

## 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



*This is an electronic version of a test report which was made as a copy of test report officially issued in a paper form. The electronic version of a test report shall be used only for informative purposes. Any information listed in this test report is the property of the sponsor and shall not be used or published without written permission. Contents of this file may only be modified by the editor i.e. Testing laboratory FIRES s.r.o. Batizovce. Sponsor is allowed to publish this test report in parts only with written permission of the editor.*

**FIRES, s.r.o.**

Notifikovaná osoba č./ Notified Body No.: 1396  
Autorizovaná osoba reg. č./Approved Body No.: SK01  
Osloboditeľov 282, 059 35 Batizovce, Slovakia  
Tel.+421 52 775 2298, Fax+421 52 7881412, e-mail: info@fires.sk, [www.fires.sk](http://www.fires.sk)



Reg. No. 041/S-159

Testing laboratory No. 041/S-159 accredited by  
Slovak national accreditation service

# 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)H

Manufacturer: **Zaklady 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 construction

Sponsor: **Zaklady 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

Number of pages: 6 Number of appendices: 36

Test reports: 3 Copy No.: 2

Distribution list:

Copy No.1: **FIREs, s.r.o.**, Osloboďiteľov 282, SK-059 35 Batizovce, Slovakia  
(electronic version)

Copy No.2: **Zaklady Kablowe Bitner Celina Bitner**, Friedleina 3/3, 30-009 Kraków, Poland  
(electronic version)

Copy No.3: **Zaklady Kablowe Bitner Celina Bitner**, Friedleina 3/3, 30-009 Kraków, Poland

## 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:	NHXH - 4x1,5 RE E90 MICA	( 4 x )
	NHXH - 4x50 RM E90 MICA	( 8 x )
	(N)HXH - 4x1,5 RE E90 CERAMIC	( 2 x )
	(N)HXCH - 4x1,5 RE/1,5 E90 MICA	( 2 x )
	(N)HXCH - 4x1,5 RE/1,5 E90 CERAMIC	( 4 x )
	(N)HXCH - 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:

<b>Relative air humidity [%]</b>		<b>Ambient air temperature [°C]</b>	
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 O<sub>2</sub> 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:

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

The fire test was discontinued in 92<sup>nd</sup> 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:**

Ing. Štefan Rástocký  
leader of the testing laboratory

**Responsible for the technical side of this report:**

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

Appendix 1	Measured values inside the test furnace
Appendix 2	Measured values inside the test furnace / graph
Appendix 3	Measured times of tested specimens from S1 to S8
Appendix 4	Measured times of tested specimens from S9 to S16
Appendix 5	Measured times of tested specimens from S17 to S22
Appendix 6	Measured times of tested specimens from S52 to S59
Appendix 7	Measured times of tested specimens from S60 to S67
Appendix 8	Layout of cables in the test furnace
Appendix 9-10	Photos taken before and after the fire test
Appendix 11- 36	Drawings

## 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

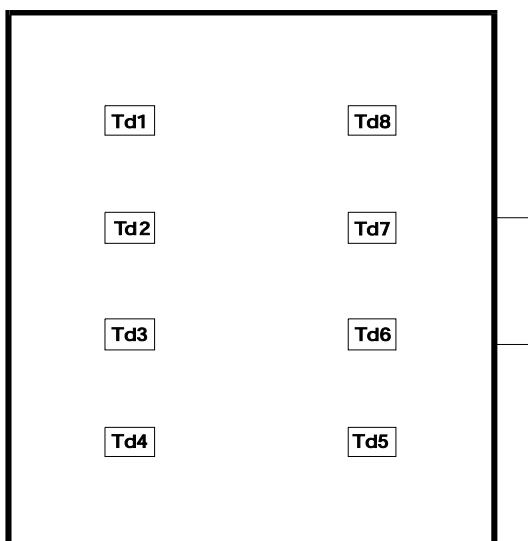
Tn Standard temperature in the test furnace laid down to test guideline

To Ambient temperature

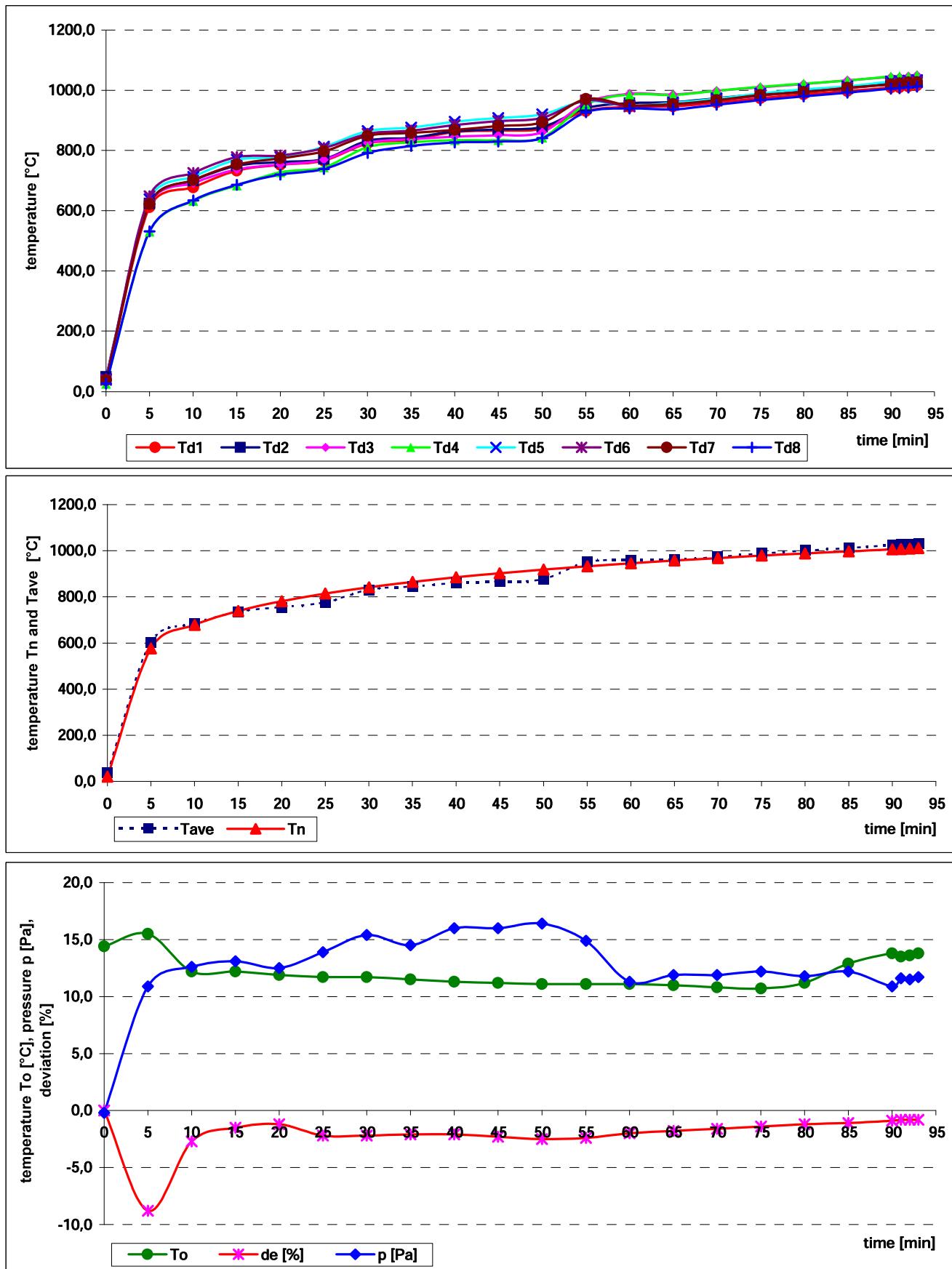
$d_e$  Deviation of the average temperature from the standard temperature calculated according to test guideline

