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

FIRES
The Experts on Fire Safety

SNAS
Reg. No. 041/S-159

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

TEST REPORT

Test report number:	**FIRES-FR-102-07-AUNE**
Tested property:	Function in fire
Test method:	DIN 4102 – 12:1998-11
Date of issue:	**12. 07. 2007**

Name of the product:	Cables with integrity function Type – (N)HXH, (N)HXCH, HTKSHekw, JE-H(St)H
Manufacturer:	**TECHNOKABEL S.A.,** Nasielska 55, 04-343 Warszawa, Poland – producer of cables
	Baks, Jagodne 5, 05-480 Karczew, Poland – producer of construction
Sponsor:	**TECHNOKABEL S.A.,** Nasielska 55, 04-343 Warszawa, Poland

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Task No.:	PR-07-0103
Specimen received:	06. 06. 2007
Date of the fire test:	14. 06. 2007

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

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Number of pages:	7	Number of appendices:	25
Test reports:	3	Copy No.:	1

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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. Test specimens were communication non-halogen cables with circuit integrity maintenance. Persons witnessing the test:

Representatives of the sponsor: Mr. Mariusz Kwiatkowski (TECHNOKABEL)
Mr. Jacek Kliczek (BAKS)

Test directed by: Ing. Štefan Rástocký
Test carried out by: Miroslav Hudák
Operator: Alexander Reľovský

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 (-50až+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 54 055	Racking meter	-
F 57 005	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 company BAKS 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 system BAKS with accessories – cable trays, cable ladders, ceiling ledges with clamps UKO1, clamps UEF, UDF and sleeves – OZO, OZMO.

Cables:	(N)HXH 4x1,5 RE FE180 PH30/E30-E60	(14 x)
	(N)HXH 4x50 RM FE180 PH30/E30-E60	(8 x)
	(N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	(14 x)
	(N)HXCH 4x50/25 RM FE180 PH30/E30-E60	(8 x)
	HTKSHekw 1x2x2,3 FE180 PH90/E30-E90	(12 x)
	JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	(12 x)

Supporting system: suspension track and ceiling installation were used for specimen test.
Suspension track: was made by three hangers (type WPCO 800) which were fixed to ceiling by four dowels (type PSRO M10x80) in spacing of 1500 mm. Two booms (type WMCO 400) and two booms (type WMCO 300) were fixed by screws (type SM M10 x 20) at each hanger. Holders (type UPWO) were fixed at the end of booms. Booms were fixed through these holders by threaded bar M10 with washers and nuts M10 to ceiling holder (type USOV) which was fixed to ceiling by dowel (type PSRO M10x80).
Trays (type KCOP 300H60/3) were fixed at left booms and jointed together by two junctions (type LPOPH60N) and by sheet (type BLO N) with screws M6 (type SGN M6x12). Trays were fixed to booms by screws M6 (type SGN M6x12).
Ladders (type DGOP 400H60/3) were fixed at right booms and jointed together by junction (type LDOCH60N) with screws M8 (type SGN M8x14). Ladders were fixed to booms by clips (type ZMO) with screws M8 (type SGN M8x14).
Ceiling installation: was made by cable clips UDF, UEF and sleeves OZO, OZMO, which were fixed to ceiling by dowels (type SRO M6x30) in spacing of 600 mm and by ceiling ledges (type SDOC 600) which were fixed to ceiling by three dowels (type PRSO M8x75) in spacing of 600 mm. Cables were fixed to ledges by clips (type UKO1) in spacing of 600 mm.
Types of individual components are from catalogue BAKS 8/2006.

Cable penetration through the wall of test furnace was sealed by mineral wool Rockwool.
Load capacity: bearing system was loaded with maximal tolerance according to the standard:

- trays with 10 kg/m and ladders with 20 kg/m.

Loading with steel chain was 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

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 drawings was checked. The specimen corresponded to the drawings 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 specimen was 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
47,3	3,1	24,0	0,4

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_2 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]**
14. 06. 2007	66,4	18,6

