

TEST REPORT FIRES-FR-010-15-AUNE

Cable bearing system BAKS with cables business Tele-Fonika Kable

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TEST REPORT

FIRES-FR-010-15-AUNE

Tested property: Functional resistance in fire
Test method: STN 92 0205: 2014
(ZP-27/2008, DIN 4102-12: 1998-11) acc. to cl. 1 of this test report
Type of test: Accredited
Date of issue: 06. 03. 2015

Name of the product: Cable bearing system BAKS with cables business Tele-Fonika Kable

Manufacturer: BAKS Kazimierz Sielski, ul. Jagodne 5, 05-480 Karczew, Poland
(producer of cable bearing system)
Tele-Fonika Kable sp. z o.o. S.K.A., ul. Wielicka 114, 30-630 Kraków,
Poland (producer of cables)

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

Test carried out by: FIRES, s.r.o., Testing laboratory
Task No.: PR-15-0039
Specimens received: 22. 01. 2015
Date of the test: 29. 01. 2015

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

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1. INTRODUCTION

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

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

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

Deviations from standard at the test according to DIN 4102-12: 1998-11: This test was carried out according to standard STN 92 0205 and meets requirements of DIN 4102-12: 1998-11. Basic deviation in process and carrying out of test between these standards is in measuring and in control of temperature in the test furnace. According to STN 92 0205, plate thermometers according to EN 1363-1: 1999 are used. According to DIN 4102-12: 1998-11, common thermocouples of construction which was used for this measurement till issue of EN 1363-1:1999 are used. Measurement by plate thermometers acc. to EN 1363-1: 1999 can be considered as stricter method of temperature control in test furnace in compare with thermocouples used till issue of EN 1363-1: 1999. Therefore, it is possible to use results of test according to STN 92 025 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. Jacek Kliczek	BAKS Kazimierz Sielski
Mr. Dariusz Gowronski	BAKS Kazimierz Sielski
Mr. Lukasz Daniel	Tele-Fonika Kable sp. z o.o. S.K.A.
Mr. Marcin Zywiński	Tele-Fonika Kable sp. z o.o. S.K.A.

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

2. MEASURING EQUIPMENT

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



Identification number	Measuring equipment	Note
F 60 001 - F 60 009	Sensors of temperature and relative air humidity	measurement of climatic conditions
F 10 521 - F 10 528	Plate thermometers	measurement of temperature inside the test furnace according to EN 1363-1
F 10 701	Sheathed thermocouple type K Ø 3 mm	measurement of ambient temperature
F 57 007	Digital stop-watch	-
F 96 015	Test signal panel	-

3. PREPARATION OF THE SPECIMENS

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

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMEN STRUCTURE

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

Cables

Used cables by test:

Power cables:

(N)HXH FE180/PH90/E90 4x1,5 RE	(22x)
(N)HXH FE180/PH90/E90 4x6 RE	(4x)
(N)HXH FE180/PH90/E90 4x50 RM	(20x)
(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	(26x)
(N)HXCH FE180/PH90/E90 4x50/25 RM	(22x)

Communication cables:

Je-H(St)H 1x2x0,8 Bd FE180/E90	(24x)
HDGs 5x1 300/500V	(24x)

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

Cable bearing systems were made of following constructions:

Suspension tracks No. 1 and 2

Tracks are made of four consoles (WPCB1000) fixed to ceiling by threaded rods (PG M10) in spacing of 1500 mm. Brackets (WWS/WWSO300) are fixed to consoles by screws (SM M10x80). Consoles are reinforced in place of fixing brackets by spacer (BR55).

Cable trays (KFL300H60, height 60 mm, width 300 mm, steel sheet thickness 0,7 mm) fixed together by integrated junctions and by screws (SGK M6x12). Trays are fixed to brackets by screws (SGK M6x12) and loaded with 10kg.m⁻¹. Cables are fixed to trays by plastic stripes.

**Suspension tracks No. 3 and 4**

Track is made of four consoles (WPCB1000) fixed to ceiling by threaded rods (PG M10) in spacing of 1500 mm.

Cable ladders (DUP600H60, height 60 mm, width 600 mm, steel sheet thickness 1,5 mm, spacing of transoms 300 mm) fixed together by two junctions (LDC/LDOCH60) and nut bolts (SGK M8x14) on sides. Ladders are fixed vertically to consoles by brackets (UTM/UTMO) and nut bolts (SGN M8x14) and loaded with 20kg.m⁻¹. Cables are fixed to ladders by cable clamps (UK1/UKO1 – according to cable cross-section).

Suspension tracks No. 5 and 6

Tracks are made of four consoles (WPCB1000) fixed to ceiling by threaded rods (PG M10) in spacing of 1500 mm. Brackets (WWS/WWSO300) are fixed to consoles by screws (SM M10x80). Consoles are reinforced in place of fixing brackets by spacer (BR55).

Cable ladders (DUD300H60, height 60 mm, width 300 mm, steel sheet thickness 1,2 mm, spacing of transoms 300 mm) fixed together by two junctions (LDC/LDOCH60) and nut bolts (SGK M8x14) on sides. Ladders are fixed to brackets by junctions (ZM/ZMO) and nut bolts (SGK M8x14) and loaded with 10kg.m⁻¹. Cables are fixed to ladders by cable clamps (UK1/UKO1 – according to cable cross-section).

Suspension tracks No. 7 and 8

Tracks are made of cable trays (KGL/KGOL100H60, height 60 mm, width 100 mm, steel sheet thickness 0,7 mm) fixed together by nut bolts (SGK M6x12). Individual tracks are fixed together by threaded rods (PG M6) and washers with nuts (M6). Threaded rods are fixed to ceiling in spacing of 1500 mm. Trays are loaded with 5kg.m⁻¹.

Suspension tracks No. 9 and 10

Tracks are made of cable mesh trays (KDS/KDSO100H60, height 60 mm, width 100 mm, steel wire Ø 4,0 mm) fixed together by junctions (USS/USSO). Individual tracks are fixed together by threaded rods (PG M6) and center hanger (ZSW) together with washers and nuts (M6). Threaded rods are fixed to ceiling in spacing of 1500 mm. Mesh trays are loaded with 5kg.m⁻¹.

Suspension tracks No. 11 – 13

Tracks are made of four consoles (WPCB1000) fixed to ceiling by threaded rods (PG M10) in spacing of 1500 mm. Consoles are reinforced in place of fixing brackets by spacer (BR55). Brackets (WWS/WWSO400) are fixed to consoles by screws (SM M10x80). Holders (UPW/UPWO) are fixed at the end of brackets with screws (SGK M8x14). Brackets are fixed through these holders by threaded rods (PG M10) with washer and nuts (M10) to ceiling.

Track No. 11:

Cable trays (KGJ/KGOJ400H60, height 60 mm, width 400 mm, steel sheet thickness 0,9 mm) fixed together by screws (SGK M6x12). Separating steel sheet (PGJ60) is placed inside the cable trays for the whole length. Trays are fixed to brackets by screws (SGK M6x12) and loaded with 20kg.m⁻¹. Cables are fixed to trays by plastic stripes.

Track No. 12:

Cable mesh trays (KDS/KDSO400H60, height 60 mm, width 400 mm, steel wire Ø 4,5 mm) fixed together by junctions (USS/USSO). Separating steel sheet (PGJ50) is placed inside the cable trays for the whole length. Mesh trays are fixed to brackets by junctions (ZS/ZSO) and loaded with 20kg.m⁻¹. Cables are fixed to mesh trays by cable clamps (UKZ1/UKZO1 – according to cable cross-section).

Track No. 13:

Cable ladders (DUD400H60, height 60 mm, width 400 mm, steel sheet thickness 1,2 mm, spacing of transoms 300 mm) fixed together by two junctions (LDC/LDOCH60) and nut bolts (SGK M8x14) on sides. Ladders are fixed to brackets by junctions (ZM/ZMO) and nut bolts (SGK M8x14) and loaded with 20kg.m⁻¹. Cables are fixed to ladders by cable clamps (UK1/UKO1 – according to cable cross-section).

**Suspension tracks No. 14 and 16**

Tracks are made of four consoles combined of supports (CWP40H22/05; length of profile 500 mm) and two threaded rods (PG M12) fixed to ceiling in spacing of 1500 mm.

Track No. 14:

Cable trays (KGJ/KGOJ400H60, height 60 mm, width 400 mm, steel sheet thickness 0,9 mm) fixed together by screws (SGK M6x12). Trays are fixed to supports by screws (SGK M6x12) and loaded with 20kg.m⁻¹. Cables are fixed to trays by plastic stripes.

Track No. 15:

Cable trays (KBJ400H60, height 60 mm, width 400 mm, steel sheet thickness 0,9 mm) fixed together by nut bolts (SGK M6x12). Trays are fixed to assembling profiles by screws (SGK M6x12) and loaded with 20kg.m⁻¹. Cables are not fixed to trays.

Track No. 16:

Cable trays (KGL/KGOL300H60, height 60 mm, width 300 mm, steel sheet thickness 0,7 mm) fixed together by screws (SGK M6x12) and covered by cover (PKJ300) with clips (ZPD H60). Trays are fixed to supports by screws (SGK M6x12) and loaded with 20kg.m⁻¹. Cables are fixed to trays by plastic stripes.

Ceiling tracks No. 17 and 21

Supporting construction for tracks is made of steel I – beams (DPH) fixed to ceiling by threaded rods.

Track No. 17:

Track is made of single cable clips (KSA) fixed to steel beams by beam clips (ZSU3 13/3) and threaded rods (PG M6) in spacing of 600 mm.

Track No. 18:

Track is made of single cable clips (KSA) fixed to steel beams by beam clamps (ZK8) and threaded rods (PG M6) in spacing of 600 mm.

Track No. 19:

Track is made of cable hangers (OZM/OZMO) fixed to steel beams by beam clamps (ZK8) and threaded rods (PG M6) in spacing of 600 mm.

Track No. 20:

Track is made of cable hangers (OZS/OZSO) fixed to steel beams by beam clamps (ZK8) and threaded rods (PG M6) in spacing of 600 mm.

Track No. 21:

Track is made of cable hangers (OZ/OZO) fixed to steel beams by beam clamps (ZK8) and threaded rods (PG M6) in spacing of 600 mm.

Ceiling track No. 22

Track is made of steel pipes (Ø 16 mm, Ø 63 mm) fixed to ceiling by hangers (OBS) in spacing of 1500 mm. Steel pipes are at mid-length separated and there is created the offset.

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

Cable penetration through the wall of test furnace was sealed by mineral wool Rockwool.

Loading with steel chain and line loads was used as the equivalent load.

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

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

4.2 DESCRIPTION OF THE SPECIMENS FIXATION

The test specimens were fixed on the ceiling of the test furnace which was created from aerated concrete panels with dimensions (4000 x 600 x 240) mm – 7 pieces. Ceiling panels were jointed by beam which provides balance deflection of the ceiling.

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



4.3 INSPECTION OF THE SPECIMENS

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

4.4 CLIMATIC CONDITIONING OF THE SPECIMENS

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

Ambient air temperature [°C]

mean	19,2
standard deviation	1,0

Relative air humidity [%]

mean	44,2
standard deviation	2,5

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

5. CARRYING OUT OF THE TEST

5.1 TEST GENERALLY

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

5.2 CONDITIONS OF THE TEST

Conditions in the test furnace (temperature – standard temperature/time curve, pressure, content of O₂) as well as in the testing room (ambient temperature) corresponded to EN 1363-1 during the test. Detailed information is part of this test report.

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

Relative air humidity [%]	Ambient air temperature [°C]
44,1	18,2

5.3 RESULTS OF THE TEST

Measured values of individual cables are stated in this test report.

During the test there was a gradual deflection of cable bearing system, but no failure or damage of tracks – even during cooling down of the tracks after termination of the test. Deflection of cable bearing system was not measured.



6. CLOSING

Evaluation of the test:

Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
1	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM	16	90 minutes no failure / interruption
2	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		80 minutes
3	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM	15	90 minutes no failure / interruption
4	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		79 minutes
5	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	14	90 minutes no failure / interruption
6	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM		90 minutes no failure / interruption
7	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE	22	90 minutes no failure / interruption
8	2 cables (N)HXH FE180/PH90/E90 4x50 RM		90 minutes no failure / interruption
9	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	13	36 minutes
10	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		35 minutes
11	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM		90 minutes no failure / interruption
12	2 cables (N)HXH FE180/PH90/E90 4x50 RM		90 minutes no failure / interruption
13	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	12	76 minutes
14	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM		90 minutes no failure / interruption
15	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		75 minutes
16	2 cables (N)HXH FE180/PH90/E90 4x50 RM		90 minutes no failure / interruption
17	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	11	90 minutes no failure / interruption
18	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM		90 minutes no failure / interruption
19	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		89 minutes
20	2 cables (N)HXH FE180/PH90/E90 4x50 RM		90 minutes no failure / interruption
21	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM	9, 10	90 minutes no failure / interruption
22	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		75 minutes
23	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM	7, 8	90 minutes no failure / interruption
24	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		86 minutes
25	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM	6	85 minutes
26	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		32 minutes
27	2 cables (N)HXH FE180/PH90/E90 4x50 RM	5	82 minutes
28	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		32 minutes
29	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM	21	90 minutes no failure / interruption
30	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		84 minutes
31	2 cables (N)HXH FE180/PH90/E90 4x50 RM		90 minutes no failure / interruption
32	2 cables (N)HXH FE180/PH90/E90 4x6 RE		36 minutes
33	2 cables (N)HXH FE180/PH90/E90 4x6 RE	20	90 minutes no failure / interruption
34	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		76 minutes
35	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	19	74 minutes
36	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		75 minutes
37	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM	4	90 minutes no failure / interruption
38	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		34 minutes
39	2 cables (N)HXH FE180/PH90/E90 4x50 RM	3	29 minutes
40	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		37 minutes
41	2 cables (N)HXH FE180/PH90/E90 4x50 RM	18	90 minutes no failure / interruption
42	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		90 minutes no failure / interruption
43	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM	2	90 minutes no failure / interruption
44	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		79 minutes



Specimen No.	Cables	Track No.	Time to first failure / interruption of conductor
45	2 cables (N)HXH FE180/PH90/E90 4x50 RM	1	90 minutes no failure / interruption
46	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		70 minutes
47	2 cables (N)HXH FE180/PH90/E90 4x50 RM	17	90 minutes no failure / interruption
48	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE		90 minutes no failure / interruption
52	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90	15	63 minutes
53	2 cables HDGs 5x1 300/500V		62 minutes
54	2 cables HDGs 5x1 300/500V	13	32 minutes
55	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90	22	81 minutes
56	2 cables HDGs 5x1 300/500V		90 minutes no failure / interruption
57	2 cables HDGs 5x1 300/500V	10	84 minutes
58	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90	9	60 minutes
59	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90	7	39 minutes
60	2 cables HDGs 5x1 300/500V	6	30 minutes
61	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90	5	39 minutes
62	2 cables HDGs 5x1 300/500V	21	36 minutes
63	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90		43 minutes
64	2 cables HDGs 5x1 300/500V	20	90 minutes no failure / interruption
65	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90		43 minutes
66	2 cables HDGs 5x1 300/500V	19	90 minutes no failure / interruption
67	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90		64 minutes
68	2 cables HDGs 5x1 300/500V	3	31 minutes
69	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90		38 minutes
70	2 cables HDGs 5x1 300/500V	18	90 minutes no failure / interruption
71	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90		83 minutes
72	2 cables HDGs 5x1 300/500V	2	35 minutes
73	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90	1	90 minutes no failure / interruption
74	2 cables HDGs 5x1 300/500V	17	78 minutes
75	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90		90 minutes no failure / interruption

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

Specimens S1 – S48 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Specimens S52 – S75 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.