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

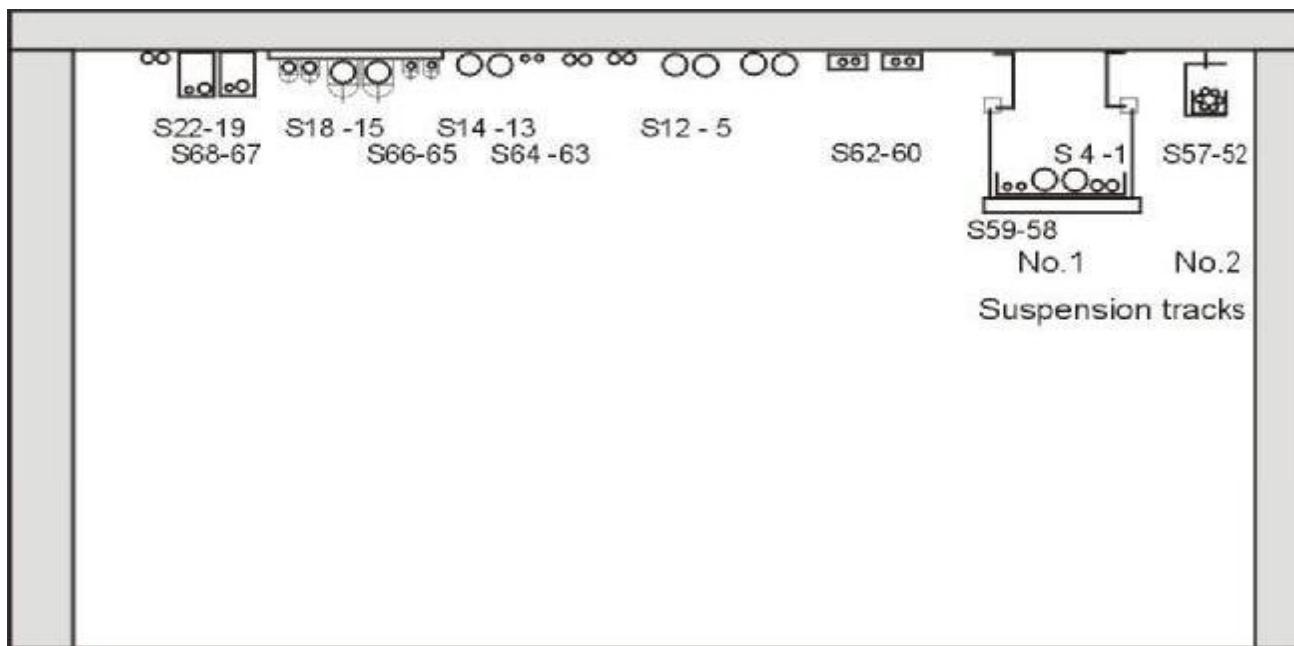
Specimens 65,66: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC

Specimens 67,68: cables JE-H(St)H - 2x2x0,8 E90 CERAMIC

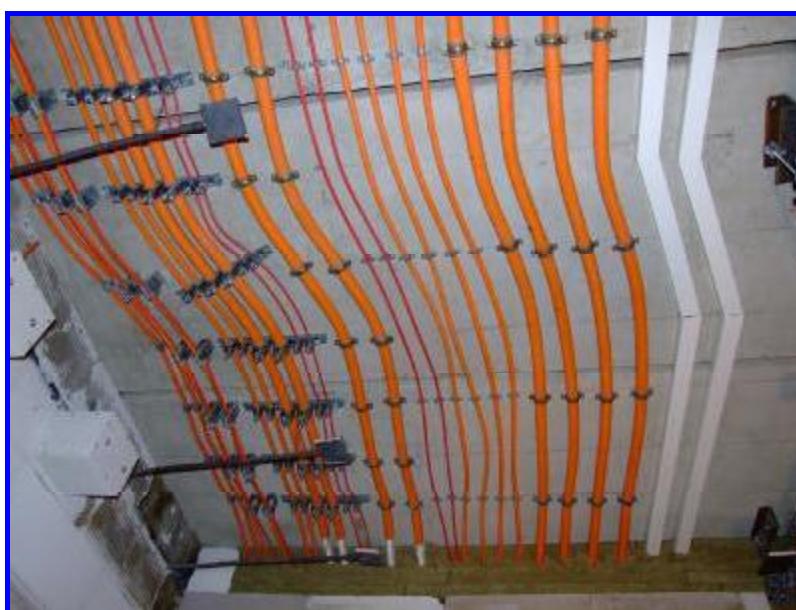
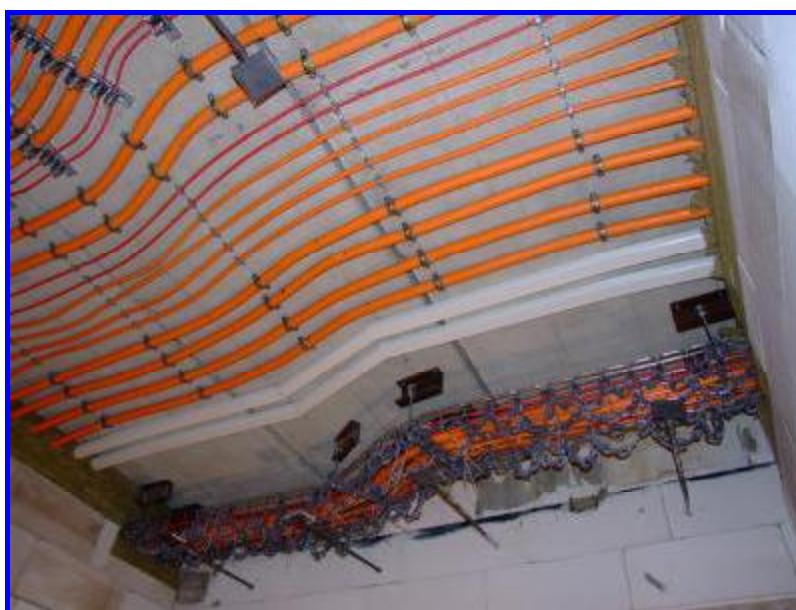
x conductor was turned off manually after permanent interruption / failure of other conductors in the cable

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.

