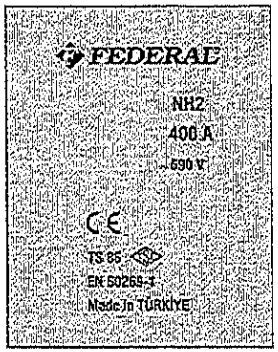
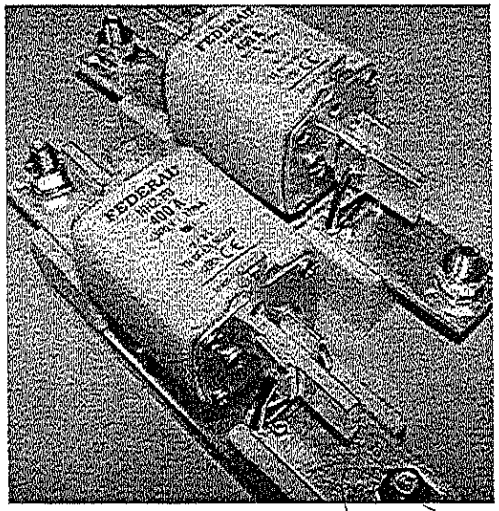
Copy of marking plate and product

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.





Test item particulars	:
Classification of installation and use	: Fuses for use by authorized persons
Supply Connection	: At both sides
	:
Possible test case verdicts:	
- test case does not apply to the test object	: N/A
- test object does meet the requirement	: P (Pass)
- test object does not meet the requirement	: F (Fail)
Testing	:
Date of receipt of test item	: 10.03.2015
Date (s) of performance of tests	: 13.03.2015 – 15.09.2015

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 6.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided : ☐ Yes ☐ Not applicable

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) :