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
Specimens 1,2: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 3,4: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 5.6: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 7,8: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 9,10: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 11,12: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	**90 minutes no failure**
Specimen 13: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**80 minutes**
Specimen 14: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**76 minutes**
Specimens 15,16: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimen 17: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**81 minutes**
Specimen 18: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**78 minutes**
Specimens 19,20: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimen 21: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**40 minutes**
Specimen 22: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**72 minutes**
Specimen 23: cable (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**88 minutes**
Specimen 24: cable (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**88 minutes**
Specimen 25: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**88 minutes**
Specimen 26: cable (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**84 minutes**
Specimens 27,28: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimen 29: cable (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimen 30: cable (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**81 minutes**
Specimens 31,32: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 33,34: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 35,36: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 37,38: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 39,40: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 41,42: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 43,44: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	**90 minutes no failure**
Specimens 52A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure**
Specimens 53A,B: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	**90 minutes no failure**
Specimens 54A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure**
Specimens 55A,B: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	**90 minutes no failure**
Specimens 56A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure**
Specimen 57A: cable JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	**75 minutes**
Specimen 57B: cable JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	**90 minutes no failure**
Specimens 58A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure**
Specimen 59A: cable JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	**32 minutes**
Specimen 59B: cable JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	**71 minutes**
Specimens 60A,B: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	**90 minutes no failure**
Specimens 61A,B: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	**90 minutes no failure**
Specimens 62A,B: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure**
Specimens 63A: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**90 minutes no failure**
Specimen 63B: cable HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	**40 minutes**

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

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: Marek Gorlický
Translated by: 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 behavior 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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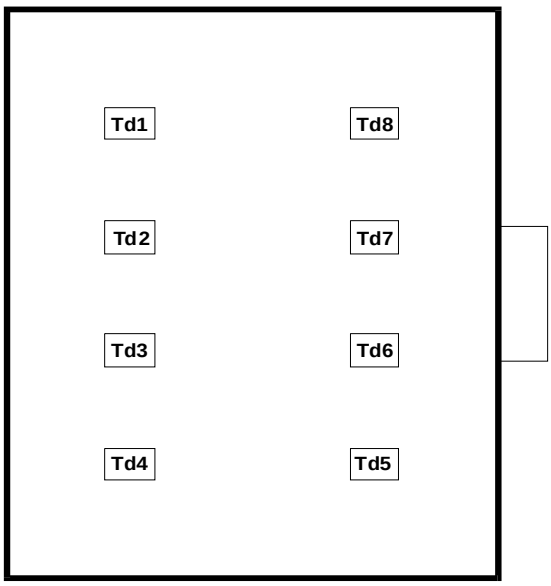
Measured values inside the test furnace