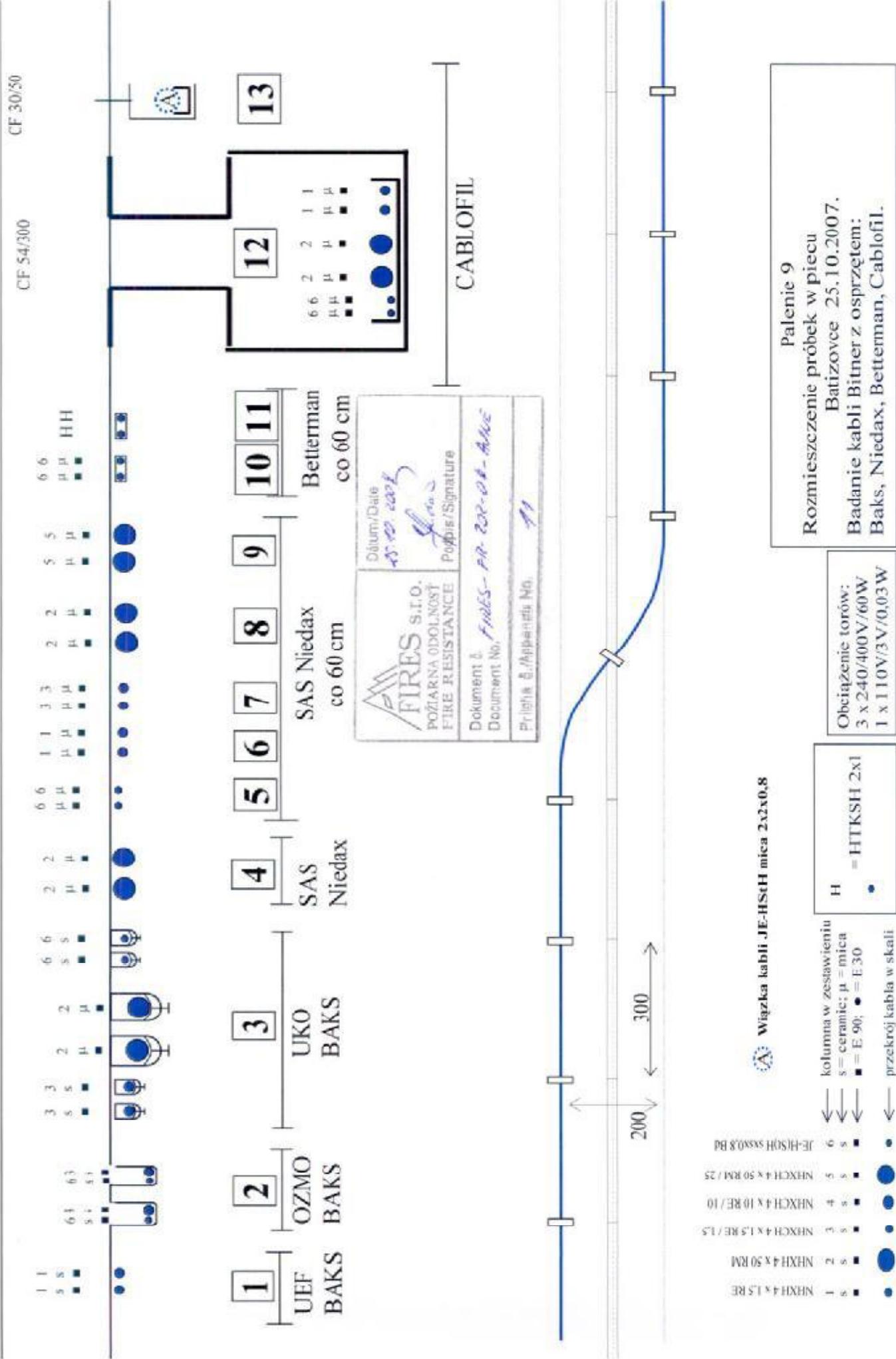
## Layout of cables in the test furnace



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 7,8: cables NHXH - 4x50 RM E90 MICA	Specimens placed in ceiling clips SAS (NIEDAX) in spacing of 600 mm
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**



A: Wiązka kabli JE-HStH mica 2x2x0,8

H	= HTKSH 2x1	JE-HStH 2x0,8 Bl
1	NHXH 4x1,5 RE	NHXH 4x1,5 RE / 1,5
2	NHXH 4x1,5 RE	NHXH 4x1,5 RE / 1,5
3	NHXH 4x1,5 RE	NHXH 4x1,5 RE / 1,5
4	NHXH 4x1,5 RE	NHXH 4x1,5 RE / 1,5
5	NHXH 4x1,5 RE	NHXH 4x1,5 RE / 1,5
6	NHXH 4x1,5 RE	NHXH 4x1,5 RE / 1,5

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					
21	(N)HXH 4 x 1,5	17,3-17,8 //0,42	Uchwyt UEF Kotwa SROM 6x30	300mm		1	
68	JE-H(St)H 2 x 2 x 0,8 ceramic	11,5-12,8 //0,14					
20	(N)HXH 4 x 1,5	17,3-17,8 //0,42	Uchwyt OZMO Kotwa SROM 6x30	300mm		2	
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 Szezbel 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 (do 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 (do 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. POŻARNA ODOLNOŚĆ FIRE RESISTANCE	Datum/Date 25.10.2007  Podpis/Signature 
Dokument č. / Document No. FIRES - 10 - 2007 - 09. Anew	
Príloha č./Appendix No. 2	

Badanie systemów tras kablowych wg normy DIN 4102-12 w Fires, Batizovce, w dniu 25.10.2007.

## 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	600 mm		10	
61	JE-H(St)H 2 x 2 x 0,8 mika	11,5-12,8// 0,18	Kanal WDK-H 40060 nr kat.6175014				
60B	HTKSH 2x1		Obejma 1015 Kotwa FNA II 6				
60A	HTKSH 2x1 PH90		Kanal WDK-H 40060 nr kat.6175014	600 mm		11	

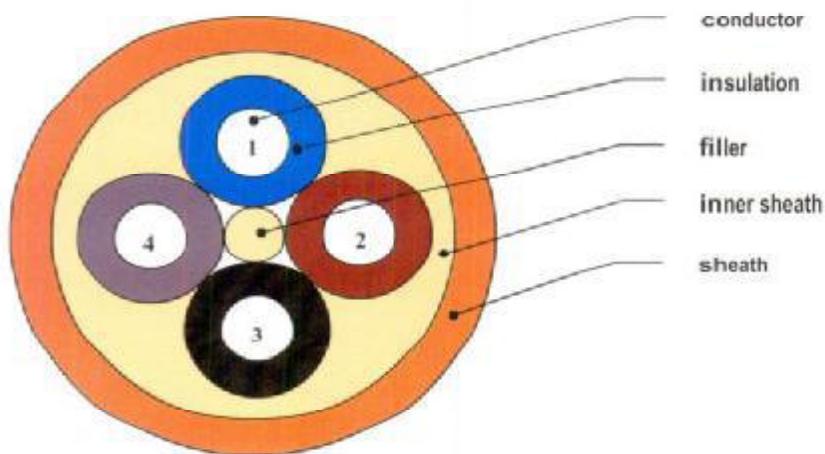
**Kable BITNER + osprzęt CABLOFIL**

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 mica	11,45-12,8// 0,18					
58	JE-H(St)H 2 x 2 x 0,8 mica	11,45-12,8// 0,18	Basket cable tray Korytko CF 54/300				
04	NHXH 4 x 50	40,3-41,4 //3,38	Zawieszenie 2x TF8 +	max			
03	NHXH 4 x 50	40,3-41,4 //3,38	RCSN/PA23	1,25 m	20 kg	12	
02	NHXH 4 x 1,5	16,1-17,0// 0,4	rys. 2				
01	NHXH 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 mica	11,45-12,8// 0,18	Basket cable tray Korytko CF 30/50	max			
			Zawieszenie TF6 + CEQ/CAT30	1,25 m	2 kg	13	
			rys. 1				

 FIRES s.r.o. POŻIARNA ODOLNOŚĆ FIRE RESISTANCE	Datum/Date 25.10.2007  Podpis/Signature
Dokument & Document No. FIRES-PR-202-01-AWE	
Príloha 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

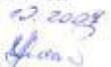
 <b>Fires s.r.o.</b> POŽÁRNA ODOLNOST FIRE RESISTANCE	Dátum/Date 25.10.2009  Podpis/Signature
Dokument č. Document No. FIRES-PR-201-08-A106	
Príloha č./Appendix No. 14	

## (N)HXH E90

### CHARACTERISTICS

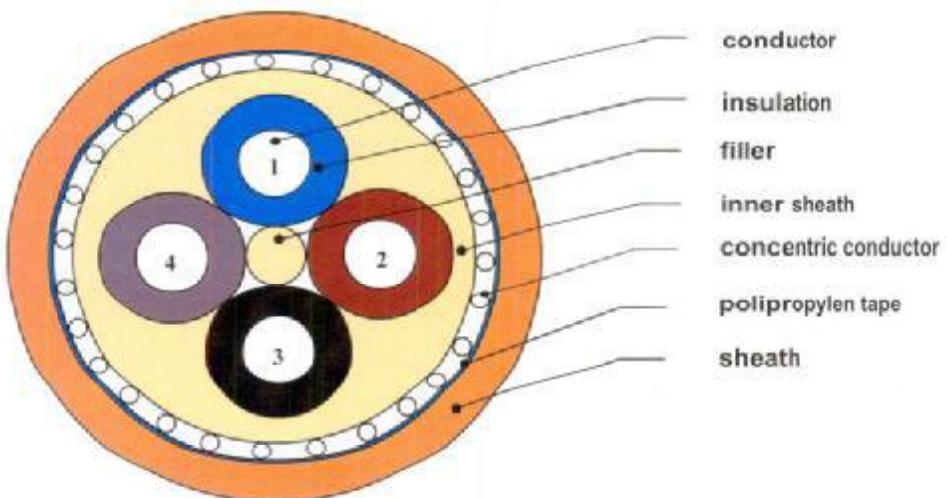
Conductor cross-section	
Number of conductors	Nominal conductor cross-section mm <sup>2</sup>
n	
1 + 4	1,5 + 240
5 + 7	1,5 + 70
7 + 10	1,5 + 25
10 + 24	1,5 + 2,5

