

TEST REPORT FIRES-FR-202-07-AUNE

Cables with integrity function FE180/E90

Type – NHXH, NHXCH, (N)HXH, (N)HXCH, HTKSH, JE-H(St)H



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Reg. No. 041/S-159

Testing laboratory No. 041/S-159 accredited by
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TEST REPORT

Test report number: **FIRES-FR-202-07-AUNE**

Tested property: Function in fire

Test method: DIN 4102 – 12:1998-11

Date of issue: **22. 11. 2007**

Name of the product: Cables with integrity function FE180/E90
Type – NHXH, NHXCH, (N)HXH, (N)HXCH, HTKSH, JE-H(St)HManufacturer: **Zakłady Kablowe Bitner Celina Bitner**, Friedleina 3/3,
30-009 Kraków, Poland – producer of cables**BAKS**, 05-480 Karczew, Jagodne 5, Poland – producer of construction**NIEDAX KLEINHUIS POLSKA Sp. z o. o.**, ul. Zagórska 133,
42-680 Tarnowskie Góry, Poland - producer of construction**CABLOFIL**, ul. T. Kościuszki 227, 40-600 Katowice, Poland - producer of
construction**OBO BETTERMANN Polska Sp. z o.o.**, ul. Krakowiaków 68/70, Warszawa,
Poland - producer of constructionSponsor: **Zakłady Kablowe Bitner Celina Bitner**, Friedleina 3/3,
30-009 Kraków, Poland

Task No.: PR-07-0374

Specimen received: 22. 10. 2007

Date of the fire test: 25. 10. 2007

Technician responsible for the technical side of this report: Miroslav Hudák

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1. INTRODUCTION

This test report contains the results of the test carried out at the testing laboratory of FIRES s.r.o. in Batizovce. The purpose of the test was product classification. The test specimen was power and communication non-halogen cables with circuit integrity maintenance. Persons witnessing the test:

Representatives of the sponsor: Mrs. Alina Rychlik - Paradowska (Zaklady Kablowe Bitner)
 Mr. Adam Cichoń (Zaklady Kablowe Bitner)
 Mr. Jan Krajewski (Zaklady Kablowe Bitner)

Test directed by: Mr. Štefan Rástocký
 Test carried out by: Mr. Miroslav Hudák
 Operator: Mr. Ján Hurajt

2. MEASURING EQUIPMENT

Identification number	Measuring equipment	Note
F 90 002	Horizontal test furnace for fire testing	-
F 69 005	PLC system for data acquisition and control TECOMAT NS 950	-
F 40 008	Software Control Web 2000	
F 40 009	Control and communication software to PLC TECOMAT NS 950	
F 40 010	Visual and calculating software to PLC TECOMAT NS 950	-
F 40 011	Driver Tecomat – CW 2000 (software)	-
F 71 008, F 71 009	Transducer of differential pressure (from -50 to +150) Pa	pressure inside the test furnace
F 06 501, F 06 502, F 06 503, F 06 504 F 06 505, F 06 506, F 06 507, F 06 508	Plate thermometers	temperature inside the test furnace, according to EN 1363-1 a DIN 4102-2
F 06 701	Sheathed thermocouple type K ϕ 3 mm	ambient temperature
F 69 009	PLC system for data acquisition and climate control TECOMAT TC 604	climatic conditions
F 60 001 – F 60 009	Temperature and relative air humidity sensors	climatic conditions
F 54 057	Racking meter	-
F 57 007	Digital stop-watch	-
F 96 015	Test signal panel	-

3. PREPARATION OF THE SPECIMEN

Testing laboratory didn't take off individual components of the specimen. 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 was carried out by workers of businesses BAKS, NIEDAX and CABLOFIL according to requirements of the sponsor. Mounting of cables and weights into the supporting system was carried out by workers of the test sponsor.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMEN STRUCTURE

Test specimen comprised from power and communication non-halogen cables and supporting systems:

- BAKS with accessories – ceiling ledges with clamps UKO1, clamps UEF and sleeves – OZMO;
- NIEDAX with accessories – clamps SAS;
- OBO Bettermann with accessories – trays WDK-H 40060 and sleeves (type 1015);
- CABLOFIL with accessories – basket cable trays.

Cables:	NHXXH - 4x1,5 RE E90 MICA	(4 x)
	NHXXH - 4x50 RM E90 MICA	(8 x)
	(N)HXXH - 4x1,5 RE E90 CERAMIC	(2 x)
	(N)HXXCH - 4x1,5 RE/1,5 E90 MICA	(2 x)
	(N)HXXCH - 4x1,5 RE/1,5 E90 CERAMIC	(4 x)
	(N)HXXCH - 4x50 RM/25 E90 MICA	(2 x)
	JE-H(St)H - 2x2x0,8 E90 MICA	(12 x)
	JE-H(St)H - 2x2x0,8 E90 CERAMIC	(4 x)
	HTKSH(ekw) - 2x1 FE180/PH90	(2 x)

Supporting system BAKS: ceiling installation was used for specimen test.

Ceiling installation: was made by cable clips UEF and sleeves OZMO, which were fixed to ceiling by dowels (type SRO M6x30) in spacing of 300 mm and by ceiling ledges (type SDOC 600) which were fixed to ceiling by three dowels (type PRSO M8x75) in spacing of 300 mm. Cables were fixed to ledges by clips (type UKO1) in spacing of 300 mm.

Types of individual components are from catalogue BAKS 8/2006.

Supporting system NIEDAX: ceiling installation was used for specimen test.

Ceiling installation: was made by cable clips SAS depending on the diameter of cable which were fixed to ceiling by dowels (type DAM M6x50) in spacing of 300 mm and 600 mm.

Supporting system OBO Bettermann: ceiling installation was used for specimen test.

Ceiling installation: was made by cable sleeves (type 1015) depending on the diameter of cable which were fixed to ceiling by dowels (type FNA II 6) in spacing of 600 mm and trays WDK-H 40060.

Supporting system CABLOFIL: suspension track were used for specimen test.

Suspension track No. 1: was made of four hangers combined of horizontal support (type RCSN 400) and two threaded bar M8 with washers and nuts M8 and two hangers (type PA23) which were fixed to steel profiles U 100. These profiles were fixed to ceiling in spacing of 1200 mm. Trays (type CF54/300) were fixed to horizontal supports. Load-bearing system was loaded with 20 kg/m.

Suspension track No. 2: was made by three hangers combined of console (type CEQ100) and holder (type CAT30) with threaded bar M6 which was fixed to ceiling by dowels (type HKD-S6x40) in spacing of 1200 mm. Trays (type CF30/50) were fixed to holders. Load-bearing system was loaded with 2 kg/m.

Types of individual components are from catalogue CABLOFIL 9/2006.

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

Loading with steel chain were used as the equivalent load.

More detailed information about specimen construction is shown in the drawings which form the appendix of this test report. Drawings were delivered by the sponsor of the test.

All the information about technical specifications of used materials and semi-products, information about their type sign and their producers were delivered by sponsor. This information was not subject

of the specimen inspection. Parameters which were checked are quoted in paragraph 4.3 SPECIMEN INSPECTION.

4.2 DESCRIPTION OF THE SPECIMEN FIXATION

The test specimen was fixed on the ceiling of the test furnace which was created from concrete panels made of common shocked concrete of class B 20, 150 mm thick.

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

4.3 SPECIMEN INSPECTION

Before and after the fire testing, conformity of the test specimen with drawing was checked. The specimen corresponded to the drawing which create appendix of this report.

Specimen inspection consisted of visual review of the test specimen as well as size verification (number and cross sections of conductors, thickness, measurements of cables and trays).

4.4 CLIMATIC CONDITIONING

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

Relative air humidity [%]		Ambient air temperature [°C]	
mean	standard deviation	mean	standard deviation
49,9	5,2	23,3	0,6

The equilibrium state of test specimen humidity was not determined. The test specimen did not comprise hygroscopic material.

5. CARRYING OUT THE TEST

5.1 TEST CONDITIONS

Conditions in the test furnace (temperature, pressure, content O₂ content) as well as conditions in the testing room (ambient temperature) corresponded to EN 1363-1 and DIN 4102-2 during the whole test. Detailed information is shown in appendices of this report or in quality records of the testing laboratory.

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

Date of fire test	Relative air humidity [%]	Ambient air temperature [°C]
25. 10. 2007	60,1	14,7

5.2 TEST RESULTS

The measured values are shown in tables that form an integral part of this test report.

5.3 EVALUATION OF THE TEST

SPECIMENS		Time to first failure/interruption of conductor
Specimen 1: cable NHXH - 4x1,5 RE E90 MICA		90 minutes no failure/interruption
Specimen 2: cable NHXH - 4x1,5 RE E90 MICA		86 minutes
Specimens 3,4: cables NHXH - 4x50 RM E90 MICA		90 minutes no failure/interruption
Specimens 5,6: cables NHXCH - 4x50 RM/25 E90 MICA		90 minutes no failure/interruption
Specimen 7: cable NHXH - 4x50 RM E90 MICA		81 minutes
Specimen 8: cable NHXH - 4x50 RM E90 MICA		79 minutes
Specimens 9, 10: cables NHXCH - 4x1,5 RE/1,5 E90 MICA		90 minutes no failure/interruption
Specimen 11: cable NHXH - 4x1,5 RE E90 MICA		90 minutes no failure/interruption
Specimen 12: cable NHXH - 4x1,5 RE E90 MICA		78 minutes
Specimen 13: cable NHXH - 4x50 RM E90 MICA		63 minutes
Specimen 14: cable NHXH - 4x50 RM E90 MICA		90 minutes no failure/interruption
Specimen 15: cable NHXH - 4x50 RM E90 MICA		90 minutes no failure/interruption
Specimen 16: cable NHXH - 4x50 RM E90 MICA		73 minutes
Specimen 17: cable (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC		69 minutes
Specimen 18: cable (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC		68 minutes
Specimen 19: cable (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC		40 minutes
Specimen 20: cable (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC		47 minutes
Specimens 21,22: cables (N)HXH - 4x1,5 RE E90 CERAMIC		90 minutes no failure/interruption
Specimens 52, 53, 54, 55, 56, 57:	bundle of six cables JE-H(St)H - 2x2x0,8 E90 MICA	90 minutes no failure/interruption
Specimens 58, 59: cables JE-H(St)H - 2x2x0,8 E90 MICA		90 minutes no failure/interruption
Specimen 60A: cable HTKSH(ekw) - 2x1 FE180/PH90		47 minutes
Specimen 60B: cable HTKSH(ekw) - 2x1 FE180/PH90		15 minutes
Specimens 61, 62: cables JE-H(St)H - 2x2x0,8 E90 MICA		90 minutes no failure/interruption
Specimens 63, 64: cables JE-H(St)H - 2x2x0,8 E90 MICA		90 minutes no failure/interruption
Specimen 65: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC		34 minutes
Specimen 66: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC		57 minutes
Specimen 67: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC		81 minutes
Specimen 68: cable JE-H(St)H - 2x2x0,8 E90 CERAMIC		88 minutes

The fire test was discontinued in 92nd minute at the request of sponsor.