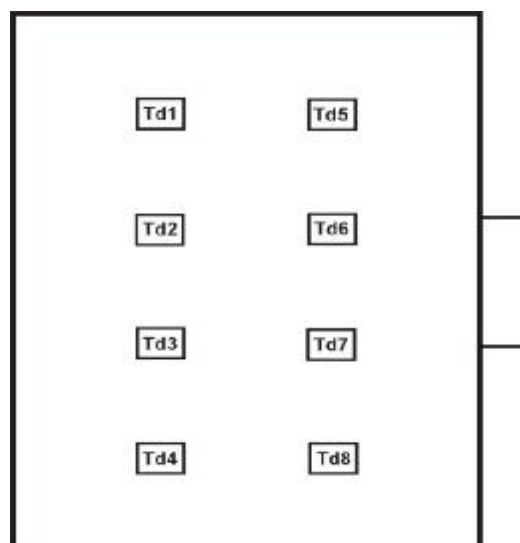


Measured values inside the test furnace

Time t [min]	Temperature [°C]											Deviation d _e [%]	Pressure p [Pa]
	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To		
0	21,1	20,2	19,4	20,0	20,5	21,0	21,6	21,9	20,7	20,0	18,2	0,0	19,3
5	518,1	530,6	539,3	581,1	534,5	546,1	577,3	511,1	542,3	576,0	18,3	-5,4	19,6
10	625,2	698,3	710,4	716,6	680,0	704,4	685,1	692,1	689,0	678,0	18,3	-2,2	20,0
15	682,1	749,9	754,7	664,5	704,1	675,6	778,2	686,7	712,0	739,0	18,4	-2,1	18,6
20	717,2	786,5	788,4	780,1	763,3	784,4	831,9	788,7	780,1	781,0	18,4	-1,9	20,0
25	769,0	836,2	823,7	813,1	804,0	819,3	828,8	825,5	815,0	815,0	18,5	-1,5	19,1
30	831,7	856,2	861,1	870,6	852,7	865,2	870,5	859,7	858,5	842,0	18,5	-1,0	19,7
35	886,1	909,1	916,6	891,1	901,7	902,5	919,4	913,9	905,1	865,0	18,6	-0,1	18,0
40	949,4	918,9	915,0	911,4	932,8	933,9	919,4	956,3	929,6	885,0	18,6	0,5	17,2
45	886,9	885,2	897,7	877,7	890,6	887,3	926,6	896,9	893,6	902,0	18,7	0,7	17,5
50	870,2	882,9	891,0	875,0	879,6	877,5	897,4	880,0	881,7	918,0	18,7	0,2	18,5
55	890,2	895,6	901,5	900,1	899,3	906,2	916,0	912,3	902,7	932,0	18,8	-0,2	17,3
60	914,9	933,1	933,9	947,1	935,7	958,2	953,7	969,2	943,2	945,0	18,9	-0,3	17,3
65	922,5	943,6	949,8	961,5	948,0	971,6	961,5	981,7	955,0	957,0	18,9	-0,3	17,1
70	931,3	953,4	963,2	970,6	958,1	979,9	972,6	989,1	964,8	968,0	19,0	-0,3	18,4
75	939,9	960,5	970,1	978,8	965,9	987,7	978,4	996,6	972,2	979,0	19,0	-0,3	18,4
80	951,2	968,9	971,5	980,5	972,3	994,1	990,3	1007,6	979,5	988,0	19,1	-0,4	18,4
85	958,4	979,2	984,4	994,7	982,7	1005,2	998,9	1015,6	989,9	997,0	19,1	-0,4	18,1
90	965,7	984,1	985,8	992,4	985,3	1004,3	1003,5	1016,1	992,1	1006,0	19,2	-0,4	17,2
91	965,5	984,2	985,1	991,8	984,4	1002,5	1003,7	1013,1	991,3	1008,0	19,2	-0,5	18,9
92	966,1	984,2	986,4	992,5	985,6	1004,2	1005,7	1015,8	992,6	1009,0	19,2	-0,5	19,6
93	967,1	985,6	986,9	994,6	986,7	1006,0	1005,0	1017,4	993,7	1011,0	19,2	-0,5	17,2

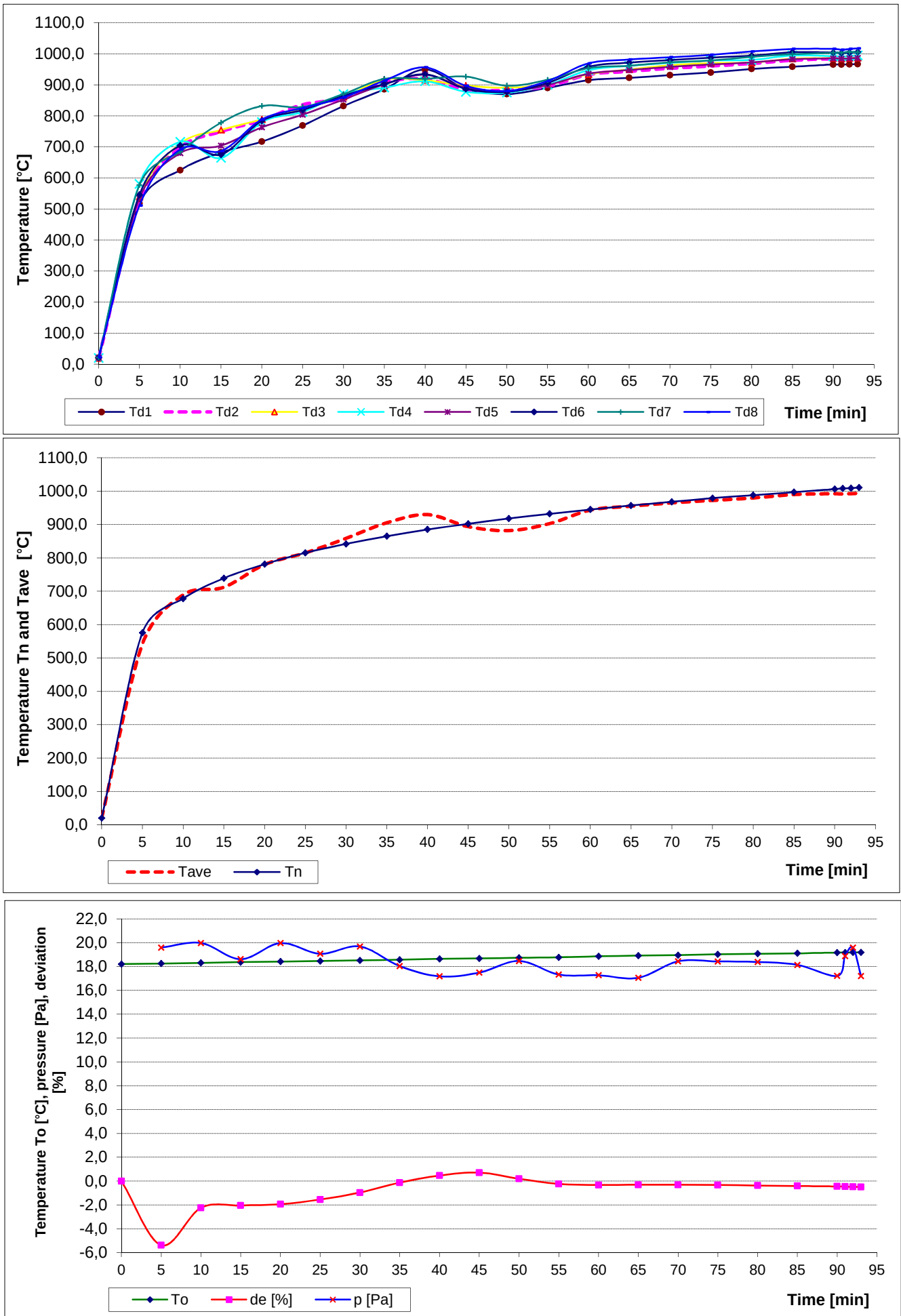
- Tave** Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

Layout of measuring points inside the test furnace:





Measured values inside the test furnace /graph




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

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S1	1-L1	no failure / interruption
	2-L2	no failure / interruption
	3-L3	no failure / interruption
	4-PEN	no failure / interruption
S2	5-L1	80:11
	6-L2	80:11
	7-L3	x
	8-PEN	x
S3	9-L1	no failure / interruption
	10-L2	no failure / interruption
	11-L3	no failure / interruption
	12-PEN	no failure / interruption
S4	13-L1	79:27
	14-L2	x
	15-L3	79:27
	16-PEN	x
S5	17-L1	no failure / interruption
	18-L2	no failure / interruption
	19-L3	no failure / interruption
	20-PEN	no failure / interruption
S6	21-L1	no failure / interruption
	22-L2	no failure / interruption
	23-L3	no failure / interruption
	24-PEN	no failure / interruption
S7	25-L1	no failure / interruption
	26-L2	no failure / interruption
	27-L3	no failure / interruption
	28-PEN	no failure / interruption
S8	29-L1	no failure / interruption
	30-L2	no failure / interruption
	31-L3	no failure / interruption
	32-PEN	no failure / interruption
S9	33-L1	36:20
	34-L2	36:20
	35-L3	36:20
	36-PEN	x
S10	37-L1	35:49
	38-L2	35:49
	39-L3	35:49
	40-PEN	x

Specimen No.	Cables
1	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
2	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
3	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
4	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
5	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
6	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
7	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE
8	2 cables (N)HXH FE180/PH90/E90 4x50 RM
9	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
10	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE

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


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

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S11	41-L1	no failure / interruption
	42-L2	no failure / interruption
	43-L3	no failure / interruption
	44-PEN	no failure / interruption
S12	45-L1	no failure / interruption
	46-L2	no failure / interruption
	47-L3	no failure / interruption
	48-PEN	no failure / interruption
S13	49-L1	76:12
	50-L2	76:12
	51-L3	x
	52-PEN	x
S14	53-L1	no failure / interruption
	54-L2	no failure / interruption
	55-L3	no failure / interruption
	56-PEN	no failure / interruption
S15	57-L1	75:00
	58-L2	x
	59-L3	75:00
	60-PEN	x
S16	61-L1	no failure / interruption
	62-L2	no failure / interruption
	63-L3	no failure / interruption
	64-PEN	no failure / interruption
S17	65-L1	no failure / interruption
	66-L2	no failure / interruption
	67-L3	no failure / interruption
	68-PEN	no failure / interruption
S18	69-L1	no failure / interruption
	70-L2	no failure / interruption
	71-L3	no failure / interruption
	72-PEN	no failure / interruption
S19	73-L1	89:21
	74-L2	89:21
	75-L3	89:21
	76-PEN	x
S20	77-L1	no failure / interruption
	78-L2	no failure / interruption
	79-L3	no failure / interruption
	80-PEN	no failure / interruption

Specimen No.	Cables
11	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
12	2 cables (N)HXH FE180/PH90/E90 4x50 RM
13	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
14	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
15	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE
16	2 cables (N)HXH FE180/PH90/E90 4x50 RM
17	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
18	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
19	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE
20	2 cables (N)HXH FE180/PH90/E90 4x50 RM

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


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

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S21	81-L1	no failure / interruption
	82-L2	no failure / interruption
	83-L3	no failure / interruption
	84-PEN	no failure / interruption
S22	85-L1	75:48
	86-L2	75:48
	87-L3	x
	88-PEN	x
S23	89-L1	no failure / interruption
	90-L2	no failure / interruption
	91-L3	no failure / interruption
	92-PEN	no failure / interruption
S24	93-L1	x
	94-L2	86:08
	95-L3	x
	96-PEN	x
S25	97-L1	85:18
	98-L2	x
	99-L3	x
	100-PEN	x
S26	101-L1	32:46
	102-L2	32:46
	103-L3	32:46
	104-PEN	x
S27	105-L1	x
	106-L2	x
	107-L3	82:21
	108-PEN	x
S28	109-L1	32:18
	110-L2	x
	111-L3	32:18
	112-PEN	x
S29	113-L1	no failure / interruption
	114-L2	no failure / interruption
	115-L3	no failure / interruption
	116-PEN	no failure / interruption
S30	117-L1	84:59
	118-L2	84:59
	119-L3	x
	120-PEN	x

Specimen No.	Cables
21	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
22	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
23	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
24	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
25	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
26	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
27	2 cables (N)HXH FE180/PH90/E90 4x50 RM
28	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE
29	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
30	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE

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


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

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S31	121-L1	no failure / interruption
	122-L2	no failure / interruption
	123-L3	no failure / interruption
	124-PEN	no failure / interruption
S32	125-L1	36:54
	126-L2	x
	127-L3	36:54
	128-PEN	x
S33	129-L1	no failure / interruption
	130-L2	no failure / interruption
	131-L3	no failure / interruption
	132-PEN	no failure / interruption
S34	133-L1	76:58
	134-L2	x
	135-L3	x
	136-PEN	x
S35	137-L1	74:20
	138-L2	74:20
	139-L3	x
	140-PEN	x
S36	141-L1	75:20
	142-L2	75:20
	143-L3	x
	144-PEN	x
S37	145-L1	no failure / interruption
	146-L2	no failure / interruption
	147-L3	no failure / interruption
	148-PEN	no failure / interruption
S38	149-L1	34:36
	150-L2	34:36
	151-L3	34:36
	152-PEN	x
S39	153-L1	x
	154-L2	29:16
	155-L3	x
	156-PEN	x
S40	157-L1	x
	158-L2	37:38
	159-L3	x
	160-PEN	x

Specimen No.	Cables
31	2 cables (N)HXH FE180/PH90/E90 4x50 RM
32	2 cables (N)HXH FE180/PH90/E90 4x6 RE
33	2 cables (N)HXH FE180/PH90/E90 4x6 RE
34	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE
35	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
36	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE
37	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
38	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
39	2 cables (N)HXH FE180/PH90/E90 4x50 RM
40	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE

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


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

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S41	161-L1	no failure / interruption
	162-L2	no failure / interruption
	163-L3	no failure / interruption
	164-PEN	no failure / interruption
S42	165-L1	no failure / interruption
	166-L2	no failure / interruption
	167-L3	no failure / interruption
	168-PEN	no failure / interruption
S43	169-L1	no failure / interruption
	170-L2	no failure / interruption
	171-L3	no failure / interruption
	172-PEN	no failure / interruption
S44	173-L1	79:29
	174-L2	x
	175-L3	x
	176-PEN	x
S45	177-L1	no failure / interruption
	178-L2	no failure / interruption
	179-L3	no failure / interruption
	180-PEN	no failure / interruption
S46	181-L1	70:53
	182-L2	70:53
	183-L3	x
	184-PEN	x
S47	185-L1	no failure / interruption
	186-L2	no failure / interruption
	187-L3	no failure / interruption
	188-PEN	no failure / interruption
S48	189-L1	no failure / interruption
	190-L2	no failure / interruption
	191-L3	no failure / interruption
	192-PEN	no failure / interruption

Specimen No.	Cables
41	2 cables (N)HXH FE180/PH90/E90 4x50 RM
42	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE
43	2 cables (N)HXCH FE180/PH90/E90 4x50/25 RM
44	2 cables (N)HXCH FE180/PH90/E90 4x1,5/1,5 RE
45	2 cables (N)HXH FE180/PH90/E90 4x50 RM
46	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE
47	2 cables (N)HXH FE180/PH90/E90 4x50 RM
48	2 cables (N)HXH FE180/PH90/E90 4x1,5 RE

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


Measured time of tested specimen S52 to S61 - communication cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S52A	209-L	68:18
	210-PEN	-
S52B	211-L	63:16
	212-PEN	-
S53A	213-L	66:31
	214-PEN	-
S53B	215-L	62:05
	216-PEN	-
S54A	217-L	74:00
	218-PEN	-
S54B	219-L	32:29
	220-PEN	-
S55A	221-L	no failure / interruption
	222-PEN	no failure / interruption
S55B	223-L	81:30
	224-PEN	-
S56A	225-L	no failure / interruption
	226-PEN	no failure / interruption
S56B	227-L	no failure / interruption
	228-PEN	no failure / interruption
S57A	229-L	86:08
	230-PEN	-
S57B	231-L	84:12
	232-PEN	-
S58A	233-L	60:22
	234-PEN	-
S58B	235-L	61:06
	236-PEN	-
S59A	237-L	39:27
	238-PEN	-
S59B	239-L	38:06
	240-PEN	-
S60A	241-L	33:18
	242-PEN	-
S60B	243-L	30:05
	244-PEN	-
S61A	245-L	44:37
	246-PEN	-
S61B	247-L	39:58
	248-PEN	-