Operating voltage	0,6/1kV	Operating temperature range during operation	-30°C up to +70°C
Voltage test	4000 V, 50 Hz	during installation	-5°C up to +50°C
Insulation resistivity at 90°C, minimum	10 <sup>14</sup>	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

 <b>Fires s.r.o.</b> POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 25.12.2023 
Dokument č. Document No. <b>Fires-FR-2023-08.ANE</b>	Podpis/Signature
Printba č./Kopie č. No. <b>15</b>	

## (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

**polypropylene tape**

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

 FIRES s.r.o. POŽIARNA ODOĽNOSŤ FIRE RESISTANCE	Datum/Date 05.10.2004 
Dokument č. Document No. FIRES-FR-202-08-AWE	Podpis/Signature
Príloha č./Appendix No. 16	

## (N)HXCH E90

### CHARACTERISTICS

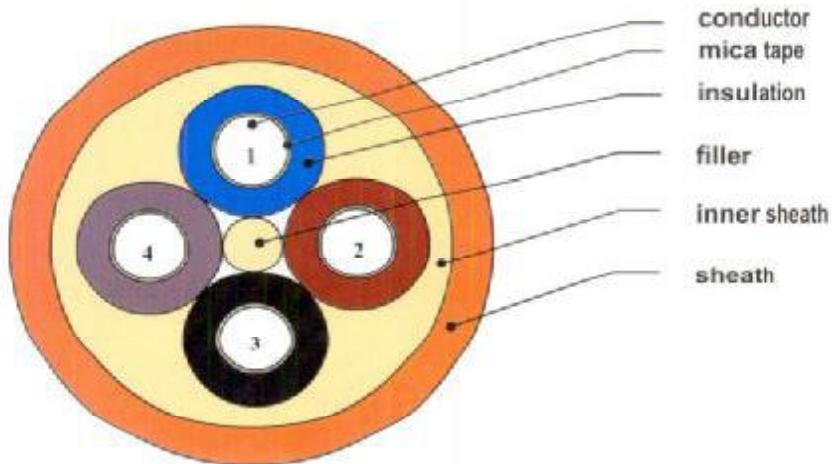
Conductor cross-section	
Number of conductors	Nominal conductor cross-section mm <sup>2</sup>
n	
1 + 4	1,5/1,5 + 150/70
5 + 7	1,5/1,5 + 4/4
10 + 24	1,5/2,5 + 2,5/10

Operating voltage	0,6/1kV	Operating temperature range during operation	-30°C up to +70°C
Voltage test	4000 V, 50 Hz	during installation	-5°C up to +50°C
Insulation resistivity at 20°C, minimum	10 <sup>14</sup>	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 0286



## NHXH 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

 <b>FIREs</b> s.r.o. POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Datum/Date 25.10.2009  Podpis/Signature
Dokument č. Document No. <i>FIREs-FR-100-06.100</i>	
Príloha č./Appendix No. <i>18</i>	

# NHXH E90

## CHARACTERISTICS

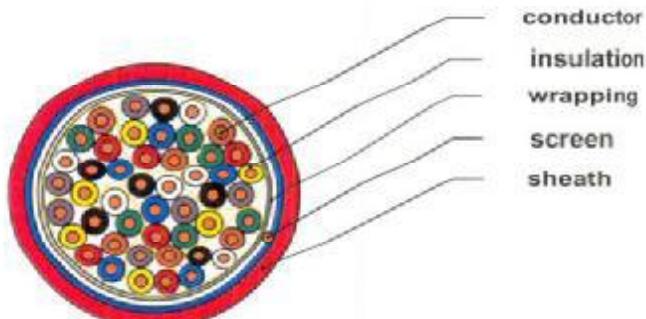
Conductor cross-section	
Number of conductors	Nominal conductor cross-section mm <sup>2</sup>
n	mm <sup>2</sup>
1 + 4	1,5 + 240
5 + 7	1,5 + 70
7 + 10	1,5 + 25
10 + 24	1,5 + 2,5

Operating voltage	0,6/1kV	Operating temperature range during operation	-30°C up to +70°C
Voltage test	4000 V, 50 Hz	during installation	-5°C up to +50°C
Insulation resistivity at 90°C, minimum	10 <sup>14</sup>	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

 <b>Fires</b> s.r.o. POŽÁRNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 25.10.2009  Podpis/Signature
Dokument č. Document No. <b>Fires-FR-101-01-AUE</b>	
Príloha č./Appendix No. <b>19</b>	

## **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**

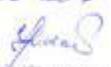
**conductor** - bare copper, solid acc. to DIN VDE 0295

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

**wrapping** - 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

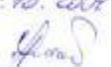
 <b>FIRES S.r.o.</b> POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 25.10.2023 Podpis/Signature 
Dokument č. Document No. <i>FIRES-FR-2023.08.AUE</i>	
Príloha č./Appendix No. <i>20</i>	

## JE-H(St)H CERAMIC E90

### CHARACTERISTICS

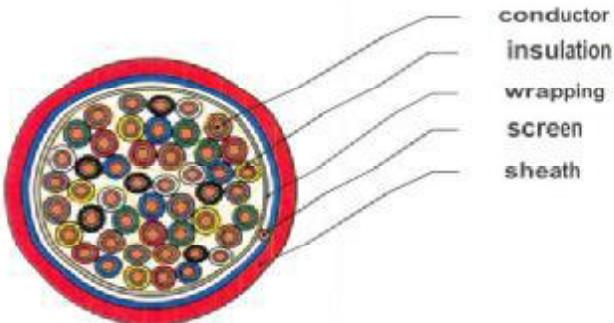
Conductor cross-section	
Number of conductors	Nominal conductor cross-section
n	mm
1 x 2 x ... 80 x 2 x ...	0,6
1 x 2 x ... 80 x 2 x ...	1,0

Operating voltage:	225V	Operating temperature range during operation	-30°C up to +70°C
Voltage test: core/core	500 V, 50 Hz	during installation	-5°C up to +50°C
core/screen	2000 V, 50 Hz	Minimum bending radius	8 x D single core D = outer diameter
Insulation resistivity at 90°C, minimum	10 <sup>14</sup>	Cable combustibility	
		Fire resistance	E90
		Combustibility tests	PN-EN 50226:2006, IEC 60332-3
		Reference standards	DIN VDE 0815

 <b>FIRES</b> s.r.o. POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Datum/Date 25.10.2008  Podpis/Signature
Dokument č. Document No.	<i>FIRES-FR-222-08-AWE</i>
Príloha č./Appendix No.	21

## **JE-H(St)H MIKA E90**

### **FIRE RESISTANT HALOGEN FREE ELECTRONIC AND TELECOMUNICATIONS 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

 <b>FIRES s.r.o.</b> POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date 25.10.2012 Signature
Dokument č.: Document No. <i>FIRES-FR-202-01-AWE</i>	
Príloha č./Appendix No. <i>22</i>	

## JE-H(St)H MIKA E90

### CHARACTERISTICS

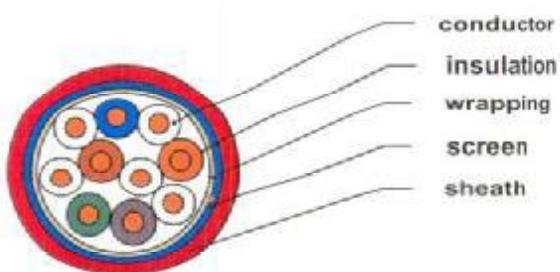
Conductor cross-section	
Number of conductors	Nominal conductor cross-section mm
n 1 x 2 x .... 80 x 2 x ....	0,8
1 x 2 x .... 80 x 2 x ....	1,0

Operating voltage	225V	Operating temperature range during operation	-30°C up to +70°C
Voltage test core/core	500 V, 50 Hz	during installation	-5°C up to +50°C
core/screen	2000 V, 50 Hz	Minimum bending radius	8 x D single core D = outer diameter
Insulation resistivity at 90°C, minimum	10 <sup>14</sup>	Cable combustibility	E90
		Fire resistance	PN-EN 50226:2006, IEC 60332-3
		Combustibility tests	DIN VDE 0815
		Reference standards	