Specimens S1 – S22 were tested by three-phase voltage supply 3 x 230/400V with bulbs 240V / 60 W.
Specimens S52 – S68 were tested by one-phase voltage supply 1 x 110V with LED diodes 3V /0,03W.

6. CLOSING

- 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 DIN 4102 – 12:1998-11. Any significant deviation with respect to size, constructional details, loads, stresses, edges 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 Ltd. 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 Ltd. Batizovce.

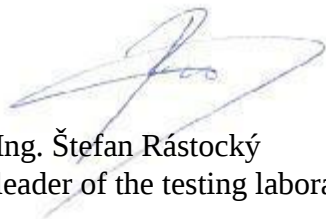
Report checked by: Ing. Štefan Rástocký

Translated by: Ing. Marek Rusnák



Issued by:

Responsible for the technical side of this report:



Ing. Štefan Rástocký
leader of the testing laboratory



Miroslav Hudák
technician of the testing laboratory

7. NORMATIVE REFERENCES

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
STN EN 1363-1:2001	Fire resistance tests – Part 1: General requirements

8. LIST OF APPENDICES

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Appendix 2	Measured values inside the test furnace / graph
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Appendix 4	Measured times of tested specimens from S9 to S16
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Appendix 8	Layout of cables in the test furnace
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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	39,3	49,5	45,4	26,2	41,7	39,6	39,0	27,4	38,5	20,0	14,4	0,0	-0,2
5	611,9	624,0	620,6	530,7	638,2	648,0	621,4	531,3	603,3	576,1	15,5	-8,8	10,9
10	677,3	699,4	691,1	632,7	712,0	725,4	701,2	634,1	684,2	678,4	12,2	-2,7	12,6
15	733,0	749,3	736,9	683,2	769,6	778,0	753,2	686,0	736,2	738,6	12,2	-1,5	13,1
20	752,3	761,3	753,4	727,7	777,6	783,0	773,6	720,0	756,1	781,4	11,9	-1,2	12,5
25	766,1	772,0	769,0	743,9	812,3	808,3	797,0	738,1	775,8	814,6	11,7	-2,2	13,9
30	823,7	832,0	825,3	810,9	864,3	855,3	848,9	792,0	831,6	841,8	11,7	-2,2	15,4
35	835,4	842,3	837,1	827,4	875,9	866,3	858,2	815,0	844,7	864,8	11,5	-2,1	14,5
40	861,4	863,6	845,9	833,9	895,0	884,8	868,5	826,3	859,9	884,7	11,3	-2,1	16,0
45	865,6	869,8	850,8	834,4	907,6	897,5	881,5	829,3	867,1	902,3	11,2	-2,3	16,0
50	872,5	878,2	860,5	842,8	920,0	908,5	893,6	841,1	877,2	918,1	11,1	-2,5	16,4
55	931,3	940,1	957,7	952,3	963,9	966,3	971,0	927,4	951,3	932,3	11,1	-2,4	14,9
60	944,5	957,6	987,8	985,6	948,1	946,3	950,6	939,3	957,5	945,3	11,1	-2,0	11,3
65	946,7	960,4	985,6	984,3	957,8	951,5	954,0	936,6	959,6	957,3	11,0	-1,8	11,9
70	959,7	973,6	998,2	998,0	972,0	965,5	967,5	951,5	973,3	968,4	10,8	-1,6	11,9
75	973,8	986,4	1010,0	1011,0	988,8	982,0	984,4	967,6	988,1	978,7	10,7	-1,4	12,2
80	986,8	998,5	1021,0	1022,0	1003,0	995,0	993,8	979,4	1000,0	988,4	11,2	-1,2	11,8
85	997,2	1010,0	1033,0	1032,0	1013,0	1007,0	1008,0	992,1	1011,8	997,4	12,9	-1,1	12,2
90	1009,0	1022,0	1044,0	1046,0	1029,0	1021,0	1019,0	1005,0	1024,8	1005,9	13,8	-0,9	10,9
91	1010,0	1024,0	1044,0	1047,0	1031,0	1024,0	1022,0	1007,0	1026,7	1007,6	13,5	-0,8	11,6
92	1013,0	1027,0	1046,0	1046,0	1032,0	1027,0	1026,0	1009,0	1028,5	1009,2	13,6	-0,8	11,5
93	1016,0	1029,0	1050,0	1051,0	1034,0	1027,0	1027,0	1012,0	1031,2	1010,8	13,8	-0,8	11,7

Tave Average temperature in the test furnace calculated from plate thermometers

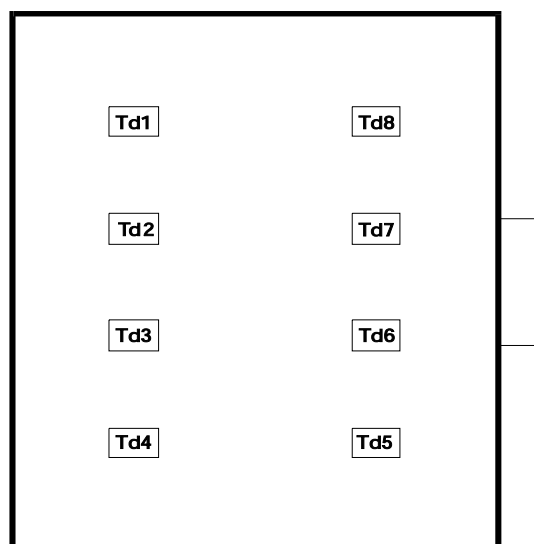
Tn Standard temperature in the test furnace laid down to test guideline

To Ambient temperature

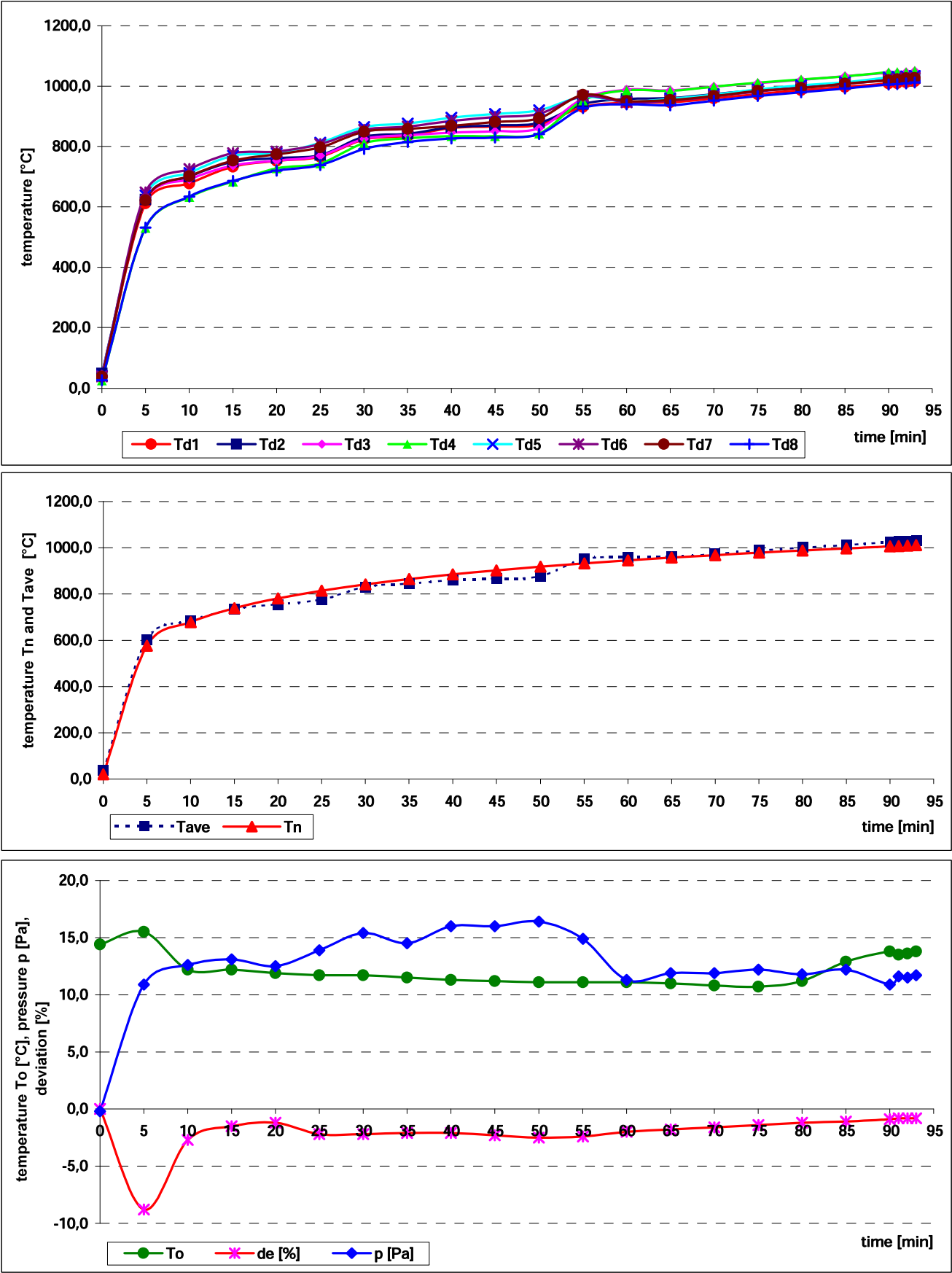
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline

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

Layout of measuring points in the test furnace:



Measured values inside the test furnace / graph



Measured time of tested specimens from S1 to S8

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	x
	6-L2	86:27
	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	no failure / interruption
	14-L2	no failure / interruption
	15-L3	no failure / interruption
	16-PEN	no failure / interruption
S5	17-L1	no failure / interruption
	18-L2	no failure / interruption
	19-L3	no failure / interruption
	20-PEN	no failure / interruption
S6	21-L1	no failure / interruption
	22-L2	no failure / interruption
	23-L3	no failure / interruption
	24-PEN	no failure / interruption
S7	25-L1	81:10
	26-L2	x
	27-L3	x
	28-PEN	x
S8	29-L1	x
	30-L2	x
	31-L3	79:25
	32-PEN	x

Specimens 1,2: cables NHXH - 4x1,5 RE E90 MICA

Specimens 3,4: cables NHXH - 4x50 RM E90 MICA

Specimens 5,6: cables NHXCH - 4x50 RM/25 E90 MICA

Specimens 7,8: cables NHXH - 4x50 RM E90 MICA

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 S9 to S16

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S9	33-L1	no failure / interruption
	34-L2	no failure / interruption
	35-L3	no failure / interruption
	36-PEN	no failure / interruption
S10	37-L1	no failure / interruption
	38-L2	no failure / interruption
	39-L3	no failure / interruption
	40-PEN	no failure / interruption
S11	41-L1	no failure / interruption
	42-L2	no failure / interruption
	43-L3	no failure / interruption
	44-PEN	no failure / interruption
S12	45-L1	78:55
	46-L2	x
	47-L3	x
	48-PEN	x
S13	49-L1	x
	50-L2	63:19
	51-L3	63:19
	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	no failure / interruption
	58-L2	no failure / interruption
	59-L3	no failure / interruption
	60-PEN	no failure / interruption
S16	61-L1	x
	62-L2	73:15
	63-L3	73:15
	64-PEN	x

