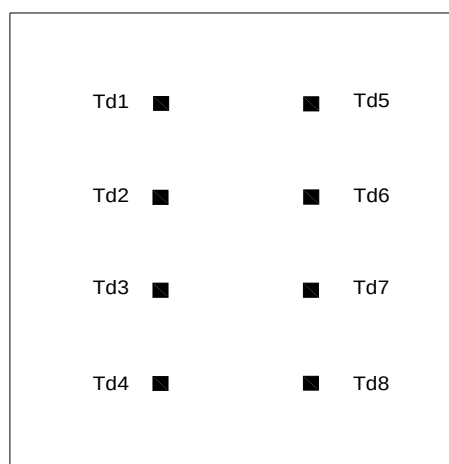
Tn Standard temperature in the test furnace laid down according to test guideline

d_e Deviation of the average temperature from the standard temperature calc. acc. to test guideline

To Ambient temperature

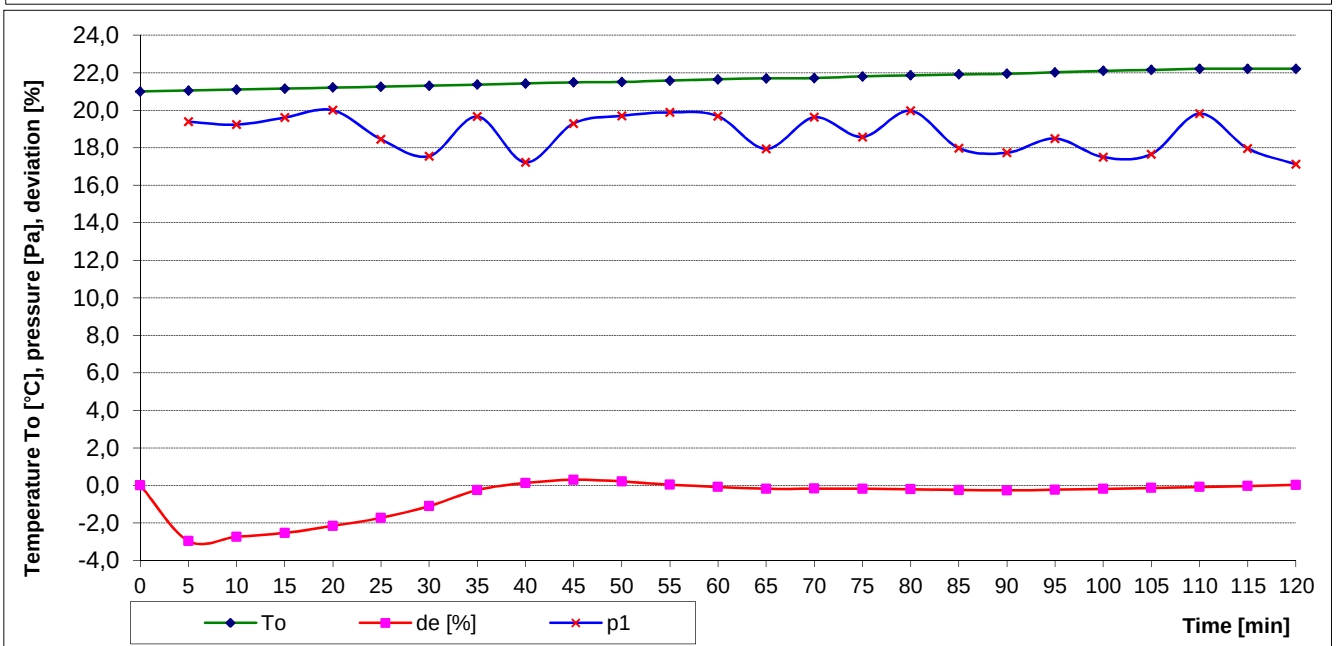
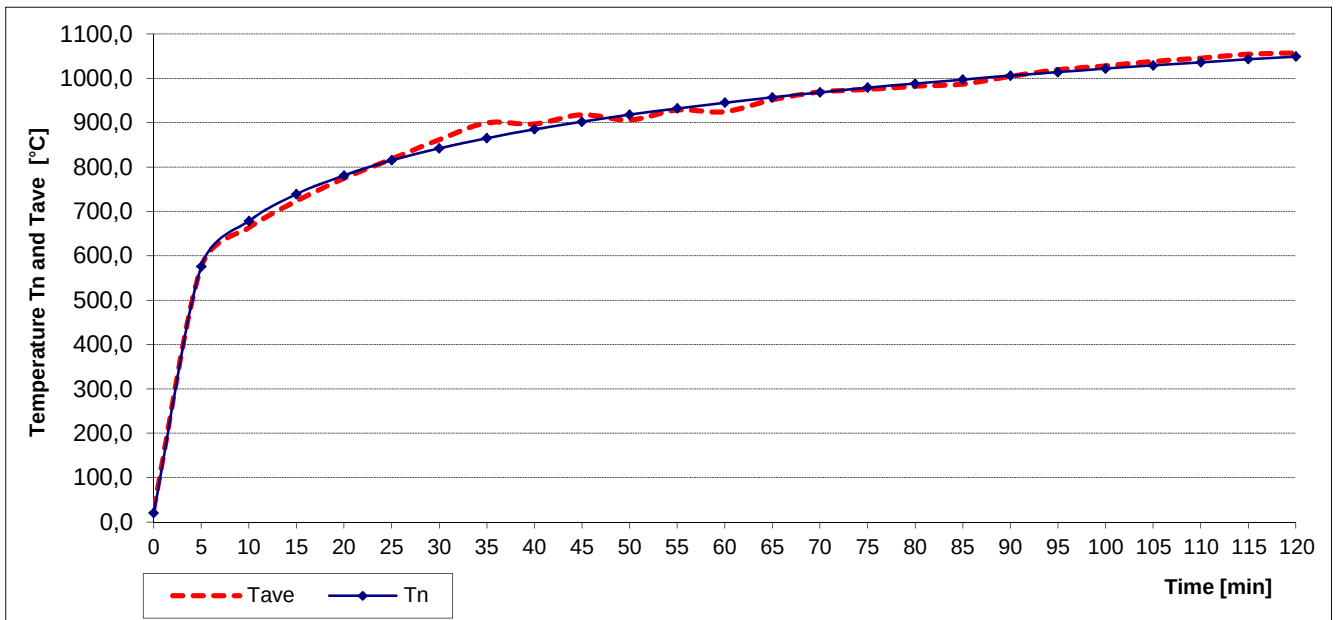
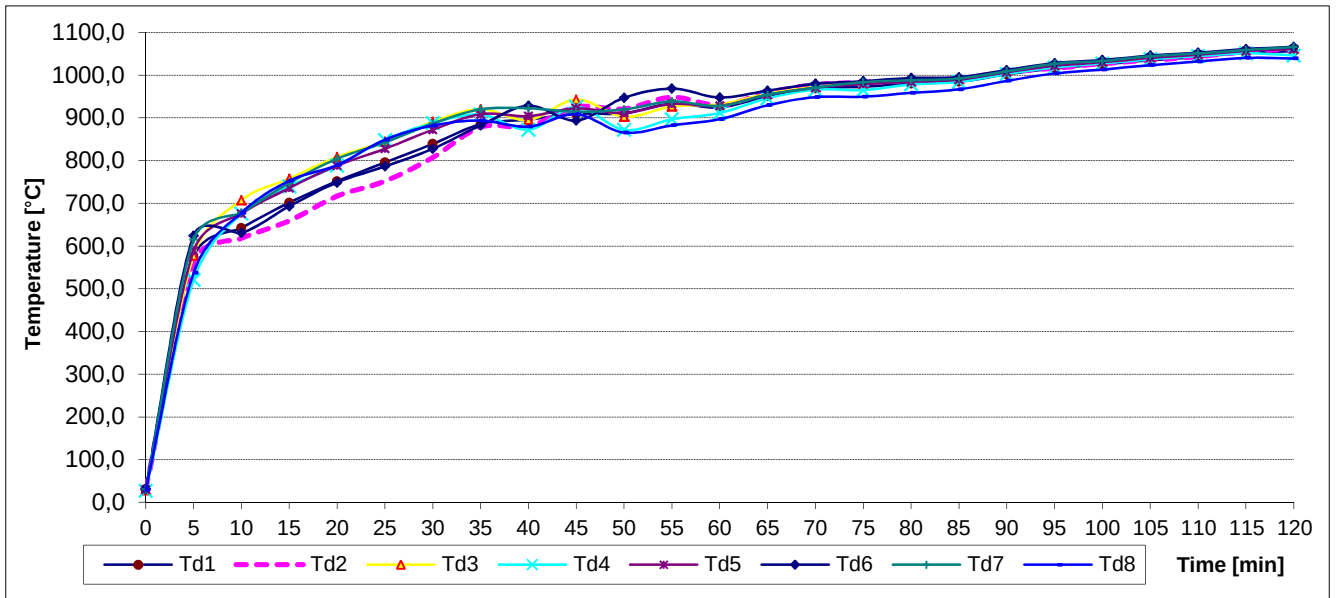
p Pressure inside the test furnace measured under the ceiling of the test furnace

Layout of measuring points in the test furnace:





Measured values inside the test furnace /graph



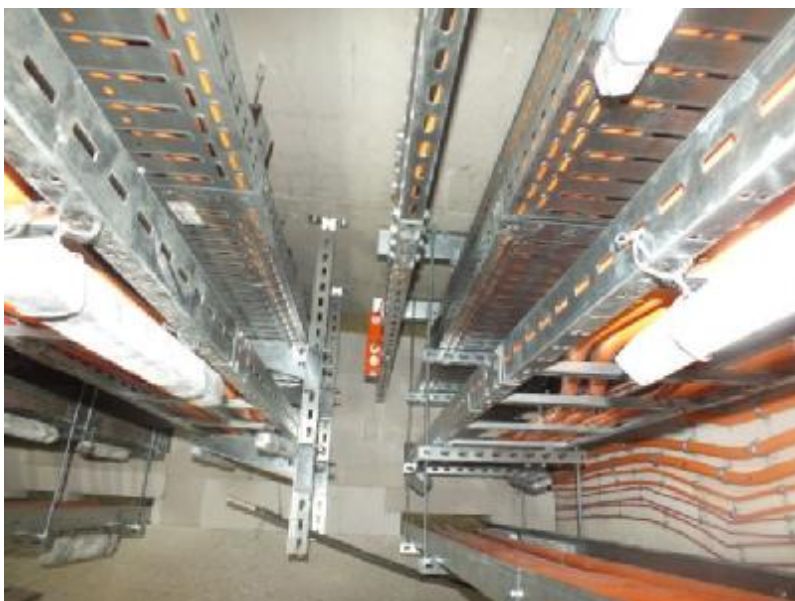
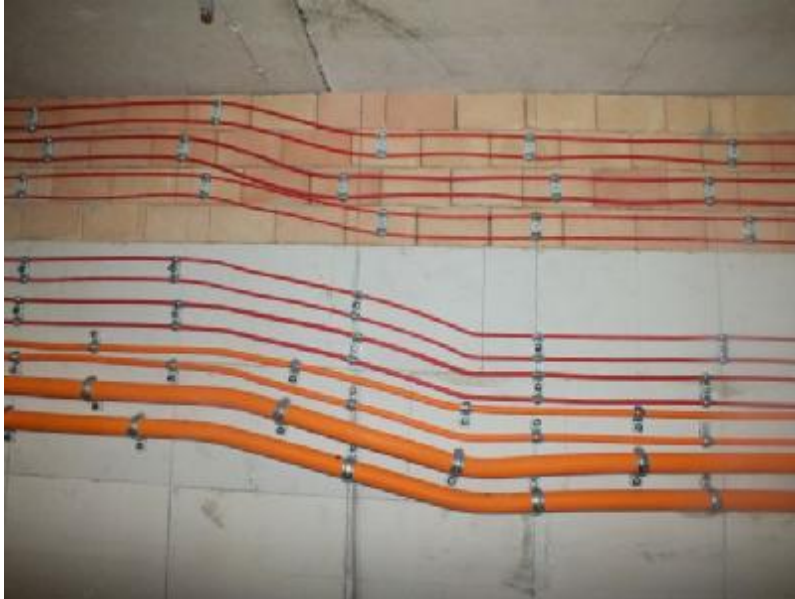


PHOTOS TAKEN BEFORE THE TEST





PHOTOS TAKEN BEFORE THE TEST





PHOTOS TAKEN AFTER THE TEST





PHOTOS TAKEN AFTER THE TEST





CABLES USED BY TEST

ISO
9001:2008

NHHH FE180 PH90/E90 0.6/1 kV, NHHH-J FE180 PH90/E90 0.6/1 kV

FIRE RESISTANT HALOGEN FREE POWER CABLES



APPLICATIONS

NHHH FE180 PH90/E90 0.6/1 kV and NHHH-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.

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

Cables for application in fire protected rooms with permanent installed water extinguishing system.

The cables are suitable for indoor and outdoor installations. Laying cables outdoor is only permitted if additional UV protection is used.

CONSTRUCTION

conductor	–	bare copper, solid or stranded, according to PN-EN 60228, EN 60228, RE - single wire round conductor; RM - multiwire round conductor
insulation	–	mica tape and halogen free cross-linked compound insulation - 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%).

CABLES USED BY TEST

ISO
9001:2008

NHXH FE180 PH90/E90 0.6/1 kV, NHXH-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	Operating temperature range	
Voltage test	4.0 kV rms	during operation	from -30 to +90°C
Insulation resistivity at 90°C, minimum	10 ¹¹ Ω·cm	during installation	from -5 to +50°C
Inductance, approximate	0.7 mH/km	Minimum bending radius:	single core cables -15 x cable diameter multi core cables -12 x cable diameter
Corrosivity of emitted gases per PN-EN 60754-2, IEC 60754-2		Cable combustibility	flame retardant
pH, approximate	6.8	Circuit integrity *	
conductivity, approximate	0.4 μS/mm	E90	DIN 4102-12
Smoke density per PN-EN 61034-2, IEC 61034-2		PH90	PN-EN 50200 Annex E or EN 50362
light transmittance, minimum	80%	Insulation integrity FE180	IEC 60331-21; IEC 60331-11
		Combustibility tests	PN-EN 60332-3-24, IEC 60332-3-24 PN-EN 50200 Annex E 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

Liczba żył x przekrój żył	Średnica zewnątrzna (około)	Indeks miedziowy	Masa kabla (około)	Ciepło spalania
mm ²	mm	kg/km	kg/km	kWh/m
1 x 6 RE	7,3	58,0	108	0,23
1 x 10 RE	8,1	96,0	152	0,26
1 x 16 RE	9,0	154,0	215	0,30
1 x 25 RM	11,0	240,0	325	0,41
1 x 35 RM	12,0	336,0	425	0,46
1 x 50 RM	13,4	480,0	560	0,55
1 x 70 RM	15,4	672,0	780	0,69
1 x 95 RM	17,1	912,0	1090	0,78
1 x 120 RM	18,8	1152,0	1290	0,90
1 x 150 RM	20,9	1440,0	1620	1,12
1 x 185 RM	22,8	1776,0	2000	1,31
1 x 240 RM	25,7	2304,0	2600	1,59
1 x 300 RM	27,9	2880,0	3200	1,80
1 x 400 RM	31,2	3840,0	4300	2,20
2 x 1,5 RE	10,1	28,8	157	0,58
2 x 2,5 RE	10,9	48,0	193	0,66
2 x 4 RE	11,8	77,0	245	0,76
2 x 6 RE	12,8	115,0	305	0,88
2 x 10 RE	14,4	192,0	425	1,08
2 x 16 RE	16,4	307,0	595	1,37
2 x 25 RM	20,5	480,0	920	2,12
3 x 1,5 RE	10,7	43,2	178	0,60
3 x 2,5 RE	11,5	72,0	225	0,68
3 x 4 RE	12,5	115,0	290	0,78
3 x 6 RE	13,5	173,0	370	0,90
3 x 10 RE	15,5	288,0	530	1,13
3 x 16 RM	18,2	461,0	770	1,47
3 x 25 RM	21,8	720,0	1150	2,10
3 x 35 RM	24,1	1008,0	1500	2,48
3 x 50 RM	27,2	1440,0	1990	3,12
3 x 70 RM	31,4	2016,0	2760	4,05
3 x 95 RM	35,1	2736,0	3600	4,89
3 x 120 RM	38,8	3456,0	4550	5,92
4 x 1,0 RE	11,0	38,4	182	0,63
4 x 1,5 RE	11,6	58,0	215	0,69

Liczba żył x przekrój żył	Średnica zewnątrzna (około)	Indeks miedziowy	Masa kabla (około)	Ciepło spalania
mm ²	mm	kg/km	kg/km	kWh/m
4 x 2,5 RE	12,5	96,0	270	0,78
4 x 4 RE	13,6	154,0	355	0,89
4 x 6 RE	14,8	230,0	455	1,02
4 x 10 RE	16,9	384,0	660	1,26
4 x 16 RM	20,0	614,0	965	1,66
4 x 25 RM	24,1	960,0	1450	2,39
4 x 35 RM	26,8	1344,0	1910	2,88
4 x 50 RM	30,1	1920,0	2520	3,54
4 x 70 RM	34,7	2688,0	3550	4,59
4 x 95 RM	39,1	3648,0	4900	5,62
5 x 1,5 RE	12,6	72,0	255	0,79
5 x 2,5 RE	13,6	120,0	325	0,90
5 x 4 RE	14,9	192,0	425	1,04
5 x 6 RE	16,4	288,0	555	1,22
5 x 10 RE	18,6	480,0	800	1,49
5 x 16 RM	22,1	768,0	1190	1,99
5 x 25 RM	26,7	1200,0	1780	2,87
5 x 35 RM	29,6	1680,0	2330	3,37
5 x 50 RM	33,4	2400,0	3150	4,23
5 x 70 RM	38,5	3360,0	4350	5,48
5 x 95 RM	43,5	4560,0	6000	6,70
7 x 1,5 RE	13,7	101,0	310	0,89
7 x 2,5 RE	14,8	168,0	400	1,01
7 x 4,0 RE	16,4	269,0	535	1,19
12 x 1,5 RE	18,0	173,0	500	1,39
12 x 2,5 RE	19,5	288,0	650	1,57
14 x 1,5 RE	18,9	202,0	555	1,51
19 x 1,5 RE	21,2	274,0	715	1,87
19 x 2,5 RE	23,1	456,0	945	2,11
24 x 1,5 RE	24,7	346,0	905	2,34
24 x 2,5 RE	27,2	576,0	1210	2,71
30 x 1,5 RE	26,4	432,0	1080	2,70
30 x 2,5 RE	28,8	720,0	1440	3,06

Other cross-sections and conductor counts available on request.