 <b>Fires s.r.o.</b> POŽIARNA ODOLOST FIRE RESISTANCE	Datum/Date 15.10.2009 Podpis/Signature
Dokument č. Document No. <i>Fires-FR-001-08.ANE</i>	
Príloha č./Appendix No. <i>23</i>	

## **HTKSH(ekw) FE180/PH90**

### **FIRE RESISTANT HALOGEN FREE ELECTRONIC AND TELECOMUNICATIONS 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

 <b>FIRES S.R.O.</b> POŽIARNA ODPOLNOSŤ FIRE RESISTANCE	Dátum/Date 15.10.2009 Podpis/Signature 
Dokument č. Document No. <i>FIRES-FR-000-08-AWE</i>	
Príloha č./Appendix No. <i>24</i>	

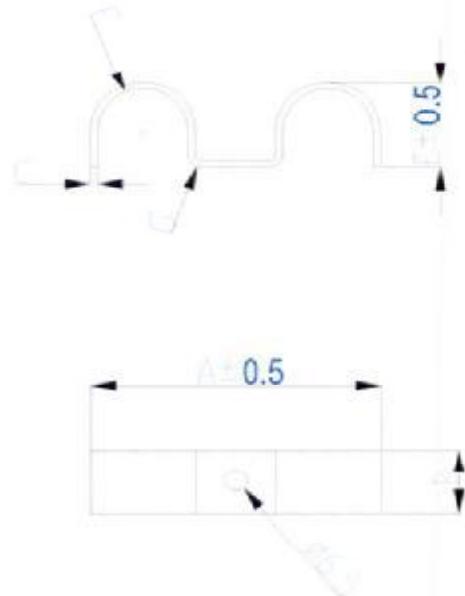
## HTKSH(ekw) FE180/PH90

### CHARACTERISTICS

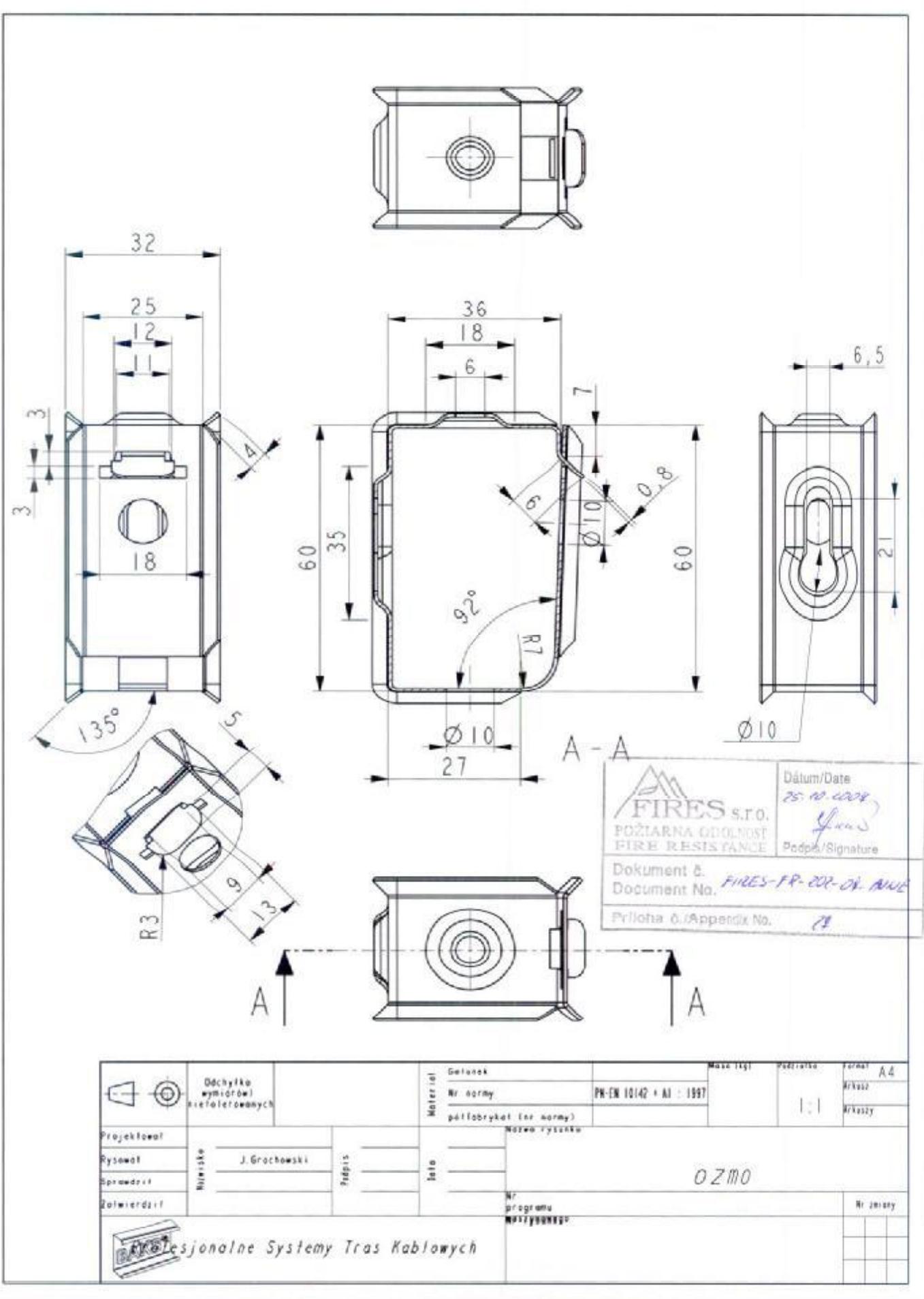
Conductor cross-section	
Number of conductors	Nominal conductor cross-section
n	mm
1 x 2 x .... 10 x 2 x ....	0,8 + 2,3

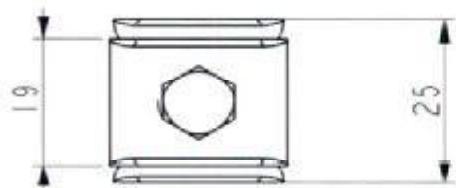
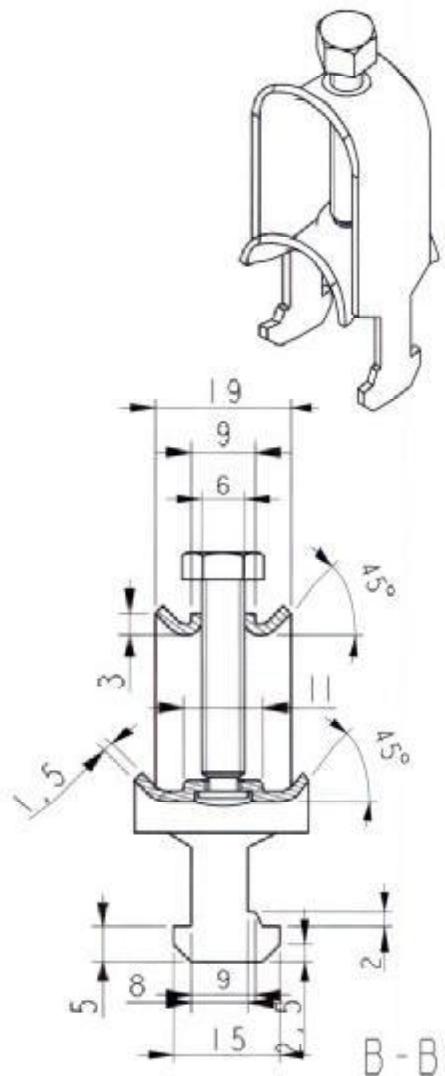
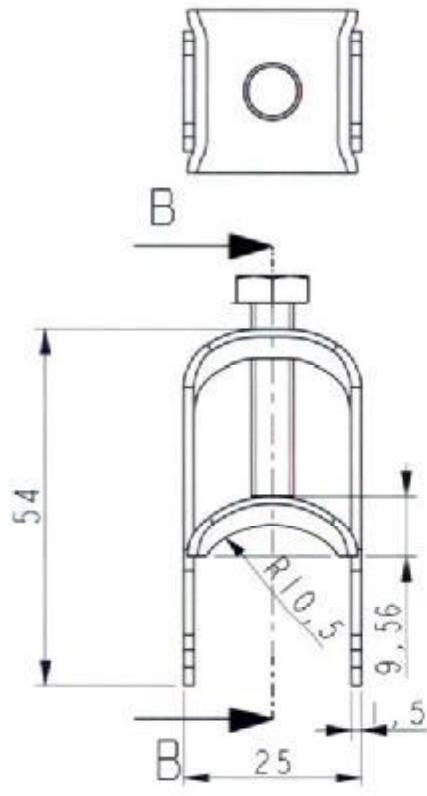
Operating voltage	225V	Operating temperature range during operation	-30°C up to +70°C
Voltage test core/core	1500 V, 50 Hz	during installation	-5°C up to +50°C
core/screen	2000 V, 50 Hz	Minimum bending radius	10 x D single core
Insulation resistivity at 90°C, minimum	$10^{14}$	D = outer diameter	
		Cable combustibility	
		Fire resistance	PH90
		Combustibility tests	PN-EN 50226:2006, IEC 60332-3
		Reference standards	ZN-CB 25:2005