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
5	CHARACTERISTICS OF FUSES		
5.2	Rated voltage (V) as specified ..... :	500 V	P
5.3.1	Rated current (A) of the fuse-link in accordance with specified values ..... :	63, 80, 100, 125, 160, 200, 250, 315, 400 A	P
5.3.2	Rated current (A) of the fuse-holder ..... :	400 A	P
5.4	Rated frequency (Hz) ..... :	50 Hz	P
5.5	Max. rated power dissipation (VA) of fuse-link ..... :	34 W	P
	Rated acceptable power dissipation (VA) of fuse-holder ..... :	45 W	P
5.6	Limits of time-current characteristics based on reference ambient air temperature Ta of +20°C	+20°C	P
5.6.1	Time-current zones deviated from standardized, or available in manufacturers documentation (with tolerances) ..... :		N/A
5.6.2	Conventional times and currents see Table 2 ..... :		P
5.6.3	Gates..... :		P
5.7	Breaking range and breaking capacity		
5.7.1	Breaking range and utilization category ..... :	gL/gG	P
5.7.2	Rated breaking capacity (A) of fuse-link corresponds to the rated voltage (V), and is equal or higher than given minimum (A) in subsequent part of this standard ..... :	100 kA/500 V	P
5.8	Cut-off current and I^2t characteristics are referred to the values of voltage, frequency and power factor		P
5.8.1	Cut-off current characteristics, if required, given by the manufacturer according to Figure 4 ..... :		P
5.8.2	Pre-arcing I^2t characteristics for pre-arcing times of less than 0,1 s down to a time corresponding to the rated breaking capacity given by the manufacturer :		P
	The operating I^2t characteristics with specified voltages as parameter for pre-arcing times less than 0,1 s given by the manufacturer ..... :		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
6	MARKINGS		
	Markings are durable and easily legible		P
6.1	Fuse-holders marked by:		
	- name of manufacturer or trade mark which enable identification of fuse-holder ..... :	FEDERAL	P
	- manufacturer's identification reference enabling to find all characteristics listed in 5.1.1 ..... :	NH2-FA	P
	- rated voltage (V) ..... :	690 V	P
	- rated current (A) ..... :	400 A	P
	- kind of current and rated frequency (Hz) ..... :	~	P
6.2	Fuse-link(s) except small fuse-link(s) marked by:		
	- name of manufacturer or trade mark which enable identification of fuse-links ..... :	FEDERAL	P
	- manufacturer's identification reference enabling to find all characteristics listed in 5.1.2 ..... :	NH2-FB	P
	- rated voltage (V) ..... :	500 V	P
	- rated current (A) ..... :	63, 80, 100,125, 160, 200, 250, 315, 400 A	P
	- breaking range and utilization category (if applicable) (5.7.1) ..... :	gL/gG	P
	- kind of current ..... :	~	P
	- rated frequency (Hz), if applicable (5.4)	-	N/A
	Small fuse-links marked by:		
	- trademark ..... :		N/A
	- list reference of manufacturer ..... :		N/A
	- rated voltage (V) ..... :		N/A
	- rated current (A) ..... :		N/A
6.3	Symbols for the kind of current and frequency in accordance with IEC 60417		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
7	STANDARD CONDITIONS FOR CONSTRUCTION		
7.1	Mechanical design		
7.1.1	Replacement of fuse-links easily and safely		P
7.1.2	Connections, including terminals		
	Contact force is not transmitted through insulating material other than ceramic or other material with characteristics not less suitable, unless		P
	there is sufficient resilience in the metallic parts to compensate any possible shrinkage or other deformation of the insulating material		P
	Terminals cannot turn or be displaced when the connecting screws are tightened		P
	Terminals shall be such, that the conductors cannot be displaced		P
	Parts gripping the conductors are of metal		P
	Gripping parts cannot unduly damage conductors		P
	Terminals readily accessible under the intended conditions of installation		P
7.1.3	Fuse-contacts		
	Fuse-contacts are such that necessary contact force is maintained under the conditions of service and operation		P
	Contact is such that electromagnetic forces occurring during operation under conditions in accordance with 7.5 not impair electrical connections between		
	a) fuse-base and fuse-carrier		N/A
	b) fuse-carrier and fuse-link		N/A
	c) fuse-link and fuse-base		P
	Fuse contacts are so constructed and of such material that, when fuse is properly installed and service conditions are normal, adequate contact is maintained		
	a) after repeated engagement and disengagement		P
	b) after being left undisturbed in service for long period		P
7.1.4	Construction of a gauge-piece		
	Gauge-piece is so designed that it withstands normal stresses occurring during use		N/A
7.1.5	Mechanical strength of fuse-link		
	Fuse-link have adequate mechanical strength and its contacts are securely fixed		P
7.2	Insulating properties and suitability for isolation		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Fuses are such that they do not lose insulating properties at voltages to which they are subjected in normal service		P
	Fuse passes the tests for verification of insulating properties and suitability for isolation in accordance with 8.2		P
7.3	Temperature rise, power dissipation of the fuse-link and acceptable power dissipation of the fuse-holder		
	See Table 5 ..... :		P
	Requirements are verified by tests according to 8.3		P
7.4	Operation		
	Fuse-link is so designed and proportioned that, when tested in its appropriate test arrangement at rated frequency and ambient air temperature of (20±5)°C		
	- is able to carry continuously any current not exceeding its rated current		P
	- is able to withstand overload conditions as they may occur in normal service (see 8.4.3.4)		P
	Fuse-link satisfy these conditions if it passes the tests prescribed in 8.4		P
7.5	Breaking capacity		
	Fuse is capable of breaking, at rated frequency and at voltage not exceeding the recovery voltage specified in 8.5, any circuit having prospective current between		
	- current I_r (for "g" fuse-links) ..... :		P
	- current $k_2 I_n$ (for "a" fuse-links) ..... :		N/A
	- for a.c., rated breaking capacity at power factors not lower than those in Table 20 ..... :	100 kA	P
	- for d.c., rated breaking capacity at time constants not greater than those limits in Table 21 ..... :		N/A
	Arc voltage not exceed values given in Table 6..... :		P
	Fuse satisfy these conditions if it passes the tests prescribed in 8.5		P
7.6	Cut-off current characteristic		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Values of cut-off current measured as specified in 8.6 are less than, or equal to, the values corresponding to cut-off current characteristics assigned by the manufacturer		P
7.7	I^2t characteristics		
	Pre-arcing I^2t values verified according to 8.7 (Table 7) ..... :		P
	Operating I^2t values verified according to 8.7 ..... :		P
7.8	Overcurrent discrimination of fuse-links ..... :		P
7.9	Protection against electric shock		
	The degree of protection when the fuse is under normal service conditions: ..... :	IP	N/A
	The degree of protection when replacing the fuse-link: ..... :	IP	N/A
	The degree of protection when the fuse-link and fuse-carrier is removed: ..... :	IP	N/A
7.9.1	Clearances and creepage distances		
	Clearances are not less than the values given in Table 9 ..... :	See Clause 8.2.3	P
	Creepage distances correspond to material group, as defined in 2.7.1.3 of IEC 60664-1, corresponding with rated voltage given in Table 10 ..... :	See Clause 8.2.3	P
7.9.2	Leakage currents of fuses suitable for isolation		
	Value of leakage current (mA) not exceed		
	- 0,5 mA per pole for fuses in new conditions ..... :	< 0,05 mA	P
	- 2 mA per pole for fuses having been submitted to test according to 8.5 ..... :		-
7.9.3	Additional constructional requirements for fuses for linked fuse-carriers, suitable for isolation		
	Fuse-holder are marked with the symbol IEC 60617-S00369		N/A
	When fuse is in open position, with fuse-link remaining inside the fuse-carrier, isolating distance between the fuse contacts in accordance with the isolating function are provided		N/A
	Indication of this position is provided by the position of the fuse-carrier		N/A
	There exists a locking means in order to lock the fuses in the isolated position, locking is possible only in this position		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Fuses are designed so that the fuse-carrier remains attached to the fuse-base giving correct indication of the open position, and of locking		N/A
7.10	Resistance to heat		
	All components are sufficiently resistant to heat which may occur in normal use (see 8.9 and 8.10)		P
7.11	Mechanical strength		
	All components of fuse are sufficiently resistant to mechanical stresses which may occur in normal use (see 8.3 to 8.5 and 8.11.1)		P
7.12	Resistance to corrosion		
	All metallic components of fuse are resistant to corrosive influences which may occur in normal use		P
7.12.1	Resistance to rusting		
	Ferrous components are so protected that they meet relevant tests (see 8.2.2.3.2 and 8.11.2.3)		P
7.12.2	Resistance to season cracking		
	Current-carrying parts are sufficiently resistant to season cracking (see 8.2.2.3.2 and 8.11.2.1)		P
7.13	Resistance to abnormal heat and fire		
	All components of fuse are sufficiently resistant to abnormal heat and fire (see 8.11.2.2)		P
7.14	Electromagnetic compatibility		
	Fuses within the scope of this standard are not sensitive to normal electromagnetic disturbances		N/A
	No immunity tests are required		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
8	TESTS		
8.1.2	At the beginning of each test, the fuse is approximately at the ambient temperature		P
8.1.3	Tests made on fuses in clean and dry condition		P
8.1.4	Arrangement of the fuse and dimensions		
	Except for degree of protection test (see 8.8), fuse are mounted in free air in draught-free surroundings in the normal operation position and on insulating material of sufficient rigidity		P
	Before tests are started, specified external dimensions are measured and results compared with dimensions specified in the relevant data sheet of the manufacturer or specified in subsequent parts	Part 2. Figure 101	P
8.1.5	Testing of fuse-links		
	Fuse-links tested with the kind(s) of current for which they are rated	AC	P
	Fuse-links tested for a.c. with frequency for which they are rated	50 Hz	P
8.1.5.1	Complete tests		
	Internal resistance R measured by a current ≤ 0,1 In		P
	Measuring current (A) .....:	0,3	P
	Ambient air temperature in range of 20 ± 5 °C		P
	The values of resistance	(see appended table)	P
8.1.5.2	Testing of fuse-links of a homogeneous series		
	Fuse-links tested like a homogeneous series .....:	Yes/No	P
	If yes: fuse-links have identical enclosures in form and construction (except of fuse-elements and contacts)		P
	- the same arc-extinguishing medium and same completeness of filling		P
	- fuse-elements of identical materials		P
	- their cross-section of fuse-elements not exceed the cross-section of fuse-links having the highest rated current		P
	- number of fuse-elements do not exceed number of fuse-elements of fuse-links with the highest rated current		P
	- minimum distances between adjacent fuse-elements and between the fuse-elements and the inner surface of the cartridge is not less than those in the fuse-link with the highest rated current		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- fuse-links used with a given fuse-holder, or		P
	- fuse-links intended to be used in an arrangement identical for all rated currents of the homogeneous series		P
	- value of $RI_n^{3/2}$ does not exceed the value for the fuse-link with largest rated current of the homogeneous series (R measured as indicated in 8.1.5.1)		P
	the rated breaking capacity of fuse-links not greater than that of the fuse-link with the largest rated current within the homogeneous series		P
	- if not, the fuse-links with greater breaking capacity subjected to tests no. 1 and no. 2		N/A
	The fuse-link having the largest rated current tested completely according to Table 11	400 A	P
	The fuse-link having the smallest rated current tested only according to Table 12	63 A	P
	The fuse-links between the largest and smallest rated current tested according to Table 13	80 A,100 A , 125 A, 160 A, 200, 250, 315 A	P
8.1.6	Testing of fuse-holders		
	The fuse-holders are subjected to the tests according to Table 14		P
8.2	Verification of the insulating properties and of the suitability for isolation		P
8.2.1	Arrangement of the fuse-holder		
	The fuse-holder fitted with a fuse-links of the largest dimensions for the type of fuse-holder concerned		P
	The fuse-base fixed to a metal plate, unless otherwise specified		P
	Fuse-link is replace a while five - surfaces of fuse-link, of device for replacing it or of fuse-carrier, if of insulating material, are provided with metal coverings connected during tests to the frame of the apparatus; if of metal, they are connected direct to the frame		P
8.2.2	Verification of the insulating properties		
	Points of application of the test voltage	1890 V	P
	The test voltage is applied between:		
	a) live parts and the frame with the fuse-link and the device for replacing it, or		P
	the fuse-carrier, if any, in position		N/A
	no breakdown of insulation or flashover during 1 min of the applying test voltage		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	b) the terminals without fuse-link, device for replacing or the fuse-carrier		P
	no breakdown of insulation or flashover during 1 min of the applying test voltage		P
	c) live parts of different polarity in the case of multipole fuse-holder with fuse-links, fuse-carrier(s) or device(s) for replacing the fuse-links		N/A
	no breakdown of insulation or flashover during 1 min of the applying test voltage		N/A
	d) live parts which in the case of a multipole fuse-holder reach different potential after the fuse-link operates (equipped by fuse-carrier or device for replacing without fuse-link)		N/A
	no breakdown of insulation or flashover during 1 min of the applying test voltage		N/A
	The values of test voltage (V) as specified in Table 15 ..... :	1890 V	P
8.2.2.3.2	Fuse-holder is subjected to humid atmospheric conditions		P
	Relative humidity of ambient air (%) ..... :	%95	P
	Ambient air temperature (°C) ..... :	25 °C	P
	Duration of treatment (h) ..... :	48 h	P
	Insulation resistance is measured between the points prescribed in 8.2.2.1 by applying d.c. voltage of approximately 500 V	500 Vdc	P
	Points of measuring:		
	a) min. measured value (MΩ) ..... :	> 1 MΩ	P
	b) min. measured value (MΩ) ..... :	> 1 MΩ	P
	c) min. measured value (MΩ) ..... :		N/A
	d) min. measured value (MΩ) ..... :		N/A
	The insulation resistance not less than MΩ ..... :	> 1 MΩ	P
8.2.3	Verification of the suitability for isolation		
	Clearances and creepage distances are verified by dimensional measurement and by voltage test		
	Points of application of the test voltage		N/A
	The test voltage is applied between:		
	- terminals when the fuse-link and device for replacing it, are removed		N/A
	Test voltage (kV) for verification of the rated impulse withstand voltage is given in Table 16 ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The 1,2/50 µs impulse voltage applied 5 times for each polarity at intervals of 1 s minimum		N/A
	no breakdown of insulation or flashover during of the applying test voltage		N/A
	no disruptive discharge during the test		N/A
8.2.4.2	Fuse-holder is subjected to humid atmospheric conditions		N/A
	Relative humidity of ambient air (%) ..... :	%95	P
	Ambient air temperature (°C) ..... :	25 °C	P
	Duration of treatment (h) ..... :	48 h	P
	Insulation resistance is measured between the points prescribed in 8.2.2.1 by applying d.c. voltage of approximately 500 V	500 Vdc	P
	Points of measuring:		
	a) min. measured value (MΩ) ..... :	> 1 MΩ	P
	b) min. measured value (MΩ) ..... :	> 1 MΩ	P
	c) min. measured value (MΩ) ..... :		N/A
	d) min. measured value (MΩ) ..... :		N/A
	The insulation resistance not less than 1 MΩ ..... :	>1 MΩ	P
8.3	Verification of temperature rise and power dissipation		
8.3.1	One fuse used for test (unless otherwise stated by the manufacturer) mounted in free air		P
	Test performed at an ambient air temperature of (20±5) °C	20°C	P
	Ambient air temperature during the test (°C) ..... :		P
	Cross-sectional area (see Table17) (mm^2 or mm x mm) ..... :	240 mm^2	P
	Tightened by torque; torque (Nm) ..... :	32 Nm	P
8.3.2	The temperature of the fuse measured by method of measuring ..... :	Thermocouples	P
8.3.3	Measurement of the power dissipation of the fuse-link		
	One fuse used for test (unless otherwise stated by the manufacturer) mounted in free air		P
	Test performed at an ambient air temperature of (20±5) °C		P
	Ambient air temperature during the test (°C) ..... :	22°C	P
	Cross-sectional area (see Table17) (mm^2 or mm x mm) ..... :	240 mm^2	P
	Tightened by torque; torque (Nm) ..... :	32 Nm	P
8.3.4.1	Temperature rise of the fuse-holder		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Applied a.c. current (A) for test equal to the rated current of the fuse-holder :	400 A	P
	Test made with fuse-link (A), or :		N/A
	with a dummy fuse-link specified in subsequent parts :	Part 2 Figure 105	P
	Temperature rise limits T for contacts and terminals (Table 5):		
	spring loaded contacts;(silver plated: limited only by the necessity of not causing any damage to adjacent parts) :	unenclosed / enclosed 47K	P
	bolted contacts; limit:(K) :	unenclosed / enclosed	N/A
	terminals; (silver plated) limit:≤70 K :	unenclosed / enclosed 40K	P
8.3.4.2	Power dissipation of a fuse-link		
	The test made with a.c. at the current (A) equal to the rated current of the fuse-link :	400 A	P
	The points of measuring :	Part 2 Figure 106 , S points	P
	Measured value of power (W) dissipation in limits (W) specified in subsequent parts :	24,8 W	P
8.3.5	The acceptable power dissipation (W) of fuse-holder not less than the rated power dissipation of the corresponding fuse-links :	45 W	P
	After the tests prescribed in 8.3, the insulating parts of the fuse-holders cooled down to ambient temperature withstood the test voltage according to 8.2 :		P
	No deformation after tests of 8.3		P
8.4	Verification of operation		
8.4.1	The test arrangement as specified in 8.1.4		P
	Length (m) of conductors (see 8.3.1) :	2 m	P
	their cross-sectional area (mm^2) as specified in Table 17 :	16 mm^2 (63 fuse-links) 25 mm^2 (80A fuse-link) 35 mm^2 (100A fuse-link) 50 mm^2 (125A fuse-link) 70 mm^2 (160A fuse-link) 95 mm^2 (200A fuse-link) 120 mm^2 (250A fuse-link) 185 mm^2 (315A fuse-links) 240 mm^2 (400A fuse-links)	P
8.4.2	Ambient air temperature during test within (20±5) °C	20-22 °C	P
8.4.3.1	Verification of conventional non-fusing and fusing current		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	a) the fuse-link subjectod to the conventional non-fusing current (I_{nf}) (see Table 2) :	1,25 In	P
	the fuse-link did not operate within the conventional time of (h) (Table 2) :	1 h (63A) 2 h (80A,100A,125A,160A) 3 h (200A, 250A,315A,400A)	P
	b) the same fuse-link, after cooled down to ambient temperature, subjected to the conventional fusing current (I_f) (see Table 2) :	1,6 In	P
	the fuse-link operated within the conventional time of (minutes) (Table 2) :	35 min (63A fuse-link) 27 min. (80A fuse-link) 33 min. (100A fuse-link) 44 min. (125A fuse-link) 39 min. (160A fuse-link) 50 min. (200A fuse-link) 41 min. (250A fuse-link) 58 min. (315A fuse-link) 43 min. (400A fuse-link)	P
8.4.3.2	Verification of rated current of "g" fuse-links		