Specimen No.	Cables
52	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
53	2 cables HDGs 5x1 300/500V
54	2 cables HDGs 5x1 300/500V
55	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
56	2 cables HDGs 5x1 300/500V
57	2 cables HDGs 5x1 300/500V
58	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
59	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
60	2 cables HDGs 5x1 300/500V
61	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90

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


Measured time of tested specimens from S62 to S71 - communication cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S62A	249-L	36:19
	250-PEN	-
S62B	251-L	39:19
	252-PEN	-
S63A	253-L	43:54
	254-PEN	-
S63B	255-L	44:14
	256-PEN	-
S64A	257-L	no failure / interruption
	258-PEN	no failure / interruption
S64B	259-L	no failure / interruption
	260-PEN	no failure / interruption
S65A	261-L	56:45
	262-PEN	-
S65B	263-L	43:17
	264-PEN	-
S66A	265-L	no failure / interruption
	266-PEN	no failure / interruption
S66B	267-L	no failure / interruption
	268-PEN	no failure / interruption
S67A	269-L	67:47
	270-PEN	-
S67B	271-L	64:34
	272-PEN	-
S68A	273-L	34:19
	274-PEN	-
S68B	275-L	31:34
	276-PEN	-
S69A	277-L	38:26
	278-PEN	-
S69B	279-L	39:57
	280-PEN	-
S70A	281-L	no failure / interruption
	282-PEN	no failure / interruption
S70B	283-L	no failure / interruption
	284-PEN	no failure / interruption
S71A	285-L	no failure / interruption
	286-PEN	no failure / interruption
S71B	287-L	83:02
	288-PEN	-

Specimen No.	Cables
62	2 cables HDGs 5x1 300/500V
63	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
64	2 cables HDGs 5x1 300/500V
65	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
66	2 cables HDGs 5x1 300/500V
67	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
68	2 cables HDGs 5x1 300/500V
69	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
70	2 cables HDGs 5x1 300/500V
71	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90

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


Measured time of tested specimens S72 to S75 - communication cables

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S72A	289-L	36:57
	290-PEN	-
S72B	291-L	35:14
	292-PEN	-
S73A	293-L	no failure / interruption
	294-PEN	no failure / interruption
S73B	295-L	no failure / interruption
	296-PEN	no failure / interruption
S74A	297-L	78:55
	298-PEN	-
S74B	299-L	85:26
	300-PEN	-
S75A	301-L	no failure / interruption
	302-PEN	no failure / interruption
S75B	303-L	no failure / interruption
	304-PEN	no failure / interruption

Specimen No.	Cables
72	2 cables HDGs 5x1 300/500V
73	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90
74	2 cables HDGs 5x1 300/500V
75	2 cables JE-H(St)H 1x2x0,8 Bd FE180/E90

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



PHOTOS



Photo taken before the test.



Photo taken before the test.

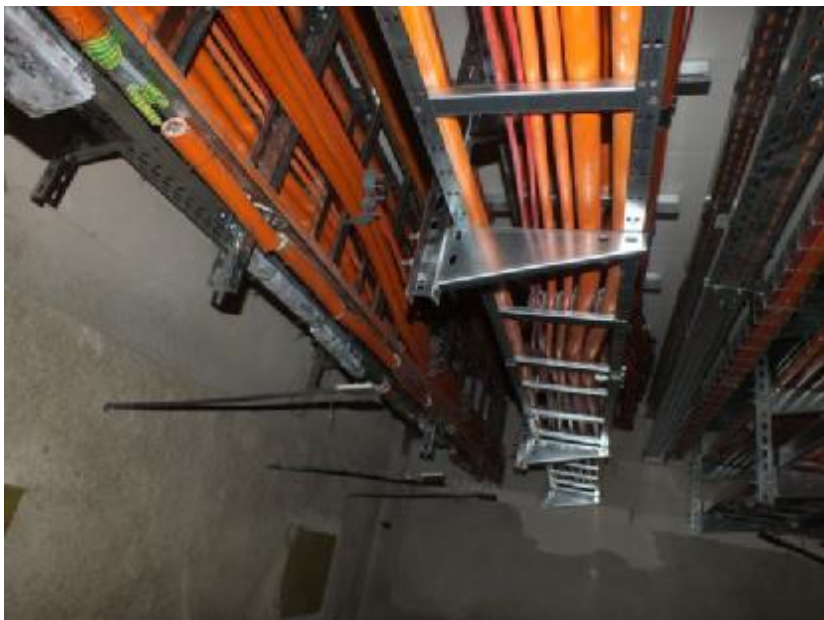


Photo taken before the test.



PHOTOS



Photo taken before the test.



Photo taken before the test.



Photo taken before the test.



PHOTOS



Photo taken after the test.



Photo taken after the test.



Photo taken after the test.



PHOTOS



Photo taken after the test.



Photo taken after the test.

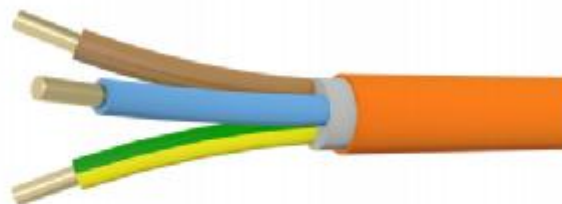


Photo taken after the test.

FLAME-X⁹⁵⁰ (N)HXH FE180/E90 0,6/1 kV

DIN VDE 0266, DIN 4102-12, CNBOP-PIB AT-0603-0287/2010 edit 4

Halogen-free low
smoke fire resistant
security power cables

**FIRE PERFORMANCE**

Insulation integrity FE 180:	DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21
System integrity E90:	DIN 4102-12 (90 min.)
Flame propagation:	DIN EN 60332-3-22, VDE 0482-332-3-22, IEC 60332-3-22
Smoke density:	DIN EN 61034-2, VDE 0482-1034-2, IEC 61034-2
Gases evolved during combustion:	DIN EN 50267-2-2, VDE 0482-267-2-2, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 10 µS/mm

CONSTRUCTION

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

CHARACTERISTIC

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

	(N)HXH-O FE180/E90	(N)HXH-J FE180/E90
	without protective conductor	with protective conductor
1-core:	black	green-yellow
2-core:	blue, brown	—
3-core:	brown, black, grey	green-yellow, blue, brown
4-core:	blue, brown, black, grey	green-yellow, brown, black, grey
5-core:	blue, brown, black, grey, black	green-yellow, blue, brown, black, grey
more 5-core:	black with numbering	green-yellow, others cores black with numbering

Maximum conductor operating temperature:	+90°C
Lowest ambient temperature for fixed installation:	-30°C
Lowest installation temperature:	-5°C
Maximum short-circuit conductor temperature:	+250°C
Minimum bending radius:	15D - for single core cable; 12D - for multicore cable (D - overall cable diameter)
Maximum permissible tensile stress with cable grip for Cu-conductor:	50 N/mm ²
Application:	Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.
Standard packing:	500 m on drums. Other forms of packing and delivery are available on request.



CABLES

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



CABLES

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



CABLES

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



CABLES

FLAME-X⁹⁵⁰ (N)HXCH FE180/E90 0,6/1 kV

DIN VDE 0266, DIN 4102-12, CNBOP-PIB AT-0603-0287/2010 edit 4



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

FIRE PERFORMANCE

Insulation integrity FE 180:	DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21
System integrity E30:	DIN 4102-12 (90 min.)
Flame propagation:	DIN EN 60332-3-22, VDE 0482-332-3-22, IEC 60332-3-22
Smoke density:	DIN EN 61034-2, VDE 0482-1034-2, IEC 61034-2
Gases evolved during combustion:	DIN EN 50267-2-2, VDE 0482-267-2-2, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 10 µS/mm

CONSTRUCTION

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

CHARACTERISTIC

Colour of sheath:	orange
Core identification:	according to HD 308 S2 or EN 50334

2-core:	blue, brown
3-core:	brown, black, grey
3 core-*	blue, brown, black
4-core:	blue, brown, black, grey
5-core:	blue, brown, black, grey, black
≥ 7-core:	black with numbering

*For certain applications only.

Maximum conductor operating temperature:	+90°C
Lowest ambient temperature for fixed installation:	-30°C
Lowest installation temperature:	-5°C
Maximum short-circuit conductor temperature:	+250°C
Minimum bending radius:	15D - for single core cable; 12D - for multicore cable (D - overall cable diameter)
Maximum permissible tensile stress with cable grip for Cu-conductor:	50 N/mm ² , (total cross-section in mm ² of the conductors (any screen not included))
Application:	Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.
Standard packing:	500 m on drums. Other forms of packing and delivery are available on request.



CABLES

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



CABLES

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



CABLES

FLAME-X⁹⁵⁰ JE-H(St)H...Bd FE180/E90

Based on DIN VDE 0815

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



FIRE PERFORMANCE

Insulation integrity FE 180:	DIN VDE 0472-814 (800°C, 180 minutes), IEC 60331
System integrity E90:	DIN 4102-12 (90 min.)
Flame propagation:	DIN EN 60332-3-24, VDE 0482-332-3-24
Smoke density:	VDE 0482-1034-2, DIN EN 61034-2, IEC 61034-2
Gases evolved during combustion:	VDE 0482-267-2-2, DIN EN 50267-2-2, IEC 60754-2: pH ≥ 3,5; conductivity ≤ 10 µS/mm

CONSTRUCTION

Conductors:	bare solid copper conductor 0,8 mm
Insulation:	special core insulation with mica tape and halogen-free cross-linked compound type H17 according to DIN VDE 0266
Pair:	two cores twisted to pair and each 4 pairs consist to unit
Separator:	polyester tape
Screen:	aluminium/polyester laminated tape and solid copper drain wire
Drain wire:	solid tinned annealed copper wire 0,8 mm
Sheath:	thermoplastic halogen-free, flame retardant compound according to DIN EN 50290-27 (DIN VDE 0207-24)

CHARACTERISTIC

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

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

Operating voltage:	peak voltage max. 225V (not for purposes of high current and power installation)
Loop resistance:	maximum 73,2 Ω/km
Insulation resistance at temperature 20°C:	minimum 100 MΩ x km
Mutual capacitance:	maximum 120 nF/km at 800 Hz (this values may be extended at 20% with a make-up up to 4 pairs)
Capacitance unbalance:	maximum 200 pF/100 m at 800 Hz (20% of the values, but one value up to 400 pF is allowed)
Test voltage 50 Hz:	core/core – 500V; core/screen – 2000V
Temperature range:	flexing: - 5°C to + 50°C, fixed installation: - 30°C to + 70°C
Minimum bending radius:	6D (D - overall cable diameter)



CABLES

FLAME-X⁹⁵⁰
JE-H(St)H...Bd FE180/E90

Based on DIN VDE 0815

Application:

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

Standard packing:

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

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

FLAME-X⁹⁵⁰**HDGs, HLGs, HLgGs, HDGsekwf, HLGsekwf, HLgGsekwf 300/500V**

ZN-TF-208, BS 6387, CNBOP-PIB AT-0603-0243/2009/2014 edit 2

Halogen-free low
smoke fire resistant
cables

**FIRE PERFORMANCE****Fire resistance:**

IEC 60331: 3h at 750°C

EN 50200 – PH 90 (for cables with overall diameter ≤ 20 mm)

BS 6387 Category C – resistance to fire: 3 h at 950°C

Category W – resistance to fire with water: 15 min at 650°C plus 15 min with water spray

Category Z – resistance to fire with mechanical shock: 15 min at 950°C

Flame propagation:

IEC 60332-3-22 Category A, (EN 60332-3-22)

Smoke emission:

IEC 61034-2, BS EN 61034-2:

Gases evolved during combustion:

IEC 60754-1, EN 50267-2-1: < 0,5% acid gas

IEC 60754-2, EN 50267-2-2: pH ≥ 4,3; conductivity ≤ 10 μS/mm¹**TYPE OF FLAME-X 950 CABLES:****HDGs**

cable with solid copper conductors (D), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H)

HLGs

cable with stranded copper conductors (L), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H)

HLgGs

cable with stranded flexible copper conductors (Lg), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H)

HDGsekwf

cable with solid copper conductors (D), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H), with electrostatic screen of aluminium/polyester laminated tape (ekwf)

HLGsekwf

cable with stranded copper conductors (L), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H), with electrostatic screen of aluminium/polyester laminated tape (ekwf)

HLgGsekwf

cable with stranded flexible copper conductors (Lg), special cross-linked silicone compound insulation (Gs) and thermoplastic halogen-free outer sheath (H), with electrostatic screen of aluminium/polyester laminated tape (ekwf)

CONSTRUCTION**Conductors:**

circular copper class 1 (D), circular stranded copper class 2 (L) or circular flexible stranded copper class 5 (Lg) according to EN 60228

Drain wire:

tinned annealed copper wires class 1 or stranded class 2 according to EN 60228

Insulation:

special cross-linked heat resistant compound type EI2 FR (Gs) according to EN 50363.1

Optional binder:

non hygroscopic halogen free tape

Screen:

aluminium/polyester laminated tape and drain wire (ekwf)

Outer sheath:

thermoplastic zero halogen low smoke compound (H) according to ZN-TF-208

CHARACTERISTIC**Colour of sheath:**

red

Core identification:

≤ 5 core: according to HD 308 S2



CABLES

CHARACTERISTIC		
	without protective conductor	with protective conductor
≥ 7 core:	in each layer: brown (starting core), blue (reference core), other cores natural	in outer layer: green-yellow, blue (reference core), others cores shall be natural, in other layers: brown (starting core), blue (reference core), other cores natural
Maximum conductor operating temperature:	+90°C	
Lowest temperature ambient for fixed installation:	-25°C	
Lowest installation temperature:	-10°C	
Maximum short-circuit conductor temperature:	+250°C	
Minimum bending radius:	6 D (D is the overall diameter of the cable)	
Application:	Installations emergency lighting and evacuation systems, fire and smoke detection systems air-conditioning and alarm systems, automatic elevator doors, computer control rooms, offshore and marine emergency systems, emergency evacuation communicators.	
Standard packing:	500 m on drums. Other forms of packing and delivery are available on request.	