TECHNOKABEL S.A reserves the right to change specifications without prior notice.

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CABLES USED BY TEST

ISO
9001:2008

(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%).



CABLES USED BY TEST

ISO
9001:2008

(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	Operating temperature range	from -30 to +90°C
Voltage test	4.0 kV rms	during operation	from -5 to +50°C
Insulation resistivity at 90°C, minimum	10 ¹¹ Ω·cm	during installation	
Inductance, approximate	0.7 mH/km	Minimum bending radius:	single core cables -15 x cable diameter multi core cables -12 x cable diameter
Corrosivity of emitted gases per PN-EN 60754-2, IEC 60754-2		Cable combustibility	flame retardant
pH, approximate	6.8	Circuit integrity *	
conductivity, approximate	0.4 μS/mm	E30	DIN 4102-12
Smoke density per PN-EN 61034-2, IEC 61034-2		PH30	PN-EN 50200 or PN-EN 50362
light transmittance, minimum	80%	Insulation integrity FE180	IEC 60331-21; IEC 60331-11
		Combustibility tests	PN-EN 60332-3-24, 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
mm ²	mm	kg/km	kg/km	kWh/m
1 x 16 RE	8,8	154,0	210	0,32
1 x 25 RM	10,8	240,0	315	0,44
1 x 35 RM	11,8	336,0	410	0,49
1 x 50 RM	13,4	480,0	550	0,61
1 x 70 RM	15,2	672,0	760	0,73
1 x 95 RM	17,3	912,0	1070	0,91
1 x 120 RM	18,8	1152,0	1270	1,00
2 x 1,5 RE	9,7	28,8	145	0,55
2 x 2,5 RE	10,5	48,0	179	0,64
2 x 4 RE	11,4	77,0	230	0,74
2 x 6 RE	12,4	115,0	290	0,86
2 x 10 RE	14,0	192,0	405	1,07
2 x 16 RE	16,0	307,0	575	1,37
2 x 25 RM	19,9	480,0	880	2,07
3 x 1,5 RE	10,2	43,0	167	0,59
3 x 2,5 RE	11,0	72,0	210	0,67
3 x 4 RE	12,0	115,0	275	0,78
3 x 6 RE	13,1	173,0	350	0,90
3 x 10 RE	14,8	288,0	500	1,11
3 x 16 RM	17,6	461,0	770	1,48

Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)	Fire load
mm ²	mm	kg/km	kg/km	kWh/m
3 x 25 RM	21,4	720,0	1110	2,14
4 x 1,5 RE	11,1	58,0	199	0,68
4 x 2,5 RE	12,0	96,0	255	0,77
4 x 4 RE	13,1	154,0	335	0,90
4 x 6 RE	14,3	230,0	430	1,04
4 x 10 RE	16,5	384,0	630	1,31
4 x 16 RM	19,4	614,0	970	1,70
4 x 25 RM	23,6	960,0	1400	2,45
4 x 35 RM	26,3	1344,0	1840	2,95
4 x 50 RM	30,1	1920,0	2480	3,79
5 x 1,5 RE	12,1	72,0	240	0,79
5 x 2,5 RE	13,1	120,0	305	0,90
5 x 4 RE	14,3	192,0	400	1,05
5 x 6 RE	15,9	288,0	530	1,24
5 x 10 RE	18,0	480,0	765	1,53
5 x 16 RM	21,5	768,0	1200	2,04
5 x 25 RM	26,2	1200,0	1720	2,94
5 x 35 RM	29,0	1680,0	2260	3,47
5 x 50 RM	33,4	2400,0	3100	4,54
7 x 1,5 RE	13,1	101,0	290	0,90

Other cross-sections and conductor counts available on request.

TECHNOKABEL S.A reserves the right to change specifications without prior notice.



CABLES USED BY TEST

ISO
9001:2008**(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.

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. Laying cables outdoor is only permitted if additional UV protection is used.

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%).



CABLES USED BY TEST

ISO
9001:2008

(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	Operating temperature range	
Voltage test	4.0 kV rms	during operation	from -30 to +90°C
Insulation resistivity at 90°C, minimum	10 ¹¹ Ω·cm	during installation	from -5 to +50°C
Inductance, approximate	0.7 mH/km	Minimum bending radius:	single core cables -15 x cable diameter multi core cables -12 x cable diameter
Corrosivity of emitted gases per PN-EN 60754-2, IEC 60754-2		Cable combustibility	flame retardant
pH, approximate	6.8	Circuit integrity *	
conductivity, approximate	0.4 μS/mm	E90	DIN 4102-12
Smoke density per PN-EN 61034-2, IEC 61034-2		PH90	PN-EN 50200 or PN-EN 50362
light transmittance, minimum	80%	Insulation integrity FE180	IEC 60331-21; IEC 60331-11
		Combustibility tests	PN-EN 60332-3-24, 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
mm ²	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

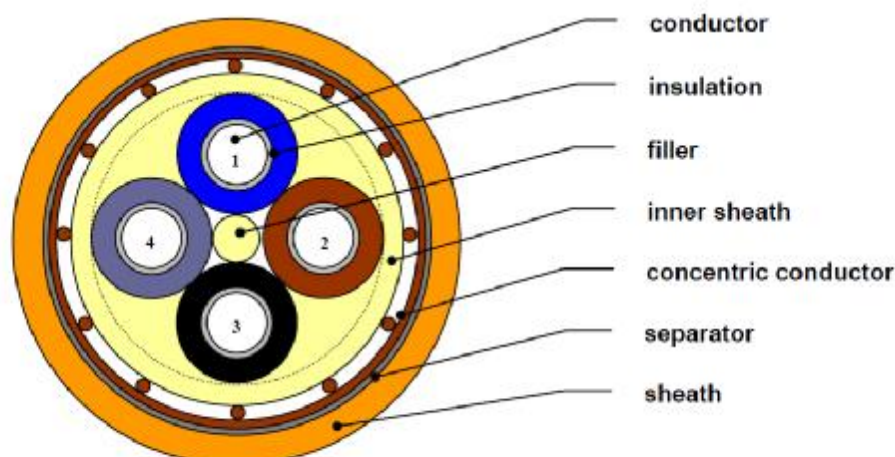
Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)	Fire load
mm ²	mm	kg/km	kg/km	kWh/m
4 x 2,5 RE	12,0	96	255	0,96
4 x 4 RE	13,1	154	335	1,06
4 x 6 RE	14,3	230	435	1,18
4 x 10 RE	16,5	384	630	1,40
4 x 16 RM	19,4	614	970	1,73
4 x 25 RM	23,6	960	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.

TECHNOKABEL S.A reserves the right to change specifications without prior notice.



CABLES USED BY TEST

ISO
9001:2008**(N)HXCH FE180 PH90/E90 0.6/1 kV****FIRE RESISTANT HALOGEN FREE POWER CABLES****APPLICATIONS**

(N)HXCH 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.

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

The cables are suitable for indoor and outdoor installations. Laying cables outdoor is only permitted if additional UV protection is used.

CONSTRUCTION

conductor	–	bare copper, solid or stranded, according to EN 60228,
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,
concentric conductor	–	concentric conductor made of bare copper wires and a copper tape binder wrapped over the inner sheath,
separator	–	polyester tape,
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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CABLES USED BY TEST

ISO
9001:2008**(N)HXCH 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	Operating temperature range	
Voltage test	4.0 kV rms	during operation	from -30 to +90°C
Insulation resistivity at 90°C, minimum	$1 \times 10^{11} \Omega \cdot \text{cm}$	during installation	from -5 to +50°C
Inductance, approximate	0.7 mH/km	Minimum bending radius	15 x cable diameter
Corrosivity of emitted gases per PN-EN 60754-2, IEC 60754-2		Cable combustibility	flame retardant
pH, approximate	6.8	Circuit integrity *	
conductivity, approximate	0.4 $\mu\text{S}/\text{mm}$	E90	DIN 4102-12
Smoke density per PN-EN 50268-2-3, IEC 61034-2		PH90	PN-EN 50200 or PN-EN 50362
light transmittance, minimum	80%	Insulation integrity FE180	IEC 60331-21; IEC 60331-11
		Combustibility tests	PN-EN 60332-3-24, 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

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm ²	mm	kg/km	kg/km
	2x1.5/1.5 RE	13.5	43.2	245
	2x2.5/2.5 RE	14.5	72	293
	2x4/4 RE	15.7	115	366
	2x6/6 RE	17.0	173	455
	3x1.5/1.5 RE	14.1	63	285
	3x2.5/2.5 RE	15.0	96	335
	3x4/4 RE	16.0	154	420
	3x6/6 RE	17.7	230	520
	3x10/10 RE	19.7	384	711
	3x16/16 RM	22.5	614	1040
	3x25/16 RM	26.0	874	1430
	4x1.5/1.5 RE	14.9	72	325
	4x2.5/2.5 RE	16.0	120	390
	4x4/4 RE	17.1	192	490
	4x6/6 RE	18.7	288	615

RE - single wire round conductor;

RM - multiwire round conductor

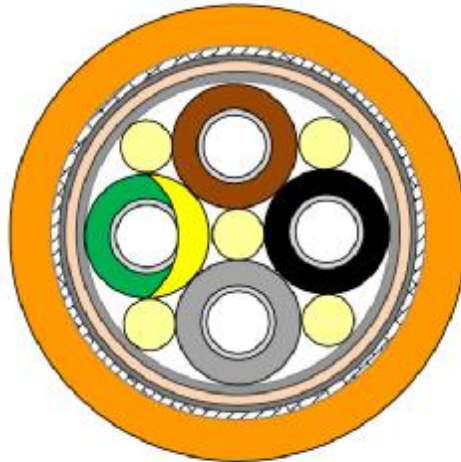
Other cross-sections and conductor counts available on request.

TECHNOKABEL S.A. reserves the right to change specifications without prior notice.

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	mm ²	mm	kg/km	kg/km
	4x10/10 RE	21.1	480	870
	4x16/16 RM	24.3	768	1250
	4x25/16 RM	28.4	1114	1740
	4x35/16 RM	31.2	1498	2200
	4x50/25 RM	35.5	2160	3000
	4x95/50 RM	45.0	4128	5600
	7x2.5/2.5 RE	17.2	192	480
	10x2.5/4 RE	21.1	278	675
	12x2.5/4 RE	21.7	326	845
	14x2.5/4 RE	22.7	374	830
	19x1.5/4 RE	22.9	312	810
	24x1.5/6 RE	26.7	403	1030



CABLES USED BY TEST

ISO
9001:2008
(N)HXCH-J-SERVO FE180 PH90/E90 0.6/1 kV
FIRE RESISTANT HALOGEN FREE MOTOR SUPPLY CABLES
**APPLICATIONS**

(N)HXCH-J-SERVO FE180 PH90/E90 fire resistant halogen free cables are intended for connecting converters or inverters with motors in industrial installations, production plants, air-conditioners and other equipment operating in dry and wet locations.

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.

Cables are protected by a specially designed and highly effective collective shield against emission of electromagnetic interferences to environment and against influence of external interferences.

The cables are suitable for indoor and outdoor installations. Laying cables outdoor is only permitted if additional UV protection is used.

CONSTRUCTION

- flexible, multiwire conductors, stranded of bare annealed copper wires (tin-plated on request), meeting requirements of class 5 per PN-EN 60228,
- double insulation, cross-linked silicone rubber - colours in accordance with PN-HD 308,
- insulated conductors and fillers laid-up in a cable core,
- cable core wrapped in a polyester tape,
- collective shield, incorporating an aluminium-polyester tape under a tinned copper wire braid shield of coverage bigger than 80%,
- orange, cable sheath made of halogen free compound according to HD 604 S1 and VDE 0276-604 – HM4, (oxygen index bigger than 35%).



CABLES USED BY TEST

ISO
9001:2008**(N)HXCH-J-SERVO 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	Operating temperature range	
Voltage test	4.0 kV rms	during operation	from -30 to +90°C
Insulation resistivity at 90°C, minimum	$1 \times 10^{11} \Omega \cdot \text{cm}$	during installation	from -5 to +50°C
Inductance, approximate	0.7 mH/km	Minimum bending radius	15 x cable diameter
Corrosivity of emitted gases per PN-EN 60754-2, IEC 60754-2		Cable combustibility	flame retardant
pH, approximate	6.8	Circuit integrity	
conductivity, approximate	0.4 $\mu\text{S}/\text{mm}$	E90	DIN 4102-12
Smoke density per PN-EN 50268-2-3, IEC 61034-2		PH90	PN-EN 50200 or PN-EN 50362
light transmittance, minimum	80%	Insulation integrity FE180	IEC 60331-21; IEC 60331-11
		Combustibility tests	PN-EN 60332-3-24, IEC 60332-3-24
			PN-EN 50200 and PN-EN 50362
		Reference standards	WT-TK-44; PN-HD 604 S1
		Circuit integrity is dependent on installation method.	

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

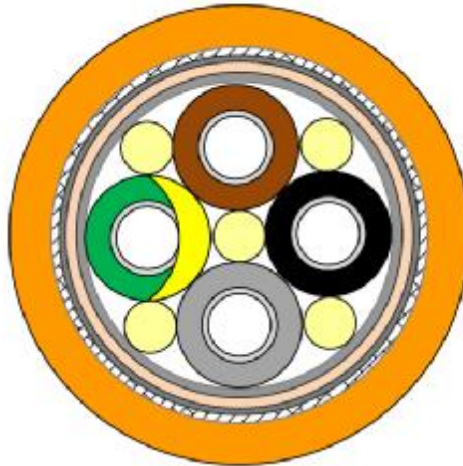
Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	number x mm ²	mm	kg/km	kg/km
	4 x 1.5	11.6	86.1	204
	4 x 50	36.8	2173	2772

Other cross-sections and conductor counts available on request.

TECHNOKABEL S.A. reserves the right to change specifications without prior notice.



CABLES USED BY TEST

ISO
9001:2008
(N)HXCH-J-SERVO-W FE180 PH90/E90 0.6/1 kV
FIRE RESISTANT HALOGEN FREE MOTOR SUPPLY CABLES
**APPLICATIONS**

(N)HXCH-J-SERVO-W FE180 PH90/E90 fire resistant halogen free cables are intended for connecting converters or inverters with motors in industrial installations, production plants, air-conditioners and other equipment operating in dry and wet locations.

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.

Cables are protected by a specially designed and highly effective collective shield against emission of electromagnetic interferences to environment and against influence of external interferences.

Cables for application in fire protected rooms with permanent installed water extinguishing system.

The cables are suitable for indoor and outdoor installations. Laying cables outdoor is only permitted if additional UV protection is used.

CONSTRUCTION

- flexible, multiwire conductors, stranded of bare annealed copper wires (tin-plated on request), meeting requirements of class 5 per PN-EN 60228,
- double insulation, cross-linked silicone rubber - colours in accordance with PN-HD 308,
- insulated conductors and fillers laid-up in a cable core,
- cable core wrapped in a polyester tape,
- cable core wrapped in mica tape,
- collective shield, incorporating an aluminium-polyester tape under a tinned copper wire braid shield of coverage bigger than 80%,
- orange, cable sheath made of halogen free compound according to HD 604 S1 and VDE 0276-604 – HM4, (oxygen index bigger than 35%).



CABLES USED BY TEST

ISO
9001:2008**(N)HXCH-J-SERVO-W 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	Operating temperature range	
Voltage test	4.0 kV rms	during operation	from -30 to +90°C
Insulation resistivity at 90°C, minimum	$1 \times 10^{11} \Omega \cdot \text{cm}$	during installation	from -5 to +50°C
Inductance, approximate	0.7 mH/km	Minimum bending radius	15 x cable diameter
Corrosivity of emitted gases per PN-EN 60754-2, IEC 60754-2		Cable combustibility	flame retardant
pH, approximate	6.8	Circuit integrity *	
conductivity, approximate	0.4 $\mu\text{S}/\text{mm}$	E90	DIN 4102-12
Smoke density per PN-EN 50268-2-3, IEC 61034-2		PH90	PN-EN 50200 Annex E or PN-EN 50362
light transmittance, minimum	80%	Insulation integrity FE180	IEC 60331-21; IEC 60331-11
		Combustibility tests	PN-EN 60332-3-24, IEC 60332-3-24
			PN-EN 50200 Annex E and PN-EN 50362
		Reference standards	WT-TK-44; PN-HD 604 S1
		Circuit integrity is dependent on installation method.	