	One fuse-link submitted to a pulse test for 100 h	100h	P
	On-period oqual to conventional time (h) :	1 h (63A) 2 h (80A,100A,125A,160A) 3 h (200A, 250A,315A,400A)	P
	Off-period of 0,1 of the conventional time :	0,1 h (63A) 0,2 h (80A,100A,125A,160A) 0,3 h (200A, 250A,315A,400A)	P
	Test current (A) equal to 1,05 of the rated current . :	1,05 In	P
	After the test, the fuse-link not have changed its characteristics		
8.4.3.1	a) the fuse-link subjected to the conventional non-fusing current (I_{nf}) (see Table 2) :	1,25 In	P
	the fuse-link did not operate within the conventional time of (h) (Table 2) :	1 h (63A) 2 h (80A,100A,125A,160A) 3 h (200A, 250A,315A,400A)	P
8.4.3.3	Verification of time-current characteristics and gates		
8.4.3.3.1	The time-current characteristics verified on the basis of the test according to 8.5		P
	Values of pre-arcing and operating times within the time-current zones:		
	- indicated by the manufacturer		P
	- specified in subsequent parts :		N/A
	Verification for smaller current ratings, if only one largest rated current fuse-link is subjected to the test according to 8.5 (in case of homogeneous series):		
	"g" fuse-links (except "gD", "gG" and "gM")		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Tests made in connection with verification of the gates (see8.4.3.3.2)		N/A
	Ambient air temperature within (20±5) °C ..... :		N/A
	rated current In (A) of the fuse-link ..... :		
	test performed at voltage (V) ..... :		
	test 3a) prospective current (A) equal to kIn (10 ≤ k ≤ 20) ..... :		N/A
	pre-arcing time (s) ..... :		
	specified pre-arcing time (s) max./min. ..... :		N/A
	test 4a) prospective current (A) equal to kIn (5 ≤ k ≤ 8) ..... :		N/A
	pre-arcing time (s) ..... :		
	specified pre-arcing time (s) max./min. ..... :		N/A
	test 5a) prospective current (A) equal to kIn (2,5 ≤ k ≤ 4) ..... :		N/A
	pre-arcing time (s) ..... :		
	specified pre-arcing time (s) max./min. ..... :		N/A
	Verification for smaller current ratings, if only one largest rated current fuse-link is subjected to the test according to 8.5 (in case of homogeneous series):		
	"a" fuse-links		N/A
	Ambient air temperature within (20±5) °C ..... :		N/A
	rated current In (A) of the fuse-link ..... :		
	test performed at voltage (V) ..... :		
	test 3a) prospective current (A) equal to nk_2 In (5≤ n ≤ 8) ..... :		N/A
	pre-arcing time (s) ..... :		
	specified pre-arcing time (s) max./min. ..... :		N/A
	test 4a) prospective current (A) equal to nk_2 In (2≤ n ≤ 3) ..... :		N/A
	pre-arcing time (s) ..... :		
	specified pre-arcing time (s) max./min. ..... :		N/A
	test 5a) prospective current (A) equal to nk_2 In (1≤ n ≤ 1,5) ..... :		N/A
	pre-arcing time (s) ..... :		
	specified pre-arcing time (s) max./min. ..... :		N/A
8.4.3.3.2	Verification of gates		P
-	"gG" and "gM" fuse-links		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	rated current of the fuse-link (A)..... :	63, 80, 100, 125, 160, 200, 250, 315, 400 A	
	test performed at voltage (V) ..... :	10-15 V	
	a) testing current (A); pre-arcing time (s) higher than 10 s ..... :	160A; >10 s (63A fuse-link) 220A; >10 s (80A fuse-link) 298A; >10 s (100A fuse-link) 365A; >10 s (125A fuse-link) 470A; >10 s (160A fuse-link) 618A; >10 s (200A fuse-link) 761A; >10 s (250A fuse-link) 1058A; >10 s (315A fuse-link) 1433A; >10 s (400A fuse-link)	P
	b) testing current (A); pre-arcing time (s) less than 5 s ..... :	320A; 2,9 s (63A fuse-link) 428A; 2,8 s (80A fuse-link) 582A; 2,8 s (100A fuse-link) 716A; 3,2 s (125A fuse-link) 952A; 3,0 s (160A fuse-link) 1254A;3,3 s (200A fuse-link) 1655A; 2,4 s (250A fuse-link) 2205A; 3,0 s (200A fuse-link) 2844A; 2,9 s (250A fuse-link)	P
	c) testing current (A); pre-arcing time (s) higher than 0,1 s ..... :	450A; 0,43 s (63A fuse-link) 612A; 0,48 s (80A fuse-link) 828A; 0,60 s (100A fuse-link) 1114A; 0,47 s (125A fuse-link) 1452A; 0,35 s (160A fuse-link) 1921A; 0,44 s (200A fuse-link) 2601A; 0,34 s (250A fuse-link) 3421A; 0,35 s (315A fuse-link) 4555A; 0,44 s (400A fuse-link)	P
	d) testing current (A); pre-arcing time (s) less than 0,1 s ..... :	820A; 35 ms (63A fuse-link) 1115A; 35 ms (80A fuse-link) 1453A; 47 ms (100A fuse-link) 1921A; 45 ms (125A fuse-link) 2597A; 30 ms (160A fuse-link) 3428A; 16 ms (200A fuse-link) 4510A; 18 ms (250A fuse-link) 6018A; 18 ms (315A fuse-link) 8077A; 20 ms (400A fuse-link)	P
	"aM" fuse-links		N/A
	rated current of the fuse-link (A)..... :		
	test performed at voltage (V) ..... :		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Cross-sectional area (see Table18) (mm^2 or mm x mm) ..... :		
	e) testing current (A); pre-arcing time (s) higher than 60 s ..... :		N/A
	f) testing current (A); pre-arcing time (s) less than 60 s ..... :		N/A
	g) testing current (A); pre-arcing time (s) higher than 0,2 s ..... :		N/A
	h) testing current (A); pre-arcing time (s) less than 0,10 s ..... :		N/A
8.4.3.4	Overload		
	The test arrangement is same as that for the temperature rise test (see 8.3.1)		P
	Three fuse-links submitted to 50 pulses having the same duration and test current ..... :	50 pulses	P
	test performed at voltage (V) ..... :	10-15 V	
	"g" fuse-links:		
	test current (A) equal to 0,8 times the current stated for a pre-arcing time of 5 s ..... :	224A (63A fuse-links) 464A (125A fuse-links) 2000A (400A fuse-links)	P
	duration of each pulse 5 s	5 s	P
	time (s) interval between pulses equal to 20 % of the conventional time (s) specified in Table 2 ..... :	12 min (63A fuse-links) 24 min (125A fuse-links) 36 min (400A fuse-links)	P
	"a" fuse-links:		N/A
	rated current In (A) of fuse-link ..... :		N/A
	test current (A) equal to $k_1 I_n \pm 2\%$ ..... :		N/A
	the pulse duration (s) corresponds to that indicated on the overload curve for $k_1 I_n$ stated by manufacturer ..... :		N/A
	time (s) intervals between pulses equal to 30 times the pulse duration ..... :		N/A
	fuse-links having ambient air temperature subjected to a current (A) equal to current for the overload test	224A (63A fuse-links) 464A (125A fuse-links) 2000A (400A fuse-links)	P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	pre-arcing time (s) of sample lies within the manufacturers time-current zone ..... :	1) 15 s 2) 15 s (63A fuse-links) 3) 14 s 1) 14 s 2) 14 s (125A fuse-links) 3) 15 s 1) 12 s 2) 13 s (400A fuse-links) 3) 13 s	P
8.4.3.5	Conventional cable overload protection test (for "gG" fuse-links only)		
	fuse-link mounted as specified in 8.4.1		P
	provided with PVC insulated copper conductors of cross-sectional area (mm^2) (see Table 19) ..... :	10 mm^2 (63A fuse-links) 16 mm^2 (80A fuse-link) 25 mm^2 (100A fuse-link) 35 mm^2 (125A fuse-link) 50 mm^2 (160A fuse-link) 70 mm^2 (200A fuse-link) 120 mm^2 (250A fuse-link) 185 mm^2 (315A fuse-link) 240 mm^2 (400A fuse-link)	P
	fuse and conductor connected to it, preheated with rated current (A) of fuse-link ..... :	In	P
	for a time (h) equal to the conventional time ..... :	1 h (63A) 2 h (80A,100A,125A,160A) 3 h (200A, 250A,315A,400A)	P
	test current increased to 1,45 I_z (A) (I_z specified in Table 19) ..... : NOTE: It is not necessary to perform this test if the product 1,45 I_z is greater than the conventional fusing current.	63A (63A fuse-link) 124A (80A fuse-link) 163A >160A (100A fuse-link) 200,1A >200A (125A fuse-link) 244A; (160A fuse-link) 309A; (200A fuse-link) 433A >400A (250A fuse-link) 568A >504A (315A fuse-link) 668A >640A (400A fuse-link)	P P N/A N/A P P N/A N/A N/A
	the fuse-link operated in time (s) less than the conventional time (s) ..... :	50 min (63A fuse-link) 44 min (80A fuse-link) 42 min (160A fuse-link) 31 min (200A fuse-link)	P
8.4.3.6	Operation of indicating devices and strikers, if any		
	Operation of indicating device verified in combination with the verification of breaking capacity (see 8.5.5)		P
	The verification of striker operation:		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	"g" fuse-link testod at current (A) equal to current I_4 (see Table 20 and 21) :		N/A
	recovery voltage (V) :		N/A
	stated recovery voltage (V) :		N/A
	"a" fuse-link tested at current (A) equal to current $2k_1I_n$ (A) (see Figure 2) :		N/A
	recovery voltage (V) :		N/A
	stated recovery voltage (V) :		N/A
	Striker operate during all tests made at recovery voltage of at least 20 V		N/A
	No failure of indicating device or striker		N/A
8.5	Verification of the breaking capacity	BUSTYAL Report No R.0106-15	P
8.5.1	The test arrangements as specified in 8.1.4		P
8.5.2	Characteristics of the test circuit as specified		P
	Scheme of test circuit (see Figure 5)		P
	Deviations from specified characteristics of test circuit :		N/A
8.5.3	Measuring instruments		P
8.5.4	Calibration of test circuit		P
	Calibration oscillograms and their evaluation		P
8.5.6	The breaking-capacity tests made at an ambient air temperature of (20 ± 5) °C		P
	Breaking-capacity tests on a.c. fuses		P
8.5.5.1	Table 20, test No. 1 for "g" and "a" fuse-links		N/A
	Rated breaking capacity of the fuse-links (kA), at voltage (V) :	100 kA, at 500 V	
	Rated current (A) of the fuse-links :	63 A, 400 A	P
	Prospective current I_1 (kA) equal to rated breaking capacity within a tolerance of + 10%, - 0% :	103,1 kA	P
	Power factor :	0,12	P
	Initiation of arcing after voltage zero: within 40° - 65° for sample 1 and within 65° - 90° for sample 2 and 3, or :	1) 2) 3)	N/A
	for sample 1) arcing after voltage zero within 0° + 10°, - 0° :		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Power-frequency recovery voltage: voltage (V) i.e (%) of rated voltage within 105% + 5%, - 0% of the rated voltage or 110% + 5%, - 0% of the rated voltage :	1) 555,7 V 2) 551,6 V (400A fuse-link) 3) 548,6 V 1) 549,4 V 2) 548,7 V (63A fuse-link) 3) 549,4 V	P
	Cut-off current (A) :	1) 36,62 kA 2) 37,23 kA (400A fuse-link) 3) 37,11 kA 1) 6,226 kA 2) 6,348 kA (63A fuse-link) 3) 6,226 kA	P
8.5.8	Acceptability of No. 1 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) :		P
	b) fuse-links operated without external effects or damage to the components of the complete fuse		P
	c) no permanent arcing, flashover or ejection of dangerous flames		P
	d) no damage of fuse components hindering from their further use		P
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		P
	f) fuse-link remains in one piece before its removal from the fuse- carrier		P
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :		P
8.5.5.1	Table 20, test No. 2 for "g" and "a" fuse-links		P
	Prospective current I_2 (kA) :	27,10 kA	P
	Test made under conditions which approximate those giving maximum arc energy		P
	Power factor :	0,16	P
	Making angle after voltage zero: within tolerance 0° + 20°, - 0° :		P
	Power-frequency recovery voltage: voltage (V) i.e (%) of rated voltage within 105% + 5%, - 0% of the rated voltage or 110% + 5%, - 0% of the rated voltage :	1) 2) 3)	P
	Recovery voltage maintained at a value (V); duration (s) for sample (No.) :	550 V, 15 s for sample 3	P
	For other samples duration 15 s (8.5.5.2)		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.5.8	Acceptability of No. 2 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		P
	b) fuse-links operated without external effects or damage to the components of the complete fuse		P
	c) no permanent arcing, flashover or ejection of dangerous flames		P
	d) no damage of fuse components hindering from their further use		P
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		P
	f) fuse-link remains in one piece before its removal from the fuse- carrier		P
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	P
8.5.5.1	Table 20, test No. 2* for "g" and "a" fuse-links, for $I_2 \geq I_1$	(see appended table)	N/A
	Prospective current I_2 (kA) for test No. 2 greater than the rated breaking capacity (kA) ..... :		N/A
	Test made on six samples replacing tests of Nos. 1 and 2. Test made with current I_1 (kA) ..... :		N/A
	Making angels differ approximately 30° between each test		N/A
	Power factor ..... :		N/A
8.5.8	Acceptability of No. 2 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
8.5.5.1	Table 20, test No. 3 for "g" and "a" fuse-links		
	Prospective current for "g" fuse-link I_3 (A) equal to 3,2 I_f		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Prospective current for "a" fuse-link I_3 (A) equal to 2,5 $k_2 I_n$ ..... :		N/A
	Power factor ..... :		N/A
	Tolerance on current ± 20%		N/A
	Recovery voltage (V) maintained for 15 s (8.5.5.2)		N/A
8.5.8	Acceptability of No. 3 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 20, test No. 4 for "g" and "a" fuse-links		
	Prospective current for "g" fuse-link I_4 (A) equal to 2,0 I_f ..... :		N/A
	Prospective current for "a" fuse-link I_4 (A) equal to 1,6 $k_2 I_n$ ..... :		N/A
	Power factor ..... :		N/A
	Tolerance on current + 20%, - 0%		N/A
	Recovery voltage (V) maintained for 15 s (8.5.5.2) :		N/A
8.5.8	Acceptability of No. 4 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 20, test No. 5 for "g" and "a" fuse-links		
	Prospective current for "g" fuse-link I_3 (A) equal to 1,25 I_f ..... :		N/A
	Prospective current for "a" fuse-link I_3 (A) equal to $k_2 I_n$ ..... :		N/A
	Power factor ..... :		N/A
	Tolerance on current + 20%, - 0%		N/A
	Recovery voltage (V) maintained for 15 s (8.5.5.2) :		N/A
8.5.8	Acceptability of No. 5 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
	Breaking-capacity tests on d.c. fuses		N/A
8.5.5.1	Table 21, d.c.test No. 1 for "g" and "a" fuse-links		
	Rated breaking d.c. capacity of the fuse-links (kA), at voltage (V) ..... :		
	Rated current (A) of the fuse-links ..... :		N/A
	Rated voltage (V) of the fuse-links ..... :		N/A
	Prospective current I_1 (kA) equal to rated breaking capacity within a tolerance of + 10%, - 0% ..... :		N/A
	Time constant ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 1 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 21, d.c.test No. 2 for "g" and "a" fuse-links		
	a) During test No. 1 arcing commences at a current ≥ 0,5 I_1, test No. 2 was not performed		N/A
	b) Prospective current I_2 (A). Test made under conditions which approximate those giving maximum arc energy ..... :		N/A
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 2 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 21, d.c.test No. 3 for "g" and "a" fuse-links		
	Conventional fusing current (A) ..... :		
	Prospective current I_3 (A) equal to 3,2 I_r ..... :		N/A
	Tolerance on current (%) ± 20% ..... :		N/A
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 3 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 21, d.c.test No. 4 for "g" and "a" fuse-links		
	Conventional fusing current (A) ..... :		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Prospective current I_4 (A) equal to 2,0 I_r ..... :		N/A
	Tolerance on current (%) + 20%, - 0% ..... :		N/A
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 4 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 21, d.c.test No. 5 for "g" and "a" fuse-links		
	Conventional fusing current (A) ..... :		
	Prospective current I_5 (A) equal to 1,25 I_r ..... :		N/A
	Tolerance on current (%) + 20%, - 0% ..... :		N/A
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 5 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.6	Verification of the cut-off current characteristics		
8.6.2	The values measured did not exceed cut-off characteristics indicated by the manufacturer (see 5.8.1)		P
8.7	Verification of I^2t characteristics and overcurrent discrimination		
8.7.2	The operating I^2t values measured not exceed the values indicated by the manufacturer, or		N/A
	those specified in subsequent parts	I_1 – 1810 kA^2s I_2 – 2544 kA^2s	P
	The pre-arcing I^2t values not less than minimum pre-arcing values given by the manufacturer, or		N/A
	they lie within the limits indicated in Table 7	I_1 - 718 kA^2s I_2 - 837 kA^2s	P
8.7.3	Verification of compliance for fuse-links at 0,01 s		
	"gG" and "gM" fuse-links at 0,01 s comply with Table 7	$I_{0,1s}$ – 1089 kA^2s $I_{0,01s}$ – 365 kA^2s (Annex B1)	P
8.7.4	Verification of overcurrent discrimination		
	The discrimination of the fuse-links verified by means of the time-current characteristics and the pre-arcing and operating I^2t values		P
8.8	Verification of the degree of protection of enclosures		
	Degree of protection IP ..... :	IP	N/A
	Verification by test under conditions specified in IEC 60529 ..... :		N/A
8.9	Verification of resistance to heat		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	No damage impaired by heat during the previous tests (in particular with respect to 8.3, 8.4, 8.5 and 8.10)		P
8.10	Verification of non-deterioration of contacts		
8.10.1	Three samples provided with standardized dummy fuse-links of the highest current rating (A) intended to be used in the fuse-holder (see subsequent parts) :	400 A dummy fuse-links	P
8.10.2	Test current (A) for load period ..... :	500 A	P
	Duration (s) of load period ..... :	45 min	P
	Duration (s) of no-load period ..... :	18 min	P
	a) Test of 250 cycles, measured values not exceed the limits given in subsequent parts		P
	b) Test of 750 cycles, measured values not exceed the limits given in subsequent parts		N/A
8.11	Mechanical and miscellaneous tests		
8.11.1	Mechanical strength		
	Mechanical characteristics of fuse and its parts judged in the context of normal handling and mounting as well as with results shown after breaking-capacity test (see 8.5), if not otherwise specified in the subsequent parts		P
8.11.2	Miscellaneous tests		
8.11.2.1	Verification of freedom from season cracking		
	Current-carrying parts made of rolled copper alloy with less than 83% copper content and with all grease removed, placed for 4 h in test cabinet having temperature of (30 ± 10) °C		N/A
	After this, samples placed for 8 h in test cabinet, on the bottom of which is ammonium chloride solution having pH value 10 - 11		N/A
	After test no cracks visible to the unaided eye		N/A
8.11.2.2	Verification of resistance to abnormal heat and fire		N/A
8.11.2.2.1	Parts of insulating material, except ceramic, have a limited duration of burning without spreading fire by flames or burning droplets or glowing particles falling from the specimen		N/A
8.11.2.2.5	Glow-wire test: (650 ± 10) °C		
	Parts of insulating materials not necessary to retain current-carrying parts in position even though they are in contact with them, made the glow-wire test (650 ± 10) °C		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	No visible flame, or burning or glowing of the specimen extinguish within max. (s) after removal of the glow-wire. Limit (30 ± 1) s ..... :		P
	No burning of the tissue papor		P
	No scorching of the pinewood board		P
	Glow-wire test: (960 ± 10) °C		
	Parts of insulating materials necessary to retain current-carrying parts and parts of the earthing circuit, if any, in position , made the glow-wire test (960 ± 10) °C		P
	No visible flame, or burning or glowing of the specimen extinguish within max. (s) after removal of the glow-wire. Limit (30 ± 1) s ..... :		P
	No burning of the tissue paper		P
	No scorching of the pinewood board		P
8.11.2.3	Verification of resistance to rusting		
	Tested parts after degreasing (10 min in specified solution) placed for 10 min in air saturated with moisture and after that dried 10 min in an ambient temperature (100 ± 5) °C	10 min. - 10 % solution of ammonium chloride in water	P
	Surface of tested parts show no signs of rust		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict

APPENDIX 1

8.1.5.1	TABLE: Internal resistance of the fuse-links											
	a) rated current (A) of the fuse-link :					400 A						
	measuring current (A) :											
	ambient air temperature (°C) :					21 °C						
Internal resistance	sample No.											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,136	0,128	0,132	0,140	0,136	0,140	0,138	0,132	0,136	0,140	0,138	0,136
Internal resistance	sample No.											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,140	0,132	0,136	0,142	0,138	0,136	0,138	0,132	0,136	0,134	0,142	0,136

	a) rated current (A) of the fuse-link :					315 A						
	measuring current (A) :											
	ambient air temperature (°C) :					21 °C						
Internal resistance	sample No.											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,198	0,196	0,198	0,192	0,194	0,196	0,192	0,198	0,190	0,194	0,192	0,196
Internal resistance	sample No.											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,194	0,198	0,196	0,192								

	TABLE: Internal resistance of the fuse-links											
	a) rated current (A) of the fuse-link :					250 A						
	measuring current (A) :											
	ambient air temperature (°C) :					21 °C						
Internal resistance	sample No.											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,240	0,232	0,242	0,234	0,238	0,242	0,234	0,232	0,228	0,230	0,236	0,242
Internal resistance	sample No.											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,238	0,236	0,238	0,240								

	a) rated current (A) of the fuse-link :					200 A						
	measuring current (A) :											
	ambient air temperature (°C) :					21 °C						
Internal resistance	sample No.											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,292	0,304	0,298	0,302	0,292	0,296	0,298	0,296	0,304	0,292	0,298	0,296
Internal resistance	sample No.											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,298	0,292	0,296	0,292								

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict

	a) rated current (A) of the fuse-link :					160 A							
	measuring current (A) :												
	ambient air temperature (°C) :					21 °C							
internal resistance	sample No.:												
	1	2	3	4	5	6	7	8	9	10	11	12	
R (mΩ)	0,368	0,358	0,364	0,362	0,368	0,364	0,368	0,364	0,366	0,362	0,368	0,372	
internal resistance	sample No.:												
	13	14	15	16	17	18	19	20	21	22	23	24	
R (mΩ)	0,368	0,364	0,364	0,362									

	a) rated current (A) of the fuse-link :					125 A							
	measuring current (A) :												
	ambient air temperature (°C) :					21 °C							
internal resistance	sample No.:												
	1	2	3	4	5	6	7	8	9	10	11	12	
R (mΩ)	0,558	0,562	0,556	0,564	0,568	0,558	0,562	0,564	0,558	0,568	0,564	0,558	
internal resistance	sample No.:												
	13	14	15	16	17	18	19	20	21	22	23	24	
R (mΩ)	0,560	0,564	0,558	0,562									

	a) rated current (A) of the fuse-link :					100 A							
	measuring current (A) :												
	ambient air temperature (°C) :					21 °C							
internal resistance	sample No.:												
	1	2	3	4	5	6	7	8	9	10	11	12	
R (mΩ)	0,752	0,746	0,748	0,752	0,748	0,752	0,752	0,748	0,754	0,740	0,746	0,752	
internal resistance	sample No.:												
	13	14	15	16	17	18	19	20	21	22	23	24	
R (mΩ)	0,746	0,748	0,748	0,744									

	a) rated current (A) of the fuse-link :					80 A							
	measuring current (A) :												
	ambient air temperature (°C) :					21 °C							
internal resistance	sample No.:												
	1	2	3	4	5	6	7	8	9	10	11	12	
R (mΩ)	0,968	0,972	0,964	0,962	0,968	0,966	0,962	0,970	0,968	0,972	0,966	0,970	
internal resistance	sample No.:												
	13	14	15	16	17	18	19	20	21	22	23	24	
R (mΩ)	0,968	0,964	0,962	0,968									