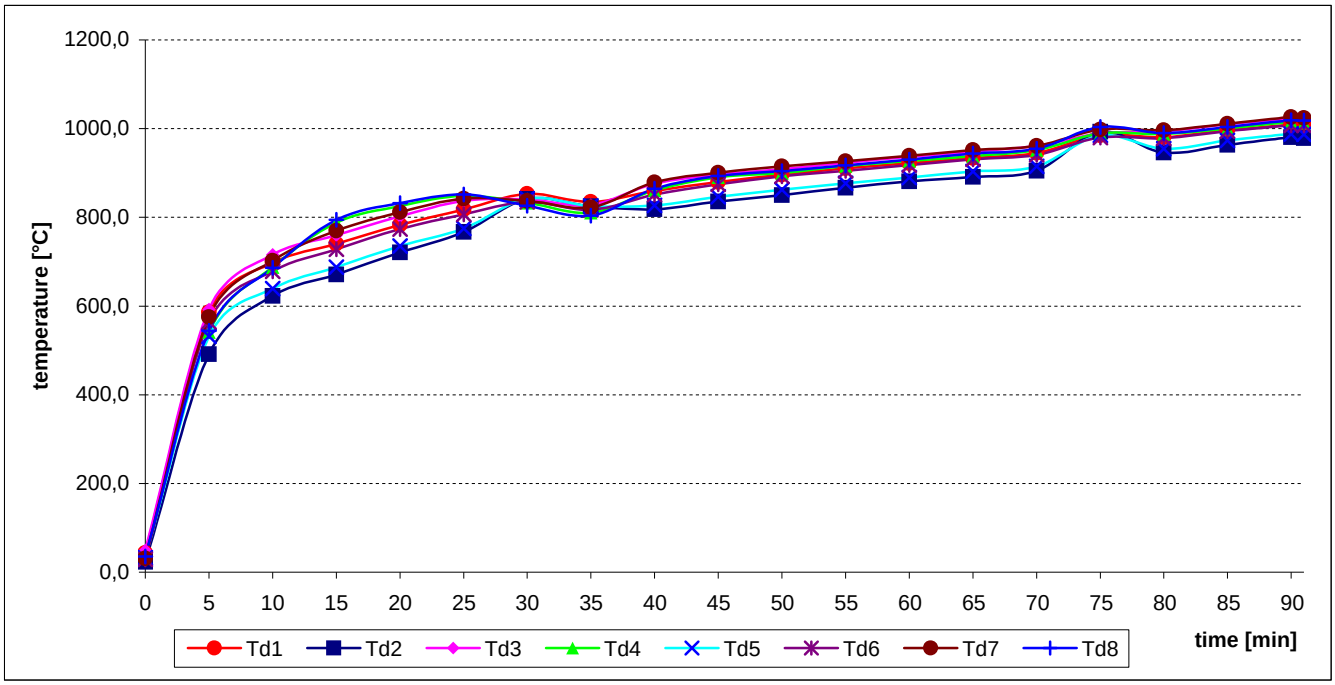
Time t [min]	Temperature [°C]											Deviation d_e [%]	Pressure p [Pa]
	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To		
0	43,3	22,9	49,1	34,0	32,8	29,1	30,9	35,7	34,7	20,0	20,8	0,0	0,0
5	585,7	491,4	592,4	541,0	532,1	564,5	574,9	544,2	553,3	576,2	20,7	-8,7	14,5
10	697,2	622,6	715,7	688,0	639,1	678,5	702,2	686,3	678,7	678,3	19,9	-2,3	16,2
15	740,3	670,9	759,7	788,3	687,4	728,2	769,9	794,6	742,4	738,5	20,1	-0,6	15,6
20	782,8	721,0	802,7	825,4	735,3	773,9	812,1	832,1	785,7	781,3	20,2	-0,3	16,5
25	817,9	767,0	836,8	848,4	775,3	806,5	842,4	851,5	818,2	814,6	20,2	-0,1	16,3
30	853,1	841,6	840,7	833,0	841,8	834,8	836,8	826,1	838,5	841,8	20,6	0,0	15,9
35	835,1	824,9	827,7	810,3	825,6	816,7	822,3	803,9	820,8	864,8	20,3	-0,5	16,1
40	859,2	818,2	875,9	861,0	826,7	851,7	879,2	864,8	854,6	884,7	19,5	-1,3	16,5
45	879,8	835,8	896,1	890,4	846,6	874,8	900,4	893,2	877,1	902,3	19,3	-1,5	16,3
50	896,0	850,3	908,5	900,0	862,0	892,3	915,0	904,1	891,0	918,1	18,9	-1,7	16,6
55	910,6	866,3	923,0	915,7	876,5	905,2	926,5	916,9	905,1	932,3	19,1	-1,8	16,4
60	922,3	881,0	936,6	927,4	889,7	917,5	939,1	929,9	917,9	945,3	18,8	-1,9	16,6
65	933,5	891,4	948,3	938,4	903,1	930,7	951,7	943,6	930,1	957,3	19,3	-2,0	16,6
70	945,0	905,2	960,9	952,0	915,2	940,8	961,5	954,6	941,9	968,4	19,5	-2,1	16,7
75	984,7	992,8	989,2	989,1	984,7	980,1	997,7	1004,0	990,4	978,7	19,5	-1,9	16,3
80	980,8	946,1	993,7	988,2	954,7	978,4	996,2	990,0	978,5	988,4	19,6	-1,8	17,1
85	996,5	963,5	1010,0	1000,0	973,3	994,2	1011,0	1004,0	994,4	997,4	19,6	-1,7	17,3
90	1009,0	980,3	1022,0	1015,0	988,1	1007,0	1026,0	1019,0	1008,6	1005,9	19,7	-1,5	16,7
91	1010,0	978,8	1021,0	1013,0	987,0	1007,0	1024,0	1018,0	1007,7	1007,6	19,8	-1,5	17,2

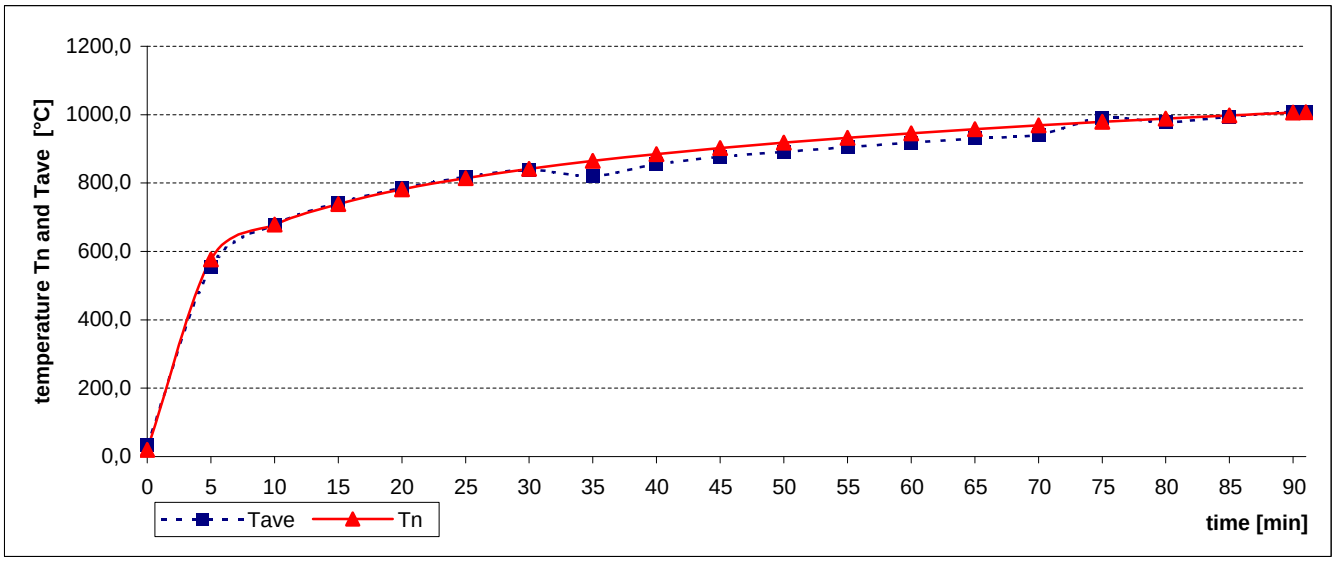
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside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