Specimens 9,10: cables NHXCH - 4x1,5 RE/1,5 E90 MICA

Specimens 11,12: cables NHXH - 4x1,5 RE E90 MICA

Specimens 13,14: cables NHXH - 4x50 RM E90 MICA

Specimens 15,16: cables NHXH - 4x50 RM E90 MICA

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 S17 to S22

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S17	65-L1	x
	66-L2	69:05
	67-L3	x
	68-PEN	x
S18	69-L1	68:50
	70-L2	68:50
	71-L3	68:50
	72-PEN	x
S19	73-L1	x
	74-L2	x
	75-L3	x
	76-PEN	40:09
S20	77-L1	x
	78-L2	x
	79-L3	x
	80-PEN	47:10
S21	81-L1	no failure / interruption
	82-L2	no failure / interruption
	83-L3	no failure / interruption
	84-PEN	no failure / interruption
S22	85-L1	no failure / interruption
	86-L2	no failure / interruption
	87-L3	no failure / interruption
	88-PEN	no failure / interruption

Specimens 17,18: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC

Specimens 19,20: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC

Specimens 21,22: cables (N)HXH - 4x1,5 RE E90 CERAMIC

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 S52 to S59

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S52	209-L	no failure / interruption
	210-PEN	no failure / interruption
	211-L	no failure / interruption
	212-PEN	no failure / interruption
S53	213-L	no failure / interruption
	214-PEN	no failure / interruption
	215-L	no failure / interruption
	216-PEN	no failure / interruption
S54	217-L	no failure / interruption
	218-PEN	no failure / interruption
	219-L	no failure / interruption
	220-PEN	no failure / interruption
S55	221-L	no failure / interruption
	222-PEN	no failure / interruption
	223-L	no failure / interruption
	224-PEN	no failure / interruption
S56	225-L	no failure / interruption
	226-PEN	no failure / interruption
	227-L	no failure / interruption
	228-PEN	no failure / interruption
S57	229-L	no failure / interruption
	230-PEN	no failure / interruption
	231-L	no failure / interruption
	232-PEN	no failure / interruption
S58	233-L	no failure / interruption
	234-PEN	no failure / interruption
	235-L	no failure / interruption
	236-PEN	no failure / interruption
S59	237-L	no failure / interruption
	238-PEN	no failure / interruption
	239-L	no failure / interruption
	240-PEN	no failure / interruption

Specimens
52,53,54,55,56,57: bundle of six cables JE-H(St)H - 2x2x0,8 E90 MICA
Specimens 58,59: cables JE-H(St)H - 2x2x0,8 E90 MICA

x conductor was turned off manually after permanent interruption / failure of other conductors in the cable

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

Measured time of tested specimens from S60 to S68

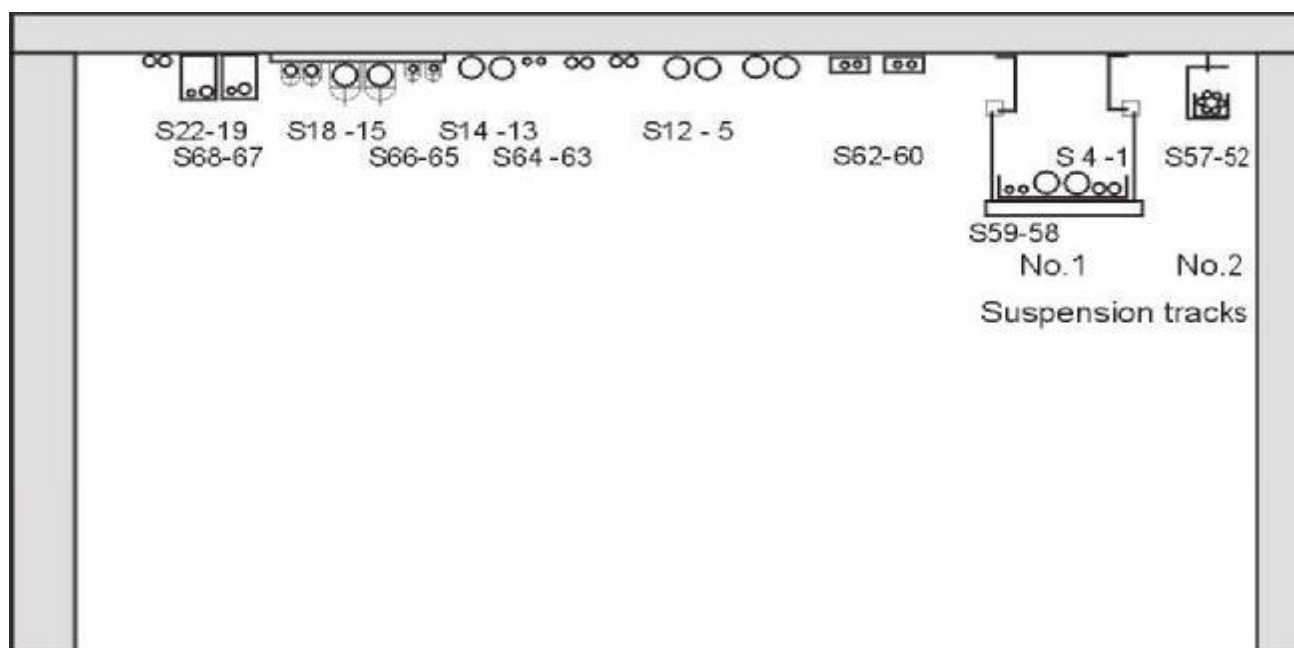
Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S60A	241-L	47:10
	242-PEN	x
S60B	243-L	15:28
	244-PEN	x
S61	245-L	no failure / interruption
	246-PEN	no failure / interruption
	247-L	no failure / interruption
	248-PEN	no failure / interruption
S62	249-L	no failure / interruption
	250-PEN	no failure / interruption
	251-L	no failure / interruption
	252-PEN	no failure / interruption
S63	253-L	no failure / interruption
	254-PEN	no failure / interruption
	255-L	no failure / interruption
	256-PEN	no failure / interruption
S64	257-L	no failure / interruption
	258-PEN	no failure / interruption
	259-L	no failure / interruption
	260-PEN	no failure / interruption
S65	261-L	34:23
	262-PEN	x
	263-L	x
	264-PEN	x
S66	265-L	x
	266-PEN	x
	267-L	57:22
	268-PEN	x
S67	269-L	81:56
	270-PEN	x
	271-L	x
	272-PEN	x
S68	273-L	89:17
	274-PEN	88:36
	275-L	x
	276-PEN	x

Specimens 60A,B: cables HTKSH(ekw) - 2x1 FE180/PH90
Specimens 61,62: cables JE-H(St)H - 2x2x0,8 E90 MICA
Specimens 63,64: cables JE-H(St)H - 2x2x0,8 E90 MICA
Specimens 65,66: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC
Specimens 67,68: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC

x conductor was turned off manually after permanent interruption / failure of other conductors in the cable

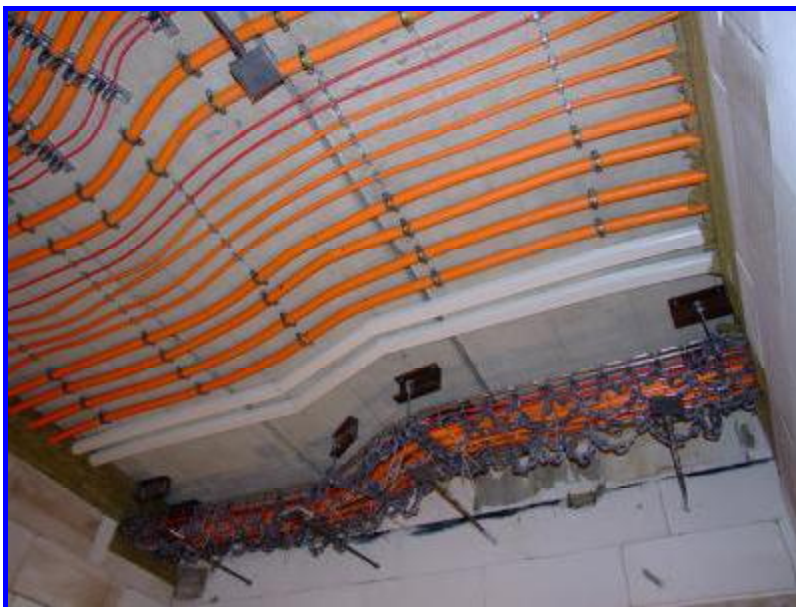
Signal cables were tested by three-phase voltage supply 1 x 110V with LED diodes 3V / 0,03W.
Circuit breakers with rating 3 A were used.

Layout of cables in the test furnace



Specimens 1,2: cables NHXH - 4x1,5 RE E90 MICA		Specimens placed in the basket cable tray (CABLOFIL) Suspension track No.1
Specimens 3,4: cables NHXH - 4x50 RM E90 MICA		
Specimens 5,6: cables NHXCH - 4x50 RM/25 E90 MICA		Specimens placed in ceiling clips SAS (NIEDAX) in spacing of 600 mm
Specimens 7,8: cables NHXH - 4x50 RM E90 MICA		
Specimens 9,10: cables NHXCH - 4x1,5 RE/1,5 E90 MICA		
Specimens 11,12: cables NHXH - 4x1,5 RE E90 MICA		
Specimens 13,14: cables NHXH - 4x50 RM E90 MICA		Specimens placed in ceiling clips SAS (NIEDAX) in spacing of 300 mm
Specimens 15,16: cables NHXH - 4x50 RM E90 MICA		Specimens placed in ceiling profile ledges with clips UKO (BAKS) in spacing of 300 mm
Specimens 17,18: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC		
Specimens 19,20: cables (N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC		Specimens placed in ceiling clips OZMO (BAKS) in spacing of 300 mm
Specimens 21,22: cables (N)HXH - 4x1,5 RE E90 CERAMIC		Specimens placed in ceiling clips UEF (BAKS) in spacing of 300 mm
Specimens 52,53,54,55,56,57:	bundle of six cables JE-H(St)H - 2x2x0,8 E90 MICA	Specimens placed in the basket cable tray (CABLOFIL) Suspension track No.2
Specimens 58,59: cables JE-H(St)H - 2x2x0,8 E90 MICA		Specimens placed in the basket cable tray (CABLOFIL) Suspension track No.1
Specimens 60A,B: cables HTKSH(ekw) - 2x1 FE180/PH90		Specimens placed in the tray WDK-H 40060 (OBO) with ceiling clips 1015 (OBO) in spacing of 600 mm
Specimens 61,62: cables JE-H(St)H - 2x2x0,8 E90 MICA		Specimens placed in the tray WDK-H 40060 (OBO) with ceiling clips 1015 (OBO) in spacing of 600 mm
Specimens 63,64: cables JE-H(St)H - 2x2x0,8 E90 MICA		Specimens placed in ceiling clips SAS (NIEDAX) in spacing of 600 mm
Specimens 65,66: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC		Specimens placed in ceiling profile ledges with clips UKO (BAKS) in spacing of 300 mm
Specimens 67,68: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC		Specimens placed in ceiling clips OZMO (BAKS) in spacing of 300 mm