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict

	a) rated current (A) of the fuse-link :					63 A							
	measuring current (A) :												
	ambient air temperature (°C) :					21 °C							
internal resistance	sample No.:												
	1	2	3	4	5	6	7	8	9	10	11	12	
R (mΩ)	1,218	1,222	1,220	1,226	1,220	1,218	1,232	1,224	1,226	1,222	1,228	1,230	
internal resistance	sample No.:												
	13	14	15	16	17	18	19	20	21	22	23	24	
R (mΩ)	1,226	1,228	1,224	1,226									

TEST REPORT
IEC 60269-2
Low-voltage fuses
Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) - Examples of standardized systems of fuses A to K

List of Attachments (including a total number of pages in each attachment):	
Summary of testing:	
Tests performed (name of test and test clause):	**Testing location:**
7.1 Mechanical design 8.1.4 Arrangement of fuse and dimensions 8.1.6 Testing of fuse holders 8.2.5 Resistance to tracking 8.3 Verification of temperature rise and power dissipation 8.7.4 Verification of overcurrent discrimination 8.9 Verification of resistance to heat 8.10 Verification of non-deterioration of contacts 8.11 Mechanical strength and miscellaneous tests	IHP Test Laboratory / SAKARYA / TURKEY
Summary of compliance with National Differences **List of countries addressed:** **The product fulfils the requirements of IEC 60269-2**	
Test item particulars ..... :	
Classification of installation and use ..... :	For use by authorized persons
Supply Connection ..... :	At both sides
Fuse system ..... :	A/B/C/D/E/F/G/H/I/J/K
..... :	

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Requirements IEC 60269-1		
	FUSE SYSTEM A – FUSES WITH FUSE-LINKS WITH BLADE CONTACTS (NH FUSE SYSTEM)		
5	**CHARACTERISTICS OF FUSES**		
5.2	Rated voltage (V) as specified ..... :	500 V	P
5.3.1	Rated current (A) of the fuse-link in accordance with specified values ..... :	63, 80, 100, 125, 160, 200, 250, 315, 400 A	P
5.3.2	Rated current (A) of the fuse-holder and the size of the fuse-link ..... :	400 A	P
5.5	Rated power (W) dissipation of fuse-link see Figure 101 ..... :	34 W	P
	Rated acceptable power (VA) dissipation of fuse-bases given in Figure 102 ..... :	45 W	P
5.6	Limits of time-current characteristics		P
5.6.1	Time-current characteristics, time-current zones and overload curves ..... :		P
5.6.2	Conventional times and current see Table 101 ... :		P
5.6.3	Gates ..... :		P
5.7.2	Rated breaking capacity (A) ..... :	100 kA	P
6	**MARKING**		
	Markings are legible		P
6.1	Fuse-holders marked by:		
	- IEC 60269-2 ..... :		P
	- size ..... :	NH2	P
	Marking of rated current and rated voltage are discernible from the front	400 A, 690 V	P
6.2	Fuse-links marked by:		
	- IEC 60269-2 ..... :		P
	- size or reference ..... :	NH2	P
	- rated breaking capacity ..... :	100 kA	P
	Marking of rated current and rated voltage are discernible from the front	63 ,80 ,100, 125, 160, 200, 250, 315, 400 A	P
	Fuse-links are marked as described in Table 104 ... :		P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
7	STANDARD CONDITIONS FOR CONSTRUCTION		
7.1	Mechanical design		
	The dimensions of the fuse-links given in Figure 101		P
	Dimensions:		
	dimension marking a_1: prescribed (mm); measured (mm) ..... :	150 ± 2,5 ; 150	P
	dimension marking a_2: prescribed (mm); measured (mm) ..... :	75 - 10 ;72	P
	dimension marking a_3: prescribed (mm); measured (mm) ..... :	62 ± 2,5 ; 62	P
	dimension marking a_4: prescribed (mm); measured (mm) ..... :	68 ± 2,5 ; 68	P
	dimension marking $b_1$min: prescribed (mm); measured (mm) ..... :	25 ; 25	P
	dimension marking $b_2$min: prescribed (mm); measured (mm) ..... :	8 ;	N/A
	dimension marking $b_3$max: prescribed (mm); measured (mm) ..... :	6 ; 5	P
	dimension marking $b_4$min: prescribed (mm); measured (mm) ..... :	22 ;25	P
	dimension marking c_1: prescribed (mm); measured (mm) ..... :	48 ± 0,8 ; 48,5	P
	dimension marking c_2: prescribed (mm); measured (mm) ..... :	11 - 2 ;10,5	P
	dimension marking d: prescribed (mm); measured (mm) ..... :	$2,5_{-0,5}{}^{+1,5}$; 2	P
	dimension marking $e_1$max: prescribed (mm); measured (mm) ..... :	61 ; 59,5	P
	dimension marking $e_2$max: prescribed (mm); measured (mm) ..... :	60 ; 59,5	P
	dimension marking e_3: prescribed (mm); measured (mm) ..... :	$20_{-2}{}^{+1}$;22,5	P
	dimension marking e_4: prescribed (mm); measured (mm) ..... :	6 ± 0,2 ; 6	P
	dimension marking f max: prescribed (mm); measured (mm) ..... :	15 ; 13	P
	dimension marking z max: prescribed (mm); measured (mm) ..... :	5 ;	N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The dimensions of the fuse-base given in Figure 102		P
	Dimensions:		
	dimension marking g: prescribed (mm); measured (mm) ..... :	61 ± 1 ;	N/A
	dimension marking h: prescribed (mm); measured (mm) ..... :	200 ± 1; 200	P
	dimension marking $n_1$max: prescribed (mm); measured (mm) ..... :	60 ;	N/A
	dimension marking $n_2$max: prescribed (mm); measured (mm) ..... :	68 ; 48	P
	dimension marking $p_1$max: prescribed (mm); measured (mm) ..... :	60 ; 55	P
	dimension marking p_2: prescribed (mm); measured (mm) ..... :	35 ± 1,5 ;	N/A
	dimension marking r min: prescribed (mm); measured (mm) ..... :	17 ; 31	P
	dimension marking s max: prescribed (mm); measured (mm) ..... :	46 ; 34	P
	dimension marking t min: prescribed (mm); measured (mm) ..... :	27 ; 28	P
	dimension marking v: prescribed (mm); measured (mm) ..... :	80 ± 3 ; 80	P
	dimension marking w_1: prescribed (mm); measured (mm) ..... :	30 ± 0,7 ; 30	P
	dimension marking w_2: prescribed (mm); measured (mm) ..... :	25 ± 0,7 ; 25	P
	dimension marking x min: prescribed (mm); measured (mm) ..... :	20 ; 21	P
	dimension marking y: prescribed (mm); measured (mm) ..... :	10,5 ± 0,5 ; 11	P
	dimension marking z max: prescribed (mm); measured (mm) ..... :	5 ; 3	P
	dimension marking a min: prescribed (mm); measured (mm) ..... :	28 ; 55	P
	dimension marking b min: prescribed (mm); measured (mm) ..... :	25 ; 35	P
	dimension marking c min: prescribed (mm); measured (mm) ..... :	4 ; 2,7 (see note 11 of Figure 102)	P
	dimension marking d : prescribed (mm); measured (mm) ..... :	11 ± 0,25 ; 11	P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	dimension marking e : prescribed (mm); measured (mm) :	12,5 ± 0,5 ; 12,5	P
7.1.2	Connections, including terminals cross-sectional ranges (Table 105) :	50 – 240 mm²	P
	torques to be applied (Table 111) (lug terminal) :	32 Nm	
7.1.3	Contact surfaces should be silver plated :	Yes / No	P
	If no test according to 8.10 are passed with dummies described in 8.10.1		P
7.1.6	Dynamic short-circuit withstand shall meet cut-off currents (Table 112) :		N/A
7.1.7	Construction of fuse-link		
	Blade contacts made of solid material :		P
	If any other construction, manufacturer demonstrate that construction adequate :		N/A
	Endplates not permitted to protrude radially from insulation body :		P
	preferable to insulate the gripping lugs from live parts		N/A
	Fuse-links has an indicator :		P
	Electrically conductive parts of indicator not ejected from the fuse-link during operation :		P
7.2	Insulating properties and suitability for insulation		
	Creepage distances and clearances of fuses and fuse-accessories meet requirements of IEC 60664-1 for overvoltage category III and pollution degree 3. :		P
	Insulating parts of fuse-base supporting live parts meet the test at PTI 400 according to IEC 60112 (test solution A) :		P
7.7	I^2t characteristics		
	maximum pre-arcing I^2t (Table 7 of IEC 60269-1) :		P
	rated currents lower than 16 A and for 224 A (Table 106) :		N/A
	maximum operating I^2t for "aM" fuse-links (Table 107) test No. 2 of the largest rated current of each homogeneous series (Table 20 of IEC 60269-1) ... :		N/A
7.8	Overcurrent discrimination of "gG" fuse-links (see 8.7.4, Table 108) :		P
7.9	Protection against electric shock		

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	increased by means of partition walls and covers of fuse-contacts :		N/A
	operation by authorized persons, instructed in electrical matters, using replacement handles according to this fuse system :		N/A

8	TESTS		
	IEC 60269-1 applies with the following supplementary requirements		
8.1.4	Arrangement of fuse and dimensions	Part 2 Figure 101	P
	Requirements of 7.2 verified on fuse-bases :		P
	Creepage distances and clearances of fuse-links according to 7.2 are verified :		P
	Clearances verified on fuse-link inserted into model fuse-base according to Figure 111 :		N/A
8.1.6	Testing of fuse-holders		
	In addition to test given in IEC 60269-1 tested according to Table 109 :		P
8.2.2.1	Points of application of test voltage		
	In addition to IEC 60269-1 e) between isolated metal gripping-lugs and terminals of test fuse-bases :		N/A
8.2.3.2	Value of test voltage		
	rated impulse withstand voltage in Table 110 :	6 kV	N/A
8.2.3.3	Test method		
	5 impulses of both polarities and of shape 1,2/50 µs and rated withstand voltage level according to Table 110 : minimum period between impulses are 1 s :	7,3 KV 5 times – period of 5 s	P
8.2.4	Acceptability of test results		
8.2.4.3	No flash-over or puncture shall occur during test ... :		P
8.2.5	Resistance to tracking		
	insulating parts supporting live parts of fuse-links and fuse-bases tested according to IEC 60112 (test solution A) :		N/A
	Five specimens tested and passed at PTI 400 ..... :		N/A
8.3	Verification of temperature rise and power dissipation		P
8.3.1	Arrangement of the fuse		
	Tightened by torque (Nm) :	32 Nm	
8.3.2	Measurement of the temperature rise		