Number and cross-sectional area of conductor			Approximate overall diameter			Approximate net weight of cables		
			HDGs	HLGs	HLgGs	HDGs	HLGs	HLgGs
n x mm ²			mm			kg/km		
2	x	1	6,4	6,9	6,8	50	54	52
2	x	1,5	7,5	8,1	8,0	69	75	72
2	x	2,5	8,9	9,6	9,6	100	109	105
2	x	4	9,8	10,6	10,5	133	144	137
3	x	1	6,8	7,3	7,2	64	70	67
3	x	1,5	7,9	8,6	8,5	90	98	93
3	x	2,5	9,4	10,1	10,1	132	143	137
3	x	4	10,6	11,5	11,3	185	200	189
4	x	1	7,6	8,2	8,0	83	91	86
4	x	1,5	8,9	9,6	9,4	117	127	120
4	x	2,5	10,5	11,3	11,3	171	186	178
4	x	4	11,6	12,6	12,4	235	254	239
5	x	1	8,6	9,3	9,1	109	119	113
5	x	1,5	9,8	10,6	10,4	147	160	152
5	x	2,5	11,6	12,5	12,5	216	235	225
5	x	4	12,8	13,9	13,7	297	321	303
7	x	1	9,3	10,1	9,8	135	148	140
7	x	1,5	10,8	11,7	11,5	190	206	195
7	x	2,5	12,6	13,6	13,6	274	298	284
10	x	1	11,8	12,8	12,5	192	211	199
10	x	1,5	13,6	14,8	14,5	263	287	270
10	x	2,5	16,5	17,9	17,9	407	441	421
12	x	1	12,1	13,2	12,9	220	241	228
12	x	1,5	14,0	15,3	15,0	303	331	311
12	x	2,5	17,0	18,5	18,4	470	510	486
16	x	1	13,4	14,6	14,2	282	310	292
16	x	1,5	16,1	17,5	17,2	415	453	427



CABLES

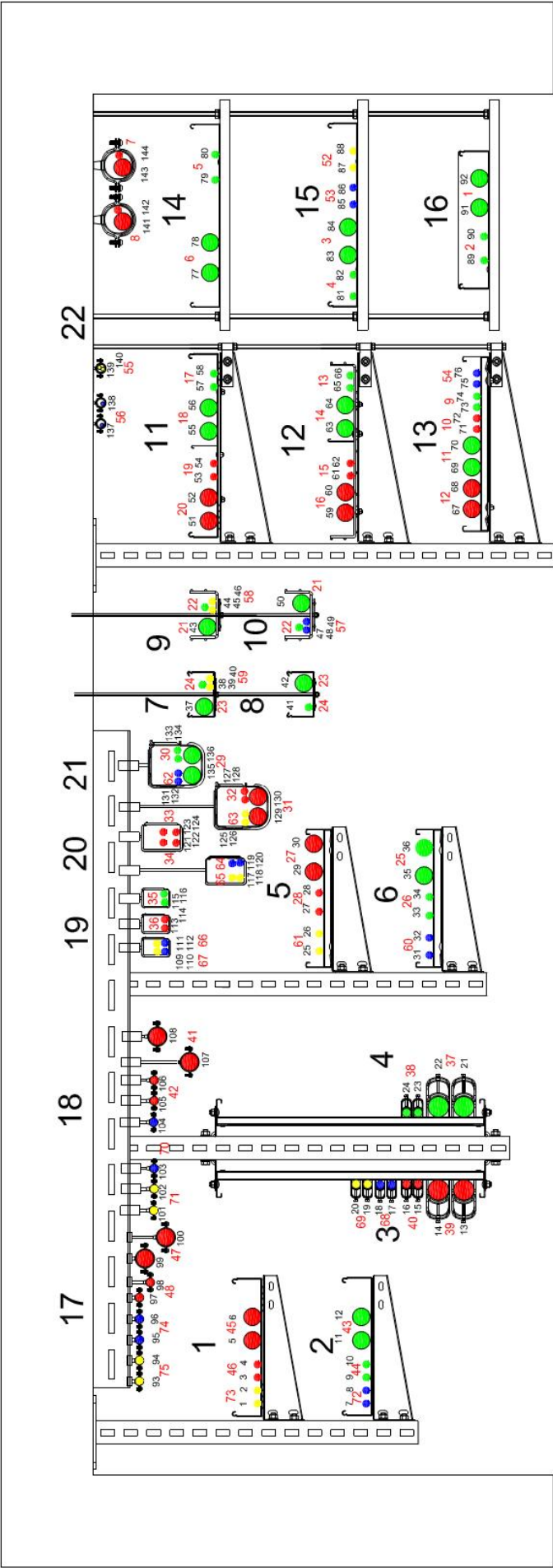
Number and cross-sectional area of conductor			Approximate overall diameter			Approximate net weight of cables		
			HDGs	HLGs	HLgGs	HDGs	HLGs	HLgGs
n x mm ²			mm			kg/km		
16	x	2,5	19,4	21,1	21,0	635	690	659
20	x	1	15,4	16,8	16,3	361	395	373
20	x	1,5	18,4	20,0	19,6	524	571	539
20	x	2,5	21,4	23,3	23,2	765	830	791
24	x	1	17,0	18,6	18,1	424	466	439
24	x	1,5	20,3	22,1	21,7	618	673	634
24	x	2,5	24,4	26,5	26,4	939	1019	972
30	x	1	18,6	20,2	19,7	535	587	553
30	x	1,5	21,4	23,4	23,0	742	808	760
30	x	2,5	25,8	28,0	27,9	1132	1228	1168
37	x	1	19,9	21,7	21,2	638	699	659
37	x	1,5	23,7	25,8	25,3	922	1004	945
37	x	2,5	27,7	30,2	30,1	1360	1476	1402

Number and cross-sectional area of conductor			Approximate overall diameter			Approximate net weight of cables		
			HDGsekwf	HLGsekwf	HLgGsekwf	HDGsekwf	HLGsekwf	HLgGsekwf
n x mm ²			mm			kg/km		
2	x	1	7,1	7,4	7,3	65	68	65
2	x	1,5	8,2	8,6	8,5	90	94	89
2	x	2,5	9,6	10,1	10,1	130	137	131
2	x	4	10,5	11,1	11,0	177	186	176
3	x	1	7,5	7,9	7,7	81	85	81
3	x	1,5	8,7	9,1	9,0	113	118	112
3	x	2,5	10,1	10,7	10,7	165	174	166
3	x	4	11,3	12,0	11,9	232	244	230
4	x	1	8,5	9,0	8,7	103	109	103
4	x	1,5	9,9	10,6	10,4	143	152	143
4	x	2,5	11,9	12,8	12,8	211	224	214
4	x	4	13,6	14,8	14,6	291	310	291
5	x	1	10,4	10,8	10,6	132	139	129
5	x	1,5	11,6	12,1	12,0	171	181	169
5	x	2,5	13,4	14,0	14,0	244	258	245
5	x	4	14,6	15,4	15,3	326	346	323
7	x	1	11,2	11,7	11,4	161	169	158
7	x	1,5	12,7	13,3	13,1	219	230	215
7	x	2,5	14,5	15,2	15,2	306	324	306
10	x	1	14,0	14,6	14,3	226	238	222
10	x	1,5	15,8	16,6	16,3	300	316	296
10	x	2,5	18,7	19,7	19,7	450	476	453
12	x	1	14,4	15,0	14,7	257	271	253
12	x	1,5	16,3	17,1	16,8	344	363	340
12	x	2,5	19,3	20,3	20,3	518	548	521



CABLES

Number and cross-sectional area of conductor		Approximate overall diameter			Approximate net weight of cables		
		HDGsekwf	HLGsekwf	HLgGsekwf	HDGsekwf	HLGsekwf	HLgGsekwf
n x mm ²		mm			kg/km		
16	x 1	15,8	16,6	16,2	327	346	324
16	x 1,5	18,5	19,5	19,2	468	495	465
16	x 2,5	21,8	23,0	23,0	698	740	705
20	x 1	18,0	18,8	18,4	416	439	412
20	x 1,5	21,0	22,0	21,7	589	622	585
20	x 2,5	24,0	25,4	25,3	838	887	844
24	x 1	19,8	20,8	20,3	488	515	483
24	x 1,5	23,1	24,3	23,9	692	730	687
24	x 2,5	27,2	28,7	28,6	1027	1087	1036
30	x 1	21,5	22,5	22,0	612	646	608
30	x 1,5	24,4	25,6	25,3	828	874	822
30	x 2,5	28,7	30,3	30,2	1233	1306	1243
37	x 1	23,0	24,1	23,6	727	768	722
37	x 1,5	26,8	28,2	27,7	1027	1084	1021
37	x 2,5	30,8	32,6	32,5	1479	1566	1489





DRAWINGS

No	No FIRES	Cable type	Position	Construction	
1	73	Je-H(St)H 1x2x0,8 Bd FE180/E90	1	Koryto kablowe KFL300H60/... B-300 1.5 m /10kg/m / grubość blachy 0,7 mm Mocowanie: Wspornik WPCB..., wysięgnik WWS/WWSO300	
2		Je-H(St)H 1x2x0,8 Bd FE180/E90			
3	46	(N)HXH FE180/PH90/E90 4x1,5 RE			
4		(N)HXH FE180/PH90/E90 4x1,5 RE			
5	45	(N)HXH FE180/PH90/E90 4x50 RM			
6		(N)HXH FE180/PH90/E90 4x50 RM			
7	72	HDGs 5x1 300/500V	2	Koryto kablowe KFL300H60/... B-300 1.5 m /10kg/m / grubość blachy 0,7 mm Mocowanie: Wspornik WPCB..., wysięgnik WWS/WWSO300	
8		HDGs 5x1 300/500V			
9	44	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE			
10		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE			
11	43	(N)HXCH FE180/PH90/E90 4x50/25 RM			
12		(N)HXCH FE180/PH90/E90 4x50/25 RM			
13	39	(N)HXH FE180/PH90/E90 4x50 RM	3	Drabina DUP600H60/... B-600/ 1,5m/ 20kg/m/ grubość blachy 1,5mm. Mocowanie: WPCB... + UTM/UTMO	
14		(N)HXH FE180/PH90/E90 4x50 RM			
15	40	(N)HXH FE180/PH90/E90 4x1,5 RE			
16		(N)HXH FE180/PH90/E90 4x1,5 RE			
17	68	HDGs 5x1 300/500V			
18		HDGs 5x1 300/500V			
19	69	Je-H(St)H 1x2x0,8 Bd FE180/E90	4	Drabina DUP600H60/... B-600/ 1,5m/ 20kg/m/ grubość blachy 1,5mm. Mocowanie: WPCB... + UTM/UTMO	
20		Je-H(St)H 1x2x0,8 Bd FE180/E90			
21	37	(N)HXCH FE180/PH90/E90 4x50/25 RM			
22		(N)HXCH FE180/PH90/E90 4x50/25 RM			
23	38	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE			
24		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE			
25	61	Je-H(St)H 1x2x0,8 Bd FE180/E90	5	Drabina kablowa DUD300H60/... B-300 1.5 m /10kg/m / grubość blachy 1,2 mm Mocowanie: Wspornik WPCB..., wysięgnik WWS/WWSO300	
26		Je-H(St)H 1x2x0,8 Bd FE180/E90			
27	28	(N)HXH FE180/PH90/E90 4x1,5 RE			
28		(N)HXH FE180/PH90/E90 4x1,5 RE			
29	27	(N)HXH FE180/PH90/E90 4x50 RM			
30		(N)HXH FE180/PH90/E90 4x50 RM			
31	60	HDGs 5x1 300/500V	6	Drabina kablowa DUD300H60/... B-300 1.5 m /10kg/m / grubość blachy 1,2 mm Mocowanie: Wspornik WPCB..., wysięgnik WWS/WWSO300	
32		HDGs 5x1 300/500V			
33	26	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE			
34		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE			
35	25	(N)HXCH FE180/PH90/E90 4x50/25 RM			
36		(N)HXCH FE180/PH90/E90 4x50/25 RM			
37	23	(N)HXCH FE180/PH90/E90 4x50/25 RM	7	Koryto kablowe KGL/KGOL 100H60/... B-100 1.5 m / 5kg/m / grubość blachy 0,7 mm. Mocowanie: Nakrętki kwadratowe NK... , pręt gwintowany PGM 6...	
38	24	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE			
39	59	Je-H(St)H 1x2x0,8 Bd FE180/E90			
40		Je-H(St)H 1x2x0,8 Bd FE180/E90			
41	24	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	8		
42	23	(N)HXCH FE180/PH90/E90 4x50/25 RM			



DRAWINGS

No	No FIRES	Cable type	Position	Construction		
43	21	(N)HXCH FE180/PH90/E90 4x50/25 RM	9	Koryto siatkowe KDS/KDSO 100H60/... B-100 1.5 m /5kg/m. Mocowanie: Zacisk ZSW , pręt gwintowany PGM 6...		
44	22	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				
45	58	Je-H(St)H 1x2x0,8 Bd FE180/E90				
46		Je-H(St)H 1x2x0,8 Bd FE180/E90				
47	22	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	10			
48	57	HDGs 5x1 300/500V				
49		HDGs 5x1 300/500V				
50	21	(N)HXCH FE180/PH90/E90 4x50/25 RM				
51	20	(N)HXH FE180/PH90/E90 4x50 RM	11		Koryto kablowe KGJ/KGOJ400H60/... + przegroda B-400 1.5 m / 20kg/m / grubość blachy 0,9 mm. Mocowanie: Wspornik WPCB... , wysięgnik WWS/WWSO400 , pręt odciągowy PGM	
52		(N)HXH FE180/PH90/E90 4x50 RM				
53	19	(N)HXH FE180/PH90/E90 4x1,5 RE				
54		(N)HXH FE180/PH90/E90 4x1,5 RE				
55	18	(N)HXCH FE180/PH90/E90 4x50/25 RM				
56		(N)HXCH FE180/PH90/E90 4x50/25 RM				
57	17	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				
58		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				
59	16	(N)HXH FE180/PH90/E90 4x50 RM		12		Koryto siatkowe KDS/KDSO400H60/... + przegroda B-400 1.5 m / 20kg/m. Mocowanie: Wspornik WPCB... , wysięgnik WWS/WWSO400 , pręt odciągowy PGM
60		(N)HXH FE180/PH90/E90 4x50 RM				
61	15	(N)HXH FE180/PH90/E90 4x1,5 RE				
62		(N)HXH FE180/PH90/E90 4x1,5 RE				
63	14	(N)HXCH FE180/PH90/E90 4x50/25 RM				
64		(N)HXCH FE180/PH90/E90 4x50/25 RM				
65	13	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				
66		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				
67	12	(N)HXH FE180/PH90/E90 4x50 RM	13		Drabina kablowa DUD400H60/... B-400 1.5 m / 20kg/m / grubość blachy 1,2 mm. Mocowanie: Wspornik WPCB... , wysięgnik WWS/WWSO400 , pręt odciągowy PGM...	
68		(N)HXH FE180/PH90/E90 4x50 RM				
69	11	(N)HXCH FE180/PH90/E90 4x50/25 RM				
70		(N)HXCH FE180/PH90/E90 4x50/25 RM				
71	10	(N)HXH FE180/PH90/E90 4x1,5 RE				
72		(N)HXH FE180/PH90/E90 4x1,5 RE				
73	9	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				
74		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				
75	54	HDGs 5x1 300/500V				
76		HDGs 5x1 300/500V				
77	6	(N)HXCH FE180/PH90/E90 4x50/25 RM	14	Koryto kablowe KGJ/KGOJ 400H60/... B-400 1.5 m / 20kg/m / grubość blachy 0,9 mm. Mocowanie: Ceownik CWP40H22, Pręty PGM...		
78		(N)HXCH FE180/PH90/E90 4x50/25 RM				
79	5	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				
80		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE				



DRAWINGS

No	No FIRES	Cable type	Position	Construction
81	4	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	15	Koryto kablowe KBJ400H60/... B-400 1.5 m / 20kg/m / grubość blachy 0,9 mm. Mocowanie: Ceownik CWP40H22, Pręty PGM...
82		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		
83	3	(N)HXCH FE180/PH90/E90 4x50/25 RM		
84		(N)HXCH FE180/PH90/E90 4x50/25 RM		
85	53	HDGs 5x1 300/500V		
86		HDGs 5x1 300/500V		
87	52	Je-H(St)H 1x2x0,8 Bd FE180/E90		
88		Je-H(St)H 1x2x0,8 Bd FE180/E90		
89	2	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	16	Koryto kablowe KGL/KGOL 300H60/... + pokrywa B-300 1.5 m / 20kg/m / grubość blachy 0,7 mm. Mocowanie: Ceownik CWP40H22, Pręty PGM...
90		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		
91	1	(N)HXCH FE180/PH90/E90 4x50/25 RM		
92		(N)HXCH FE180/PH90/E90 4x50/25 RM		
93	75	Je-H(St)H 1x2x0,8 Bd FE180/E90	17	Obejmy KSA mocowana do dwuteownika co 600 mm za pomocą zacisku sprężystego ZSU3 13/3
94		Je-H(St)H 1x2x0,8 Bd FE180/E90		
95	74	HDGs 5x1 300/500V		
96		HDGs 5x1 300/500V		
97	48	(N)HXH FE180/PH90/E90 4x1,5 RE		
98		(N)HXH FE180/PH90/E90 4x1,5 RE		
99	47	(N)HXH FE180/PH90/E90 4x50 RM		
100		(N)HXH FE180/PH90/E90 4x50 RM		
101	71	Je-H(St)H 1x2x0,8 Bd FE180/E90	18	Obejmy KSA na pręcie M6 mocowanie do dwuteownika co 600 mm za pomocą zacisku ZK8
102		Je-H(St)H 1x2x0,8 Bd FE180/E90		
103	70	HDGs 5x1 300/500V		
104		HDGs 5x1 300/500V		
105	42	(N)HXH FE180/PH90/E90 4x1,5 RE		
106		(N)HXH FE180/PH90/E90 4x1,5 RE		
107	41	(N)HXH FE180/PH90/E90 4x50 RM		
108		(N)HXH FE180/PH90/E90 4x50 RM		
109	67	Je-H(St)H 1x2x0,8 Bd FE180/E90	19	OZMO na pręcie M6 mocowanie do dwuteownika co 600 mm za pomocą ZK8
110		Je-H(St)H 1x2x0,8 Bd FE180/E90		
111	66	HDGs 5x1 300/500V		
112		HDGs 5x1 300/500V		
113	36	(N)HXH FE180/PH90/E90 4x1,5 RE		
114		(N)HXH FE180/PH90/E90 4x1,5 RE		
115	35	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		
116		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		
117	65	Je-H(St)H 1x2x0,8 Bd FE180/E90	20	OZSO na pręcie M6 mocowanie do dwuteownika co 600 mm za pomocą ZK8
118		Je-H(St)H 1x2x0,8 Bd FE180/E90		
119	64	HDGs 5x1 300/500V		
120		HDGs 5x1 300/500V		
121	34	(N)HXH FE180/PH90/E90 4x1,5 RE		
122		(N)HXH FE180/PH90/E90 4x1,5 RE		
123	33	(N)HXH FE180/PH90/E90 4x6 RE		
124		(N)HXH FE180/PH90/E90 4x6 RE		