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

Article No.	Number of conductors x conductor cross-section	Cable outer diameter (appr.)	Copper index	Cable weight (appr.)
	number x mm ²	mm	kg/km	kg/km
	4 x 1.5	12.2	87	222
	4 x 50	37.4	2175	2918

Other cross-sections and conductor counts available on request.

TECHNOKABEL S.A reserves the right to change specifications without prior notice.



CABLES USED BY TEST

ISO
9001:2008**HTKSH FE180 PH90/E30-E90, HTKSHekw FE180 PH90/E30-E90**

page 1 of 2

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.

ISO
9001:2008

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

page 2 of 2

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	200	200	200	200	200	200
	average		60	70	70	70	100	100	90	130	130	130	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	2 x 2 x 0.8	7.8	20.4	60
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	Fire Load (appr.) 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
HTKSH 1 x 2 x 1.8	0.19

Cable type	Fire Load (appr.) kWh/m
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 2 x 2 x 0.8	0.18
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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CABLES USED BY TEST

ISO
9001:2008

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

page 1 of 3

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.



CABLES USED BY TEST

ISO
9001:2008

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

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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	Corrosivity of emitted gases	very low, halogen free
Voltage test	2 kVrms	pH, aprox.	PN-EN 50267-2-3, IEC 60754-2
Insulation resistivity at 20°C, minimum	500 MΩ·km	conductivity, aprox.	6,8
Inductance, approximate	0,7 mH/km	Smoke density per	0,4 μS/cm
Conductor temperature limit in work conditions	+ 85°C	light transmittance, minimum	low smoke density
in short-circuit (max 5 s)	+ 250°C	Cable combustibility	PN-EN 50268-2-3, IEC 61034-2
Operating temperature range during operation	from - 25 to + 85°C	Combustibility tests	94 %
during installation	from -10 to + 50°C	Circuit integrity*	flame retardant
Minimum bending radius HDGs(ekw) cables	10 x cable diameter	E30-E90	PN-EN 60332-1-2, IEC 60332-1,
HLGs(ekw)cables	6 x cable diameter	PH90	PN-EN 60332-3-22, IEC 60332-3-22 (cat.A)
		Insulation integrity FE180	DIN 4102-12
		Reference standards	PN-EN 50200 or EN 50362
		Circuit integrity is dependent on installation method.	IEC 60331-21; IEC 60331-11
			AT-603-0248/2009/2014 and WT-TK-46

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



CABLES USED BY TEST

ISO
9001:2008
HDGs FE180 PH90/E30-E90, HDGsekw FE180 PH90/E30-E90
HLGs FE180 PH90/E30-E90, HLGsekw FE180 PH90/E30-E90

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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	96
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

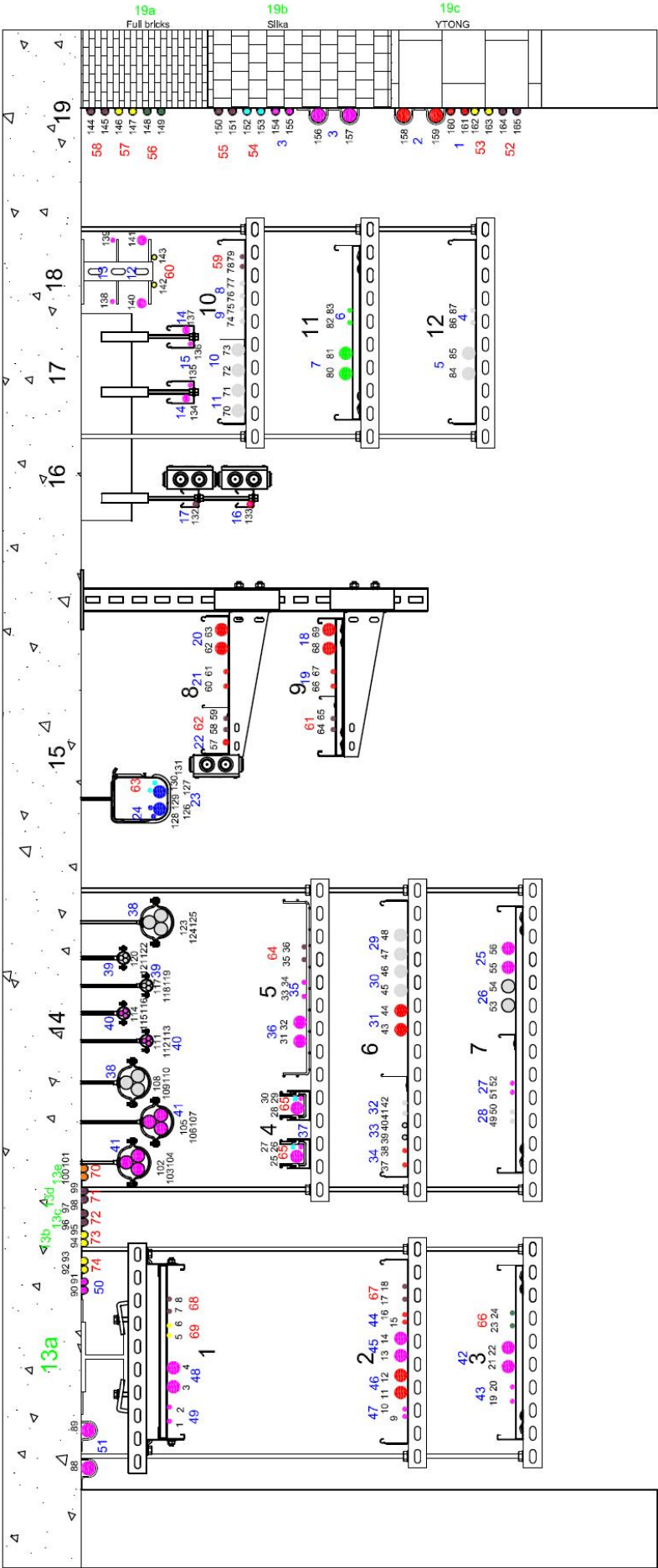
Other cross-sections and conductor counts available on request.

TECHNOKABEL S.A reserves the right to change specifications without prior notice.



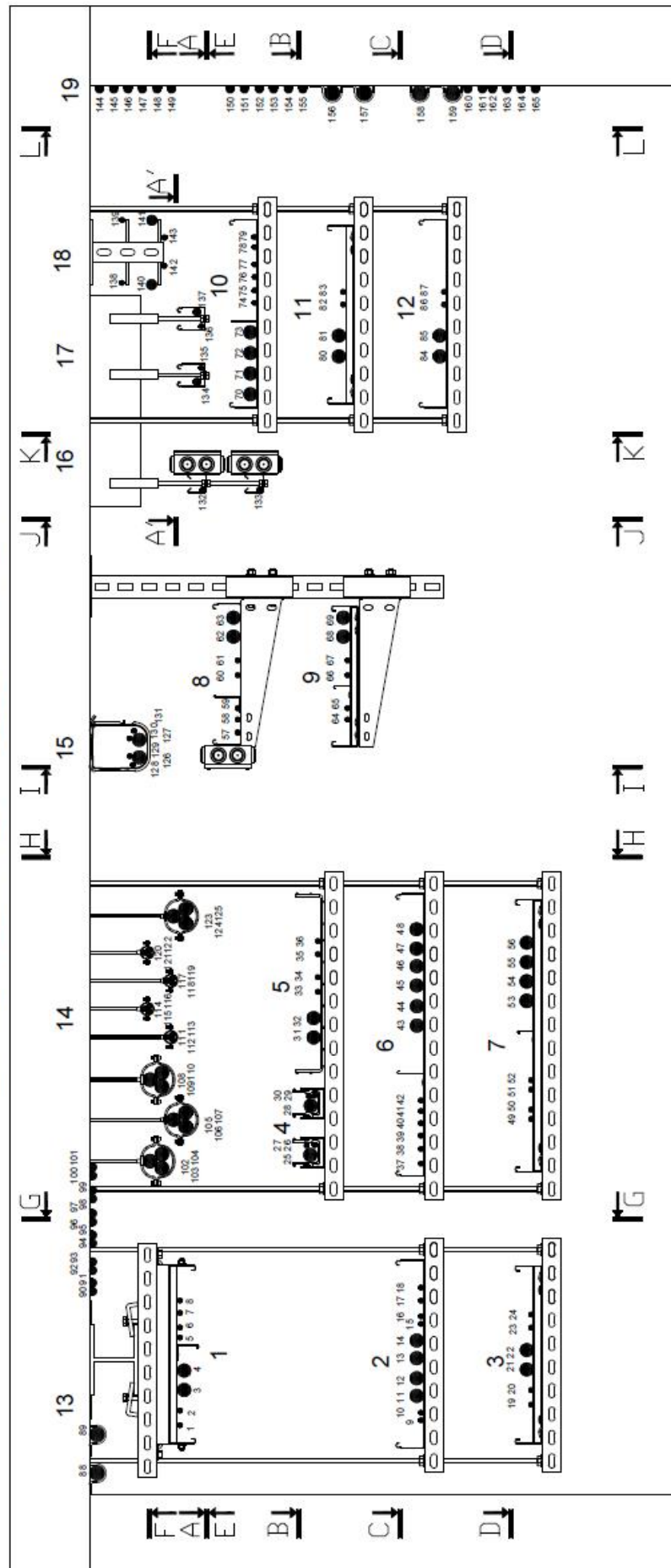
DRAWINGS

BAKS-TECHNOKABEL 14.04.2016



- (N)HXH PH90/E90
- (N)HXCH PH90/E90
- (N)HXCH-J SERVO PH90/E90
- (N)HXCH-J SERVO-W PH90/E90
- NHXH PH90/E90
- NHXH PH90/E90 B2cas1d0
- (N)HXH PH30/E30
- HTKSHekw PH90/E30-E90
- HTKSH PH90/E30-E90
- HGGS PH90/E30-E90
- HGGSzo-W PH90/E30-E90
- HLGsekw PH90/E30-E90

BAKS-TECHNOKABEL 14.04.2016





DRAWINGS

No.	No. FIRES	Cable type	Position	Description of constructions
1	49	(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	1	Cable ladders DUP/DUOP400H60 + partition B-600 1.5 m /20kg/m, steel thickness 1,5 mm. Construction: cable ladders fixed conversely to steel construction by UTM + CWOP40H40 + UDC + SRM + anchors HST2
2		(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
3	48	(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
4		(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
5	69	HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
6		HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
7	68	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
8		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
9	47	(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	2	Cable trays KCOP400H60; 1.7 m /10kg/m, steel thickness 1,5 mm. Construction: supports CWP/CWOP40H40/05 + threaded rods PG M10 + anchors HUS3-I Flex
10		(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
11	46	NHXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
12		NHXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
13	45	(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
14		(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
15	44	NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
16		NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
17	67	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
18		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
19	43	(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	3	Cable ladders DUP/DUOP400H60; 1.7 m /20kg/m, steel thickness 1,5 mm. Construction: supports CWP/CWOP40H40/05 + threaded rods PGM10 + anchors HUS3-I Flex
20		(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
21	42	(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
22		(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
23	66	HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
24		HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
25	37	(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	4	Cable mesh trays KDSZ60H60 / 1.5 m / 2kg/m. Construction: connectors USK + supports CWP/CWOP40H40/07 + threaded rods PGM10 + anchors HUS3-I Flex
26		(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
27	65	HDGszo-W FE180 PH90/E30-E90 3x1 mm ² 300/500 V		
28	37	(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
29		(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
30	65	HDGszo-W FE180 PH90/E30-E90 3x1 mm ² 300/500 V		
31	36	(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	5	Cable mesh trays KDSZ400H60 / 1.5 m / 20kg/m. Construction: supports CWP/CWOP40H40/07 + threaded rods PGM10 + anchors HUS3-I Flex
32		(N)HXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
33	35	(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
34		(N)HXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
35	64	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
36		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		



DRAWINGS

No.	No. FIRES	Cable type	Position	Description of constructions
37	34	NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	6	Cable trays KCP/KCOP600H60 + partition B-600 1.5 m /25kg/m, steel thickness 1,5 mm. Construction: supports CWP/CWOP40H40/07 + threaded rods PGM10 + anchors HUS3-I Flex
38		NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
39	33	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
40		(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
41	32	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
42		(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
43	31	NHXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
44		NHXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
45	30	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
46		(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
47	29	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		
48		(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		
49	28	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV	7	Cable ladders DUP/DUOP600H60 + partition B-600 1.5 m /30kg/m, steel thickness 1,5 mm. Construction: supports CWP/CWOP40H40/07 + threaded rods PG M10 + anchors HUS3-I Flex
50		(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
51	27	(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	26	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
54		(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
55	25	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
56		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
57	22	NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV + PMO1	8	Cable trays KFL300H60 + partition B-300 1.5 m /10kg/m, steel thickness 0,7 mm. Construction: consoles WPCB + brackets WWS/WWSO300 + anchors HST3
58	62	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
59		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
60	21	NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
61		NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
62	20	NHXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
63		NHXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
64	61	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	9	Cable ladders DFP300H60 + partition B-300/ 1.5 m / 10kg/m, steel thickness 1,5 mm. Construction: consoles WPCB + brackets WWS/WWSO300 + anchors HST3
65		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
66	19	NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
67		NHXXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
68	18	NHXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
69		NHXXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
70	11	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV	10	Cable trays KFJ400H60 + partition B-400 1.5 m /20kg/m, steel thickness 0,9 mm. Construction: supports CWP/CWOP40H40/07 + threaded rods PG M10 + anchors HUS3-I Flex
71		(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		
72	10	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
73		(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV		
74	9	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
75		(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV		
76	8	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
77		(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
78	59	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
79		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		



DRAWINGS

No.	No. FIRES	Cable type	Position	Description of constructions
80	7	(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV	11	Cable ladders DFP400H60 / 1.5 m / 20kg/m, steel thickness 1,5 mm. Construction: supports CWP/CWOP40H40/07 + threaded rods PG M10 + anchors HUS3-I Flex
81		(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV		
82	6	(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		
83		(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV		
84	5	(N)HXCH-J-SERVO-W FE180 PH90/E90 4x50 RM 0.6/1 kV	12	Cable trays KBJ400H60 1,5 m / 20kg/m, steel thickness 1,0 mm. Construction: supports CWP/CWOP40H40/07 + threaded rods PG M10 + anchors HUS3-I Flex
85		(N)HXCH-J-SERVO-W FE180 PH90/E90 4x50 RM 0.6/1 kV		
86	4	(N)HXCH-J-SERVO-W FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
87		(N)HXCH-J-SERVO-W FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
88	51	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	13a	Cable clips X-FB MX fixed to ceiling by steel nails X-P B3 in spacing of 600 mm.
89		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
90	50	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
91		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
92	74	HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
93		HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
94	73	HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V	13b	Cable clips X-FB MX fixed to ceiling by steel nails X-P B3 in spacing of 300 mm.
95		HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
96	72	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	13c	Cable clips X-FB MX fixed to ceiling by steel nails X-P B3 in spacing of 600 mm.
97		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
98	71	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	13d	Cable clips X-FB MX fixed to ceiling by steel nails X-P B3 in spacing of 300 mm.
99		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
100	70	HLGsekw FE180 PH90/E30-E90 2x1 mm ² 300/500 V	13e	Cable clips X-DFB MX fixed to ceiling by steel nails X-P B3 in spacing of 600 mm.
101		HLGsekw FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
102	41	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	14	Cable clips KSA fixed to ceiling by screw anchors HUS3-I flex 6x35 M6 and threaded rods PGM6 in spacing of 600 mm. (3 cables in one clip)
103		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
104		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
105		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
106		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
107		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
108	38	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		
109		(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		
110		(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		
111	40	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
112		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
113		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
114		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
115		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
116		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
117	39	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
118		(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
119		(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
120		(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
121		(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
122		(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV		