Photos taken before the test

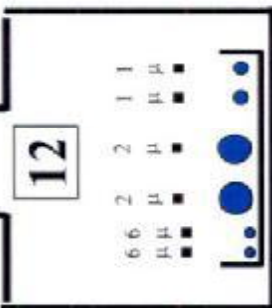


Photos taken after the termination of the test



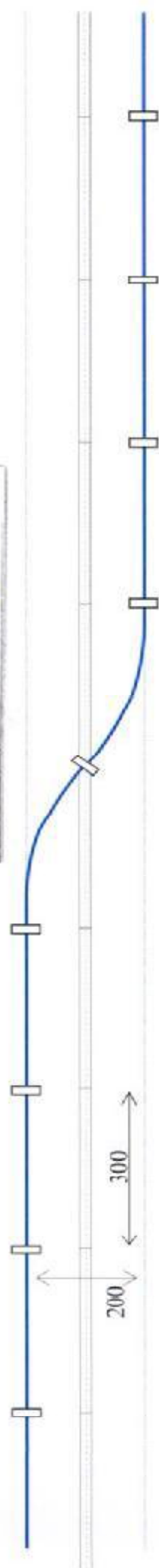
6 6
μ μ HH5 5
μ μ2 2
μ μ1 1
μ μ6 6
μ μ2 2
μ μ6 6
s s2 2
μ μ3 3
s s6 6
s s6 6
s s1 1
s s6 6
μ μ HH5 5
μ μ2 2
μ μ1 1
μ μ6 6
μ μ2 2
μ μ6 6
s s2 2
μ μ3 3
s s6 6
s s6 6
s s1 1
s s1 UEF
BAKS2 OZMO
BAKS3 UKO
BAKS4 SAS
Niedax5 6 7 8
SAS Niedax
co 60 cm9 10 11
Betterman
co 60 cm

13



CABLOFIL

	Datum/Date 15.10.2007
	Podpis/Signature <i>[Signature]</i>
	Przebieg & Appendix No. A1



NHXH 4 x 1.5 RE
NHXH 4 x 50 RM
NHXCH 4 x 1.5 RE / 1.5
NHXCH 4 x 10 RE / 10
NHXCH 4 x 50 RM / 25
JE-H/SH 8x8x0.8 Bd

Wiązka kabli JE-HStH miedź 2x2x0.8

kolumna w zestawieniu
s = ceramic; μ = miedź
■ = E 90; ● = E 30
← przekrój kabla w skali

H
= HTKSH 2x1

Obciążenie torów:
3 x 240/400V/60W
1 x 110V/3V/0.03W

Palenie 9
Rozmieszczenie próbek w piecu
Batizovce 25.10.2007.
Badanie kabli Bitner z osprzętem:
Baks, Niedax, Betterman, Cablofil.

Zestawienie kabli i osprzętu.

Kable BITNER + osprzęt BAKS

vz	Symbol kabla	średnica [mm] ciężar [kg/m]	Osprzęt	Odległość podpór	obciążenie	pozycja w piecu	czas
22	(N)HXH 4 x 1,5	17,3-17,8 //0,42	Uchwyt UEF Kotwa SROM 6x30	300mm		1	
21	(N)HXH 4 x 1,5	17,3-17,8 //0,42					
68	JE-H(St)H 2 x 2 x 0,8 ceramic	11,5-12,8 //0,14	Uchwyt OZMO Kotwa SROM 6x30	300mm		2	
20	(N)HXH 4 x 1,5	17,3-17,8 //0,42					
67	JE-H(St)H 2 x 2 x 0,8 ceramic	11,5-12,8 //0,14					
19	(N)HXH 4 x 1,5	17,3-17,8 //0,42					
18	(N)HXCH 4 x 1,5/1,5	18,5-18,8// 0,46	Uchwyt UKO Szezebel SDOC Kotwa PSROM 8x75	300mm		3	
17	(N)HXCH 4 x 1,5/1,5	18,5-18,8// 0,46					
16	NHXH 4 x 50	40,3-41,4 //3,38					
15	NHXH 4 x 50	40,3-41,4 //3,38					
66	JE-H(St)H 2 x 2 x 0,8 ceramic	11,5-12,8 //0,14					
65	JE-H(St)H 2 x 2 x 0,8 ceramic	11,5-12,8 //0,14					

Kable BITNER + osprzęt NIEDAX (co 30 cm)

vz	Symbol kabla	średnica [mm] ciężar [kg/m]	Osprzęt	Odległość podpór	obciążenie	pozycja w piecu	czas
14	NHXH 4 x 50	36,1-39,4// 3,0	Uchwyt SAS 47 Kotwa DAM 6x5	300mm		4	
13	NHXH 4 x 50	36,1-39,4// 3,0					

Kable BITNER + osprzęt NIEDAX (co 60 cm)

vz	Symbol kabla	średnica [mm] ciężar [kg/m]	Osprzęt	Odległość podpór	obciążenie	pozycja w piecu	czas
64	JE-H(St)H 2 x 2 x 0,8 mika	11,5-12,8// 0,18	Uchwyt SAS 12 Kotwa DAM 6x5	600mm		5	
63	JE-H(St)H 2 x 2 x 0,8 mika	11,5-12,8// 0,18					
12	NHXH 4 x 1,5	16,1-17,0// 0,4	Uchwyt SAS 18 Kotwa DAM 6x5	600mm		6	
11	NHXH 4 x 1,5	16,1-17,0// 0,4					
10	NHXCH 4 x 1,5/1,5		Uchwyt SAS 20 Kotwa DAM 6x5	600mm		7	
09	NHXCH 4 x 1,5/1,5						
08	NHXH 4 x 50	36,1-39,4// 3,0	Uchwyt SAS 47 Kotwa DAM 6x5	600mm		8	
07	NHXH 4 x 50	36,1-39,4// 3,0					
06	NHXCH 4 x 50	41,5-42,5//2,58	Uchwyt SAS 47 Kotwa DAM 6x5	600mm		9	
05	NHXCH 4 x 50	41,5-42,5//2,58					

 FIRES s.r.o. POŽIARNA ODOLNOST FIRE RESISTANCE	Datum/Date 25.10.2007
	Podpis/Signature 
	Dokument č./Document No. FIRES-18-202-09-ANW
Príloha č./Appendix No. 12	

Zestawienie kabli i osprzętu.

Kable BITNER + osprzęt NIEDAX i OBO-Beterman

vz	Symbol kabla	średnica [mm] ciężar [kg/m]	Osprzęt	Odległość podpór	obciążenie	pozycja w piecu	czas
62	JE-H(St)H 2 x 2 x 0,8 mika	11,5-12,8// 0,18	Obejma 1015 Kotwa FNA II 6 Kanał WDK-H 40060 nr kat.6175014	600 mm		10	
61	JE-H(St)H 2 x 2 x 0,8 mika	11,5-12,8// 0,18					
60B	HTKSH 2x1		Obejma 1015 Kotwa FNA II 6 Kanał WDK-H 40060 nr kat.6175014	600 mm		11	
60A	HTKSH 2x1 PH90						

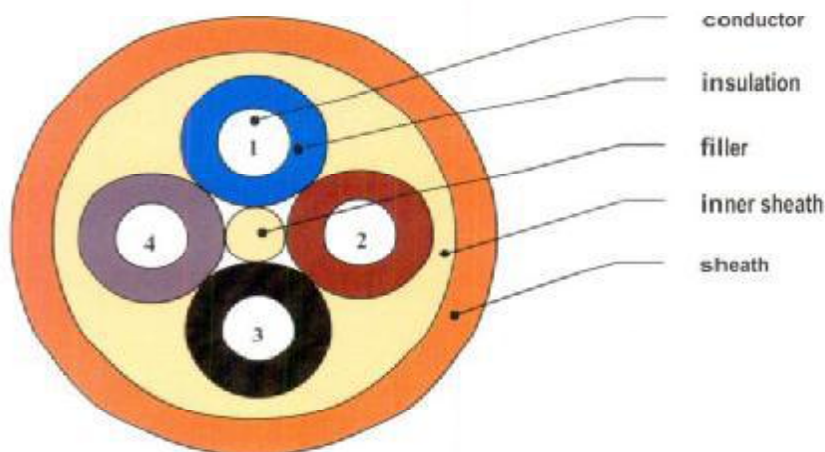
Kable BITNER + osprzęt CABLOFIL

vz	Symbol kabla	średnica [mm] ciężar [kg/m]	Osprzęt	Odległość podpór	obciążenie	pozycja w piecu	czas
57	JE-H(St)H 2 x 2 x 0,8 mika	11,45-12,8// 0,18	Basket cable tray Korytka CF 54/300 Zawieszenie 2x TF8 + RCSN/PA23 rys. 2	max 1,25 m	20 kg	12	
58	JE-H(St)H 2 x 2 x 0,8 mika	11,45-12,8// 0,18					
04	NHXX 4 x 50	40,3-41,4 //3,38					
03	NHXX 4 x 50	40,3-41,4 //3,38					
02	NHXX 4 x 1,5	16,1-17,0// 0,4					
01	NHXX 4 x 1,5	16,1-17,0// 0,4					
52- 57	Wiązka 6 kabli : JE-H(St)H 2 x 2 x 0,8 mika	11,45-12,8// 0,18	Basket cable tray Korytka CF 30/50 Zawieszenie TF6 + CEQ/CAT30 rys. 1	max 1,25 m	2 kg	13	

	Datum/Date 25.10.2007
	Podpis/Signature <i>[Signature]</i>
	Dokument č. Document No. FIRES-PR-202-04-NVLE
Příloha č./Appendix No. 13	

(N)HXH E90

FIRE RESISTANT HALOGEN FREE POWER CABLES



APPLICATIONS

Safety cables are used in all locations where a special protection against fire and fire damage is necessary for human life and equipment and where strict safety regulations have to be met and where large emergency running time is necessary. They may be used indoor and outdoor, but not directly in earth and water. They are considered as protectively insulated.