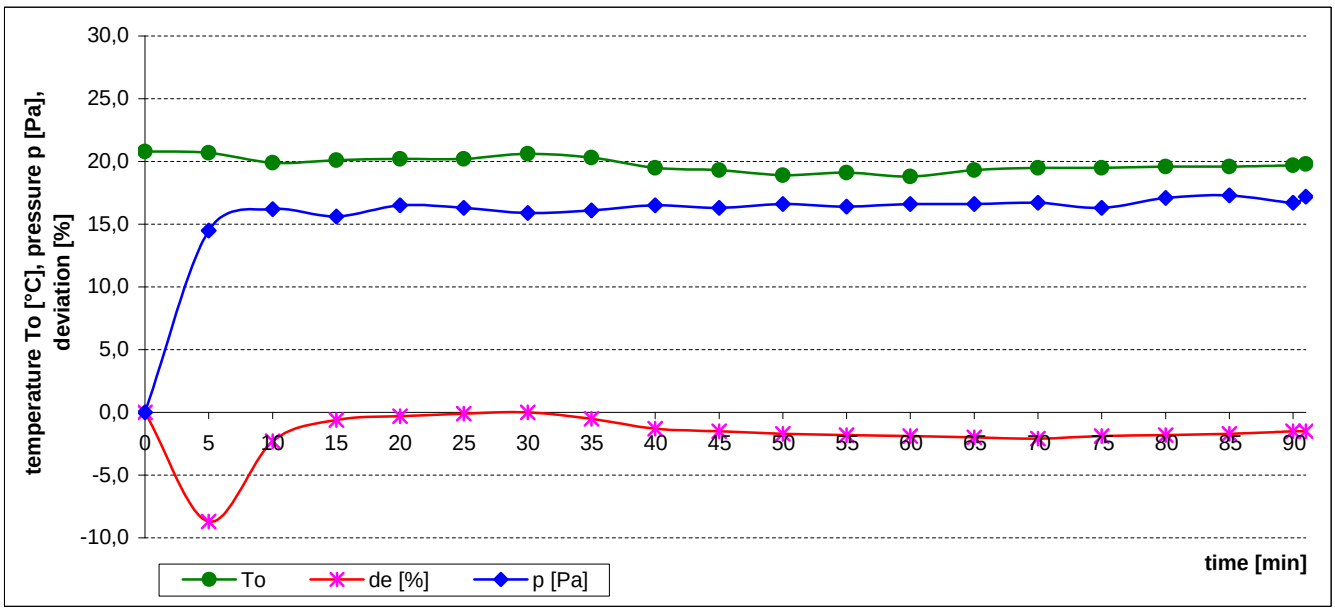
Layout of measuring points in the test furnace:



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
	2-L2	no failure
	3-L3	no failure
	4-PEN	no failure
S2	5-L1	no failure
	6-L2	no failure
	7-L3	no failure
	8-PEN	no failure
S3	9-L1	no failure
	10-L2	no failure
	11-L3	no failure
	12-PEN	no failure
S4	13-L1	no failure
	14-L2	no failure
	15-L3	no failure
	16-PEN	no failure
S5	17-L1	no failure
	18-L2	no failure
	19-L3	no failure
	20-PEN	no failure
S6	21-L1	no failure
	22-L2	no failure
	23-L3	no failure
	24-PEN	no failure
S7	25-L1	no failure
	26-L2	no failure
	27-L3	no failure
	28-PEN	no failure
S8	29-L1	no failure
	30-L2	no failure
	31-L3	no failure
	32-PEN	no failure