DRAWINGS

No.	No. FIRES	Cable type	Position	Description of constructions
123	38	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV	14	Cable clips KSA fixed to ceiling by screw anchors HUS3-I flex 6x35 M6 and threaded rods PGM6 in spacing of 600 mm. (3 cables in one clip)
124		(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		
125		(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV		
126	23	(N)HXCH-J-SERVO-W FE180 PH90/E90 4x50 RM 0.6/1 kV	15	Cable hangers OZO fixed to ceiling by screw anchors HUS3-I flex 6x35 M6 and threaded rods PGM6 in spacing of 600 mm.
127		(N)HXCH-J-SERVO-W FE180 PH90/E90 4x50 RM 0.6/1 kV		
128	24	(N)HXCH-J-SERVO-W FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
129		(N)HXCH-J-SERVO-W FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
130	63	HDGszo-W FE180 PH90/E30-E90 3x1 mm ² 300/500 V		
131		HDGszo-W FE180 PH90/E30-E90 3x1 mm ² 300/500 V		
132	17	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V + PMO1	16	Supports CWP/CWOP40H40 fixed to steel sheet (1,5 mm thick bent to trapezoidal wave) on ceiling by trapezoidal hangers WT/WTO and threaded rods PGM8 in spacing of 1500 mm. Additional loading 3,5 kg at place of connection of supports (represent lighting).
133	16	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV + PMO1		
134	14	(N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV	17	Cable trays KFL50H60, 1.5 m / 5kg/m. Construction: threaded rods PGM6 passing through cable trays + WT/WTO120M6 fixed to steel sheet (1,5 mm thick bent to trapezoidal wave) on ceiling.
135	15	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
136		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
137	14	(N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV		
138	13	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	18a	Cables fixed to steel plates (5 mm thick) welded to consoles by beam clips ZSK1 in spacing of 600 mm.
139		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
140	12	(N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV		
141		(N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV		
142	60	HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V	18b	Cables fixed to steel plates (5 mm thick) welded to consoles by cable clips X-FB MX with steel nails X-P B3 in spacing of 600 mm.
143		HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
144	58	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	19a	Cable clips X-DFB MX fixed to wall of full bricks by steel nails X-P B3 in spacing of 300 mm.
145		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
146	57	HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
147		HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
148	56	HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
149		HTKSHekw FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
150	55	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	19b	Cable clips X-DFB MX fixed to wall of SILKA blocks by steel nails X-C B3 in spacing of 300 mm.
151		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
152	54	HDGszo-W FE180 PH90/E30-E90 3x1 mm ² 300/500 V		
153		HDGszo-W FE180 PH90/E30-E90 3x1 mm ² 300/500 V		
154	3	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		Cable clips X-FB MX fixed to wall of SILKA blocks by steel nails X-C B3 in spacing of 300 mm.
155		(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
156		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
157		(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
158	2	NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	19c	Cable clips X-FB MX fixed to wall of YTONG blocks by steel nails X-P B3 in spacing of 300 mm.
159		NHXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV		
160	1	NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		
161		NHXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV		



DRAWINGS

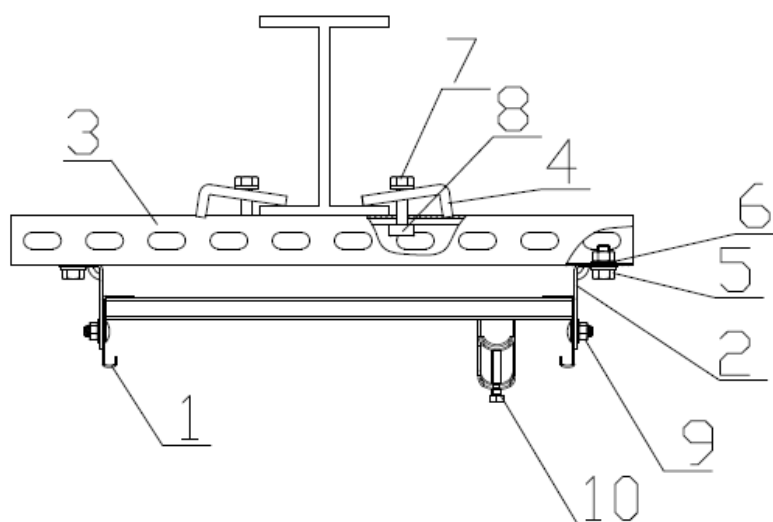
No.	No. FIRES	Cable type	Position	Description of constructions
162	53	HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V	19c	Cable clips X-DFB MX fixed to wall of YTONG blocks by steel nails X-P B3 in spacing of 300 mm.
163		HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V		
164	52	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		
165		HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V		

No.	Cable type	Cable diameter [mm]	Weight of cable [kg.m ⁻¹]	Amount
1	NHXX-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	12,0	0.2	11
2	NHXX-J FE180 PH90/E90 4x50 RM 0.6/1 kV	29,0	2.4	10
3	(N)HXCH FE180 PH90/E90 4x1.5/1.5 RE 0.6/1 kV	11,0	0.3	6
4	(N)HXCH FE180 PH90/E90 4x50/25 RM 0.6/1 kV	32,0	3.0	6
5	(N)HXH-J FE180 PH30/E30 4x1.5 RE 0.6/1 kV	14,0	0.2	2
6	(N)HXH-J FE180 PH30/E30 4x50 RM 0.6/1 kV	29,0	2.4	2
7	(N)HXH-J FE180 PH90/E90 4x16 RE 0.6/1 kV	20,0	1,0	4
8	(N)HXH-J FE180 PH90/E90 4x1.5 RE 0.6/1 kV	11,0	0.2	27
9	(N)HXH-J FE180 PH90/E90 4x50 RM 0.6/1 kV	29,0	2.4	22
10	(N)HXCH-J-SERVO FE180 PH90/E90 4x1.5 RE 0.6/1 kV	12,0	0.5	10
11	(N)HXCH-J-SERVO FE180 PH90/E90 4x50 RM 0.6/1 kV	37,0	3.3	10
12	(N)HXCH-J-SERVO-W FE180 PH90/E90 4x1.5 RE 0.6/1 kV	12,0	0.5	4
13	(N)HXCH-J-SERVO-W FE180 PH90/E90 4x50 RM 0.6/1 kV	37,0	3.3	4
14	HTKSH FE180 PH90/E30-E90 1x2x0.8 mm 240 V	5,0	0.1	23
15	HTKSHeqw FE180 PH90/E30-E90 1x2x0.8 mm 240 V	6,0	0.1	4
16	HDGs FE180 PH90/E30-E90 2x1 mm ² 300/500 V	6,0	0.1	12
17	HLGsekw FE180 PH90/E30-E90 2x1 mm ² 300/500 V	7,0	0.1	2
18	HDGszo-W FE180 PH90/E30-E90 3x1 mm ² 300/500 V	7,0	0.1	6
TOTAL				165



DRAWINGS

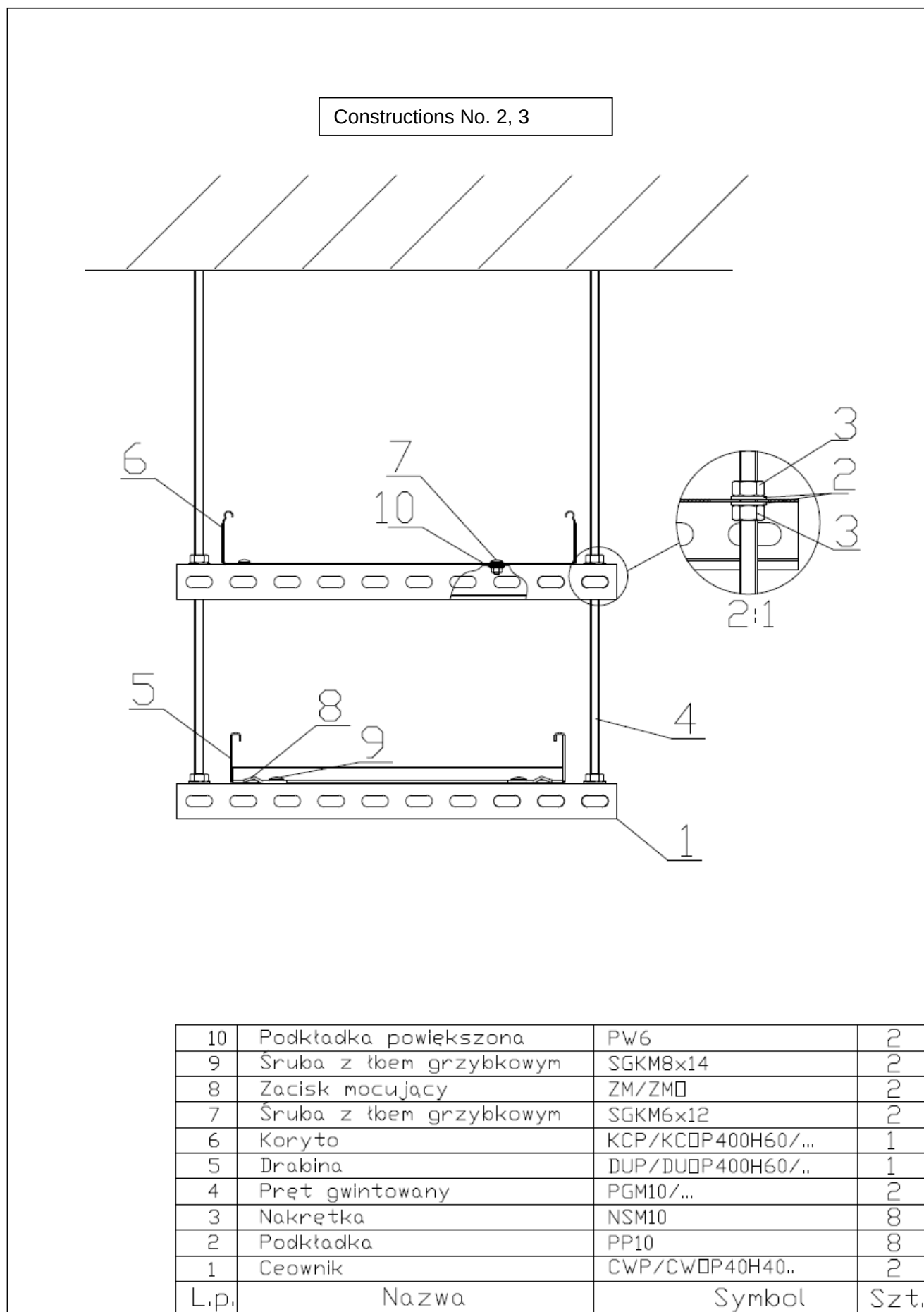
Construction No. 1



10	Uchwyt kablowy	UK1/UK01...	
9	Śruba z łbem grzybkowym	SGKM8x14	2
8	Nakrętka rombowa	NRM10	2
7	Śruba	SMM8x16	2
6	Podkładka	PW8	2
5	Śruba (kpl.)	SMM10x20	2
4	Uchwyt dociskowy	UDC	2
3	Ceownik wzmacniony	CWP/CWOP40H40/...	1
2	Uchwyt trójkątny	UTM/UTMO	2
1	Drabina	DUP/DUOP400H60/...	1
L.p.	Nazwa	Symbol	Szt.