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Protective covers and fuse-carriers as provided by manufacturer mounted ..... :		N/A
8.3.4.1	Temperature rise of the fuse-holder	51 K	P
	Dummy (Figure 105) Point at which temperature rise is measured (Figure 106)	45W dummy link Point marked with "E"	P
8.3.4.2	Power dissipation of a fuse-link (Figure 106)		N/A
8.4.3.1	Verification of conventional non-fusing and fusing current		P
	non-fusing current test – second test specimen are used for b)		P
8.4.3.5	Conventional cable overload protection test (for "gG" fuse-links only)		P
	Details of special test are given in Annex AA		N/A
Annex AA	Special test for cable overload protection		
	For fuses with I_n > 16 A of the sizes 000, 00, 0, 1 and 2 ..... :		N/A
AA.1	Arrangement of the fuse		
	Three fuse-links in fuse-bases mounted in a box... :		N/A
	Ambient air temperature outside the fuse box shall be (30^+5_0°C) ..... :	°C	N/A
AA.2	Test method and acceptability of test results		
	1,13 I_n flowed through the fuse-links for conventional time (see Table 2 of IEC 60269-1) ..... :	A for s	N/A
	None of fuse-links operated ..... :		N/A
	Test current raised without interruption within 5 s to 1,45 I_n ..... :	A	NA
	One fuse-link operated within conventional time .... :		NA
8.5.5.1	Verification of the peak withstand current of a fuse-base		
	not be carried out , if this has already been verified during the breaking capacity test of fuse-links with the highest rating of the size ..... :		N/A
8.5.5.1.1	Arrangement of the fuse		
	single-phase type, 8.5.1 of IEC 60269-1 peak values of the test currents (Table 112)..... : maximum values (see 8.5.5.1.3)..... : dummy fuse-link (Figure 101) ..... :		N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.5.5.1.2	Test method		
	fuse-base 1 (Figure107) resilient spring travel is limited to elastic range..... : contacts opened up three times ..... :		N/A
	fuse-base 2 (see 8.11.1.2) F_{max} according to Table 118		
8.5.5.1.3	Acceptability of test results		
	fuse-links not be ejected		N/A
	no signs of arcing or welding or other damage		N/A
8.5.8	Acceptability of test results		
	Fuse or circuit-breaker not operate during this test		N/A
8.7.4	Verification of overcurrent discrimination		
	verified by I^2t values evaluated from the recorded test results		N/A
	Arrangement of the samples as for the breaking capacity test		P
	two samples tested at the r.m.s. prospective test current I, corresponding to minimum pre-arcing I^2t	1,5 kA (63A fuse-links) 3 kA (125A fuse-links) 11,8 kA (400A fuse-links)	P
	The values of Pt lie within corresponding limits specified in Table 113..... : For 63A: Min pre-arcing > 9 kA²s For 125A: Min pre-arcing > 36 kA²s For 400A: Min pre-arcing > 557 kA²s	1) 9,8 kA²s (63A fuse-links) 2) 10,2 kA²s 1) 45 kA²s (125A fuse-links) 2) 40 kA²s 1) 750 kA²s (400A fuse-links) 2) 830 kA²s	P
	the other samples tested at the r.m.s. prospective test current I, corresponding to operating I^2t	2,3 kA (63A fuse-links) 5,1 kA (125A fuse-links) 20 kA (400A fuse-links)	P
	test voltage (V) ..... :	400 V	
	The test voltage for 690 V fuses is 1,05xUn/3		N/A
	The test voltage for all other fuses is 1,1xUn/3	400V (Measured values were calculated for 318V according to Annex B3)	P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The values of I^2t lie within corresponding limits specified in Table 113.....: For 63A: Max operating < 21,2 kA^2s For 125A: Max operating < 104 kA^2s For 400A: Max operating < 1600 kA^2s	1)19,2 kA^2s (63A fuse-links) 2)19,1 kA^2s 1) 72 kA^2s (125 A fuse-links) 2) 73 kA^2s 1) 1585 kA^2s (400A fuse-links) 2) 1528 kA^2s	P
8.9	Verification of resistance to heat		
	Tests apply to fuse-link and fuse-base		P
	Fuse-holder with fuse-links having maximum power dissipation are cyclically loaded as pre-treatment.... :		P
	After cooling to normal temperature breaking capacity tested at I_1 (see 8.5).....:	I_1 = 100 kA	P
	Fuse-links with organic material Fuse-holder with fuse-links having maximum power dissipation are cyclically loaded as pre-treatment.....		N/A
	After cooling to normal temperature breaking capacity tested at I_1 and I_5 (see 8.5).....:	I_1 = I_5 =	N/A
8.9.1	Fuse-base		
	test below apply if it is not obvious that components are not affected adversely by given temperature and withdrawal forces		P
8.9.1.1	Test arrangement		
	Figure 105 and 108	Figure 105	P
	Test set-up in heating chamber		
8.9.1.2	Test method		
	Temperature of (80$^{+5}_{0}$)°C for 2 h	80°C, 2 h (Steatite, bmc)	P
	160% rated current for 2 h.....:	160% I_n =640A, 2 h	P
	Test voltage .....:	10-12 V	
	3 min after switching off tensile force F_{max} (see Table 118) exerted for 15 s	(Steatite, bmc) F_{max} = 400 N, 15 s	P
8.9.1.3	Acceptability of test results		
	Contact pieces not have moved to affect the further use		P
	Dimensions of Figure 102 are considered		P
	Insulating mounting part no broken and no show any signs of cracks		P
8.9.2	Fuse-links with gripping lugs of moulded material or of metal fixed in moulded material		N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.9.2.1	Test arrangement		
	Figure 108		N/A
8.9.2.2	Test method		
	Temperature of (80$^{+5}_{0}$)°C for 2 h		N/A
	150% rated current for conventional time .....:	A for h	N/A
	Test voltage .....:	V	
	3 min after fuse-link operated or conventional time expired tensile force F_{max} (see Table 118) exerted for 15 s	F_{max} =	N/A
8.9.2.3	Acceptability of test results		
	Gripping lugs remain fully operational		N/A
	Dimensions of Figure 101 (d and c_2) not be exceeded by more than 2 mm		N/A
8.10	Verification of non-deterioration of contacts		
8.10.1	Arrangement of the fuse		P
	Figure 105	400A, dummy fuse-link	P
	for lug terminals, torque in Table 111.....:	32 Nm	
	Insulation of conductors removed over the whole length .....:	2 m	P
	All covers of contacts and terminals are removed		P
8.10.1.2	Direct terminal clamps		
	Test performed on 10 direct terminal clamps of five fuse-bases		N/A
	Distance between fuse-base centres of at least three times c_2 (see Figure 101)		N/A
	Torque of tightened of screws .....:	Nm	
	Conductor cross-section .....:	mm^2	
8.10.2	Test method		
	Test current (A) for load period .....:	1,25 xIn= 500 A	P
	Duration (s) of load period .....:	0,25 x 180 = 45 min	P
	Duration (s) of no-load period .....:	0,1 x180 = 18 min	P
	Test voltage (V) .....:	10- 12 V	
	a) Test of 50 cycles, measured valuos did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	P
	b) Test of 250 cycles, measured values did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	c) Test of 500 cycles, measured values did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	P
	d) Test of 750 cycles, measured values did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	P
8.10.2.1	Contacts		
	Points between voltage drop is measured (A and B in Figure 106)		P
	Withdrawal force (Table 118); measured force after 250 cycles (N)	1) 250 N 2) 270 N 3) 300 N	P
	Withdrawal force (Table 118); measured force after 750 cycles (N) ..... :	1) 2) 3)	N/A
	If measured values too low, test of 8.5.5.1 ..... :	Table 118 (150 N – 400 N)	P
8.10.2.2	Direct terminal clamps		N/A
	Points between voltage drop is measured (Figure 110)		N/A
	Test sequence for all types conductors (see Table 116)	(see appended table)	N/A
	Verification of temperature rise (see 8.3.4.1) (see figure 110) ..... :		N/A
8.10.3	Acceptability of test results		
8.10.3.1	Contacts		
	Limit value after 250th cycle ≤ 15%	See Table 1	P
	Limit value after 500th cycle ≤ 30%		N/A
	Limit value after 750th cycle ≤ 40%		N/A
	Difference between last and first measurement of temperature rise less than 20 K ..... :	Max 3K	P
8.10.3.2	Direct terminal clamps		N/A
	Permissible tolerance for resistance R_{d0} for Al conductors : $R_{d\,0\,max} \leq 2\,R_{d\,0\,min}$ ..... :		N/A
	Permissible changes of the resistance from $R_{d\,50}$ to $R_{d\,750}$: see Table 117 ..... :		N/A
	Copper or cleaned aluminium conductors ..... :		N/A
	Uncleaned aluminium conductors..... :		N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Change from 50th to 250th cycle		N/A
	Change after 250th to 500th cycle		N/A
	Change after 500th to 750th cycle		N/A
	Change between 50th to 750th cycle		N/A
	Temperature rise at test spot F < 75K		N/A
8.11	Mechanical and miscellaneous tests		
8.11.1.1	Mechanical strength of fuse-holders		
	Test set-up subjected to temperature rise test at rated current ..... :	400A, dummy fuse-link 46K	P
	fuse-link or fuse-carrier are withdrawn and inserted into fuse-base 100 times ..... :	100 times	
	All parts are intact and function normally		P
	Test set-up subjected to further temperature rise test at rated current (values obtained are not more than 5 K or 15 % above the values from temperature-rise test prior) ..... :	47K Difference < 5K	P
8.11.1.2	Mechanical strength of the fuse-base		
	Test-link inserted three times in the fuse-base ..... : (Dimensions of blade contacts see Figure 101) (Withdrawal force F lied within limits in Table 118)	1) 250 N 2) 260 N 3) 280 N	P
	Steel screws are fastened three times at the terminals, torque of 1,2 times value specified by manufacturer or value of Table 111 ..... :	38,4 Nm	P
	Contact pieces not have moved to affect the further use		P
	Insulating mounting part no broken and no show any signs of cracks		P
8.11.1.8	Impact resistance of gripping-lugs of moulded material or of metal fixed in moulded material		
8.11.1.8.1	Test arrangement		N/A
8.11.1.8.2	Facility is given in Figure 109 ..... :		N/A
	One fuse-link ...(150±5)°C for 168 h		
	Another one .....-15°C for 72 h		
	One impact on each of gripping-lugs		N/A
8.11.1.8.3	Acceptability of test results		
	No damage capable of hindering their further use		N/A
	No bont out by more than 3 mm		N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Coupling with a handle (Figure 103) not are hindered		N/A
8.11.2.3	Verification of resistance to rusting		
8.11.2.3.1	According to ISO 6988 cyclic moist atmosphere containing 0,2% SO2 (SFW 0,2 S) for 1 cycle		P
8.11.2.3.2	Optional test (severe environmental conditions)		N/A
	Fuse-links and fuse-bases for used in environment of pollution degree ≥3 tested with SFW 2,0 S for 5 cycles ..... :		N/A
	They marked accordingly ..... :		P
8.11.2.4	Non-deterioration of insulating parts of fuse-link and fuse-base		
8.11.2.4.1	Test method		
	Period 168 h ..... :	168 h	P
	for equipment comprising moulded elements to support live parts (150±5)°C	150 °C	P
	for covers (100±5)°C		N/A
	Period greater than 1 h ..... :	3 h	P
	for sealing compounds; stability of marking .....(150±5)°C	150°C	P
	After cooling to ambient temperature the following are tested.		P
	Fuse-links: breaking capacity with I_1 and I_2 ..... :		P
	Fuse-base: mechanical strength in accordance with 8.11.1.2		P
8.11.1.2	Mechanical strength of the fuse-base		
	Test-link inserted three times in the fuse-base ..... : (Dimensions of blade contacts see Figure 101) (Withdrawal force F lied within limits in Table118)	Figure 101 1) 250 N 2) 270 N 3) 280 N	P
	Steel screws are fastened three times at the terminals, torque of 1,2 times value specified by manufacturer or value of Table 111 ..... :	38,4 Nm	P
	Contact pieces not have moved to affect the further use		P
	Insulating mounting part no broken and no show any signs of cracks		P
8.11.2.4.2	Acceptability of test results		

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Not have changed of positions of fuse-base contacts to correct functioning		P
	No fracture nor any signs of fracture on insulating body with terminals		P
	Mechanical strength of cemented joints not impaired		P
	Sealing compounds not shifted to extent permitting live parts to exposed		P
	Fuse-links operate correctly		P
	Marking are durable and easily legible		P