Specimens 1,2: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60
Specimens 3,4: cables (N)HXH 4x50 RM FE180 PH30/E30-E60
Specimens 5.6: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60
Specimens 7,8: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60

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
	34-L2	no failure
	35-L3	no failure
	36-PEN	no failure
S10	37-L1	no failure
	38-L2	no failure
	39-L3	no failure
	40-PEN	no failure
S11	41-L1	no failure
	42-L2	no failure
	43-L3	no failure
	44-PEN	no failure
S12	45-L1	no failure
	46-L2	no failure
	47-L3	no failure
	48-PEN	no failure
S13	49-L1	80:57
	50-L2	x
	51-L3	x
	52-PEN	x
S14	53-L1	x
	54-L2	x
	55-L3	76:08
	56-PEN	x
S15	57-L1	no failure
	58-L2	no failure
	59-L3	no failure
	60-PEN	no failure
S16	61-L1	no failure
	62-L2	no failure
	63-L3	no failure
	64-PEN	no failure

Specimens 9,10: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60
Specimens 11,12: cables (N)HXH 4x50 RM FE180 PH30/E30-E60
Specimens 13,14: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60
Specimens 15,16: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60

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 S24

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S17	65-L1	x
	66-L2	x
	67-L3	81:55
	68-PEN	x
S18	69-L1	x
	70-L2	x
	71-L3	78:04
	72-PEN	x
S19	73-L1	no failure
	74-L2	no failure
	75-L3	no failure
	76-PEN	no failure
S20	77-L1	no failure
	78-L2	no failure
	79-L3	no failure
	80-PEN	no failure
S21	81-L1	x
	82-L2	x
	83-L3	40:27
	84-PEN	x
S22	85-L1	72:45
	86-L2	x
	87-L3	x
	88-PEN	x
S23	89-L1	x
	90-L2	x
	91-L3	88:12
	92-PEN	x
S24	93-L1	88:12
	94-L2	x
	95-L3	x
	96-PEN	x

Specimens 17,18: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60
Specimens 19,20: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60
Specimens 21,22: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60
Specimens 23,24: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60

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 S25 to S32

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S25	97-L1	88:55
	98-L2	x
	99-L3	88:55
	100-PEN	x
S26	101-L1	84:15
	102-L2	x
	103-L3	x
	104-PEN	x
S27	105-L1	no failure
	106-L2	no failure
	107-L3	no failure
	108-PEN	no failure
S28	109-L1	no failure
	110-L2	no failure
	111-L3	no failure
	112-PEN	no failure
S29	113-L1	no failure
	114-L2	no failure
	115-	no failure
	116-PEN	no failure
S30	117-L1	81:36
	118-L2	x
	119-L3	x
	120-PEN	x
S31	121-L1	no failure
	122-L2	no failure
	123-L3	no failure
	124-PEN	no failure
S32	125-L1	no failure
	126-L2	no failure
	127-L3	no failure
	128-PEN	no failure

Specimens 25,26: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60
Specimens 27,28: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60
Specimens 29,30: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60
Specimens 31,32: cables (N)HXH 4x50 RM FE180 PH30/E30-E60

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 S33 to S40

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S33	129-L1	no failure
	130-L2	no failure
	131-L3	no failure
	132-PEN	no failure
S34	133-L1	no failure
	134-L2	no failure
	135-L3	no failure
	136-PEN	no failure
S35	137-L1	no failure
	138-L2	no failure
	139-L3	no failure
	140-PEN	no failure
S36	141-L1	no failure
	142-L2	no failure
	143-L3	no failure
	144-PEN	no failure
S37	145-L1	no failure
	146-L2	no failure
	147-L3	no failure
	148-PEN	no failure
S38	149-L1	no failure
	150-L2	no failure
	151-L3	no failure
	152-PEN	no failure
S39	153-L1	no failure
	154-L2	no failure
	155-L3	no failure
	156-PEN	no failure
S40	157-L1	no failure
	158-L2	no failure
	159-L3	no failure
	160-PEN	no failure

Specimens 33,34: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60
Specimens 35,36: cables (N)HXH 4x50 RM FE180 PH30/E30-E60
Specimens 37,38: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60
Specimens 39,40: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60

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

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

Measured time of tested specimens from S41 to S44

Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S41	161-L1	no failure
	162-L2	no failure
	163-L3	no failure
	164-PEN	no failure
S42	165-L1	no failure
	166-L2	no failure
	167-L3	no failure
	168-PEN	no failure
S43	169-L1	no failure
	170-L2	no failure
	171-L3	no failure
	172-PEN	no failure
S44	173-L1	no failure
	174-L2	no failure
	175-L3	no failure
	176-PEN	no failure