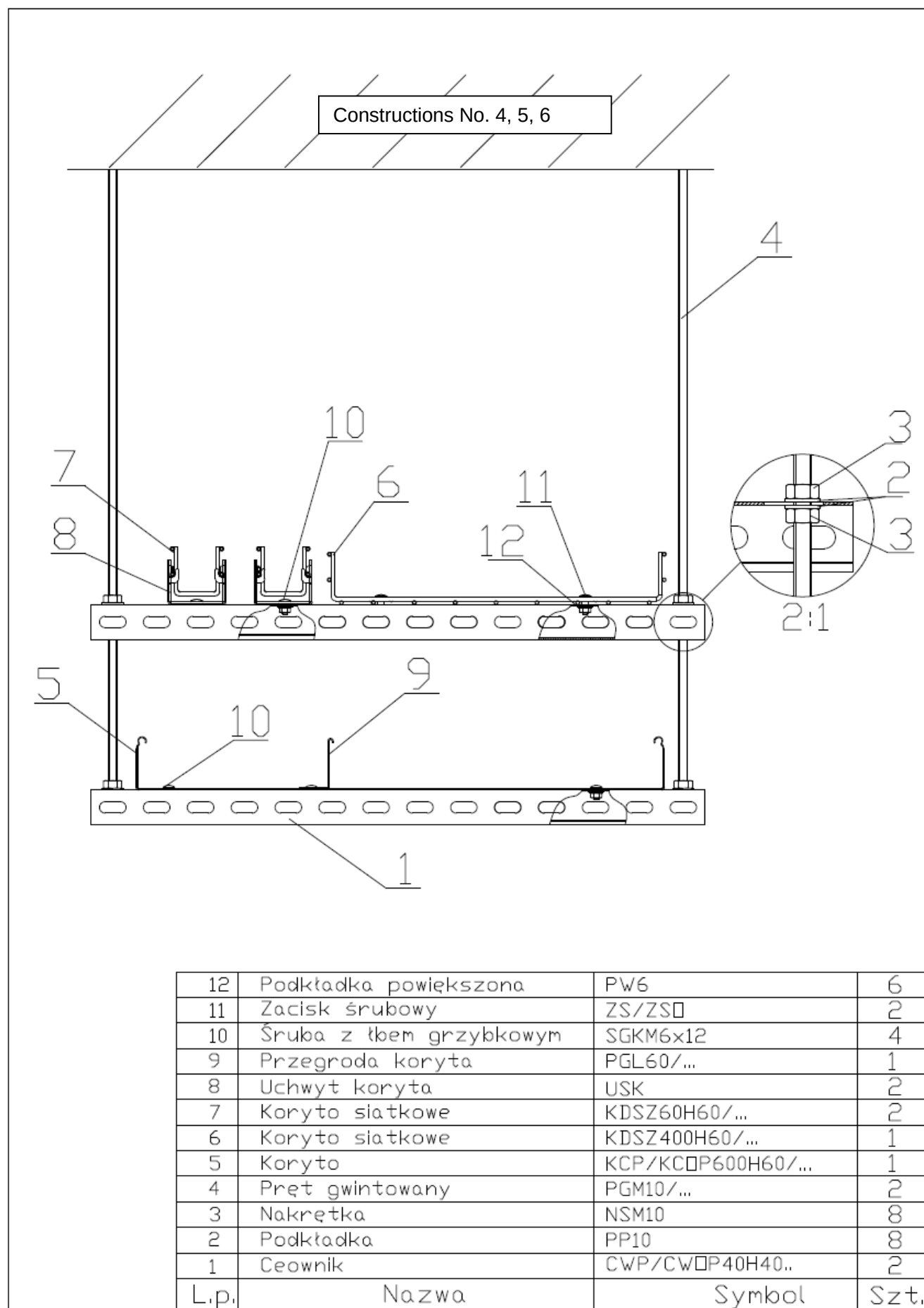


DRAWINGS



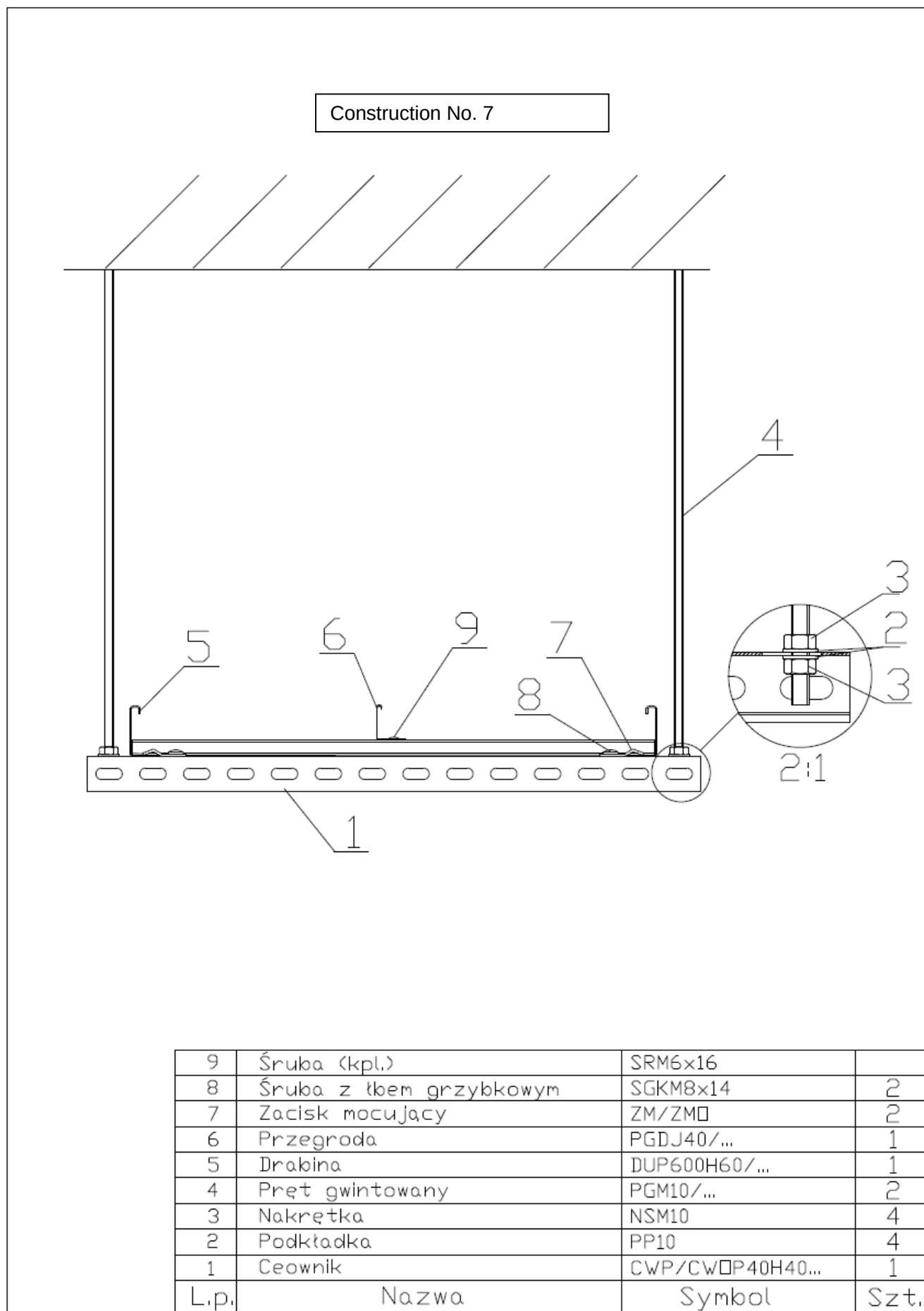


DRAWINGS





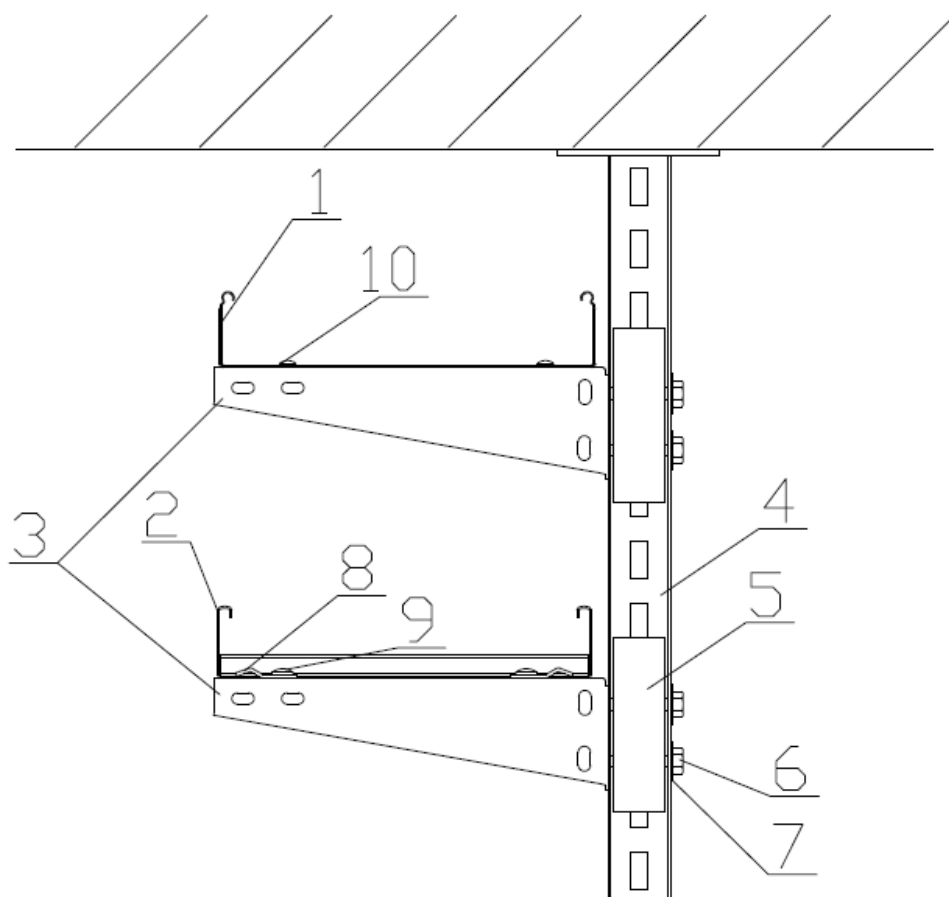
DRAWINGS





DRAWINGS

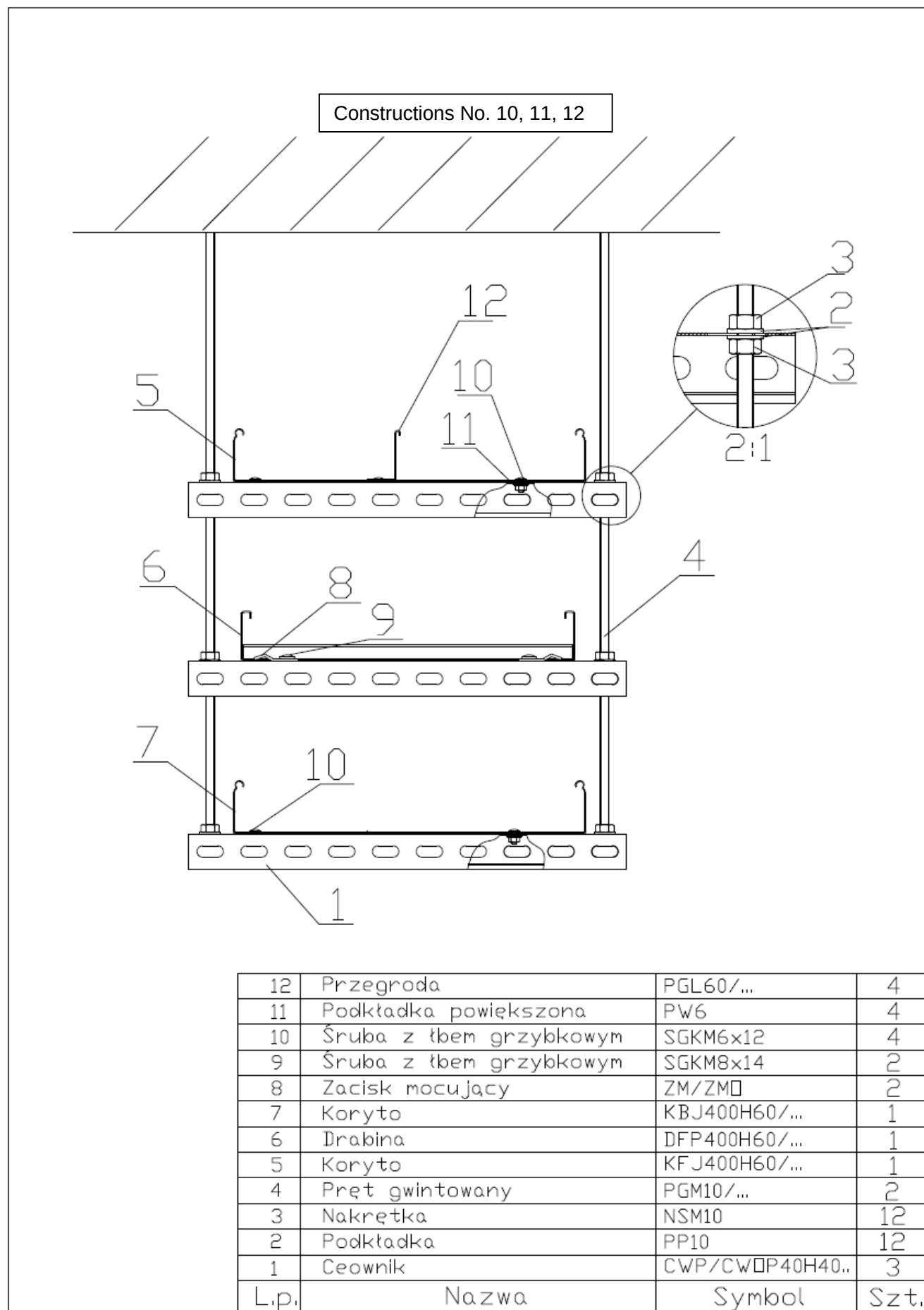
Constructions No. 8, 9



10	Śruba z łbem grzybkowym	SGKM6x12	2
9	Śruba z łbem grzybkowym	SGKM8x14	2
8	Zacisk mocujący	ZM/ZM□	2
7	Podkładka	PP10	4
6	Śruba	SMM10x70	4
5	Blacha rozporowa	BR55	2
4	Wspornik sufitowy	WPCB...	1
3	Wysięgnik	WWS/WWS□300	2
2	Drabina	DFP300H60...	1
1	Koryto	KFL300H60...	1
L.p.	Nazwa	Symbol	Szt.

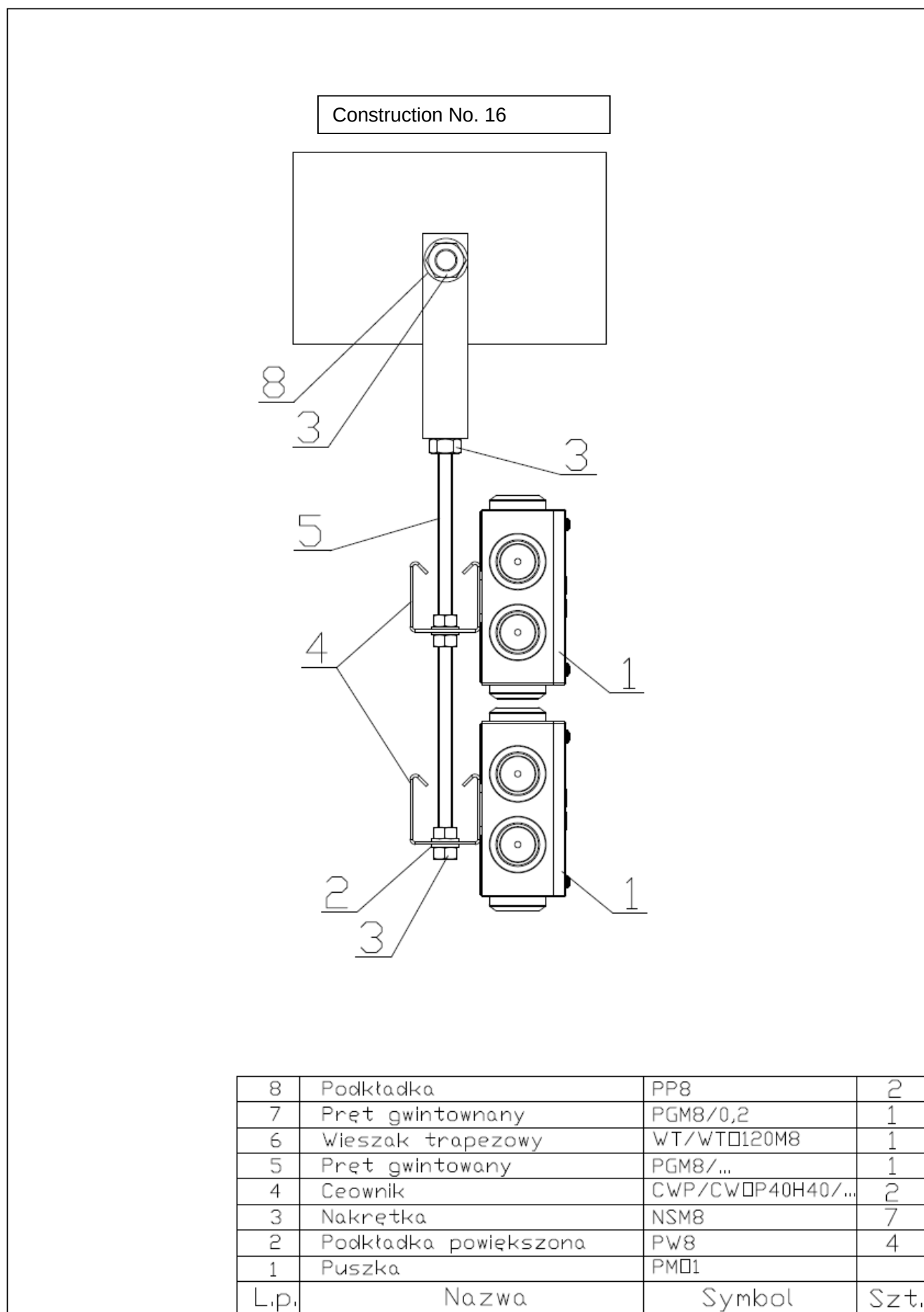


DRAWINGS





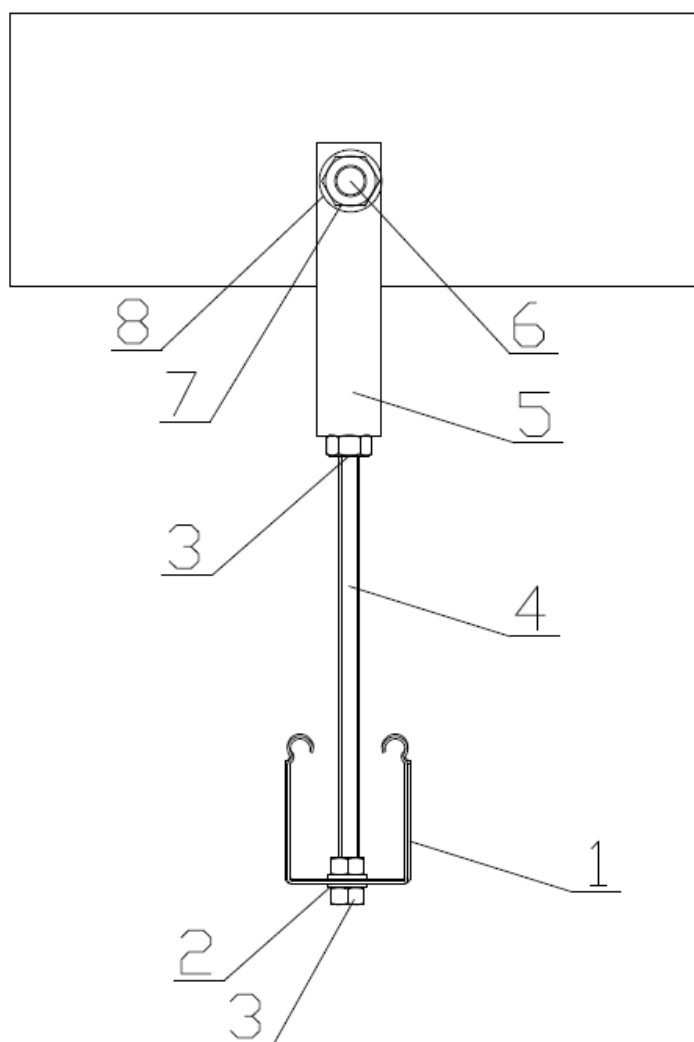
DRAWINGS





DRAWINGS

Construction No. 17



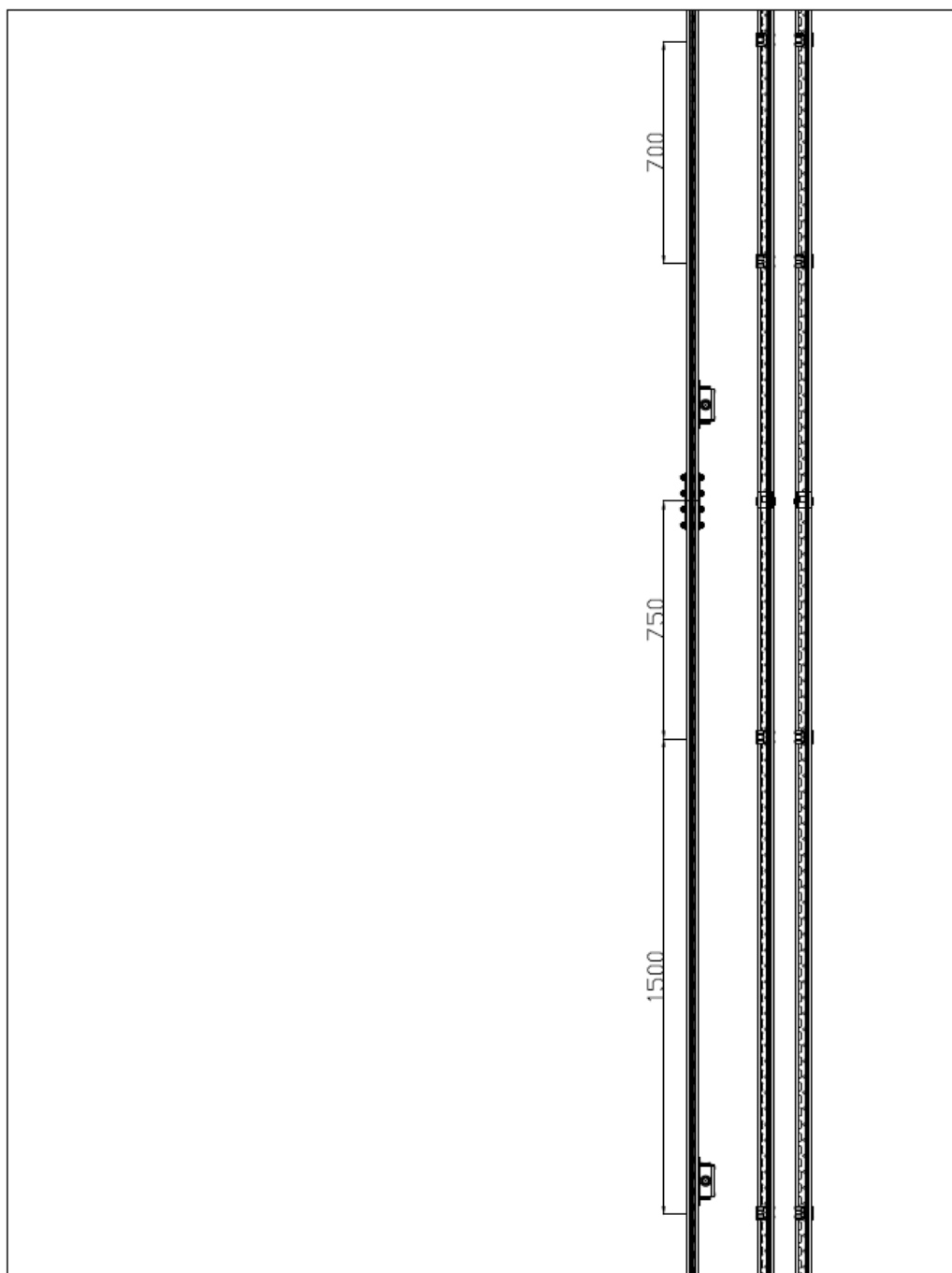
8	Podkładka	PP8	2
7	Nakrętka	NSM8	2
6	Pręt gwintowany	PGM8/0,2	1
5	Wieszak trapezowy	WT/WT0120M6	1
4	Pręt gwintowany	PGM6/...	1
3	Nakrętka	NSM6	3
2	Podkładka powiększona	PW6	4
1	Koryto	KFL50H60/...	1
L.p.	Nazwa	Symbol	Szt.