CONSTRUCTION

conductor - bare copper, solid or stranded acc. to DIN VDE 0295

insulation - cross-linked halogen free ceramic forming polymer compound acc. to DIN VDE 0266

filler - flame resistant, halogen free polymer compound

inner sheath - flame resistant, halogen free polymer compound

sheath - flame resistant, halogen free polymer compound acc. to DIN VDE 0276-604

 POŽIARNÁ ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 25.10.2004
	 Podpis/Signature
	Dokument č. Document No. FIRES-PR-20X-08-AUC
Príloha č./Appendix No. 14	

(N)HXH E90

CHARACTERISTICS

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
n	mm ²
1 + 4	1,5 + 240
5 + 7	1,5 + 70
7 + 10	1,5 + 25
10 + 24	1,5 + 2,5

Operating voltage

0,6/1kV

Voltage test

4000 V, 50 Hz

Insulation resistivity at 90°C,
minimum

10¹⁴

Operating temperature range

during operation

-30°C up to +70°C

during installation

-5°C up to +50°C

Minimum bending radius

15 x D single core

12 x D multi core

D = outer diameter

Cable combustibility

Fire resistance

E90

Combustibility tests

PN-EN 50226:2006, IEC 60332-3

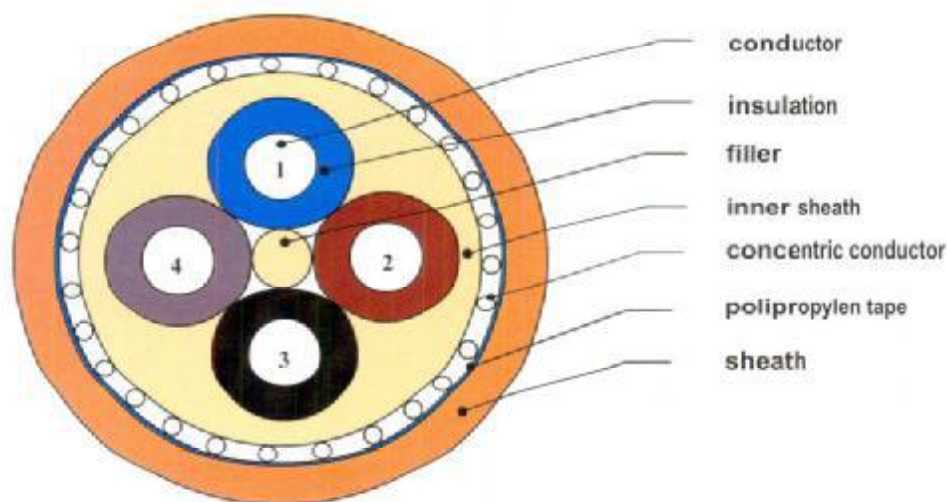
Reference standards

DIN VDE 0266

 FIRES s.r.o. POŽIARNÁ ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 25. 12. 2008 Podpis/Signature <i>[Signature]</i>
Dokument č. Document No.	FIRES-FR-207-08.ANE
Príloha č./Appendix No.	15

(N)HXCH E90

FIRE RESISTANT HALOGEN FREE POWER CABLES



APPLICATIONS

Safety cables are used in all locations where a special protection against fire and fire damage is necessary for human life and equipment and where strict safety regulations have to be met and where large emergency running time is necessary. They may be used indoor and outdoor, but not directly in earth and water. They are considered as protectively insulated.

CONSTRUCTION

conductor - bare copper, solid or stranded acc. to DIN VDE 0295

insulation - cross-linked halogen free ceramic forming polymer compound acc. to DIN VDE 0266

filler - flame resistant, halogen free polymer compound

inner sheath - flame resistant, halogen free polymer compound

concentric conductor - formed by bare copper wires with counter copper tape

polypropylen tape

sheath - flame resistant, halogen free polymer compound acc. to DIN VDE 0276-604

 FIRES S.r.o. POŽIARNÁ ODOLNOSŤ FIRE RESISTANCE	Datum/Date 15.10.2004
	Podpis/Signature 
	Dokument č. Document No. FIRES-FR-201-04-MVE
Príloha č./Appendix No. 16	

(N)HXCH E90

CHARACTERISTICS

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
n	mm ²
1 + 4	1,5/1,5 + 150/70
5 + 7	1,5/1,5 + 4/4
10 + 24	1,5/2,5 + 2,5/10

Operating voltage

0,6/1kV

Voltage test

4000 V. 50 Hz

Insulation resistivity at 20°C,
minimum

10¹⁴

Operating temperature range

during operation

-30°C up to +70°C

during installation

-5°C up to +50°C

Minimum bending radius

15 x D single core

12 x D multi core

D = outer diameter

Cable combustibility

Fire resistance

E90

Combustibility tests

PN-EN 50228:2006, IEC 60332-3

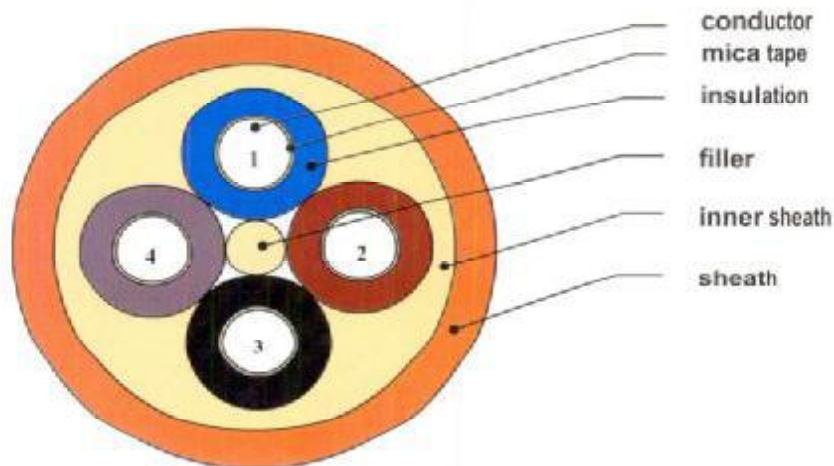
Reference standards

DIN VDE 0266

 FIRES S.R.O. POŽIARNÁ ODOLNOST FIRE RESISTANCE	Dátum/Data <i>25. 10. 2008</i> Podpis/Signature <i>[Signature]</i>
Dokument č. Document No. <i>FIRES - FR-202-08-AWE</i>	
Príloha č./Appendix No. <i>18</i>	

NHXXH E90

FIRE RESISTANT HALOGEN FREE POWER CABLES



APPLICATIONS

Safety cables are used in all locations where a special protection against fire and fire damage is necessary for human life and equipment and where strict safety regulations have to be met and where large emergency running time is necessary. They may be used indoor and outdoor, but not directly in earth and water. They are considered as protectively insulated.

CONSTRUCTION

conductor - bare copper, solid or stranded acc. to DIN VDE 0295

insulation - mica tape and cross-linked halogen free forming polymer compound acc. to DIN VDE 0266

filler - flame resistant, halogen free polymer compound

inner sheath - flame resistant, halogen free polymer compound

sheath - flame resistant, halogen free polymer compound acc. to DIN VDE 0276-604

 FIRES S.R.O. POŽIARNÁ ODOLNOST FIRE RESISTANCE	Datum/Date 25.10.2009 Podpis/Signature <i>[Signature]</i>
	Dokument č. Document No. <i>FIRES-PR-100-08-AME</i>
	Príloha č./Appendix No. <i>18</i>

NHXX E90

CHARACTERISTICS

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
n	mm ²
1 + 4	1,5 + 240
5 + 7	1,5 + 70
7 + 10	1,5 + 25
10 + 24	1,5 + 2,5

Operating voltage

0,6/1kV

Voltage test

4000 V, 50 Hz

Insulation resistivity at 90°C,
minimum

10^{14}

Operating temperature range

during operation
during installation

-30°C up to +70°C

-5°C up to +50°C

Minimum bending radius

15 x D single core

12 x D multi core

D = outer diameter

Cable combustibility

Fire resistance

E90

Combustibility tests

PN-EN 50226:2006, IEC 60332-3

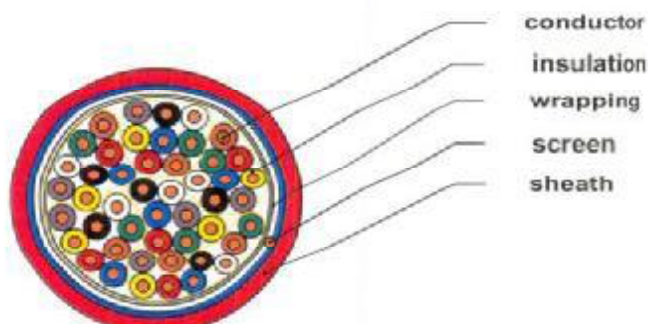
Reference standards

DIN VDE 0266

 FIRES S.T.O. POŽIARNÁ ODOLNOSŤ FIRE RESISTANCE	Dátum/Data 25. 10. 2009 Podpis/Signature 
Dokument č. Document No. FIRES-FR-101-OR-AKE	
Príloha č./Appendix No. 19	

JE-H(St)H CERAMIC E90

FIRE RESISTANT HALOGEN FREE ELECTRONIC AND TELECOMMUNICATIONS CABLE



APPLICATIONS

Safety installations cables are used for the transmission of signals and measuring data in control circuits, in locations where a particular protection against fire and fire damage for human life and equipment is necessary.

Installation cables are not admissible for power installation purposes and direct burial.

CONSTRUCTION

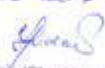
conductor - bare copper, solid acc. to DIN VDE 0295

insulation - cross-linked halogen free ceramic forming polymer compound acc. to DIN VDE 0207-23

wrapping - polypropylen and glass-fibre tape

screen - static screen of plastic coated metal foil with a solid, tinned drain wire

sheath - flame resistant, halogen free polymer compound acc. to DIN VDE 0207-5

 POŽIARNA ODOLNOST FIRE RESISTANCE	Dátum/Date 8.10.2018
	Podpis/Signature 
Dokument č. Document No. FIRES-FR-2020R AHE	
Príloha č./Appendix No. 20	

JE-H(St)H CERAMIC E90

CHARACTERISTICS

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
n	mm
1 x 2 x 80 x 2 x	0,8
1 x 2 x 80 x 2 x	1,0

Operating voltage 225V

Voltage test 500 V, 50 Hz

core/core 2000 V, 50 Hz

core/screen

Insulation resistivity at 90°C,
minimum 10^{14}

Operating temperature range

during operation -30°C up to +70°C

during installation -5°C up to +50°C

Minimum bending radius

8 x D single core

D = outer diameter

Cable combustibility

Fire resistance

E90

Combustibility tests

PN-EN 50226:2006, IEC 60332-3

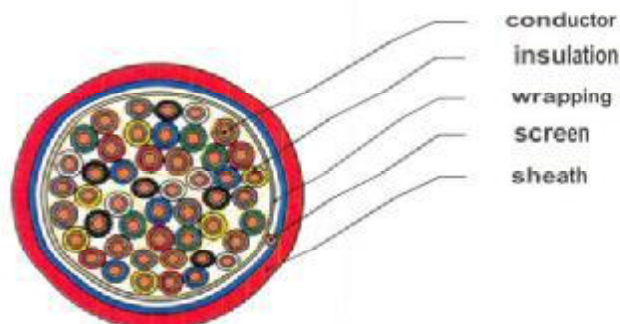
Reference standards

DIN VDE 0815

 FIRES s.r.o. POŽIARNÁ ODOLNOSŤ FIRE RESISTANCE	Datum/Date 25. 10. 2008  Podpis/Signature
Dokument č. Document No. <i>FIRES-FR-202-08-AWE</i>	
Príloha č./Appendix No. <i>21</i>	

JE-H(St)H MIKA E90

FIRE RESISTANT HALOGEN FREE ELECTRONIC AND TELECOMMUNICATIONS CABLE



APPLICATIONS

Safety installations cables are used for the transmission of signals and measuring data in control circuits, in locations where a particular protection against fire and fire damage for human life and equipment is necessary.