Specimens 41,42: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60
Specimens 43,44: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60

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]
S52A	209-L	no failure
	210-PEN	no failure
S52B	211-L	no failure
	212-PEN	no failure
S53A	213-L	no failure
	214-PEN	no failure
S53B	215-L	no failure
	216-PEN	no failure
S54A	217-L	no failure
	218-PEN	no failure
S54B	219-L	no failure
	220-PEN	no failure
S55A	221-L	no failure
	222-PEN	no failure
S55B	223-L	no failure
	224-PEN	no failure
S56A	225-L	no failure
	226-PEN	no failure
S56B	227-L	no failure
	228-PEN	no failure
S57A	229-L	75:23
	230-PEN	x
S57B	231-L	no failure
	232-PEN	no failure
S58A	233-L	no failure
	234-PEN	no failure
S58B	235-L	no failure
	236-PEN	no failure
S59A	237-L	32:39
	238-PEN	x
S59B	239-L	71:41
	240-PEN	x

Specimens 52: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90
Specimens 53: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90
Specimens 54: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90
Specimens 55: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90
Specimens 56: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90
Specimens 57: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90
Specimens 58: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90
Specimens 59: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90

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 diods 3V / 0,3W.
Circuit breakers with rating 3 A were used.

Measured time of tested specimens from S60 to S63

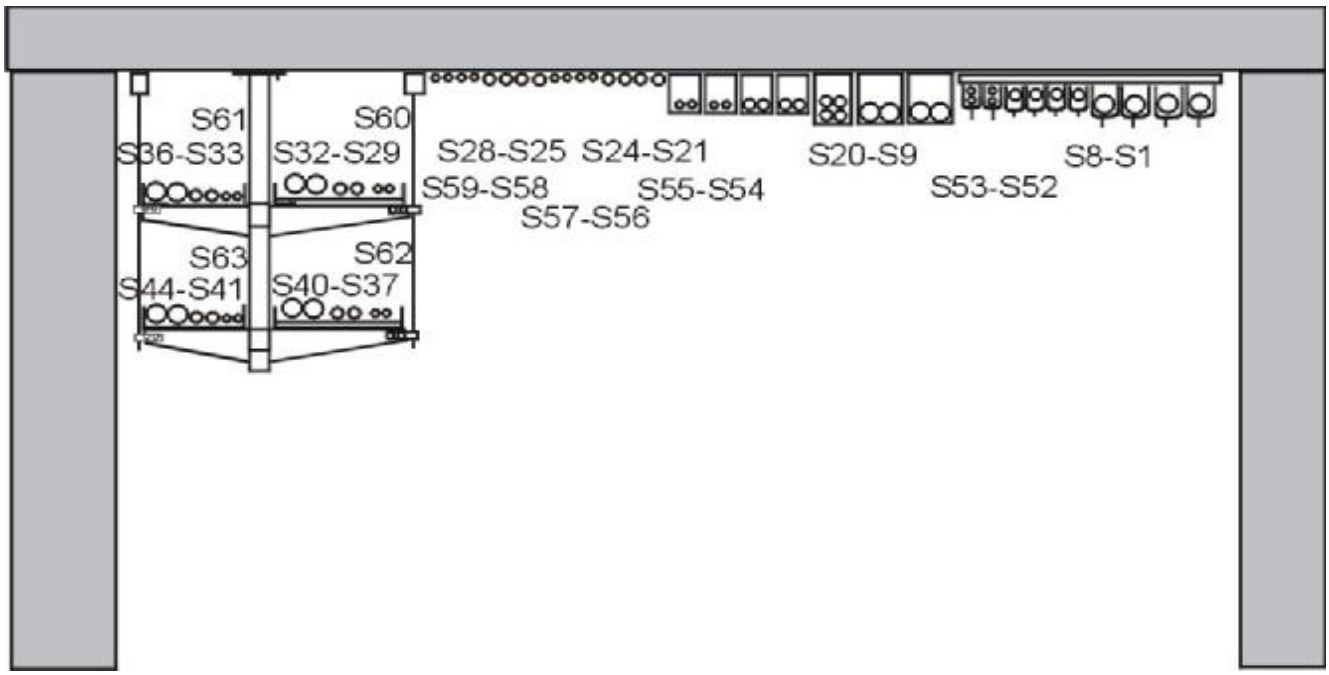
Specimen	Bulbs	Time to permanent failure / interruption [min:s]
S60A	241-L	no failure
	242-PEN	no failure
S60B	243-L	no failure
	244-PEN	no failure
S61A	245-L	no failure
	246-PEN	no failure
S61B	247-L	no failure
	248-PEN	no failure
S62A	249-L	no failure
	250-PEN	no failure
S62B	251-L	no failure
	252-PEN	no failure
S63A	253-L	no failure
	254-PEN	no failure
S63B	255-L	40:41
	256-PEN	x

Specimens 60: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90
Specimens 61: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90
Specimens 62: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90
Specimens 63: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90

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 diods 3V / 0,3W.
Circuit breakers with rating 3 A were used.