DRAWINGS

 $\Delta' - \Delta'$

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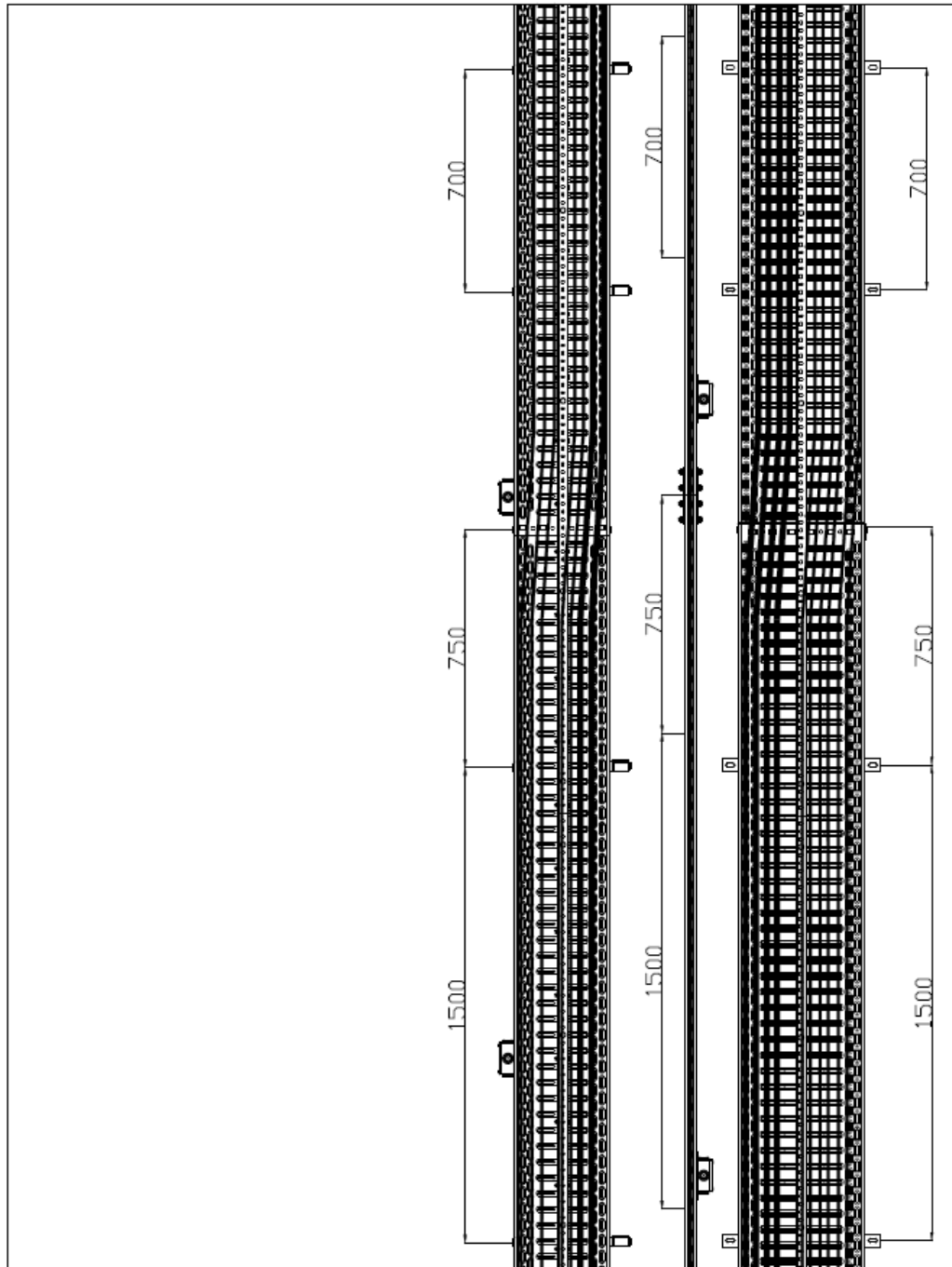