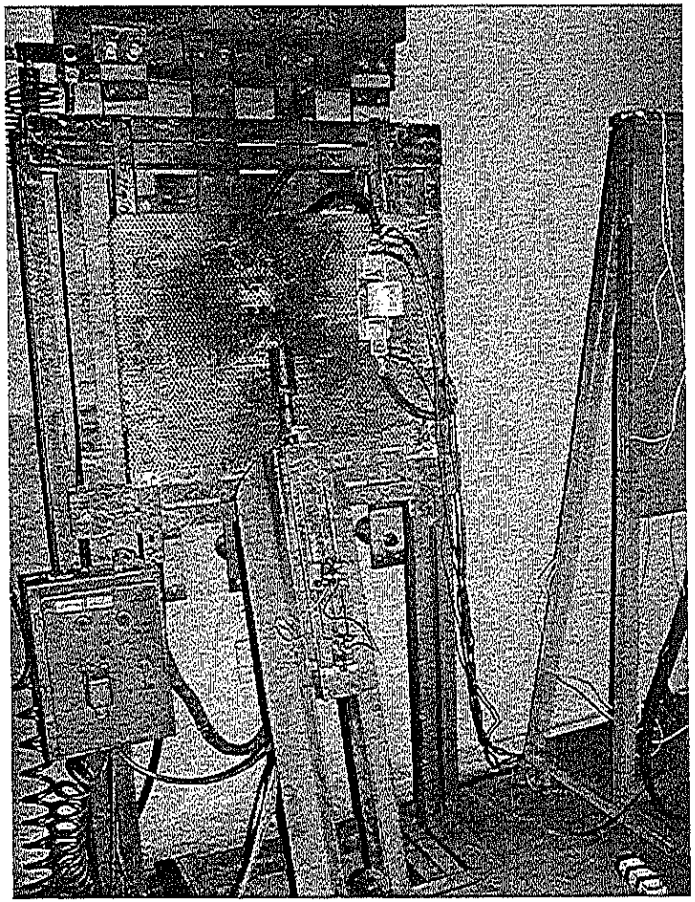
APPENDIX 1

8.10.2	TABLE 1: Direct terminal clamps									
	ambient air temperature (°C) ..... :	20°C - 22°C								
	Sample No. (contacts)									
	1	2	3	4	5	6	7	8	9	10
T 1 (K)	44K	45K	45K							
ΔU initial	1,33 Vdc	1,54 Vdc	1,48 Vdc							
Rcl 0	66,5 mΩ	77 mΩ	74 mΩ							
ΔU 50	1,34 Vdc	1,56 Vdc	1,48 Vdc							
Rcl 50	67 mΩ	78 mΩ	74 mΩ							
ΔU 250	1,44 Vdc	1,62 Vdc	1,50 Vdc							
Rcl 250	72 mΩ	81 mΩ	75 mΩ							
T 2 (K)	47K	47K	45K							
ΔU 500										
Rcl 500										
ΔU 750										
Rcl 750										
T 3 (K)										

T 1: initial temperature rise / T 2: temperature rise after 250 cycles / T 3: final temperature rise

List of test equipment used:

Test Equipment			
Equipment Name - No	**Manufacturer - Type**	**Features**	**Traceability**
Test transformer (TT01)	Best	440 V 65 kA, 660 V 5 kA	-
Resistive load (RY01-03)	Hilkar	38 ohm, 1300 A / sn	-
Inductive load (EY01-12)	BEST	126 ohm	-
Resistive and inductive load (AY01)	FEDERAL	2,3 ohm, 6 mH	-
Resistive and inductive load (AY03)	IHP	50 mohm, 380 µH	-
Current measuring system (AO01-03)	DİMES L 500 TC	143,29 kA / 2,8763 V	IHP 1014.01
Voltage measuring system(GO01-03)	DİMES L 500 TV	± 1024 V	IHP 1014.02
Rogowski coil (RG05-07)	HEBEMUS 150 K	150 kA / 2 Volt	IHP 1114.03
Fluke current coil (FL01-03)	Fluke 2000 flex	200 A / 2000 A	IHP 0814.02
Voltmeter (V01-03)	Federal FYV - 72	0-500 V	IHP 1014.03
Making breaker (KK01-03)	Preussag NVL 62DA	12 kV, 1250 A Icn=80 kA	-
Making breaker (KK04)	Federal F112E	2500 A, 400 V	-
Making breaker (KK06)	Federal F121E	2000 A, 400 V	-
Current supply (TT04)	Mersan	300 A	-
Current supply (TT05)	Mersan	5000 A	-
Current supply (TT07)	Alnal	2000 A, 5 V	-
Current-voltage supply (AGK 01)	Alnal	220 Vdc, 500 Vac, 10 A	-
Current-voltage supply (AGK 02)	GW instek	30 Vdc, 3 A	-
Transformer-Ammeter (AA01-03)	Federal FAT100-FYA96	3000 / 5 A	IHP 0814.05
Clamp meter (P03)	CIE	1000 A RMS	IHP 1014.07
Isolation test equipment (IT04)	GW instek GPI 825	5 kV AC, 1000 VDC Meger	IHP 1014.04
Oscilloscope (O02)	Textronik TDS 460 A	400 MHz, 4 canal	IHP 0713.02
Dynamometer (KO01)	Lutron FG 5100	100 Kg	IHP 0114.02
Thermometer (SO01)	CIE 306	200 °C	IHP 1114.02
Temperature measuring eq. (SO04)	Agilent 34970A	60 canal, T type termokupl	UMS S3315
Multimetre (M01)	HP 3444001A	1000 V, 3 A	IHP 0914.01
Multimetre (M02)	Fluke 87	10 A, 1000 V	IHP 0914.02
Caliper (KU03)	Mitutoyo	0,01 mm	IHP 0315.01
Torquemeter (TO 01)	Torqueleader	6-60 Nm	IHP 0215.01
Torquemeter (TO03)	Tronic AT 1502 LDIN	0-18 Nm	IHP 0215.02
Impulse test device (DT01)	HILO PG1012C	0-10 kV, 1,2/50 ms	IHP 0312.03
Climatic chamber (ID01)	Angelantoni CH 600 C	-40+180 °C, 10 - 98 %RH	-
Calibrator (K01)	Wavetek	1050 V, 20A,	046690 FLUKE
Red-hot wire test device (KT01)	Federal	960°C	-
Temperature cabinet (SK01)	Federal	60 °C, 170x225x320 cm	
High Voltage Probe (YG01)	Textronik P6016A	40 kV, x 1000 prob	IHP 0313.23



Приложение 33

TÜRKAK

TURKISH ACCREDITATION AGENCY

COPY OF THE ACCREDITATION CERTIFICATE

As a Testing Laboratory,

IHP ULUSLARARASI YÜKSEK GÜÇ TEST LABORATUVARI LTD. ŞTİ. Yüksek Güç Test Laboratuvarı

1. organize sanayi bölgesi 2. yol no:13 Hanlı 54580 SAKARYA / TURKEY

is accredited in accordance with TS EN ISO/IEC 17025:2012 standard within the scope given in Annex following the assessment conducted by **TURKAK.**

Accreditation Number : **AB-0989-T**

Accreditation Date : **04 April 2016**

This certificate shall remain in force until **03 April 2020**, subject to continuing compliance with the standard **TS EN ISO/IEC 17025:2012**, related regulations and requirements.

TÜRK AKREDİTASYON KURUMU TURKAK *1999*

на основание чл. 2 от ЗЗЛД

Dr. H. İbrahim ÇETİN
Secretary General

Turkish Accreditation Agency (TURKAK) is a signatory to the European co-operation for Accreditation (EA) Multilateral Agreement (MLA) and International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA) in the scope of ISO/IEC 17025.

ВЕРНО С ОРИГИНАЛА

Приложение 3.4.

ЕМИ ЕЛЕКТРИК ЕООД
9000 гр. Варна, бул. Сливница №26, ет.9 Тел. 052/303 528, email: office@emielectric.bg

Списък на провежданите рутинни /контролни/ изпитвания

1. Маркировка;
2. Проверка на размерите;
3. Проверка на омическото съпротивление;
4. Проверка на задействане на ВПНН;
   - Проверка на максимален нестапящ ток;
   - Проверка на минимален стопяващ ток;
5. Проверка границите на загряване;
6. Проверка на разсейваната мощност;

Дата: 10.03.2018 г.

Декларат на основание чл. 2 от ЗЗЛД

/Алексей Родин/

ВЯРНО С ОРИГИНАЛА

"ЕМИ ЕЛЕКТРИК" ЕООД

267

Приложение 3.5

ЕМИ ЕЛЕКТРИК ЕООД

9000 гр. Варна, бул. Сливница №26, ет.9 Тел. 052/803 528, email: office@emielectric.bg

Инструкция за поставяне в основата, обслужване и поддържане на предпазители

I. МОНТАЖ И ЕКСПЛОАТАЦИЯ

Монтажът на Предпазители със стопяема вложка НН , високомощни, ножови, характеристика система А (NH система) се извършва от квалифициран персонал, при спазване на всички изисквания по техника на безопасност и на техническата документация, в следния ред:

1. Отваря се блокът с носачите на Вертикалния предпазител-разеденител и се монтират предпазители с определени номинални характеристики.
2. Разеденителят се затваря с рязко движение, до пълното му затваряне.
3. Проверете с указател за напрежение наличието на напрежение по трите фази.
4. Подмяната на изгорял предпазител се извършва, като се провери с указател за напрежение фазата, на която е монтиран изгорелия прдпазител, като при проверката не се измерва наличие на напрежение на изгорелия предпазител от страната към консуматора.
5. Отваря се блокът с носачите на Вертикалния предпазител-разеденител и се демонтира изгорелия предпазител, като на негово място се монтира нов-изпревен предпазител.
6. Разеденителят се затваря с рязко движение, до пълното му затваряне.
9. Проверете с указател за напрежение наличието на напрежение по трите фази.
10. За да се осигури безопасна работа, блокът с предпазителите се заключва в извадено положение, като за тази цел е осигурен механизъм за заключване.

Дата: 16.03.2018 г.

Управител: на основание чл. 2 от ЗЗЛД
/Алексей Родин/

ВЯРНО С ОРИГИНАЛА

268

INSTITUT „PRÜFFELD FÜR ELEKTRISCHE HOCHLEISTUNGSTECHNIK" GMBH

Independent, accredited test laboratory - Registration with STLA and LOVAG

TEST REPORT

NO. 1211.0251.1.194

Federal Elektrik Yatirim ve Ticaret A.S. 1. O.S.B. Hanlibeldesi Adapazari / Turkey		CLIENT
Federal Elektrik Yatirim ve Ticaret A.S.		MANUFACTURER
LV HRC fuse-links		TEST OBJECT
NH3 – 315 A NH3 – 630 A		TYPE
Test sample		MANUFACTURING NO.
Rated voltage Rated current Rated frequency Utilization category	400 V 315 A 630 A 50 Hz gC	RATED CHARACTERISTICS GIVEN BY THE CLIENT
IEC 60269-1: 1988 IEC 60269-2-1: 1996, modified		NORMATIVE DOCUMENT
- Verification of the breaking capacity, tests I1 to I5 (630 A) - Verification of the breaking capacity, test I1 (315 A)		RANGE OF TESTS PERFORMED
18 and 20 June 2001		DATE OF TEST
Se 6		TEST RESULT

На основание чл. 2 от ЗЗЛД

На основание чл. 2 от ЗЗЛД

R CHERT
H ge test laboratory In charge
B

In accredited by Deutsche A k (DAtech) e.V. in the fields of h.v. apparat
an les and power cable ac and switchgear, installation equipment and
w ment.