 <b>Fires s.r.o.</b> POŽIARNA ODDLHOŠT FIRE RESISTANCE	Dátum/Date 25.10.2008 Signature
Dokument č. Document No.	Príloha č./Appendix No.
Fires-PR-202-01-AWE	
25	



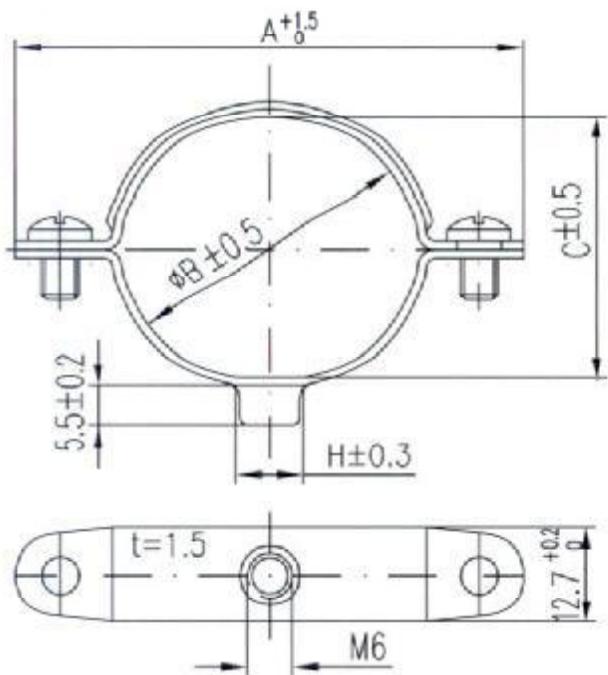
 <b>Fires s.r.o.</b> POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Dátum/Date <del>25.10.2009</del>  Podpis/Signature
Dokument č. Document No. <b>Fires-FR-202-04-ALE</b>	
Príloha č./Appendix No. <b>26</b>	



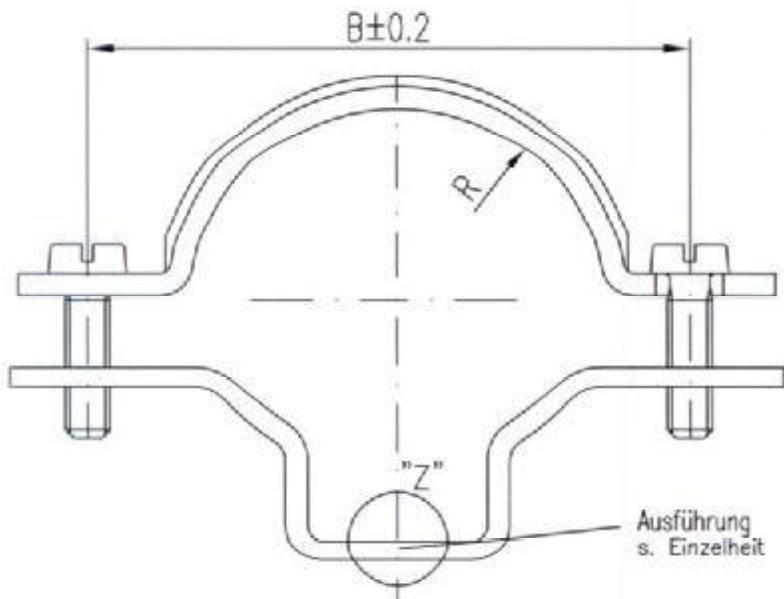


 <b>Fires s.r.o.</b> POŽIARNA ODDOLNOSŤ FIRE RESISTANCE	Datum/Date <u>25.10.2009</u> <u>Ydač</u> Podpis/Signature
Dokument č. Document No. <u>Fires-FR-202-02-AWE</u>	
Príloha č. Appendix N°. <u>28</u>	

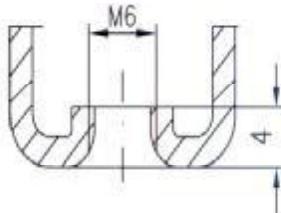
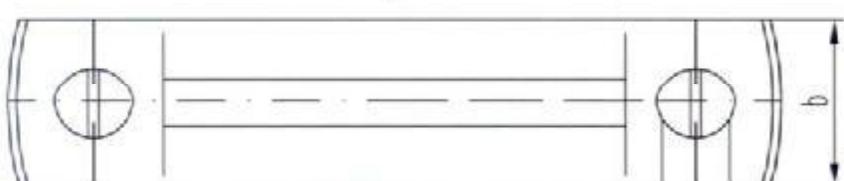
		Odchyłka wymiarów mierniczych		Materiał	Gatunek		Masa (kg)	Podziałka	Format	A4
					Nr. normy	PW-EN 10327:2005				
					geometryczny (nr normy)					Aktualny
Projektant					Notka rysunku					
Rysownik	<u>Jan Grzegorczyk</u>	<u>J. Grochowski</u>	<u></u>	Date	28-Jan-06					
Sprawdził	<u></u>	<u></u>	<u></u>							
Zatwierdził	<u></u>	<u></u>	<u></u>		Nr. programu magnetycznego					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

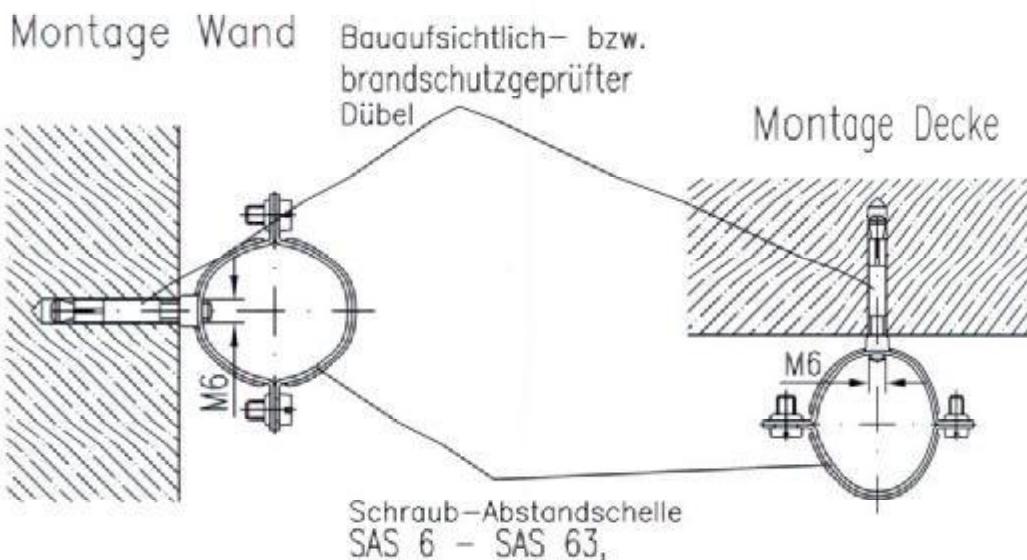


Modell-Nr.	Spann-bereich	R	B	b
SAS 38	29-38	18.5	53.7	16
SAS 47	38-47	23.5	65.2	16
SAS 55	47-55	27.5	74.7	18
SAS 63	55-63	31.5	84	18