DRAWINGS

A-A

BAKS-TECHNOKABEL 14.04.2016

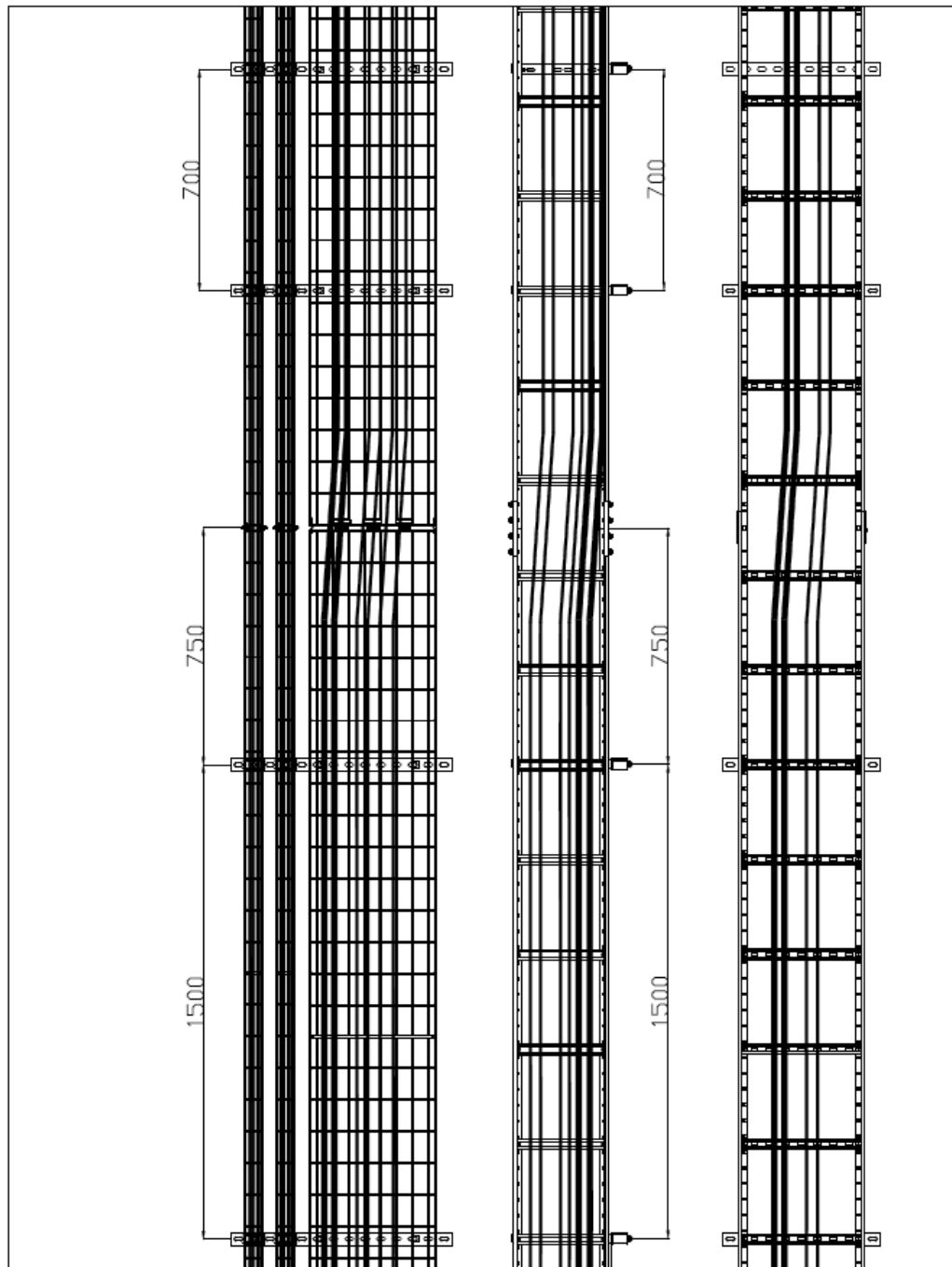




DRAWINGS

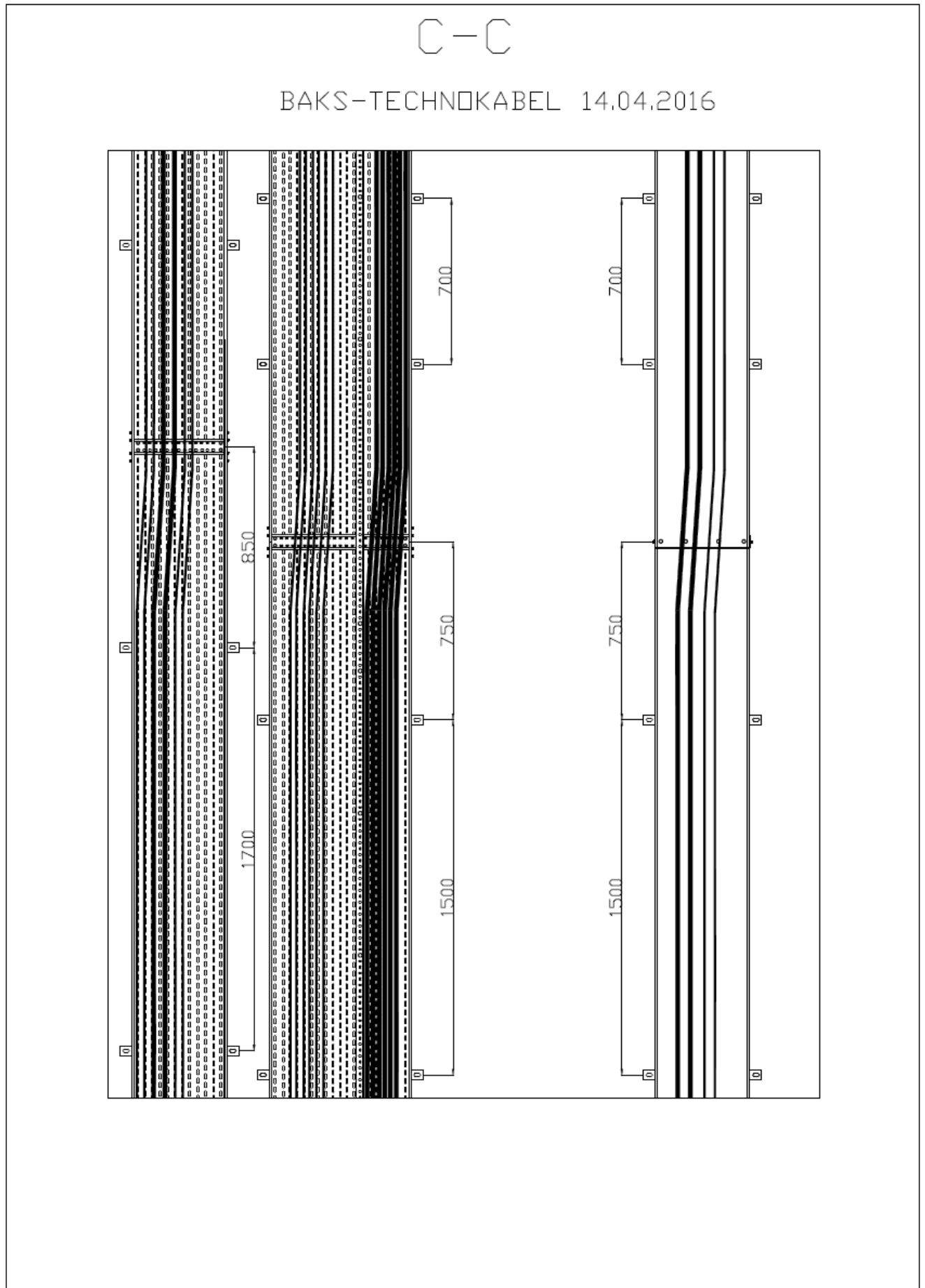
B-B

BAKS-TECHNOKABEL 14.04.2016





DRAWINGS

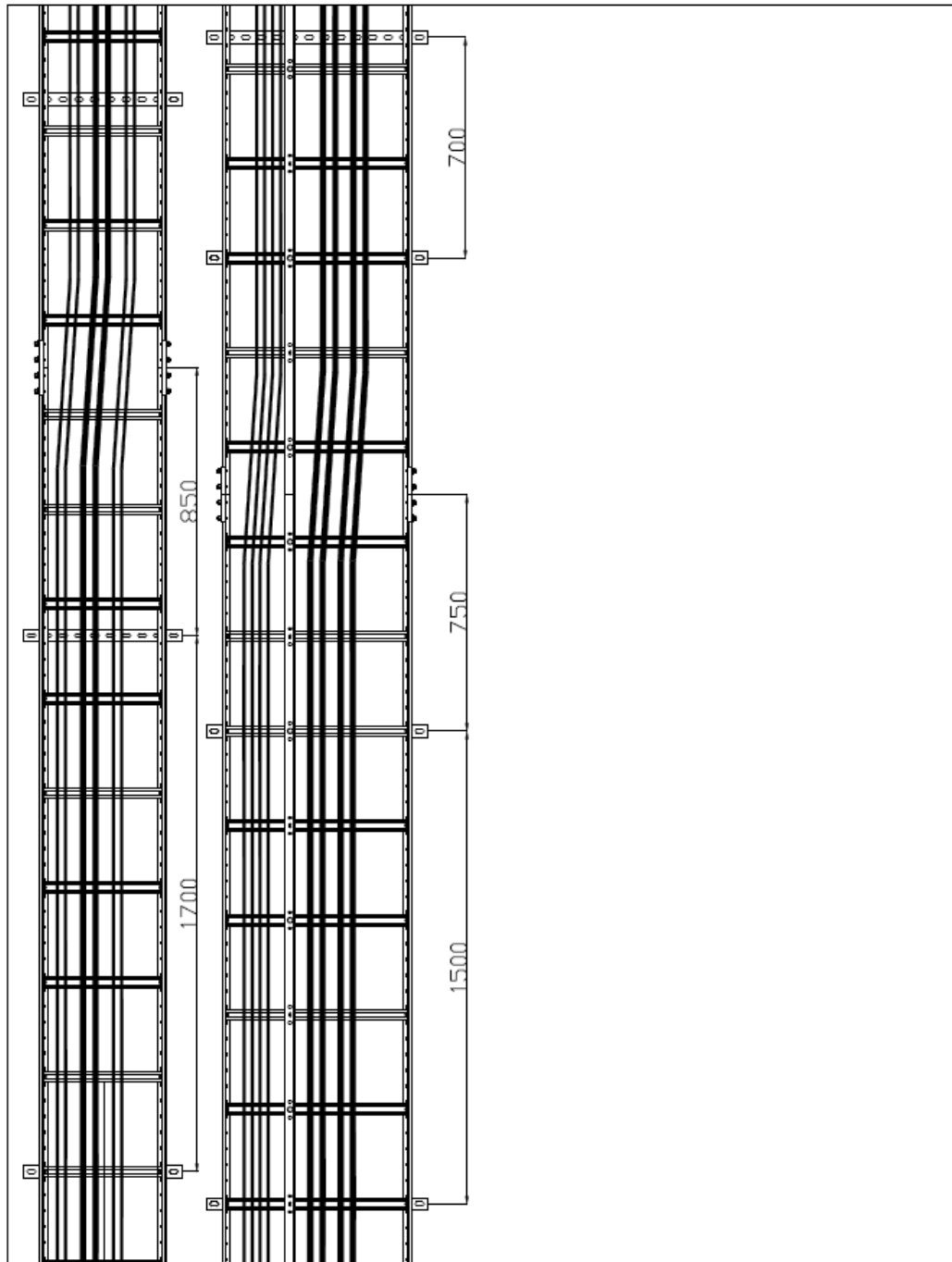




DRAWINGS

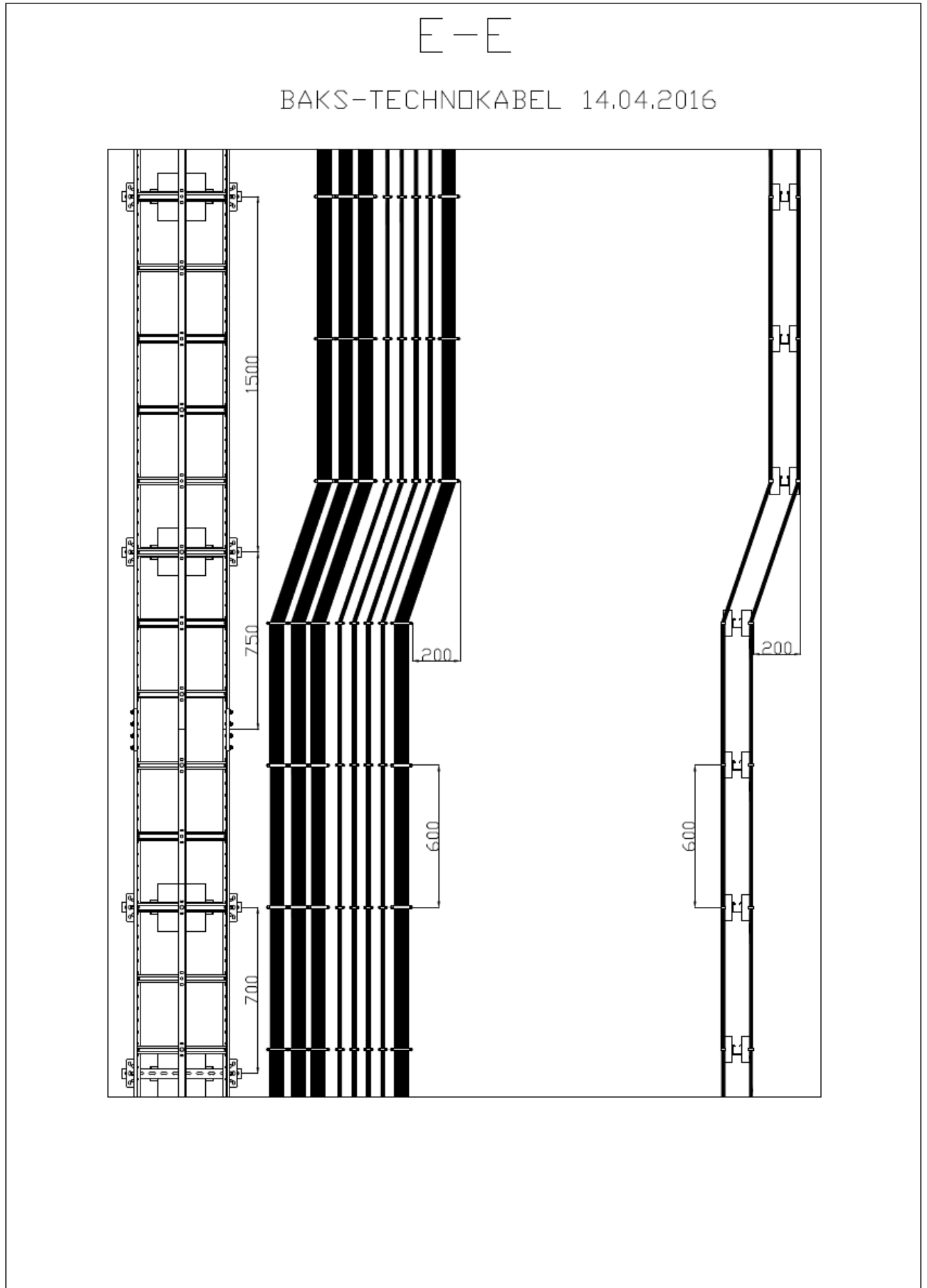
D-D

BAKS-TECHNOKABEL 14.04.2016





DRAWINGS

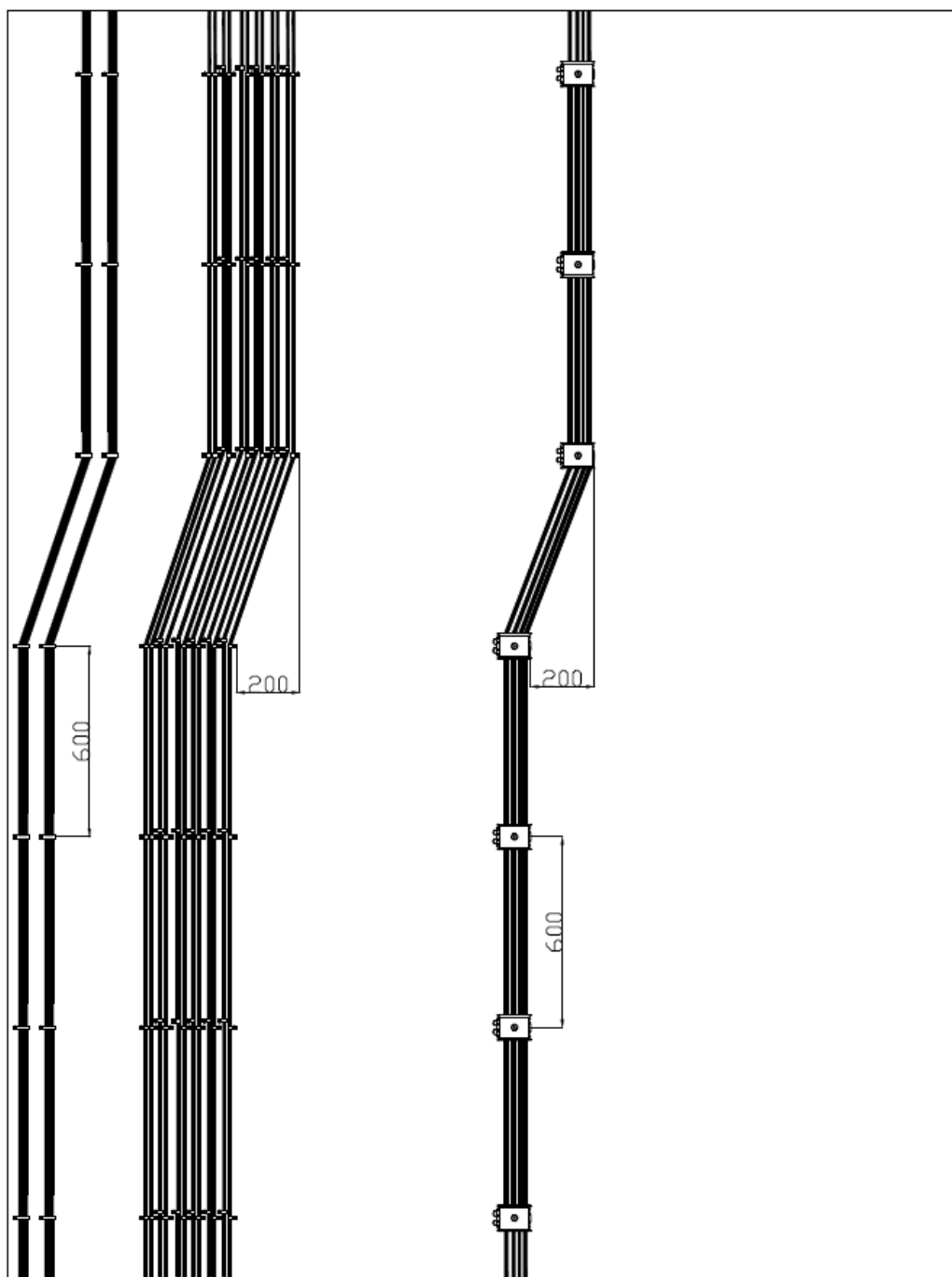




DRAWINGS

F - F

BAKS-TECHNOKABEL 14.04.2016

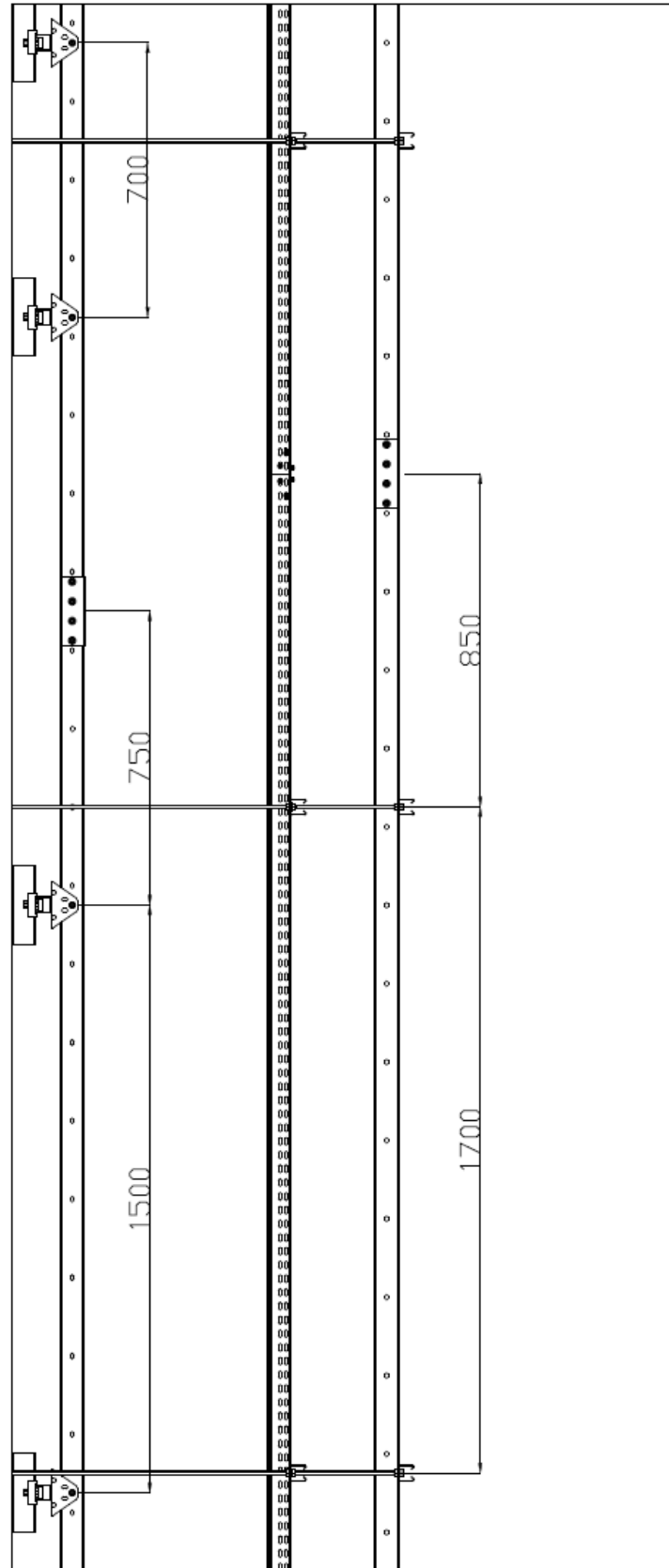




DRAWINGS

G-G

BAKS-TECHNOKABEL 14.04.2016

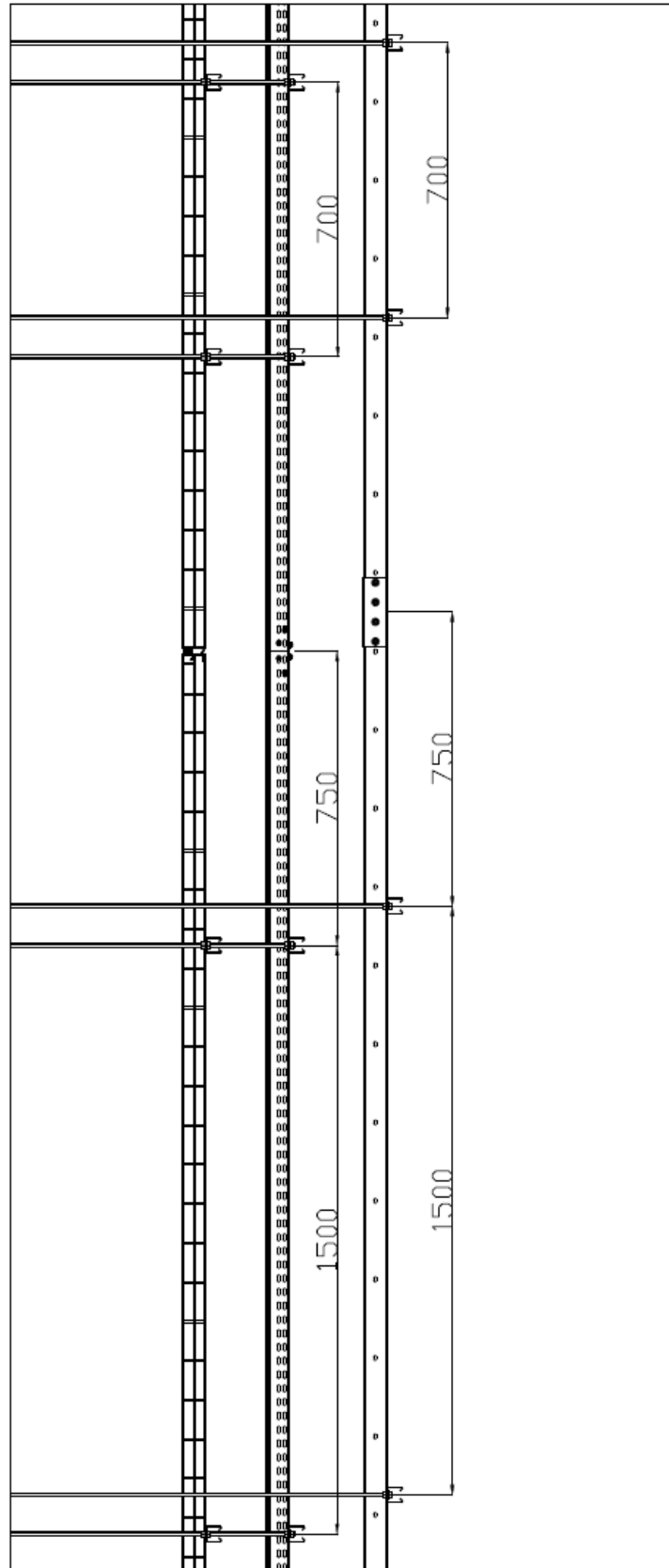




DRAWINGS

H-H

BAKS-TECHNOKABEL 14.04.2016

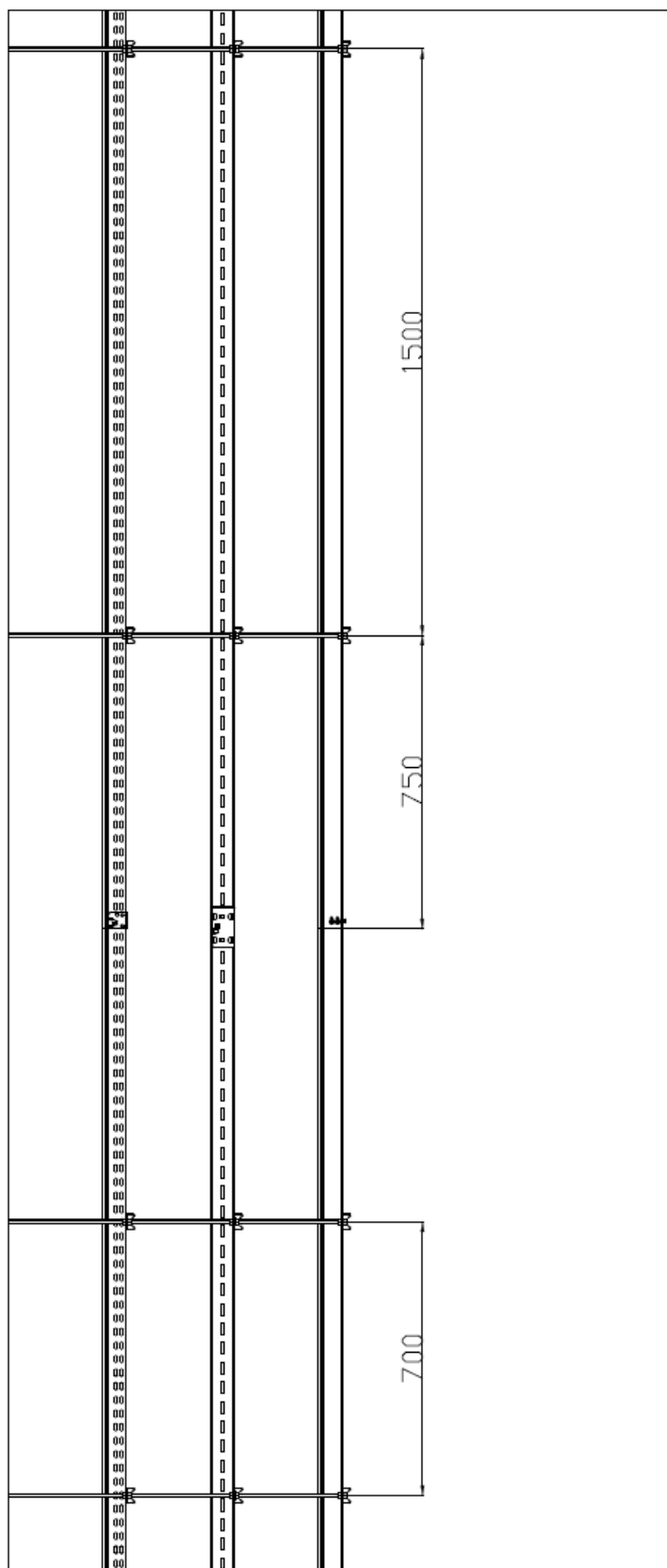




DRAWINGS

K-K

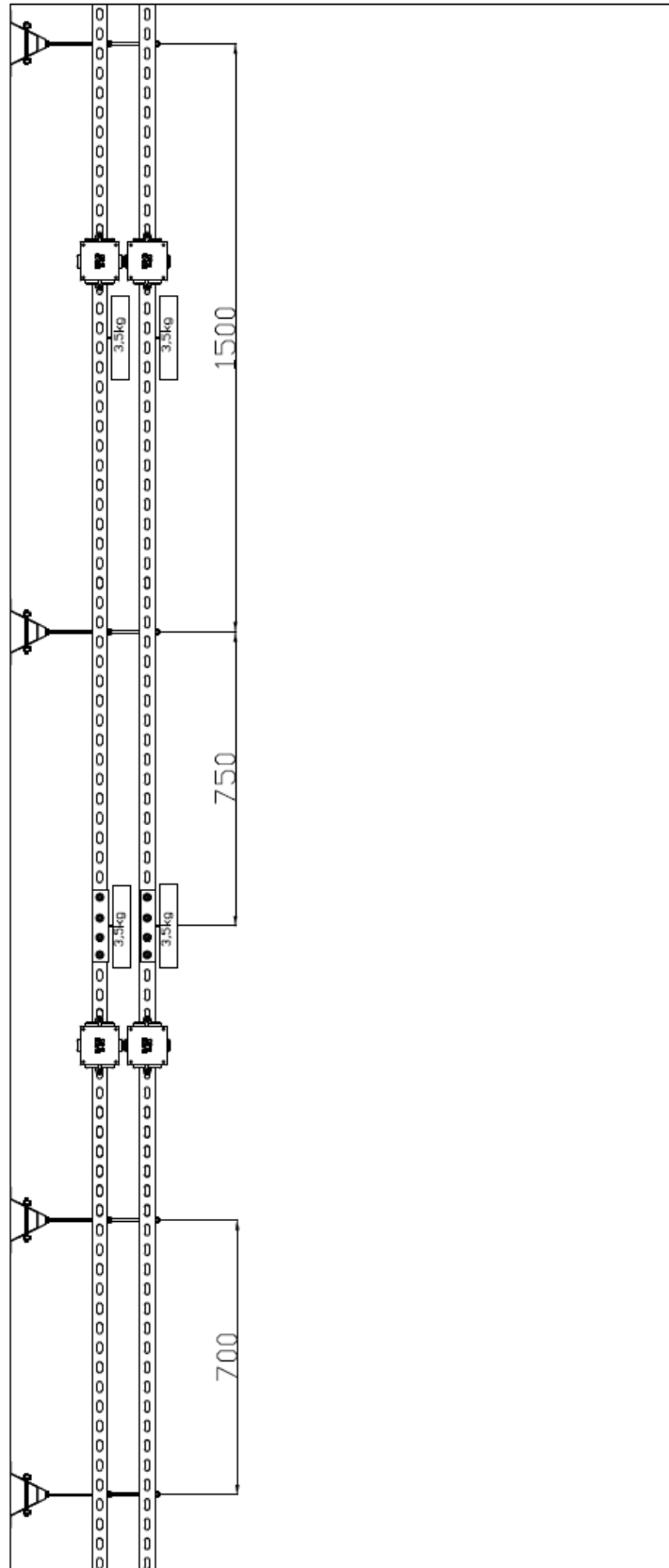
BAKS-TECHNOKABEL 14.04.2016





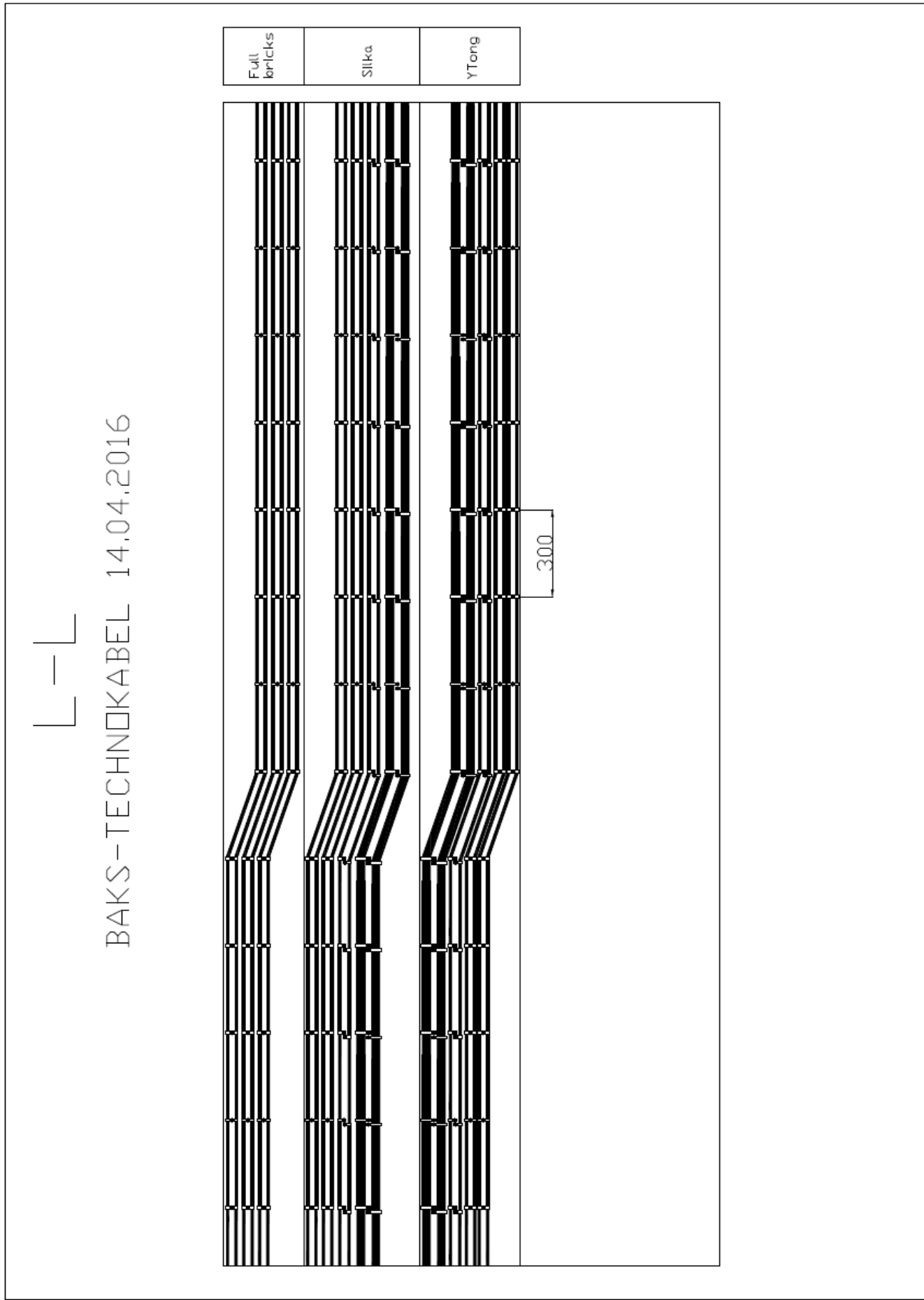
DRAWINGS

J—J
BAKS-TECHNOKABEL 14.04.2016





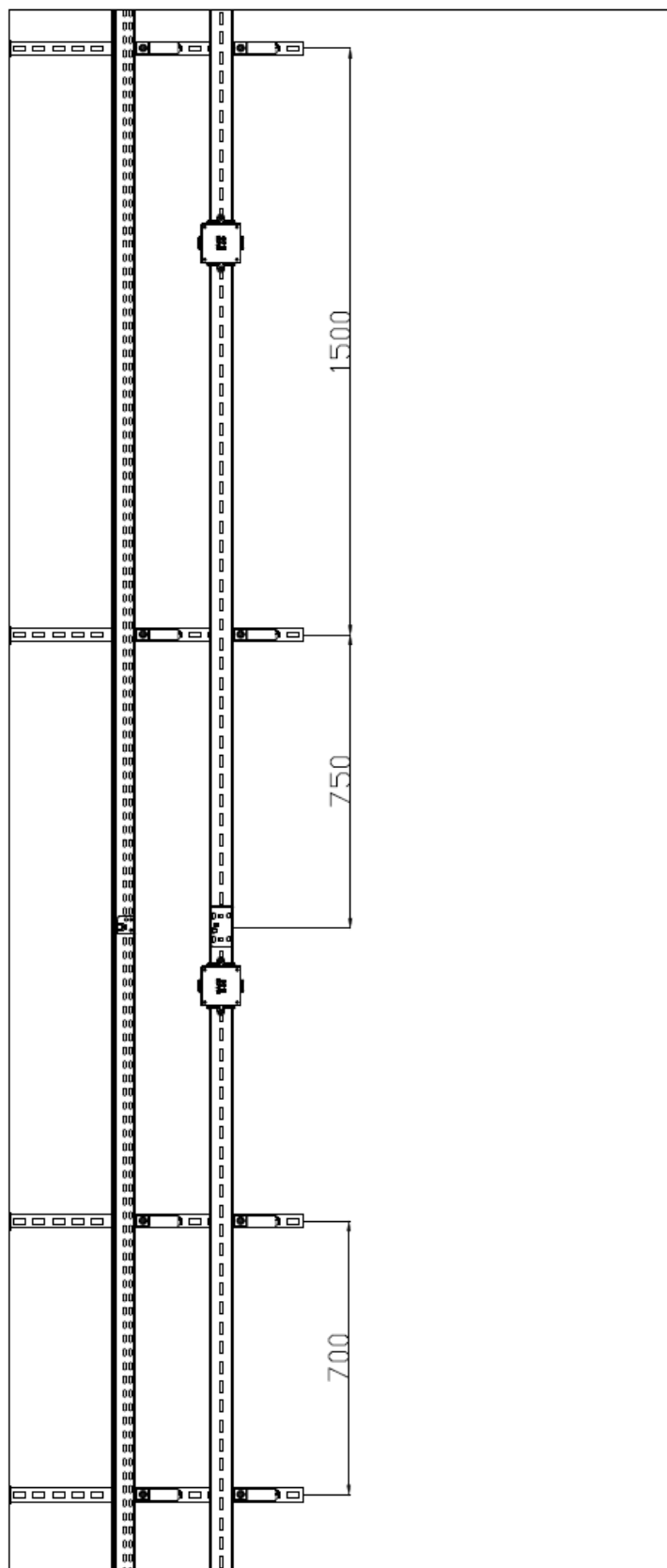
DRAWINGS





DRAWINGS

I—I
BAKS-TECHNOKABEL 14.04.2016





DRAWINGS

HILTI

BX 3 system

BX 3 system: fasteners for Mechanical & Electrical and Interior Finishing applications

Product data

BX 3 cordless electric nailer



Nails

(For fastening to concrete)

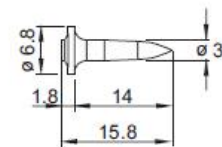
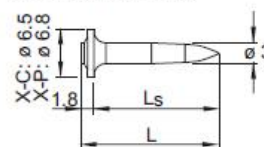
X-P 17/20/24 B3 MX

X-P 30/36 B3 P7

X-C 20/24 B3 MX

(For fastening to steel)

X-S 14 B3



Electrical elements to be used with nails

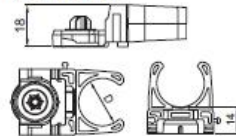
X-ECT MX



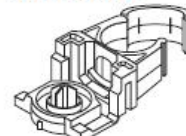
X-UCT MX



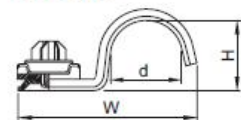
X-EKS MX



X-EKSC MX



X-FB MX



X-ECH MX



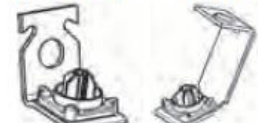
X-DFB MX



X-EKB MX



X-ECC MX X-EHS MX



X-ET MX



X-TT



X-ECT 40 MX



General information

Material specifications

X-P B3, X-S B3 nails

Carbon steel, HRC 57.5, 2-8 µm zinc coating

X-C B3 nails

Carbon steel, HRC 56.5, 5-13 µm zinc coating

X-ECT, X-EKS, X-EKSC,
X-EKB, X-ECH, X-ET

Polyamide (halogen and silicon-free), light grey RAL 7035

X-ECT-FR MX, X-EKB-FR MX

PBT (silicon free, flame retardant), stone grey RAL 7030

X-UCT

HDPE (halogen and silicon free), light grey RAL 7035

X-TT

Polyester (PES)

X-FB, X-DFB

Galvanized steel sheet, $f_u = 270-420 \text{ N/mm}^2$, 10-20 µm zinc coating

X-ECC, X-EHS

Galvanized steel sheet, $f_u = 270-420 \text{ N/mm}^2$, $\geq 10-20 \text{ µm}$ zinc coating

Approvals

ICC-ES Report



DRAWINGS

Technika kotwienia

HILTI

Kotwa segmentowa HST3



Zastosowania

- Dla zamocowań w betonie spękanym i niespękanym
- Wszystkie istotne dla bezpieczeństwa zamocowania w warunkach obciążeń sejsmicznych, kategoria C1 dla elementów niekonstrukcyjnych oraz kategoria C2 dla elementów konstrukcyjnych
- Poręcze
- Stelaże
- Sprzęt mechaniczny
- Windy

Zalety

- Najwyższa wytrzymałość do zastosowań o wysokich wymaganiach wynikających z geometrii, np. przy zmniejszonej grubości elementów nośnych, najmniejszym rozstawie oraz najmniejszych odległościach od krawędzi
- Zwiększony stopień podcięcia w połączeniu ze zoptymalizowaną powłoką
- Aprobata ETA dla dwóch głębokości kotwienia
- Minimalna odległość od krawędzi oraz rozstaw zmniejszony o 25% w porównaniu z kotwą HST
- Minimalna grubość płyty: podwyższona klasa wytrzymałości betonu z C12/15 do C80/95
- Z aprobatą ETA do zastosowań w obszarach sejsmicznych w kategoriach C1 i C2

Aprobaty/atesty