Installation cables are not admissible for power installation purposes and direct burial.

CONSTRUCTION

conductor - bare copper, solid acc. to DIN VDE 0295

insulation - mica tape and cross-linked halogen free forming polymer compound acc. to DIN VDE 0207-23

wrapping - polypropylene and glass-fibre tape

screen - static screen of plastic coated metal foil with a solid, tinned drain wire

sheath - flame resistant, halogen free polymer compound acc. to DIN VDE 0207-5

 FIRES s.r.o. POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 25.10.2008
	Podpis/Signature <i>[Signature]</i>
	Dokument č. Document No. <i>FIRES-FR-202-08-MVE</i>
Príloha č./Appendix No. <i>22</i>	

JE-H(St)H MIKA E90

CHARACTERISTICS

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
n	mm
1 x 2 x 80 x 2 x	0,8
1 x 2 x 80 x 2 x	1,0

Operating voltage 225V

Voltage test 500 V, 50 Hz

core/core 2000 V, 50 Hz

core/screen
Insulation resistivity at 90°C,
minimum 10^{14}

Operating temperature range

during operation -30°C up to +70°C

during installation -5°C up to +50°C

Minimum bending radius

8 x D single core

D = outer diameter

Cable combustibility

Fire resistance

Combustibility tests

Reference standards

E90

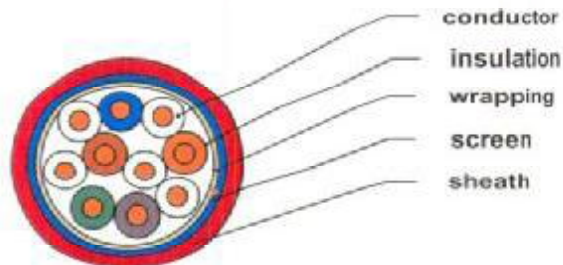
PN-EN 50226:2006, IEC 60332-3

DIN VDE 0815

 FIRES S.R.O. POŻIARNA ODOLNOŚĆ FIRE RESISTANCE	Datum/Date 15. 10. 2008
	Podpis/Signature 
Dokument 8. Document No. <i>FIRES-PR-207-08-AWE</i>	
Příloha 8./Appendix No. <i>23</i>	

HTKSH(ekw) FE180/PH90

FIRE RESISTANT HALOGEN FREE ELECTRONIC AND TELECOMMUNICATIONS CABLE



APPLICATIONS

Safety installations cables are used for the transmission of signals and measuring data in control circuits, in locations where a particular protection against fire and fire damage for human life and equipment is necessary.

Installation cables are not admissible for power installation purposes and direct burial.

CONSTRUCTION

conductor - bare copper, solid acc. to PN-83/E-90150

insulation - mica tape and halogen free forming polymer compound acc. to PN-EN 50290-2-26(U)

wrapping - polypropylene tape

screen - static screen of plastic coated metal foil with a solid, tinned drain wire

sheath - flame resistant, halogen free polymer compound acc. to PN-EN 50290-2-22

	Datum/Date 25.10.2009
	 Podpis/Signature
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HTKSH(ekw) FE180/PH90

CHARACTERISTICS

Conductor cross-section	
Number of conductors	Nominal conductor cross-section
n	mm
1 x 2 x 10 x 2 x	0,8 + 2,3

Operating voltage 225V

Voltage test
core/core 1500 V, 50 Hz
core/screen 2000 V, 50 Hz

Insulation resistivity at 90°C,
minimum 10^{14}

Operating temperature range

during operation -30°C up to +70°C
during installation -5°C up to +50°C

Minimum bending radius
10 x D single core
D = outer diameter

Cable combustibility

Fire resistance

Combustibility tests

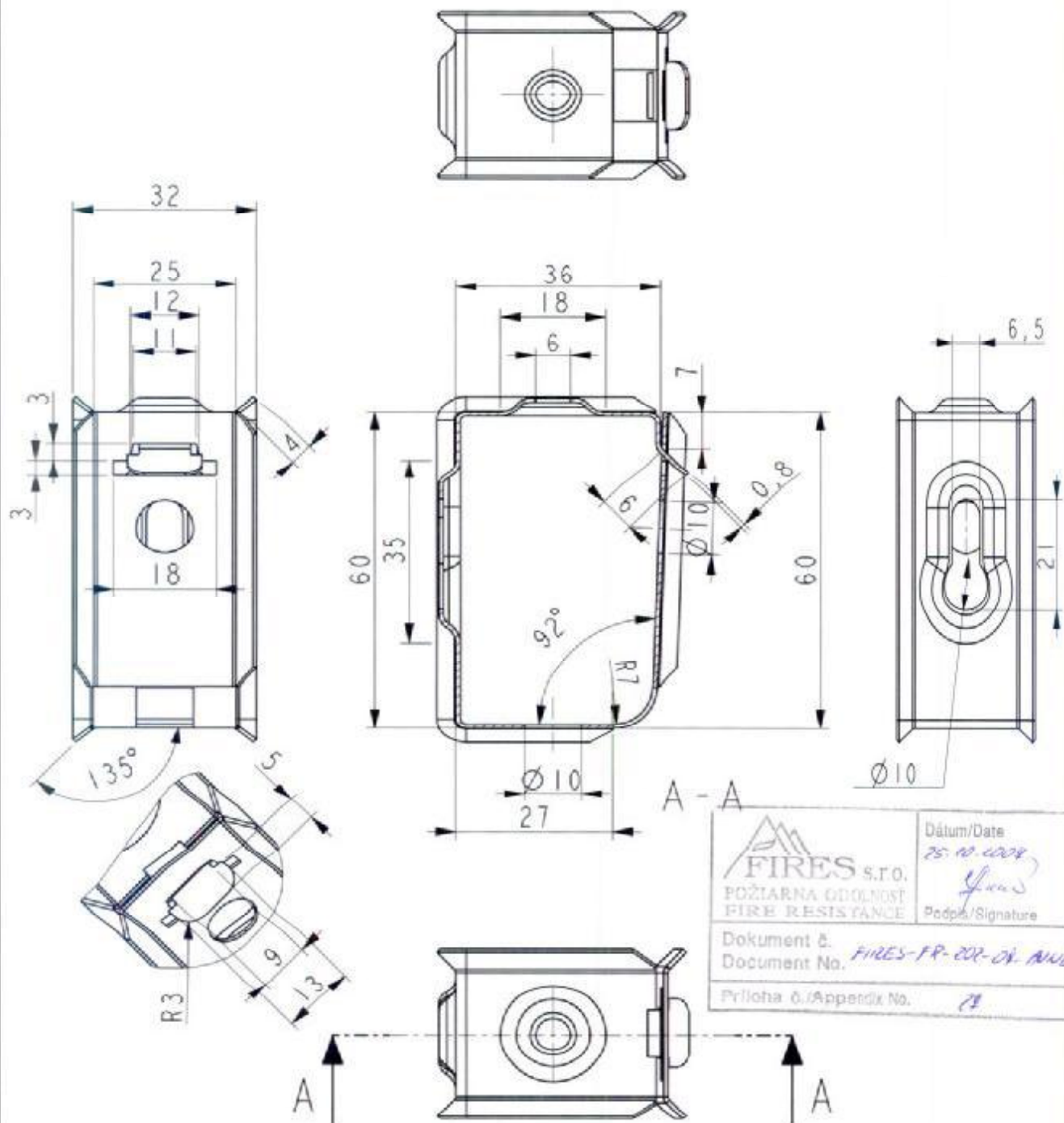
Reference standards

PH90

PN-EN 50226:2006, IEC 60332-3

ZN-CB 25:2005

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Dokument & Document No.	FIRES-PR-202-08-ANEX
Príloha &/Appendix No.	25