 GmbH & Co. KG Linz/Rhein	Verwendung: <b>Einzelverlegung Schraubabstandschellen SAS 8 - SAS 63</b>	Ausgabe vom: 25.06.2003
---------------------------------	---	-------------------------

 FIRES s.r.o. POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Datum/Date 25.10.2008  Podpis/Signature
Dokument č. Document No.	FIRE-FR-207-08-AKE
Prihláška č./Appendix Nr.	29



Verwendung:

Ausgabe vom: 25.06.2003

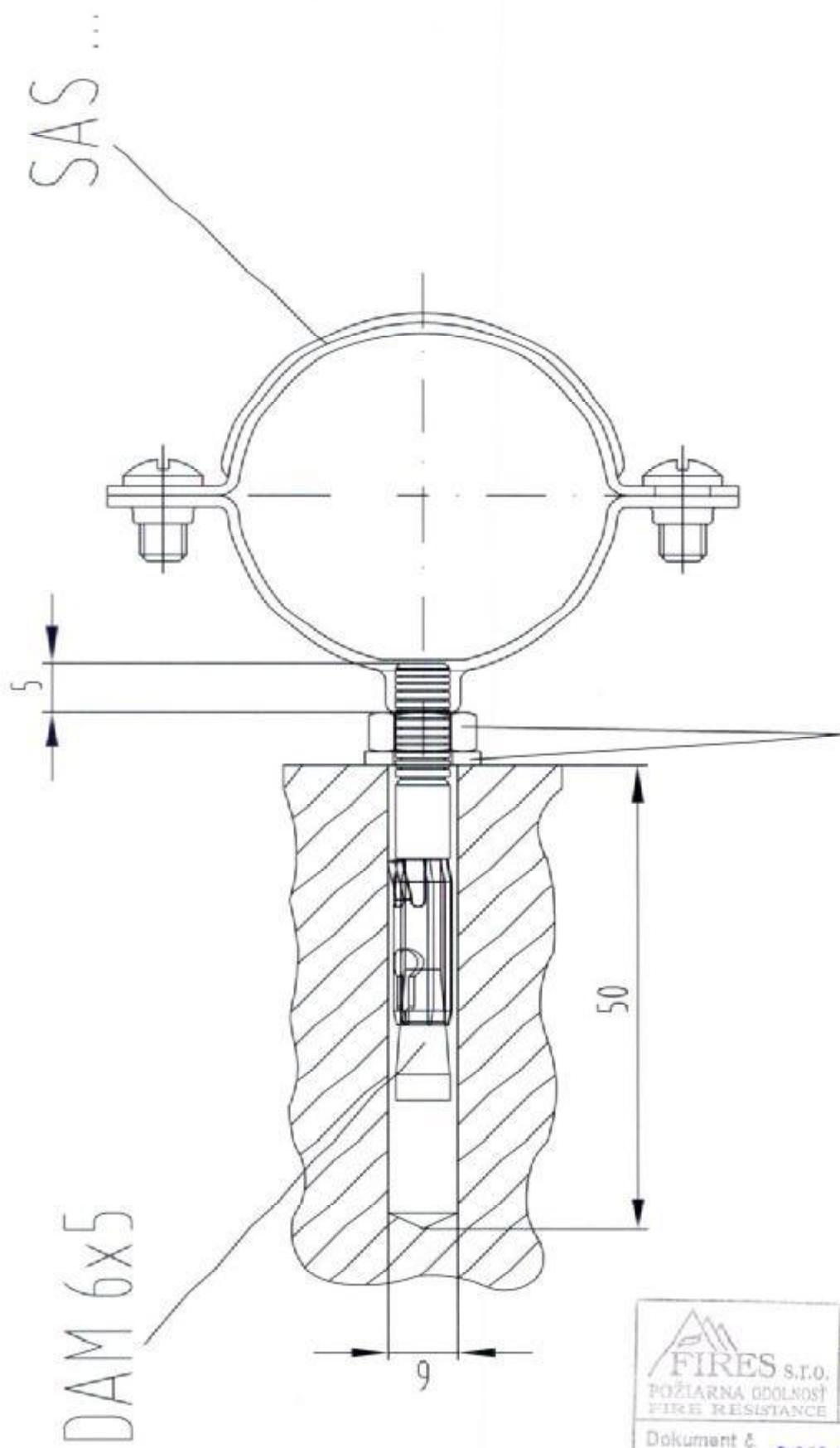
Einzelverlegung mit Schraubabstandsschellen



Datum/Uhrzeit:  
25.10.2008  
f.sas  
People/Signature

Dokument č.: Document No. FIRES-FR-202-02-AWE

Prihľa č.: Appendix III. 32



Sechskantmutter und  
Unterlegscheiben SMU 6

 FIRES S.r.o. POŽIARNA ODOLNOSŤ FIRE RESISTANCE	Datum/Date 25.10.2008 <i>[Signature]</i> Podpis/Signature
Dokument č. Document No. FIRES-FR-201-01-AWE	
Príloha č./Appendix No. 37	



## 15-60

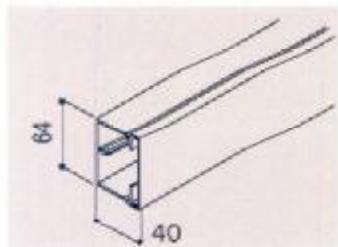
Trunking depth

### Wall/ceiling trunking, mouldings, halogen-free

#### Cover and base

Stock length: 2000 mm

Perforated base



WDK-H 40060

Packing: 16 m  
Wt: 0.505 kg/m

Colour

Ord. no.  
PPO

light grey

6173232

#### Partition



#### Cover clip



TW-H 4-40

Packing: 40 m  
Wt: 0.225 kg/pc

Ord. no.  
PPO

6173500

OK-H 60

Packing: 50 pos  
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.

 FIRES s.r.o. POŽIARNA ODOĽNOSŤ FIRE RESISTANCE	Datum/Date 25.10.2008 <i>J. Jelen</i> Podpis/Signature
Dokument č.: Document No.: FIRE5-FR-200-08-AWZ	
Príloha č./Appendix No. 32	

Systemy do zamocowania kabli i rur z metalu



Obejma mocująca

Obejma mocująca

Typ	Diair mm	Rozm. w kotwice mm	Cena Nett	Waga kg/m. nett	Nr kat.	Cena z 21% skat.
1015_5	3800	100	0,325	1009 02 8		
1015_6	2400	100	0,385	1009 03 6		
1015_7	2800	100	0,418	1009 04 4		
1015_8	2900	100	0,425	1009 05 2		
1015_9	2800	100	0,468	1009 06 9		
1015_10	2300	100	0,562	1009 07 9		
1015_11	1800	100	0,632	1009 08 7		
1015_12	1000	100	0,672	1009 10 9		
1015_13	1600	100	0,683	1009 11 7		
1015_14	1200	100	0,710	1009 15 8		
1015_15	1200	100	0,744	1009 15 4		
1015_16	1200	100	0,753	1009 19 2		
1015_17	1250	100	0,764	1009 20 6		
1015_18	1200	100	0,835	1009 21 4		
1015_20	1200	100	0,921	1009 23 0		
1015_25	1000	100	1,180	1009 42 7		
1015_28	1000	100	1,250	1009 36 2		

Podstawowe wymiary obejmę mocującą:

D	L	H	s	A
mm	mm	mm	mm	mm
5	10	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	18	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	16	25	14	7



Typ	Diair mm	Rozm. w kotwice mm	Cena Nett	Waga kg/m. nett	Nr kat.	Cena z 21% skat.
822_6	1000	100	0,885	1014 00 6		
822_10	1200	100	1,075	1014 01 3		
822_12	400	100	1,422	1014 03 1		
822_14	400	100	1,660	1014 04 6		
822_16	400	100	1,733	1014 08 8		
822_18,5	400	100	1,946	1014 11 0		
822_20	600	100	2,125	1014 13 7		
822_22,5	500	50	2,538	1014 18 1		
822_25	500	50	2,402	1014 52 7		
822_28,3	200	50	4,425	1014 21 0		
822_32	100	100	5,490	1014 52 0		
822_37	100	100	7,102	1014 23 3		
822_40	100	100	9,590	1014 53 0		
822_50	100	100	7,690	1014 53 0		
822_63	100	100	9,262	1014 55 0		