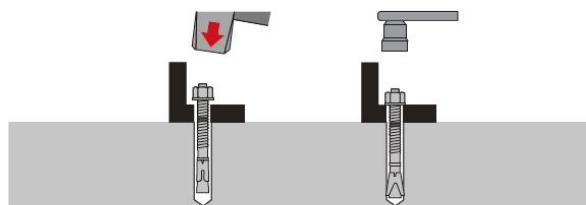
	AT_0602_0102_2009_2014_PL
	Deklaracja DSO_pl
	DSO świadectwo 1467-2013_pl
	ETA-98-0001_HST_2013-05-08_pl_PL
VdS	

Aprobaty i raporty z badań mogą odnosić się wyłącznie do wybranych produktów, szczegóły znajdują Państwo w dokumentacji.



Dane techniczne

Materiał, korozja	Stal, ocynk galwaniczny
PROFIS	Tak
Sejsmika	Tak
Wiercenie diamentowe otworów pod kotwy	Tak, razem z DD-EC1 i DD 30-W



Niniejszy dokument to wersja skrócona instrukcji mogących różnić się w zależności od zastosowania. Zalecamy, aby zawsze postępować zgodnie z pełnymi instrukcjami użytkowania dostarczonymi wraz z produktami lub szukać informacji w sekcji do pobrania na www.hilti.pl/downloads



DRAWINGS

Technika kotwienia

HILTI

Kotwa wkręcana z małym łbem HUS3-PS 6



Dane techniczne

Materiał, korozja	Stal węglowa
Konfiguracja głowicy	Łeb okrągły
Beton spękany	Tak
PROFIS	Tak

Dane do zamówienia	Grubość mocowania przy osadzeniu 1.	Grubość mocowania przy osadzeniu 2.	Skład materiału	Opakowanie zawiera	Nr artykułu
HUS3-PS 6x40/5	5 mm		Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2119772
HUS3-PS 6x60/5/25	5 mm	25 mm	Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2119773

Kotwa wkręcana z gwintem wewnętrznym i zewnętrznym HUS3-I Flex 6



Dane techniczne

Materiał, korozja	Stal węglowa
Konfiguracja głowicy	Łeb sześciokątny, odkręcana mufa, gwint zewnętrzny
Sejsmika	Nie
Beton spękany	Tak
PROFIS	Tak
Aprobata / Raporty z prób	ETA



Dane do zamówienia	Skład materiału	Opakowanie zawiera	Nr artykułu
HUS3-I Flex 6x35 M6	Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2119777
HUS3-I Flex 6x35 M8	Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2119778
HUS3-I Flex 6x55 M8	Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2119779
HUS3-I Flex 6x35 M10	Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2120020
HUS3-I Flex 6x55 M10	Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2120021
HUS3-I Flex 6x55 M12	Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2120022
HUS3-I Flex 6x35 M12	Stal, ocynk galwaniczny (min. 5 µm)	100 szt.	2121891



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 EN 1363-2. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.
- § Because of the nature of the fire resistance testing and consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.
- § The test results refer only to the tested subjects. This test report is not an approval of the tested product by the test laboratory or the accreditation body overseeing the laboratory's activities. The test was carried out on testing equipment that is the property of FIRES, s.r.o., Batizovce. Without the written permission of the test laboratory this test report may be copied and/or distributed only as the whole. Any modifications of the test report can be made only by the fire resistance test laboratory FIRES, s.r.o., Batizovce.

Approved by:

Prepared by:

Ing. Štefan Rástocký
leader of the testing laboratory



Bc. Dávid Šubert
technician of the testing laboratory

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
ČSN 73 0895: 2016	Fire protection of buildings - Circuit integrity maintenance of cable systems under fire conditions - Requirements, testing, classification Px-R, PHx-R and application of the test results

THE END OF THE TEST REPORT