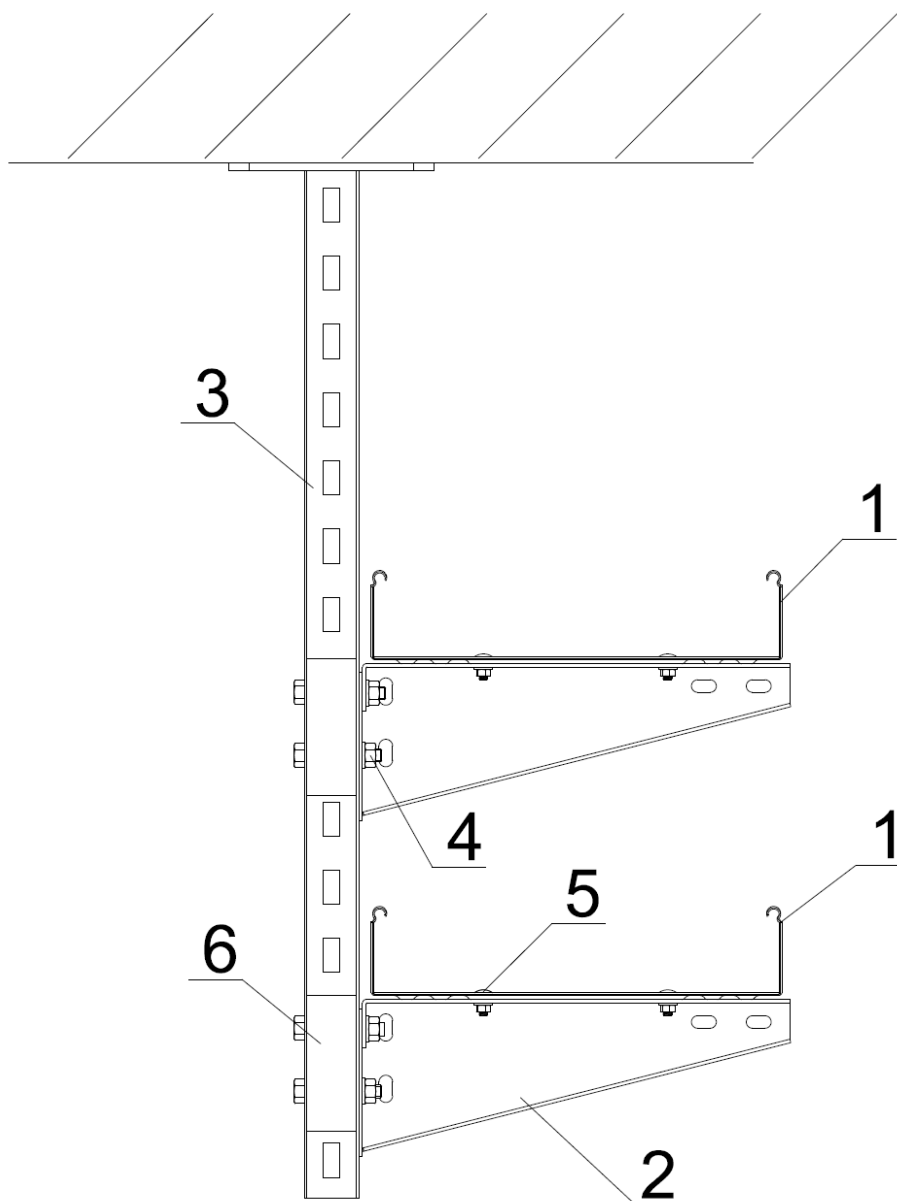
DRAWINGS

No	No FIRES	Cable type	Position	Construction
125	63	Je-H(St)H 1x2x0,8 Bd FE180/E90	21	OZO na pręcie M6 mocowanie do dwuteownika co 600 mm za pomocą ZK8
126		Je-H(St)H 1x2x0,8 Bd FE180/E90		
127	32	(N)HXH FE180/PH90/E90 4x6 RE		
128		(N)HXH FE180/PH90/E90 4x6 RE		
129	31	(N)HXH FE180/PH90/E90 4x50 RM		
130		(N)HXH FE180/PH90/E90 4x50 RM		
131	62	HDGs 5x1 300/500V		
132		HDGs 5x1 300/500V		
133	30	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		
134		(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE		
135	29	(N)HXCH FE180/PH90/E90 4x50/25 RM		
136		(N)HXCH FE180/PH90/E90 4x50/25 RM		
137	56	HDGs 5x1 300/500V	22	RURY RU 16-63,5x1,5/... / 1,5 m / Mocowanie do stropu za pomocą obejm OBS.
138		HDGs 5x1 300/500V		
139	55	Je-H(St)H 1x2x0,8 Bd FE180/E90		
140		Je-H(St)H 1x2x0,8 Bd FE180/E90		
141	8	(N)HXH FE180/PH90/E90 4x50 RM		
142	7	(N)HXH FE180/PH90/E90 4x1,5 RE		
143	8	(N)HXH FE180/PH90/E90 4x50 RM		
144	7	(N)HXH FE180/PH90/E90 4x1,5 RE		

No	Cable type	Measured cable diameter (approx)	Cable weight [kg/m], approx.	Amount
1	(N)HXH FE180/PH90/E90 4x1,5 RE	17,7 mm	0,35	22
2	(N)HXH FE180/PH90/E90 4x6 RE	20,6 mm	0,60	4
3	(N)HXH FE180/PH90/E90 4x50 RM	36,5 mm	2,88	20
4	(N)HXCH FE180/PH90/E90 4x1,5/1,5 RE	18,5 mm	0,40	26
5	(N)HXCH FE180/PH90/E90 4x50/25 RM	39,4 mm	3,23	24
6	Je-H(St)H 1x2x0,8 Bd FE180/E90	10,5 mm	0,11	24
7	HDGs 5x1 300/500V	8,6 mm	0,11	24
TOTAL				144



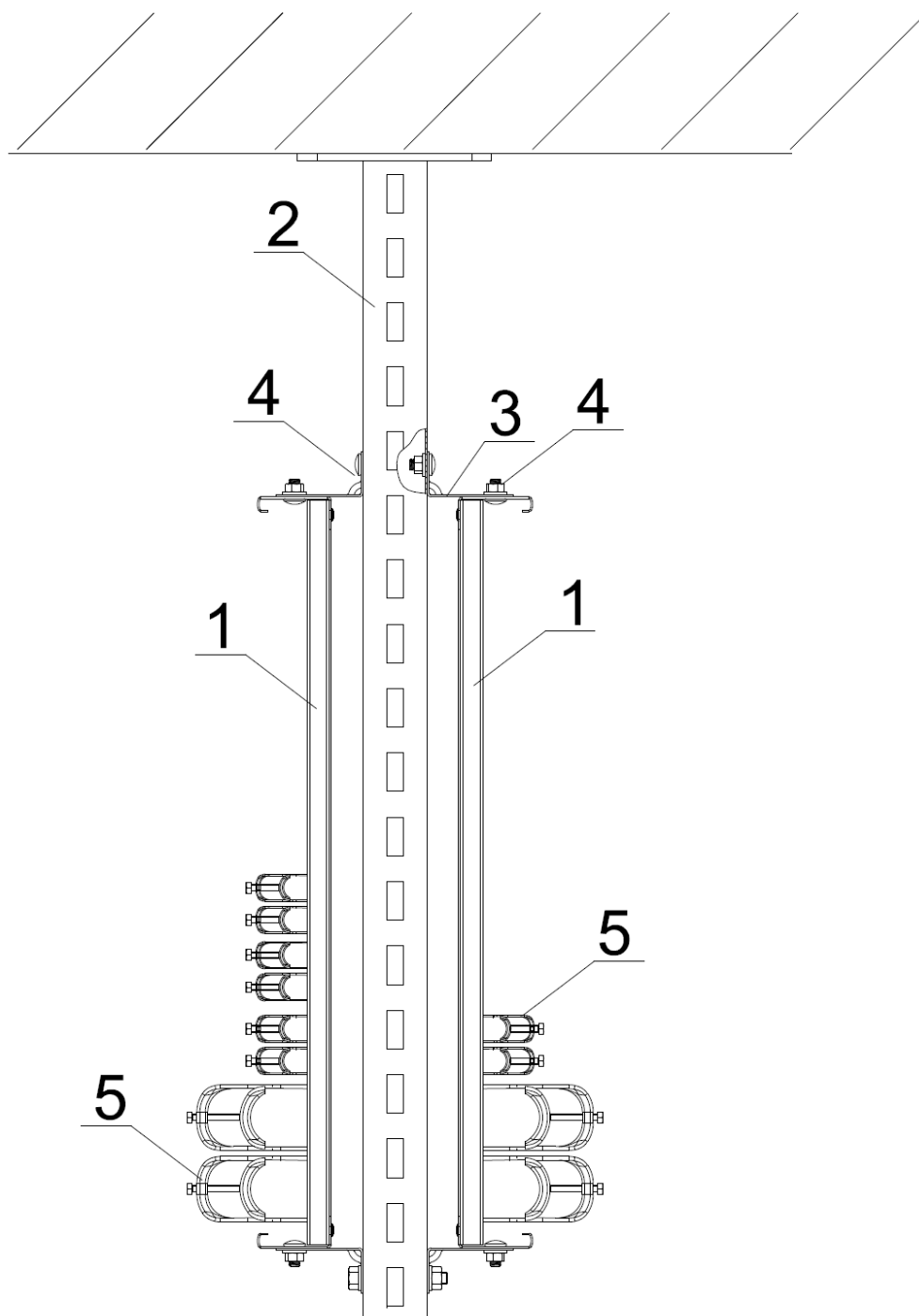
DRAWINGS



6	Blacha rozporowa	BR55	2
5	Śruba z łbem grzybkowym	SGKM6x12	4
4	Śruba + podkł. powiększona	SMM10x80 + PW10	4
3	Wspornik sufitowy	WPCB...	1
2	Wysięgnik	WWS/WWSO300	2
1	Koryto	KFL300H60/...	2
L.p.	Nazwa	Symbol	Szt.



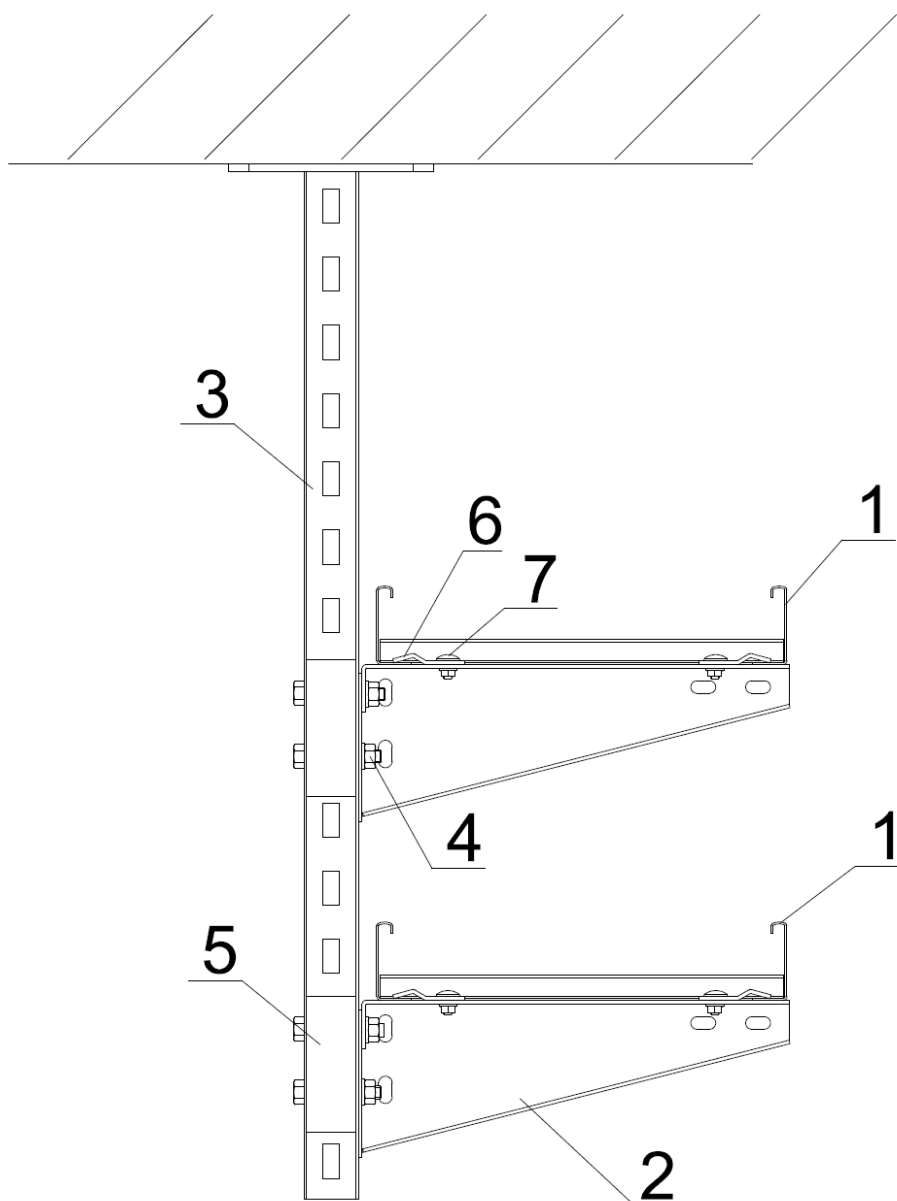
DRAWINGS



5	Uchwyt kablowy	UK/UKO1	
4	Śruba z łbem grzybkowym	SGKM8x14	8
3	Uchwyt trójkątny	UTM/UTMO	4
2	Wspornik sufitowy	WPCB...	1
1	Drabina	DUP/DUOP600H60/...	2
L.p.	Nazwa	Symbol	Szt.



DRAWINGS



7	Śruba z łbem grzybkowym	SGKM8x14	4
6	Zacisk mocujący	ZM/ZMO	4
5	Blacha rozporowa	BR55	2
4	Śruba + podkł. powiększona	SMM10x80 + PW10	4
3	Wspornik sufitowy	WPCB...	1
2	Wysięgnik	WWS/WWSO300	2
1	Drabina	DUD300H60/...	2
L.p.	Nazwa	Symbol	Szt.