Podstawowe wymiary obejmę mocującą:

D	L	H	s	A
mm	mm	mm	mm	mm
6	23,5	5	20	2
10	23,5	9	20	2
12	23,5	11	20	2
14	23,5	13	20	2
15,2	23,5	14	20	2
18,6	23,5	17	20	2
20,4	23,5	19,5	20	2
22,5	23,5	21	20	2
28,3	27	26,5	20	3
37	30	35	25	3
63	32,5	60	25	3
				15

<b>FIRES s.r.o.</b> POZIARNA ODOLNOST' FIRE RESISTANCE	Datum/Date <i>25.10.2009</i>
Podpis/Signature <i>[Signature]</i>	
Dokument č. / Document No. <i>FIRES-FR-202-04_Rule</i>	
Príloha č./Appendix No. <i>33</i>	



## Systemy śrub, gwoździ i haków

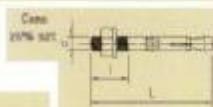
### Kołek

#### Kotwa sworzniowa



Typ	Dieni	Wysokość	Wysokość	Okab.	Wysokość	Cechi	Waga	Nr kat.
FNA II 6	M6	6	13	40	53	100	1,400	3498 42 5

Kotwa wbijana z gwintem M6 dla podłożu betonowego.  
Atest zgodnie z DIN 4102, Klasa odpornościogniowej F 90.



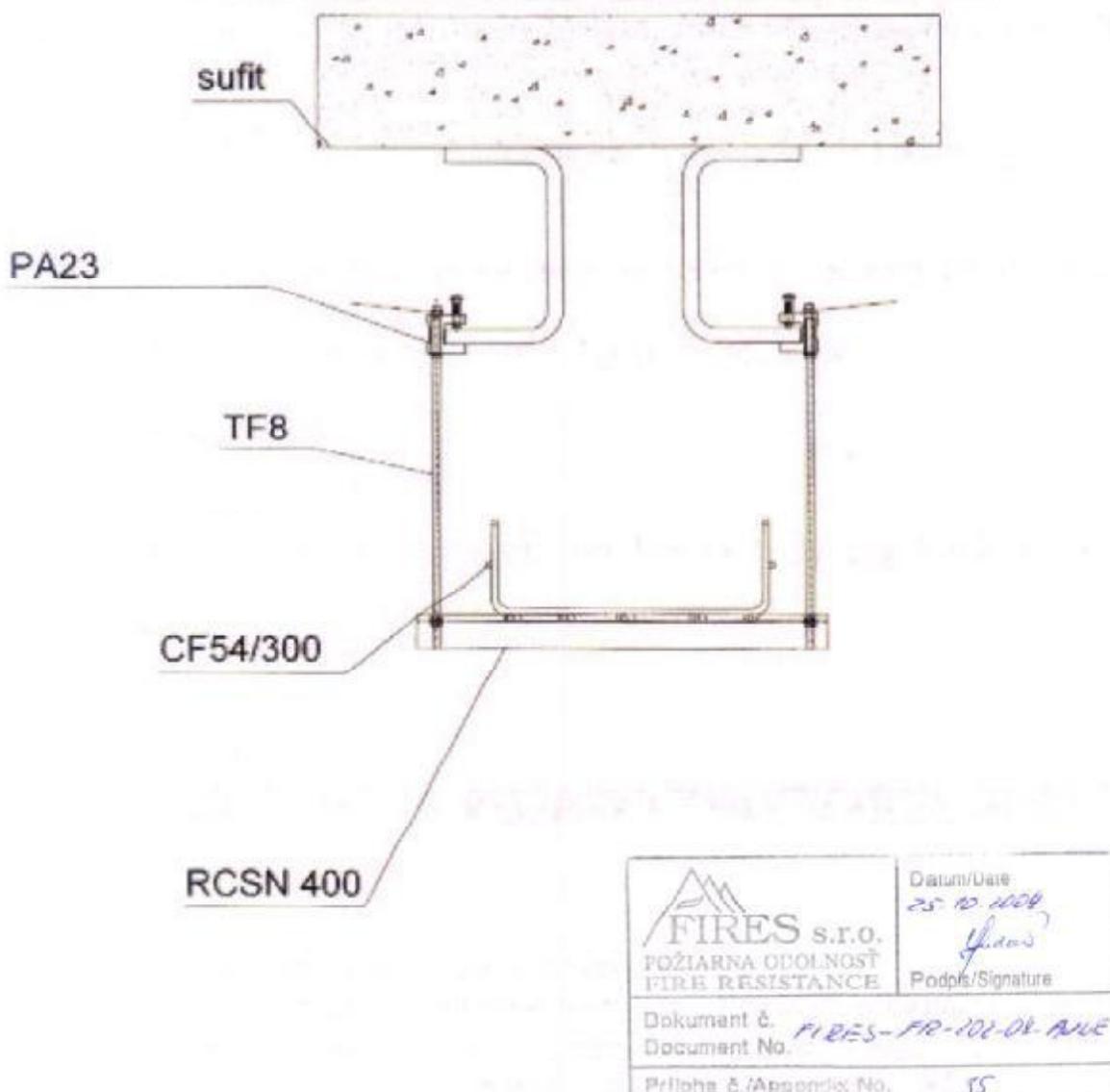
Datum/Date  
25.10.2008  
Podpis/Signature

Dokument č.: FIRES-FR-102-09. AWE  
Document No.

Příloha č./Appendix No. 35

## ZESTAWIENIE MATERIAŁÓW

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

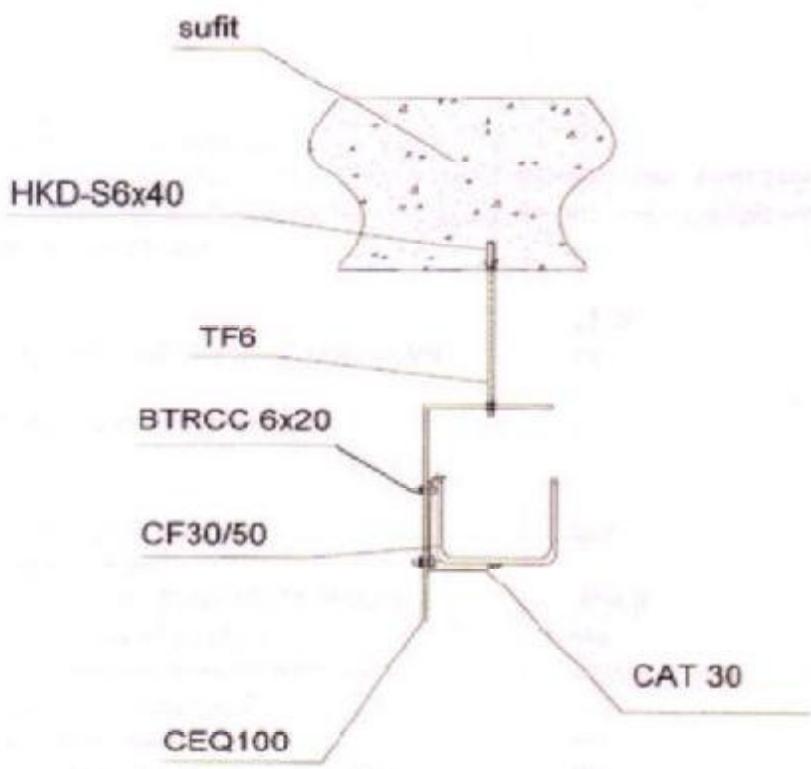


odległość między mocowaniami  
do 1,25 metra

max. obciążenie 20 kg/m

### ZESTAWIENIE MATERIAŁÓW

Lp.	Element	Ilość [szt]
1.	CF30/50 EZ	2
2.	pręt gwintowany TF6	4
3.	nakrętka wiercowa 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

	FIRES S.T.O. POŻARNA ODOLNOŚĆ FIRE RESISTANCE	Datum/Date 25.10.2008 
Dokument č. Document No.		Fires-FR-200-02-002
Příloha č./Appendix No.		