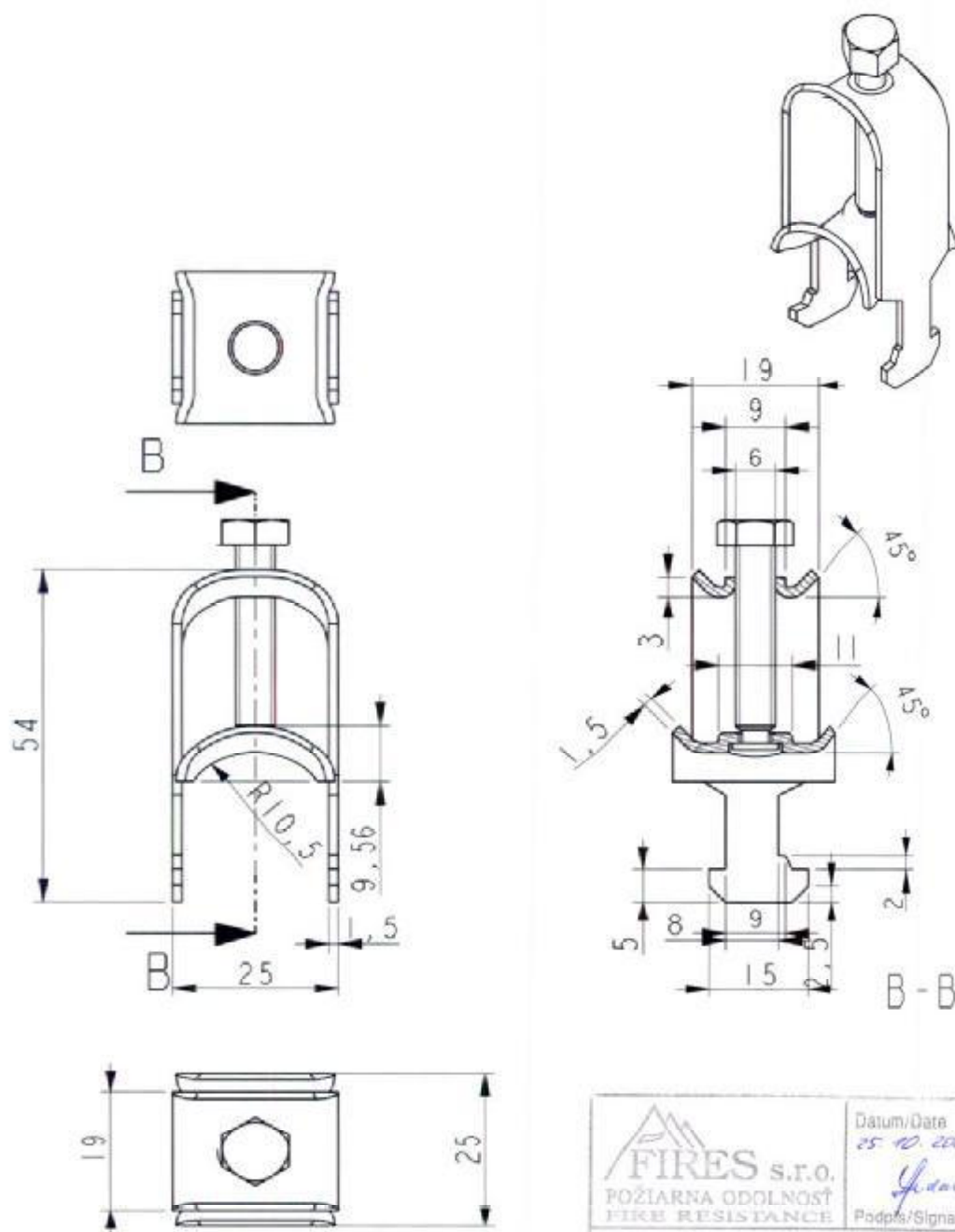


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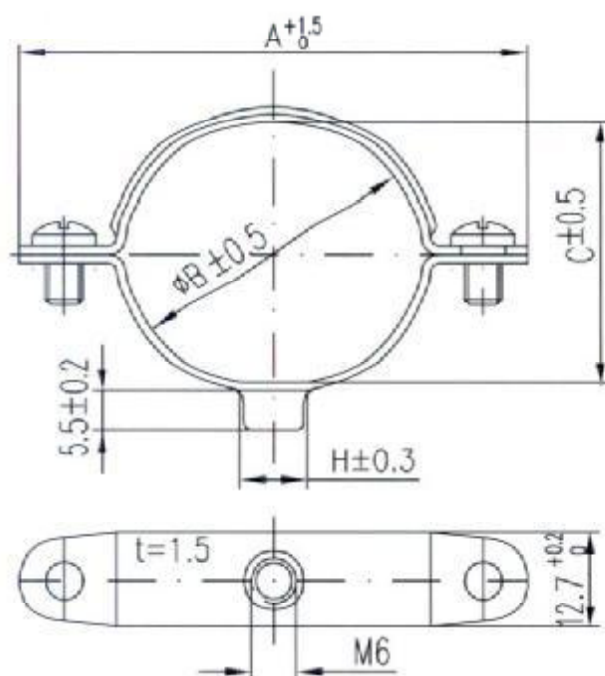
Dokument č.
Document No. *FIRES-PR-202-01. ANUL*
Priloha č./Appendix No. *74*

	Odchyłki wymiarów nieolerowanych		Materiał	Główny	Masa (kg)	Podziałka	Format A4	
				Nr normy				PN-EN 10142 + A1 : 1997
				półfabrykat (nr normy)				
Projektował	Nawisko	J. Grochowski	Podpis	Sala	Nazwa rysunku			
Rysował					OZMO			
Sprawdził								
Zatwierdził								
 Profesjonalne Systemy Tras Kablowych					Nr programu	Nr zleceny		
					Wzrosty			

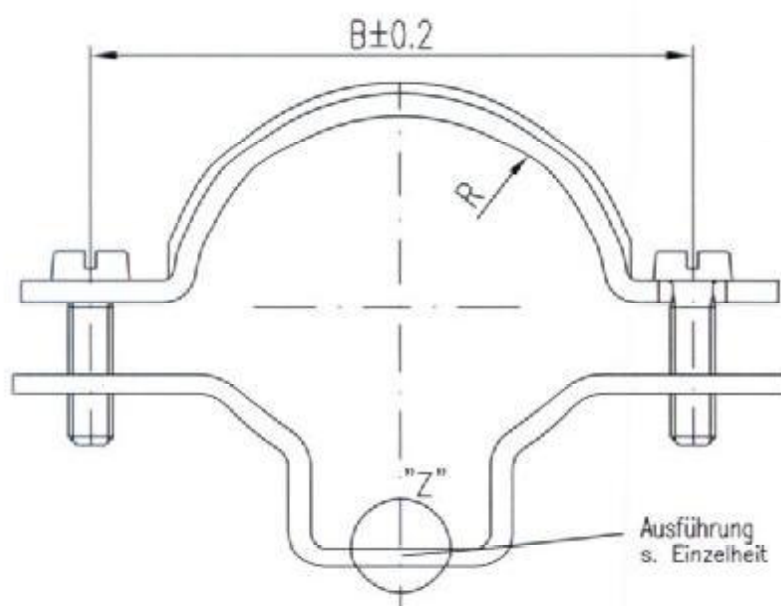


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	Dokument 6. Document No. <i>FIRES-FR-202-02-AWE</i> Priłoga 6./Appendix No. <i>28</i>

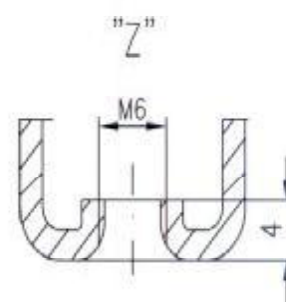
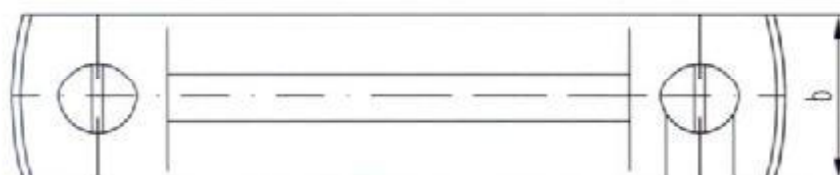
	Odchyłka wymiarów instalacyjnych		Materiał	Główny	PN-EN 10327:2005	Masa (kg)	Podziałka	Format A4
				Nr normy				Arkusz
			półfabrykat (nr normy)				1:1	Arkusz
Projektował	Materiał	J. Gruchowski	Podpis	Data	Nazwa rysunku			
Rysował					28-Jun-08			
Sprawdził								
Zatwierdził								
					Nr programu maszynowego	Nr zmiany		
					Nr rysunku			
					Profesjonalne Systemy Tras Kablowych			



Mod.-Nr.	A	B	C	H	Spannbereich
SAS 8	34.7	8	6	5.3	7.5 - 10
SAS 10	35.5	10	8	6	10 - 11
SAS 12	41.3	12	10	6.8	11 - 13
SAS 14	41	14	12	7	13 - 15
SAS 16	41.4	16	14	8	15 - 17
SAS 18	42	18	16	8.3	17 - 19
SAS 20	48.3	20	18	8.3	19 - 21
SAS 22	47.2	22	20	9	21 - 23
SAS 24	54.4	24	22	8	23 - 25
SAS 26	52.7	26	24	8.3	25 - 27
SAS 28	57	28	26	8	27 - 29
SAS 30	62.8	30	28	10	28 - 30



Modell Nr.	Spann-bereich	R	B	b
SAS 38	29-38	18.5	53.7	16
SAS 47	38-47	23.5	65.2	16
SAS 55	47-55	27.5	74.7	18
SAS 63	55-63	31.5	84	18



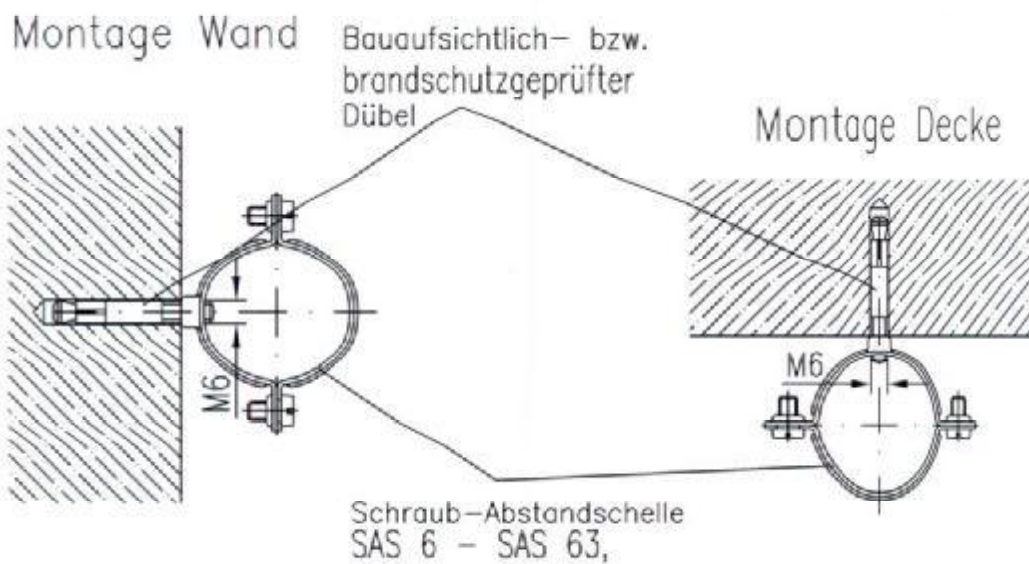
NIEDAX
GmbH & Co. KG
Linz/Rhein

Verwendung:

Einzelverlegung Schraubabstandschellen
SAS 8 – SAS 63

Ausgabe vom: 25.06.2003

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NIEDAX

GmbH & Co. KG
Linz/Rhein

Verwendung:

Ausgabe vom: 25.06.2003

Einzelverlegung mit Schraubabstandschellen

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FIRE RESISTANCE

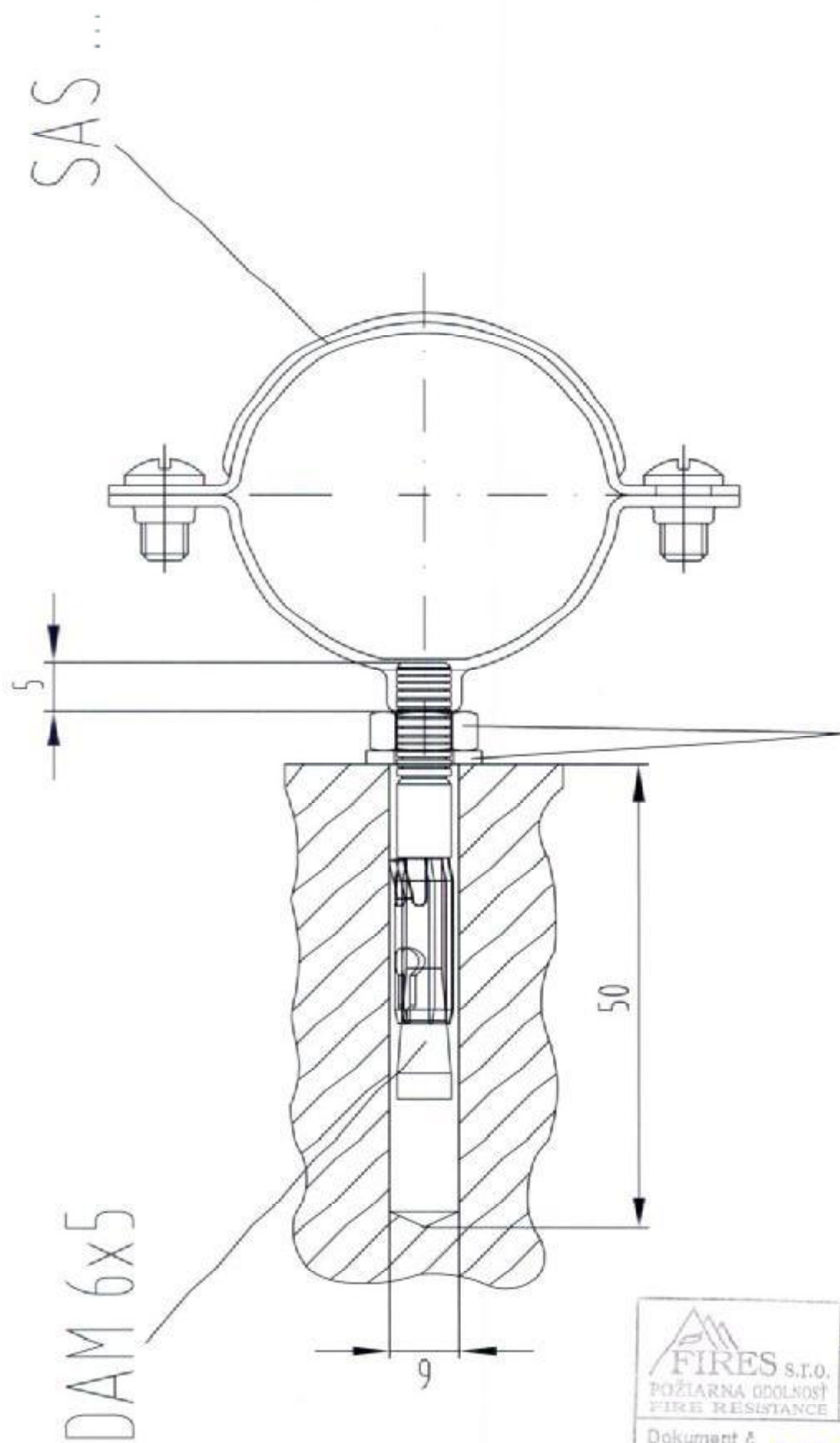
Datum/Date

25.10.2008

[Signature]
Podpis/Signature

Dokument &
Document No. FIRES-FR-202-09-ANNE

Priložak & Appendix No. 30



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Príloha č./Appendix No. 31	



15-60

Trunking depth

Wall/ceiling trunking, mouldings, halogen-free

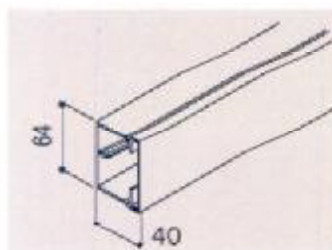
Cover and base

Stock length: 2000 mm

Perforated base

Partition

Cover clip



WDK-H 40060

Packing: 16 m
Wt: 0.505 kg/m

Colour

light grey

Ord. no.
PPO

6173232

TW-H 4-40

Packing: 40 m
Wt: 0.225 kg/pc

Ord. no.
PPO

6173500

OK-H 60

Packing: 50 pcs
Wt: 0.003 kg/pc

Ord. no.
PPO

6173519

Wiring ducts, halogen-free

The temperature resistance is between -30°C and +85°C. The self-extinguishing material achieves rating V1 according to UL 94.

Under UV stress this material is liable to colour changes, but its physical characteristics remain unchanged.

During installation care should be taken to use only halogen-free accessories and fixing materials.

These products are made in the colour light grey, similar to RAL 7035.

You will find further information on halogen-free materials on page 22.

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Příloha č./Appendix No. <i>52</i>	

Obejma mocujaca

Podstawowe wymiary obrotowej modulacji

	D	L	H	S	A
5	16	4	12	7	
6	16	5	12	7	
7	16	6	12	7	
8	16	7	12	7	
9	16	8	12	7	
10	16	9	12	7	
11	16	10	14	7	
12	16	11	14	7	
13	16	12	14	7	
14	16	12.5	14	7	
15	16	13.5	14	7	
16	16	14	14	7	
17	16	15	14	7	
18	16	16	14	7	
20	16	19	14	7	
25	16	22.5	14	7	
28	18	25	14	7	



Podstawowe wymiary obrotów mocilacw

D	L	M	S	T	A
days	days	days	days	days	days
6	23.5	5	20	2	10
10	23.5	9	20	2	10
12	23.5	11	20	2	10
14	23.5	13	20	2	10
15.2	23.5	14	20	2	10
16.6	23.5	17	20	2	10
20.4	23.5	19.5	20	2	10
22.5	23.5	21	20	2	11
26.3	27	26.5	20	3	11
37	30	35	25	3	13
63	32.5	60	26	3	16

Kolek

Kotwa sworzniowa



Tyć	Średn.	Wysokość H	Wysokość L	Głębokość wstawienia L ₁	Wysokość L ₂	Średn. d ₂	Waga kg/m	Nr kat.
FNA II S	M6	6	13	40	53	100	1,400	3498 42 5

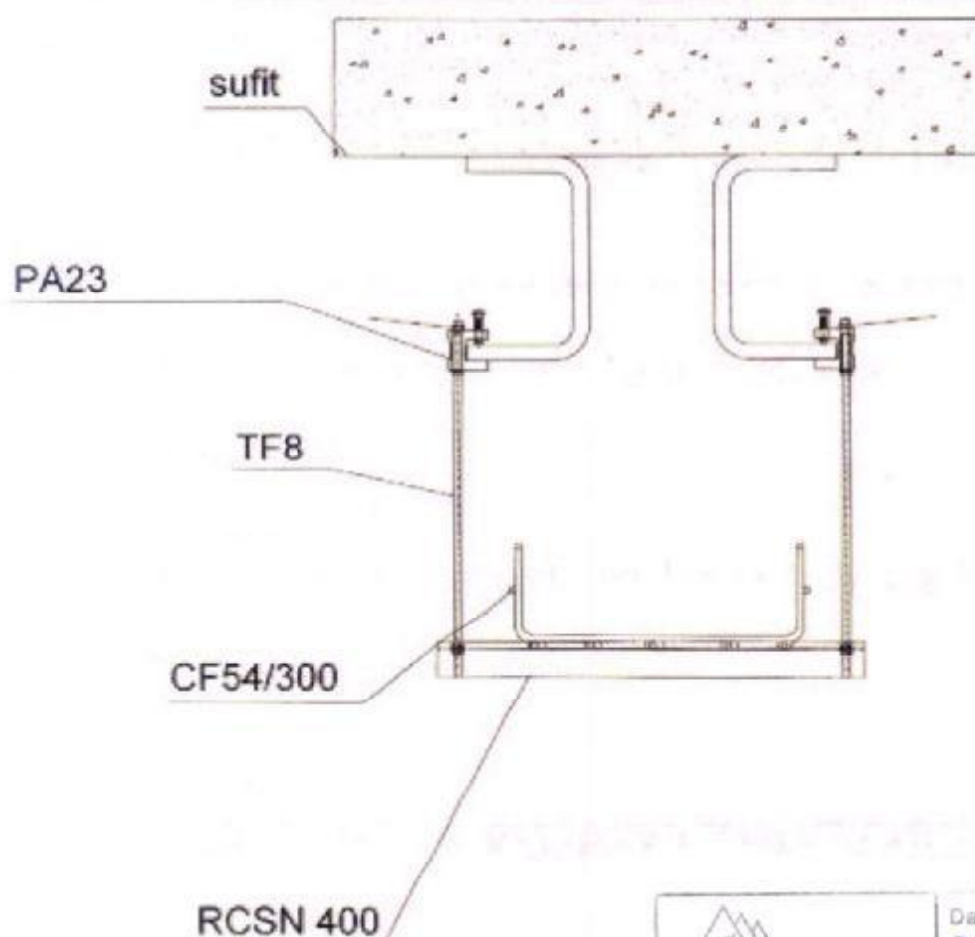
Kotwa wbijana z gwintem M6 dla podłoża betonowego.
Atest zgodnie z DIN 4102. Klasa odporności ogniowej F 90.



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ZESTAWIENIE MATERIAŁÓW

Lp.	Element	Ilość [szt]
1.	pręt gwintowany TF8	6
2.	nakrętka HM8	24
3.	kształtownik RCSN 400	4
4.	Ceownik wzmacniony	8
5.	zacisk PA23	10
6.	Koryto CF 54/300 EZ	2



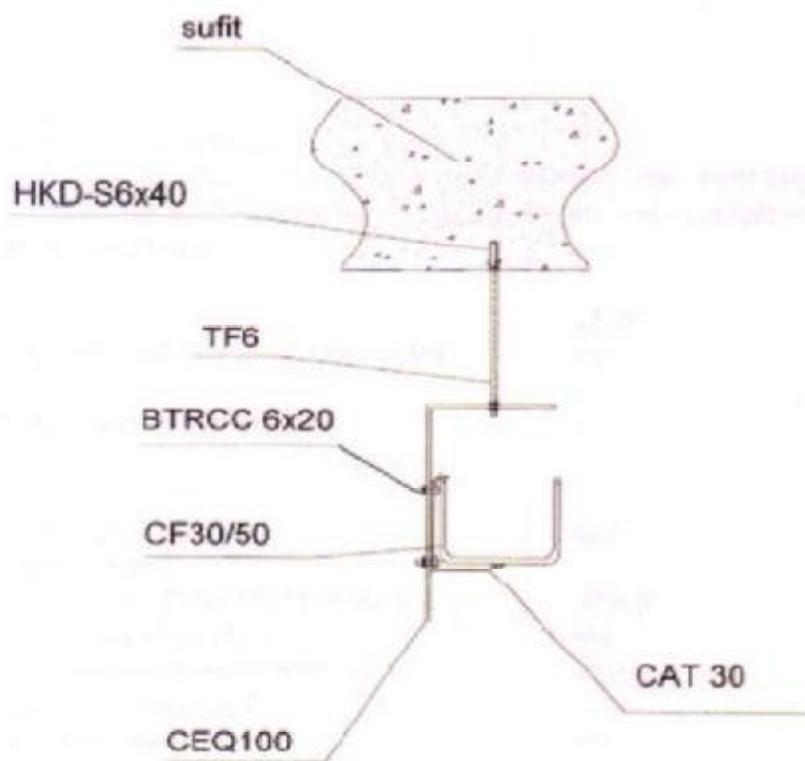
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Priloha &/Appendix No. <i>35</i>	

odległość między mocowaniami
do 1,25 metra

max. obciążenie 20 kg/m

ZESTAWIENIE MATERIAŁÓW

Lp.	Element	Ilość [szt]
1.	CF30/50 EZ	2
2.	pręt gwintowany TF6	4
3.	nakrętka wieńcowa EEC6	8
4.	CEQ 100	4
5.	kotwa HILTI HKD-S6x40	4
6.	UCHWYT CAT30	4
7.	zestaw BTRCC 6x20	8



odległość między mocowaniami
do 1,25 metra

max. obciążenie 2 kg/m

	Datum/date 25.10.2018
	Podpis/Signature 
	Dokument o. Document No. FIRES-FR-202-02.01E
Priloha 8/Appendix No. 36	