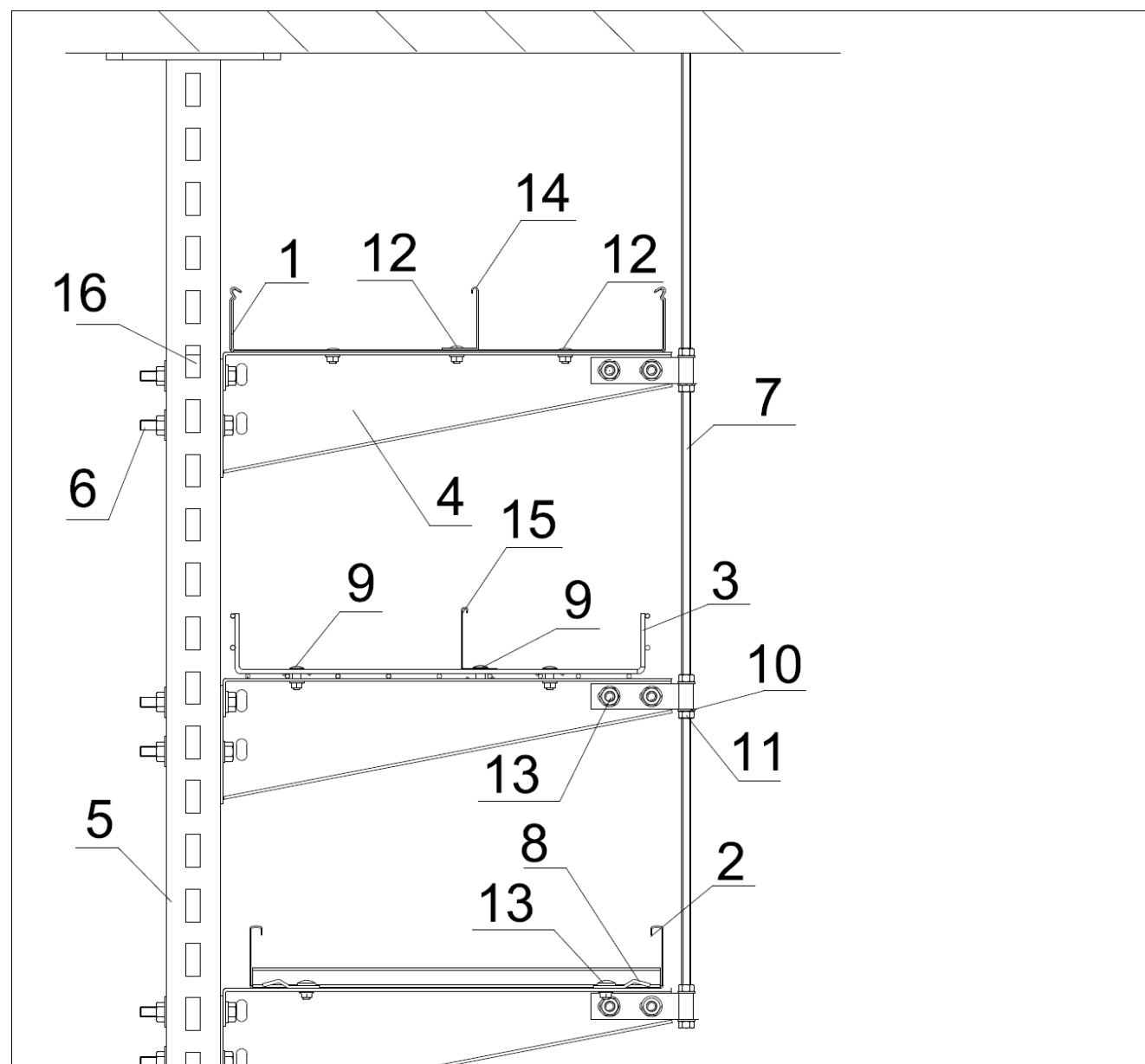
DRAWINGS

				5	Uchwyt śrubowy	ZSW	2
		4	Podkładka	PP6			4
		3	Nakrętka	NSM6			4
		2	Pręt gwintowany	PGM6/...			1
		1	Koryto siatkowe	KDS/KDSO100H60			1
		L.p.	Nazwa	Symbol			Szt.

5	Nakrętka	NSM6	2
4	Podkładka	PP6	2
3	Nakrętka kwadratowa	NKM6	2
2	Pręt gwintowany	PGM6/...	1
1	Koryto	KGL/KGOL100H60	2
L.p.	Nazwa	Symbol	Szt.



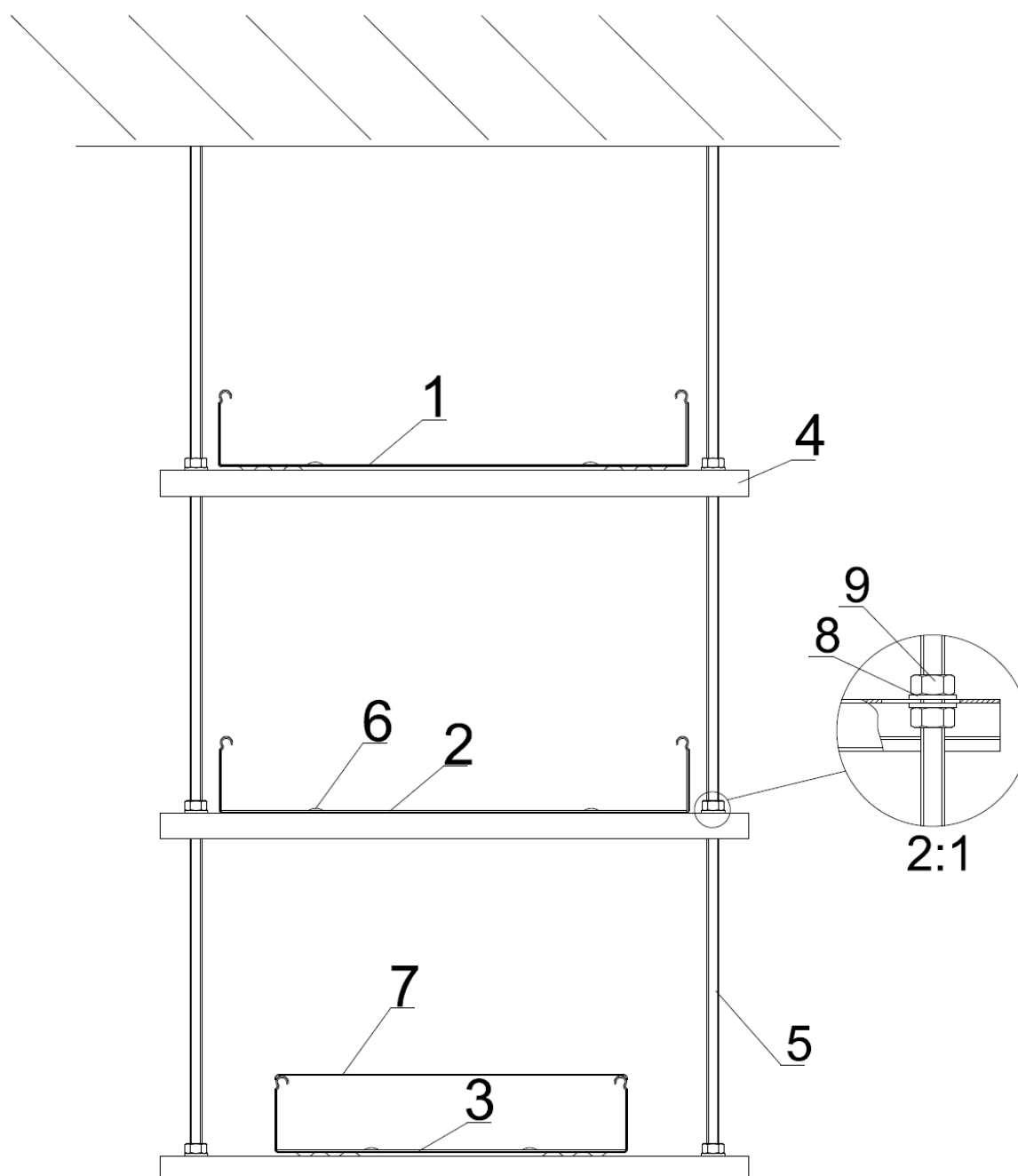
DRAWINGS



16	Blacha rozporowa	BR55	3
15	Przegroda	PGJ50/...	1
14	Przegroda	PGJ60/...	1
13	Śruba z łbem grzybkowym	SGKM8x14	8
12	Śruba z łbem grzybkowym	SGKM6x12	2
11	Nakrętka	NSM10	6
10	Podkładka	PP10	6
9	Zacisk śrubowy	ZSO	2
8	Zacisk mocujący	ZMO	2
7	Pręt gwintowany	PGM10/...	1
6	Śruba + podkł. powiększ.	SM M10x80 + PW10	6
5	Wspornik sufitowy	WPCB...	1
4	Wysięgnik	WWS/WWSO400	3
3	Koryto siatkowe	KDS/KDSO400H60	1
2	Drabinka	DUD/DUOD400H60	1
1	Koryto	KGJ/KGOJ400H60	1
L.p.	Nazwa	Symbol	Szt.



DRAWINGS

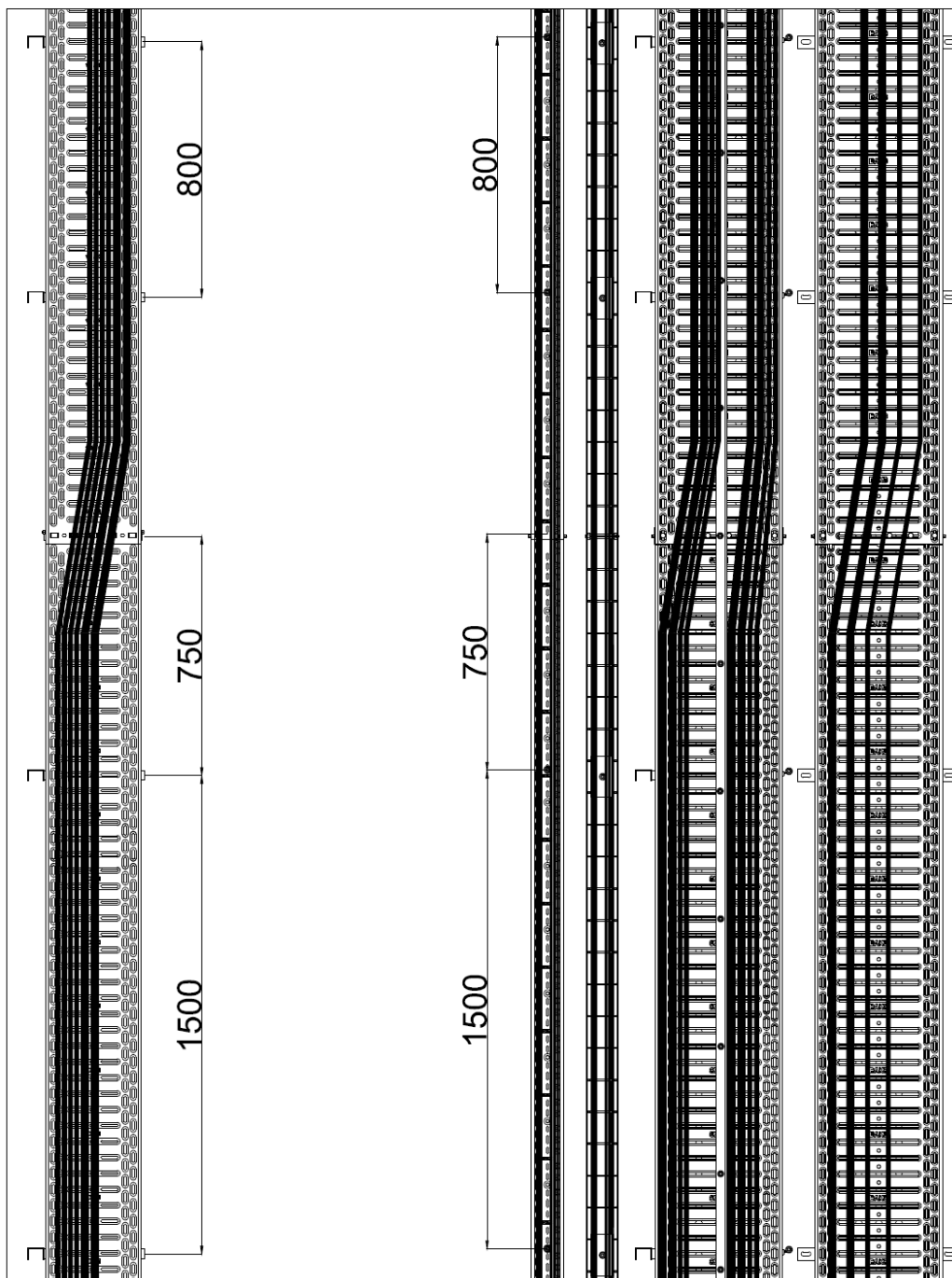


9	Nakrętka	NSM12	12
8	Podkładka	PP12	12
7	Pokrywa koryta	PKL	1
6	Śruba z łbem grzybkowym	SGKM6x12	6
5	Pręt gwintowany	PGM12/...	2
4	Ceownik	CWP40H22/...	3
3	Koryto	KGL/KGOL300H60/...	1
2	Koryto	KBJ/KBOJ400H60/...	1
1	Koryto	KGJ/KGOJ400H60/...	1
L.p.	Nazwa	Symbol	Szt.