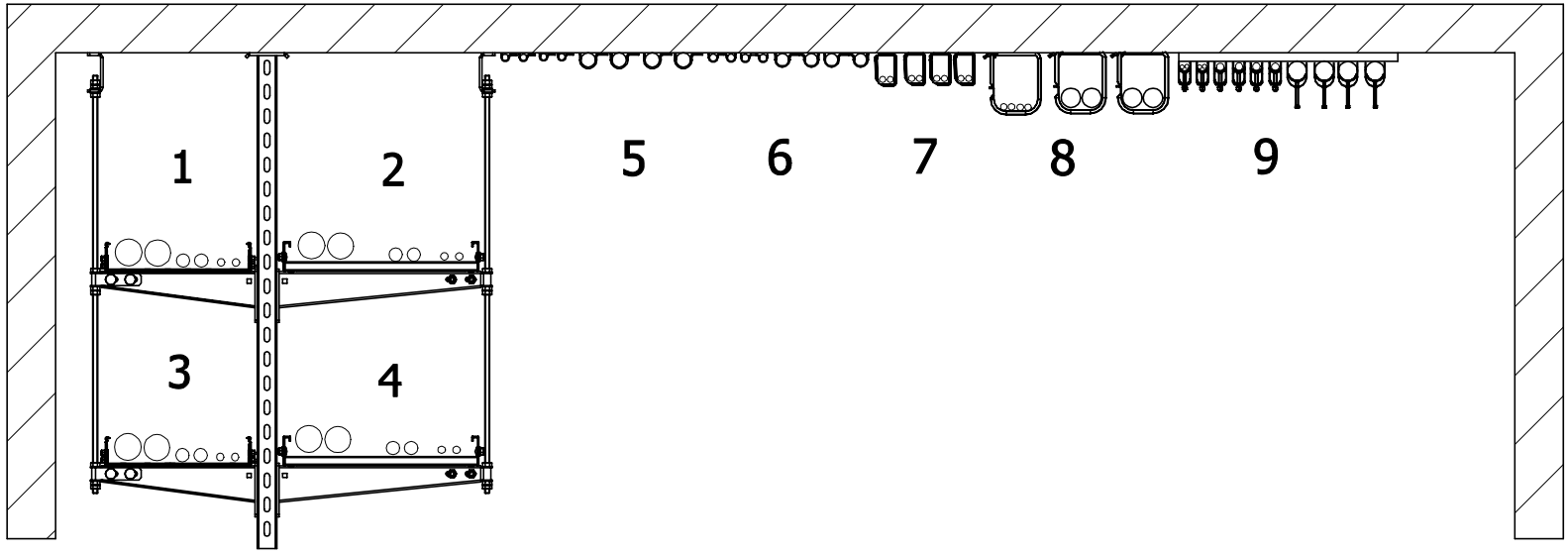
Layout of cables in the test furnace

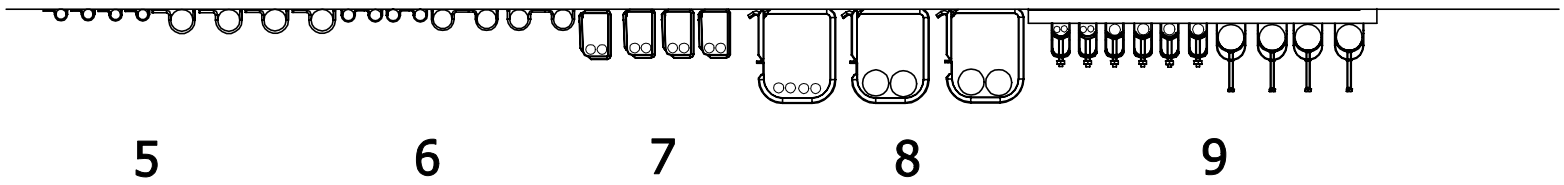


Specimens 1,2: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	Specimens placed in ceiling profile ledges SDOC with clips UKO in spacing of 600 mm
Specimens 3,4: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	
Specimens 5.6: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	
Specimens 7,8: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	
Specimens 9,10: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	Specimens placed in ceiling clips OZO 8 in spacing of 600 mm
Specimens 11,12: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	
Specimens 13,14: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	
Specimens 15,16: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	
Specimens 17,18: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	Specimens placed in ceiling clips OZMO 7 in spacing of 600 mm
Specimens 19,20: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	
Specimens 21,22: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	Specimens placed in ceiling clips UEF 6 in spacing of 600 mm
Specimens 23,24: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	
Specimens 25,26: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	Specimens placed in ceiling clips UDF 5 in spacing of 600 mm
Specimens 27,28: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	
Specimens 29,30: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	Specimens placed in the upper ladder
Specimens 31,32: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	
Specimens 33,34: cables (N)HXH 4x1,5 RE FE180 PH30/E30-E60	Specimens placed in the upper tray
Specimens 35,36: cables (N)HXH 4x50 RM FE180 PH30/E30-E60	
Specimens 37,38: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	Specimens placed in the lower ladder
Specimens 39,40: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	
Specimens 41,42: cables (N)HXCH 4x1,5/1,5 RE FE180 PH30/E30-E60	Specimens placed in the lower tray
Specimens 43,44: cables (N)HXCH 4x50/25 RM FE180 PH30/E30-E60	
Specimens 52: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in ceiling profile ledges SDOC with clips UKO in spacing of 600 mm
Specimens 53: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	
Specimens 54: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in ceiling clips OZMO 7 in spacing of 600 mm
Specimens 55: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	
Specimens 56: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in ceiling clips UEF 6 in spacing of 600 mm