DRAWINGS

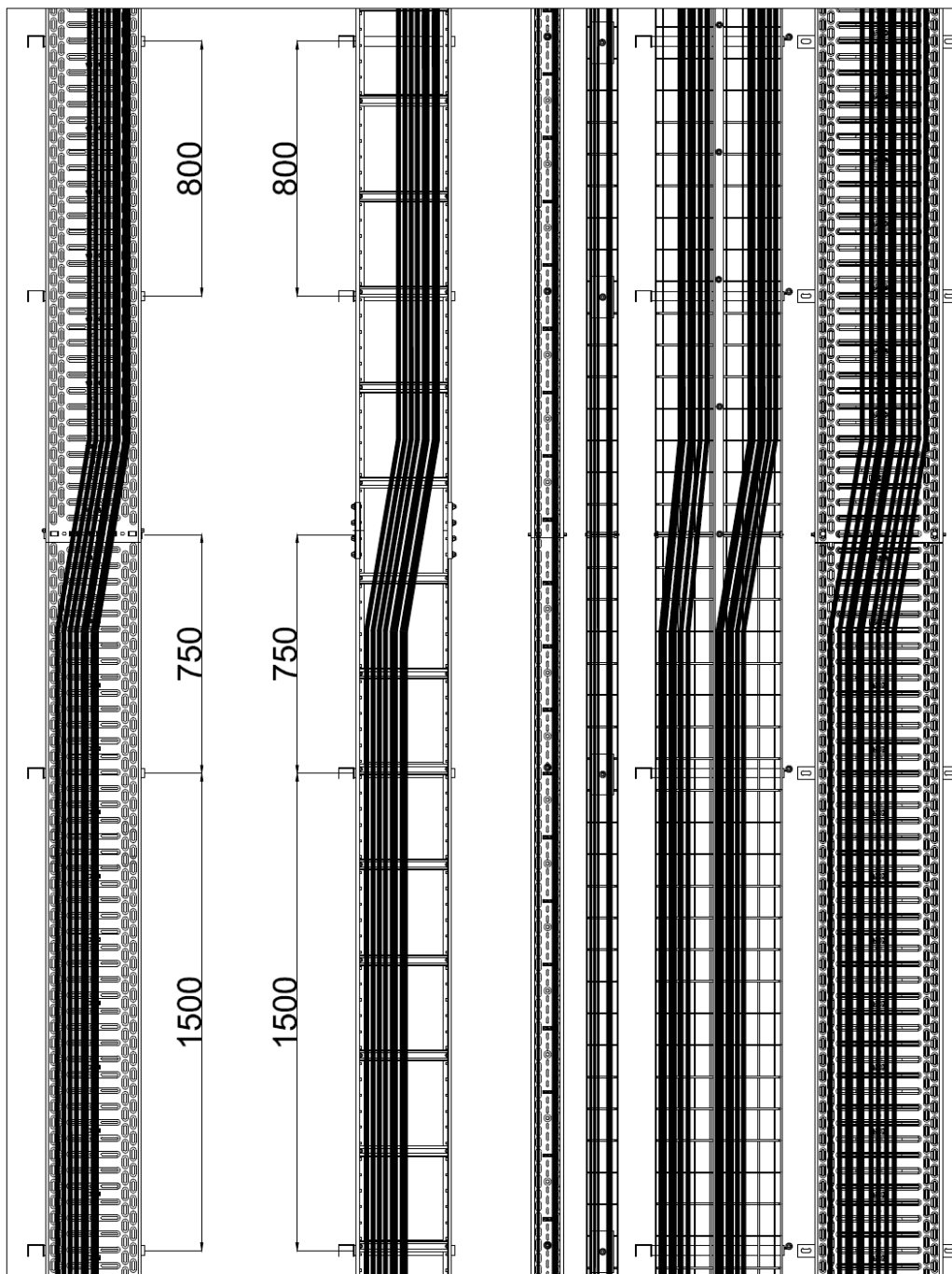
A-A





DRAWINGS

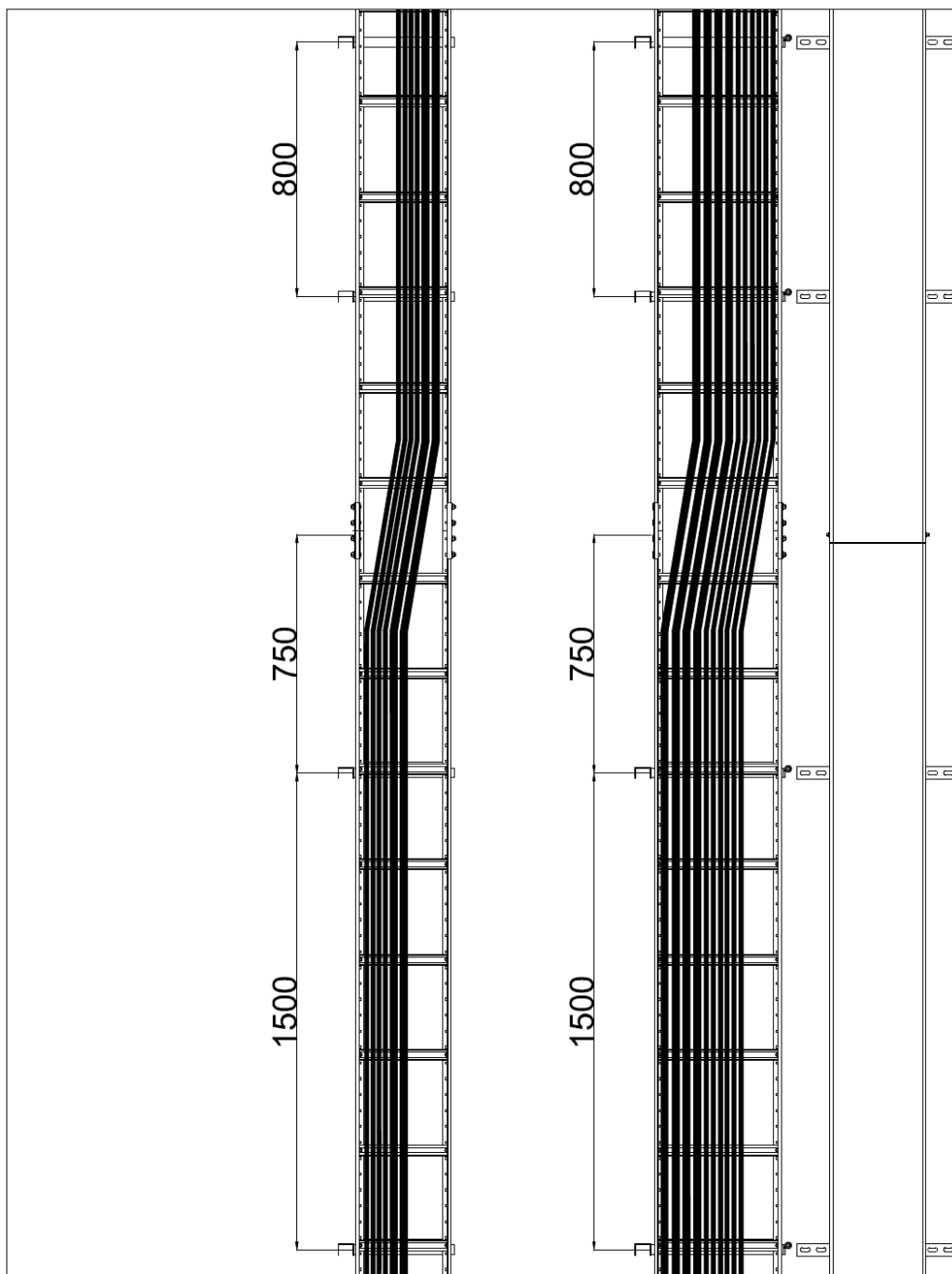
B-B





DRAWINGS

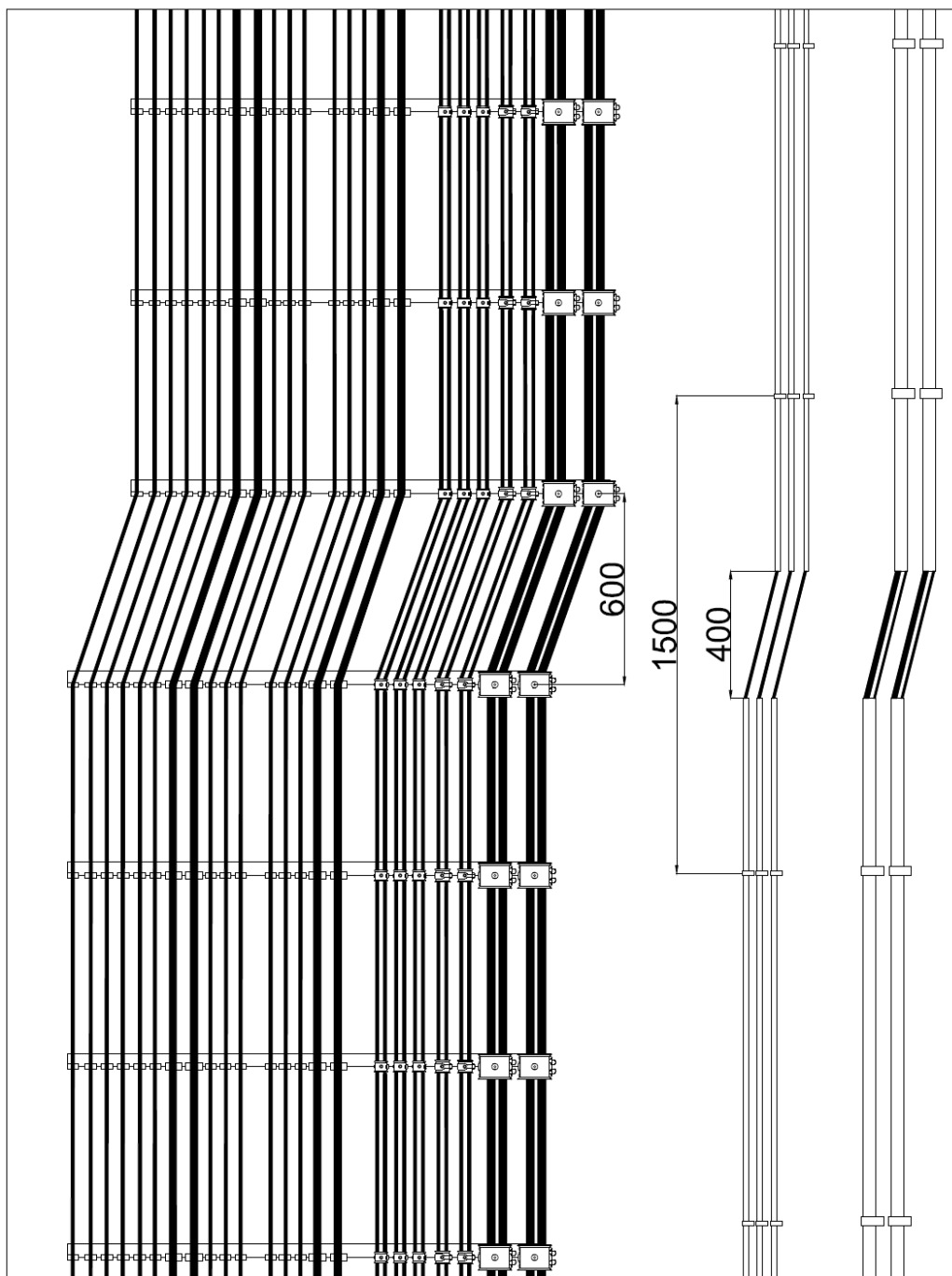
C-C





DRAWINGS

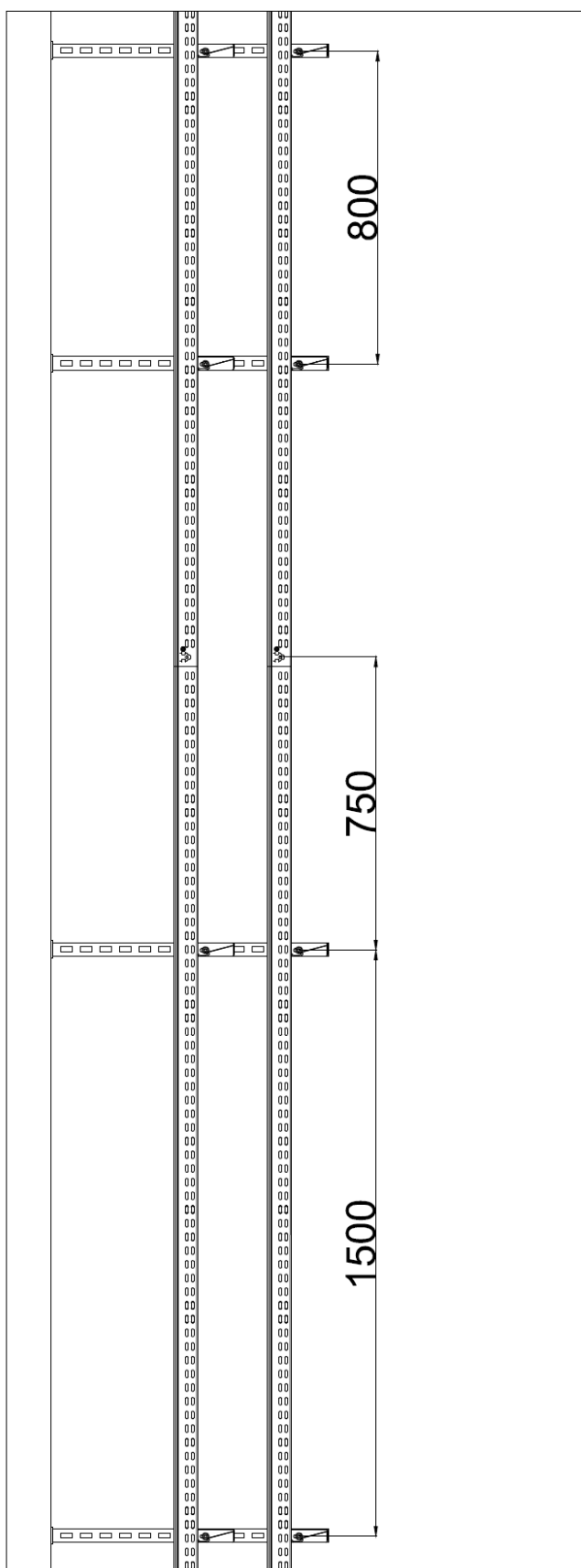
D-D





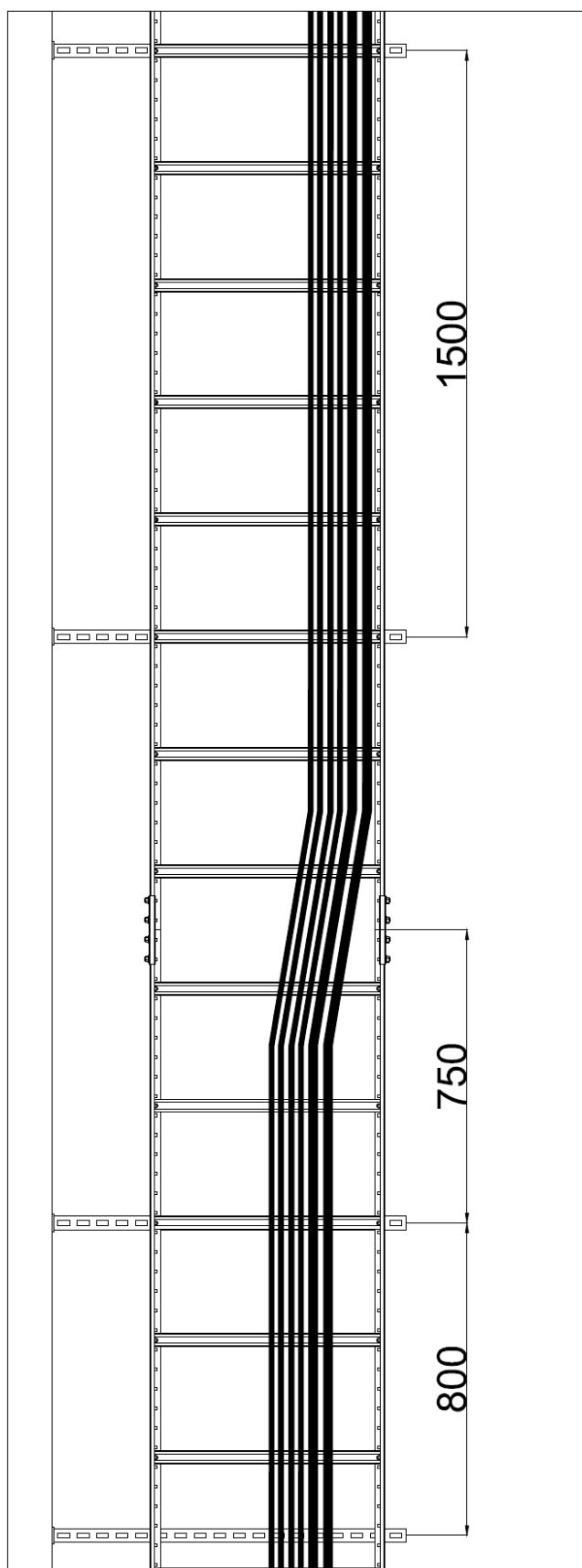
DRAWINGS

E-E





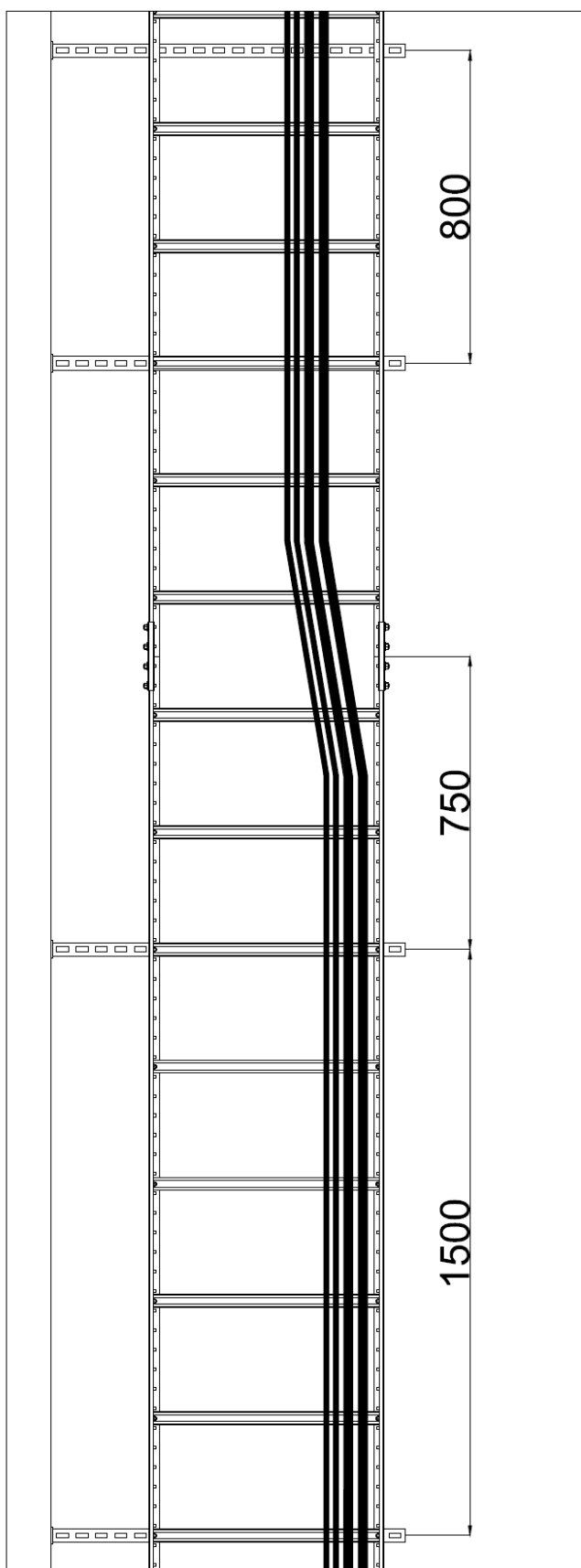
F-F





DRAWINGS

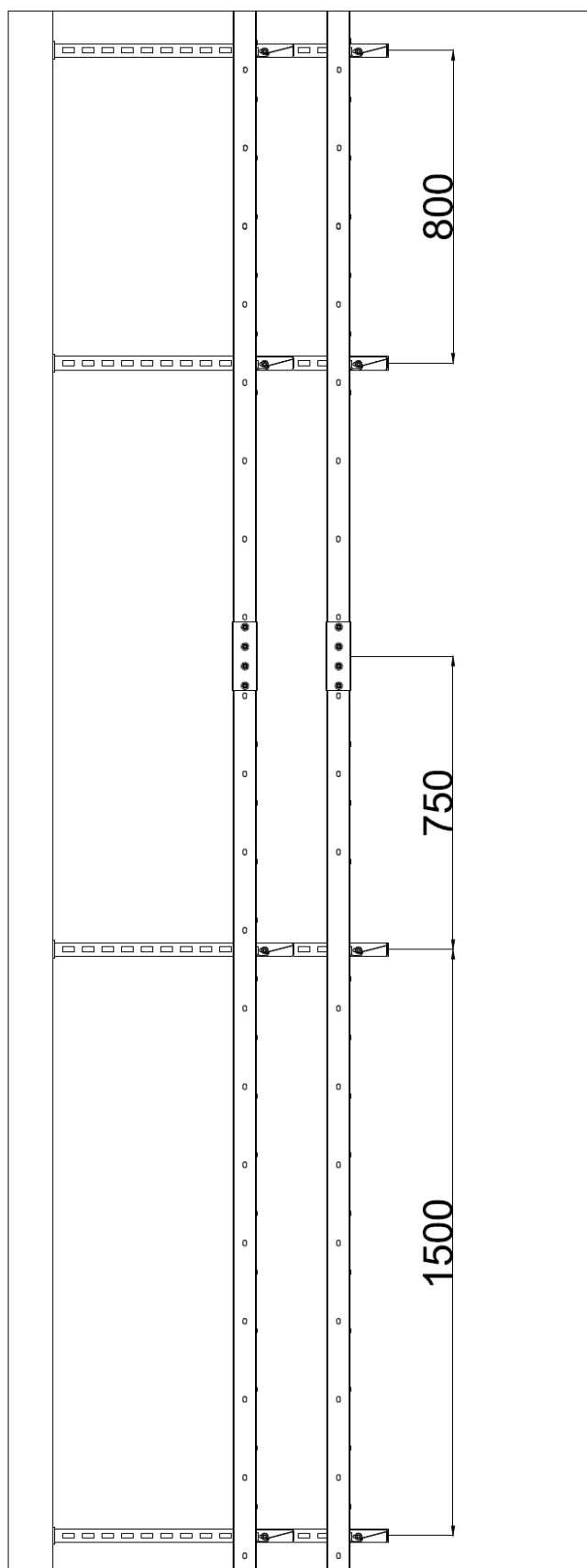
G-G





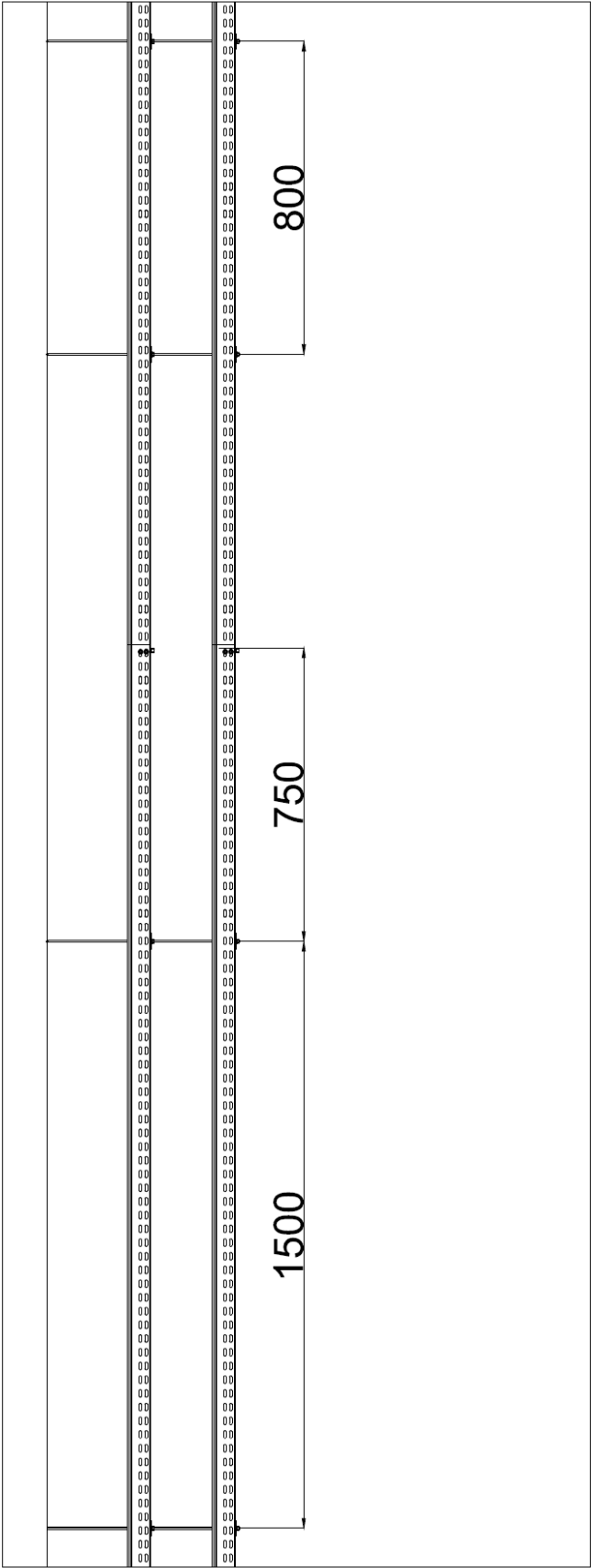
DRAWINGS

H-H





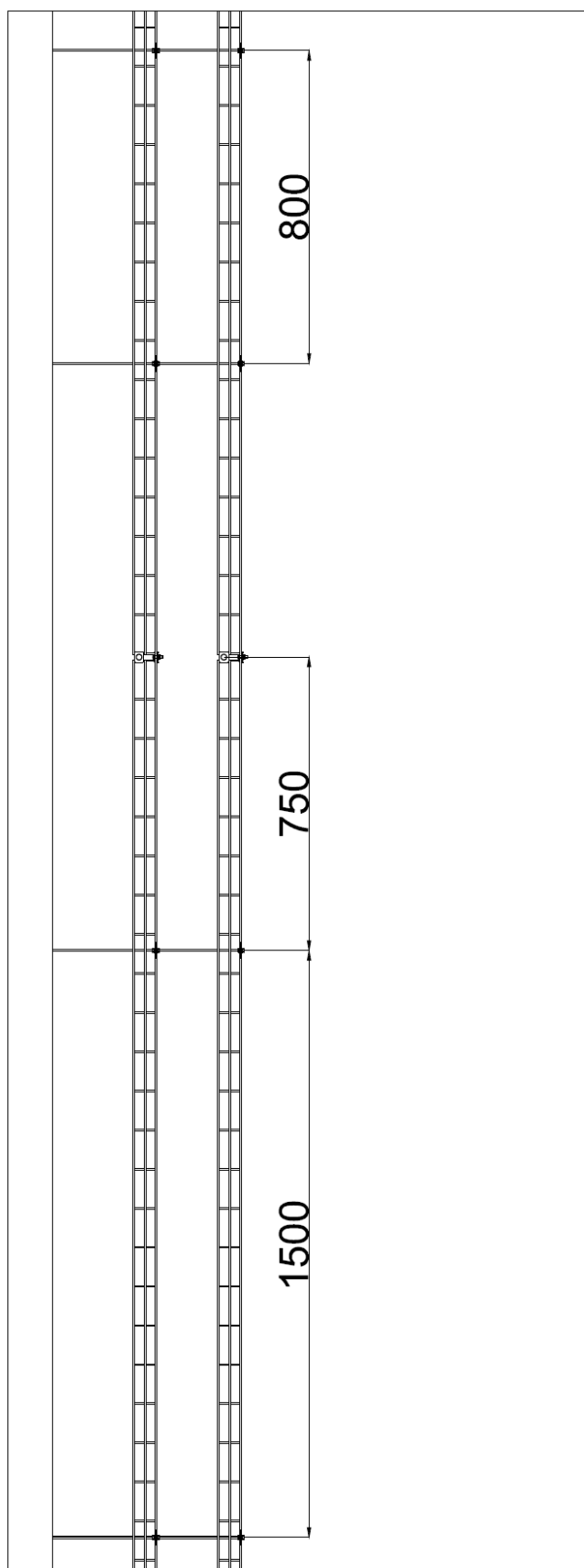
I-I





DRAWINGS

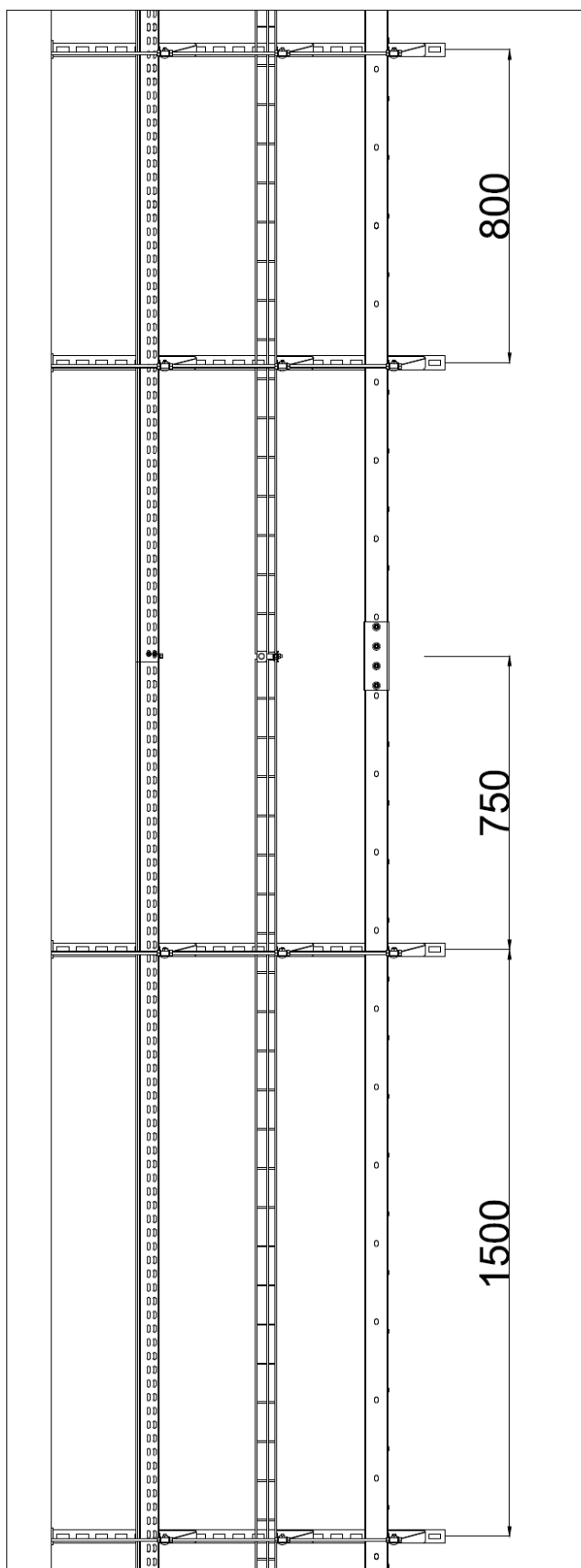
J-J





DRAWINGS

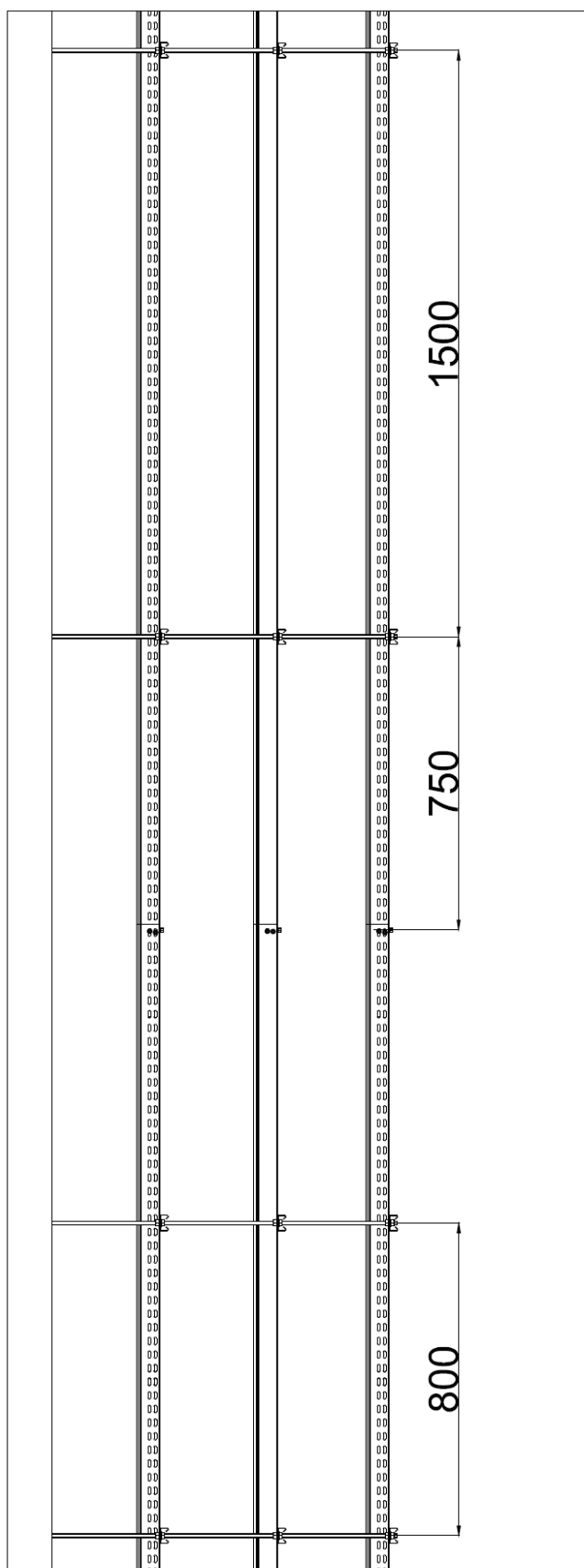
K-K





DRAWINGS

L-L





8. FINAL PROVISION

- § This report details the method of construction, the test conditions and results obtained when the specific element of construction described herein was following the procedure outlined in EN 1363-1, and where appropriate STN 92 0205. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.
- § Because of the nature of the fire resistance testing and consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.
- § The test results refer only to the tested subjects. This test report is not an approval of the tested product by the test laboratory or the accreditation body overseeing the laboratory's activities. The test was carried out on testing equipment that is the property of FIRES, s.r.o., Batizovce. Without the written permission of the test laboratory this test report may be copied and/or distributed only as the whole. Any modifications of the test report can be made only by the fire resistance test laboratory FIRES, s.r.o., Batizovce.

Approved by:

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
ZP-27/2008 PAVUS	Test method for determination of functionality class of cables and cable loadbearing constructions - cable circuits in case of fire

THE END OF THE TEST REPORT