Specimens 57: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	
Specimens 58: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in ceiling clips UDF 5 in spacing of 600 mm
Specimens 59: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	
Specimens 60: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	Specimens placed in the upper ladder
Specimens 61: cables JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90	Specimens placed in the upper tray
Specimens 62: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in the lower ladder
Specimens 63: cables HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	Specimens placed in the lower tray

Photos taken before the test

Photos taken after the termination of the test





	Odchyłka wymiarów nietolerowanych		Materiał	Gatunek		Masa [kg]	Podziałka	Format A4
				Nr normy	PN-EN 10142 + A1 : 1997			Arkusz 1
				półfabrykat (nr normy)				Arkuszy 1
Projektował	Nazwisko	Podpis	Data	Nazwa rysunku				
Rysował	J.Grochowski							
Sprawdził								
Zatwierdził				Nr programu maszynowego				Nr zmiany
Profesjonalne Systemy Tras Kablowych				Nr rysunku				

Badanie systemów tras kablowych wg normy DIN 4102-12

w FIRES Batizowce, Słowacja.

Firma TECHNOKABEL - BAKS

MICA 2 **w dniu 11-15.06.2007**

Cables type / Parameters of support cables	(N)HXH 4x1,5RE FE180 PH30/E30-E60	(N)HXH 4x50 RM FE180 PH30/E30-E60	(N)HXCH 4x1,5/1,5RE FE180 PH30/E30-E60	(N)HXCH 4x50/25 RM FE180 PH30/E30-E60	HTKSHekw 1x2x0,8 FE180 PH90/E30-E90	JE-H(St)H 1x2x0,8 Bd FE180 PH90/E30-E90
Number of cable on the drawing	1	2	3	4	5	6
Cable diameter [mm]	~14,7	~33,0	~16,0	~36,0	~7,5	~6,6
Cable weight [kg/m]	0,30	2,70	0,35	2,95	0,07	0,06
Test voltage [V]	400	400	400	400	110	110
1. Tray 60x300 mm, - support - 1500 mm, - load 10 kg/m	2	2	-----	----	2	----
2. Ladder 60x400 mm, - support - 1500 mm, - load 20 kg/m	2	2	-----	----	2	----
3. Tray 60x300 mm, - support - 1500 mm, - load 10 kg/m	----	----	2	2	----	2
4. Ladder 60x400 mm, - support - 1500 mm, - load 20 kg/m	----	----	2	2	----	2
5. Cable grip UEF - support 600 mm	2	----	2	----	2	2
6. Cable grip UDF - support 600 mm	2	----	2	----	2	2
7. Click ring OZMO - support 600 mm - load 1,1kg/m	2	-----	2	----	2	2
8. Click ring OZO - support 600 mm - load 6,0kg/m	2	2	2	2	----	----
9. Cable grip UK on the rail - support 600 mm	2	2	2	2	2	2

Total test samples [piece]	14	8	14	8	12	12
Total length of cables [m]	79,8	45,6	79,8	45,6	68,4	68,4

Length of sample - 5,7 meters
Length of chamber - 4,0 meters
Number of sample - 68