DAT - P - 019/92

IPH - LANDSBERGER ALLEE 378 - D-12681 BERLIN - TEL. 030/54 96 02 00 - FAX 030/54 96 02 22

Die IPH GmbH, Berlin, als unabhängiges akkreditiertes Prüflabor, gibt in Übereinstimmung mit DIN EN ISO/IEC 17025 folgende Prüfdokumente heraus:

Typprüf-Zertifikat

Ein Typprüf-Zertifikat wird für abwendlich bestandene Typprüfungen erstellt, die nach einer gültigen Norm und unter Beachtung der relevanten STL-Guides, LOVAG Test Instructions oder anderer Richtlinien durchgeführt wurden. Das Typprüf-Zertifikat enthält alle Bedingungen unter denen die Prüfungen durchgeführt wurden sowie Unterlagen, die das geprüfte Prüfobjekt eindeutig identifizieren. Es dokumentiert das einwandfreie Verhalten des Prüfobjektes bei den Prüfungen im Sinne der angewendeten Prüfvorschrift und weist die Ergebnisse der bestandenen Prüfungen aus.

Typprüfbericht

Ein Typprüfbericht wird für abwendlich bestandene Typprüfungen ausgestellt, die nach einer Norm oder einer eindeutig beschriebenen Prüfverfahren durchgeführt wurden. Der Typprüfbericht enthält Unterlagen, die das geprüfte Prüfobjekt eindeutig identifizieren, alle Bedingungen unter denen die Prüfungen durchgeführt wurden, und er dokumentiert das einwandfreie Verhalten des Prüfobjektes bei den Prüfungen im Sinne der angewendeten Prüfvorschrift.

Prüfbericht

Ein Prüfbericht wird für Prüfungen erstellt, die nach keinem oder nicht eindeutig beschriebenen Prüfverfahren durchgeführt wurden. Der Prüfbericht enthält Angaben zur Kennzeichnung des Prüfobjektes, die Bedingungen unter denen die Prüfungen durchgeführt wurden sowie Angaben über das Verhalten des Prüfobjektes während der Prüfungen und seinen Zustand danach.

Prüfbescheinigung

Eine Prüfbescheinigung dokumentiert bestandene Prüfungen in angegebenem Umfang. Sie wird im Zusammenhang mit Typprüf-Zertifikaten, Typprüfberichten oder Prüfberichten erteilt.

IPH GmbH, as an independent accredited test laboratory, issues the following test documents in compliance with DIN EN ISO/IEC 17025:

Type Test Certificate

The Type Test Certificate is issued if a type test, which has been performed to a valid and acknowledged normative document and to the appropriate STL-Guide or LOVAG Test Instructions, has successfully been passed. The Type Test Certificate consists of documents unequivocally identifying the test object and describes all conditions under which the test was conducted. It gives evidence of the unobjectionable behaviour of the test object during the tests in line with the normative document applied as well as of the results of successful tests.

Type Test Report

The Type Test Report is issued if a type test, which has been performed to a non-valid document, some unequivocally described test method, has unobjectionably been passed. The Type Test Report consists of documents unequivocally identifying the test object and describes all conditions under which the test was conducted. It gives evidence of the unobjectionable behaviour of the test object during the tests in line with the normative document applied.

Test Report

The Test Report is issued if tests have been conducted to normative documents or an unequivocally described test method. The Test Report includes data characterizing the test object and describes all conditions under which the test was performed. It gives evidence of the behaviour of the test object during the test as well as of the tests effected.

Test Certification

The Test Certification certifies that tests in a defined range have been conducted and passed. It is issued in connection with Type Test Certificates, Type Test Reports or Test Reports.

Contents Sheet

This test document consists of 22 sheets.

Distribution

Copies Nos. 1 to 3 in English: Copy No.: 3

Federal Elektrik Yatirim ve Ticaret A.S.

1. Participants in the test

Mr.	Rainer Borchert	IPH test engineer in charge
Mrs.	Hauschild	IPH test engineer
Mr.	Staritz	IPH test engineer
Mr.	Georgias	IPH test engineer

2. Test performed

- Verification of the breaking capacity, tests I1 to I5 at 630 A type
- Verification of the breaking capacity, test I1 at 315 A type

3. Identification of test object

3.1 Technical data and characteristics

Ratings assigned by the manufacturer

Test object:	LV HRC fuse-links	
Type:	NH3	
Manufacturer:	Federal Elektrik Yatirim ve Ticaret A.S.	
Year of manufacture:	2001	
Rated characteristics:	Rated voltage	400 V
	Rated frequency	50 Hz
	Rated current	315 A
		630 A
	Breaking capacity I1	120 kA
	Utilization category	gC

3.2 Identity documents

The identity of the test object is fixed by the following drawings and data submitted by the client:

Name of drawing	Drawing No.	Date of drawing	Author	Notes
Fuse body	14.06.01	23.03.2000	Federal Elektrik Yatirim ve Ticaret A.S.	Sheet 20
Eriyen Şerit Tel	14.06.04	08.01.2001	Federal Elektrik Yatirim ve Ticaret A.S.	Sheet 21
Eriyen Şerit Tel	13.06.04.4	25.04.1996	Federal Elektrik Yatirim ve Ticaret A.S.	Sheet 22

Entry of test object at IPH: April 2001

The tests were carried out on the samples chosen by TSE.

4. Verification of the breaking capacity, tests I1 to I5, AC

4.1 Test laboratory

High-power test laboratory, high-current test bay
Low-voltage test laboratory, test room 4

4.2 Normative document

IEC 60269-1: 1988, Sub-clause 8.5

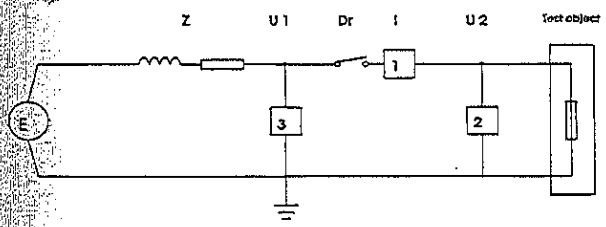
4.3 Required test parameters

Test voltage:	440 V AC, 50 Hz
Test current I1:	120 kA
Test currents I2 to I5:	To IEC 60269-1: 1988, Sub-clause 8.5, Table 12A

4.4 Test arrangement

To IEC 60269-1: 1988, Sub-clauses 8.5.1 and 8.1.4

4.5 Test and measuring circuits



E	Supply	U 1	Test voltage measurement
Dr	Making switch	U 2	Switching voltage measurement
Z	Test circuit impedance	I	Current measurement
		1 - 3	Measuring points

Figure 1: Test circuit for the verification of breaking capacity

Technical data of measuring circuits

Test No.	Measuring point	Measured quantity	Measuring sensor/device	Technical parameters
All of them	1	Current	Shunt	19.387 kA/V
	2	Switching voltage	RC divider	Ratio 499
	3	Test voltage	Voltage transformer	Ratio 100
Recording instruments: BE 256 transient recorder with optical links				

4.6 Test results

Test requirement: Test duty I1
Type of test circuit: Direct
Condition of test object before test: New
Ambient temperature: 19 °C

Test parameters:

Test No.			101 2455	101 2456	101 2457	101 2461	101 2462	101 2463
Test duty			I1	I1	I1	I1	I1	I1
Size			NH3	NH3	NH3	NH3	NH3	NH3
No. of test object			14	15	16	14	15	16
Rated current of fuse-link		A	630	630	630	315	315	315
Test voltage		V	550	550	550	550	550	550
Prospective peak short-circuit current		kA	273	273	273	273	273	273
Prospective symmetrical rms short-circuit current I_p		kA	121	121	121	121	121	121
Power factor cos φ			0.16	0.16	0.16	0.16	0.16	0.16
Making angle		°el.	27.3	41.0	58.6	29.7	57.6	68.9
Arcing angle		°el.	55.0	66.9	79.2	46.4	70.6	81.1
Fusing current I_s		kA	50.3	53.3	57.0	30.2	35.2	36.3
Cut-off current		kA	55.8	59.1	61.1	32.0	37.2	38.4
Prearcing time		ms	1.54	1.33	1.14	0.926	0.724	0.678
Arc time		ms	4.58	4.20	3.79	4.12	4.01	3.64
Break time		ms	6.12	5.53	4.94	5.05	4.74	4.31
Joule integral	10^3	A^2s	1109	1127	1224	263	292	303
Arcing integral	10^3	A^2s	2249	2792	2804	601	1038	1036
Breaking integral	10^3	A^2s	3354	3913	4022	862	1328	1336
Arc energy		kVAs	64.3	79.0	73.1	28.5	41.2	39.2
Switching voltage		V	1188	1184	1213	947	1081	1118
Recovery voltage		V	555	554	555	557	557	556
Volume resistivity		MΩ	> 0.1	> 0.1	> 0.1	> 0.1	> 0.1	> 0.1
Notes			-	-	-	-	-	-
Evaluation			o.k.	o.k.	o.k.	o.k.	o.k.	o.k.

Notes:
o.k.: The test object was able to properly break
- no permanent arcing
- no flashover
- no ejection of flames which may be dangerous to the surroundings.

Condition of test object after test:
The test object did not show any damage. The indicator responded.

Test results (continued)

Test requirement: Test duty I2
Type of test circuit: Direct
Condition of test object before test: New
Ambient temperature: 21 °C

Test parameters:

Test No.			101 2479	101 2480	101 2481
Test duty			I2	I2	I2
Size			NH3	NH3	NH3
No. of test object			4	5	6
Rated current of fuse-link		A	630	630	630
Test voltage		V	550	550	550
Prospective peak short-circuit current		kA	108	108	108
Prospective symmetrical rms short-circuit current I_p		kA	47.1	47.1	47.1
Power factor cos φ			0.16	0.16	0.16
Making angle		°el.	13.1	12.7	14.6
Arcing angle		°el.	71.5	70.7	72.0
Fusing current I_s		kA	40.4	39.9	40.8
Cut-off current		kA	43.8	43.1	44.3
I_s / I_p			0.858	0.85	0.866
Prearcing time		ms	3.24	3.22	3.19
Arc time		ms	3.64	3.82	4.20
Break time		ms	6.88	7.05	7.39
Joule integral	10^3	A^2s	1374	1308	1361
Arcing integral	10^3	A^2s	2862	2569	3136
Breaking integral	10^3	A^2s	4233	3873	4493
Arc energy		kVAs	84.6	84.2	93.4
Switching voltage		V	1201	1239	1191
Recovery voltage		V	553	550	551
Volume resistivity		MΩ	> 0.1	> 0.1	> 0.1
Notes			-	-	-
Evaluation			o.k.	o.k.	o.k.

Notes:
o.k.: The test object was able to properly break
- no permanent arcing
- no flashover
- no ejection of flames which may be dangerous to the surroundings.

Condition of test object after test:
The test object did not show any damage. The indicator responded.

Test results (continued)

Type of test circuit: Direct
Test requirement: Test duties I3, I4, I5
Condition of test object before test: New
Ambient temperature: 21 °C

Test parameters:

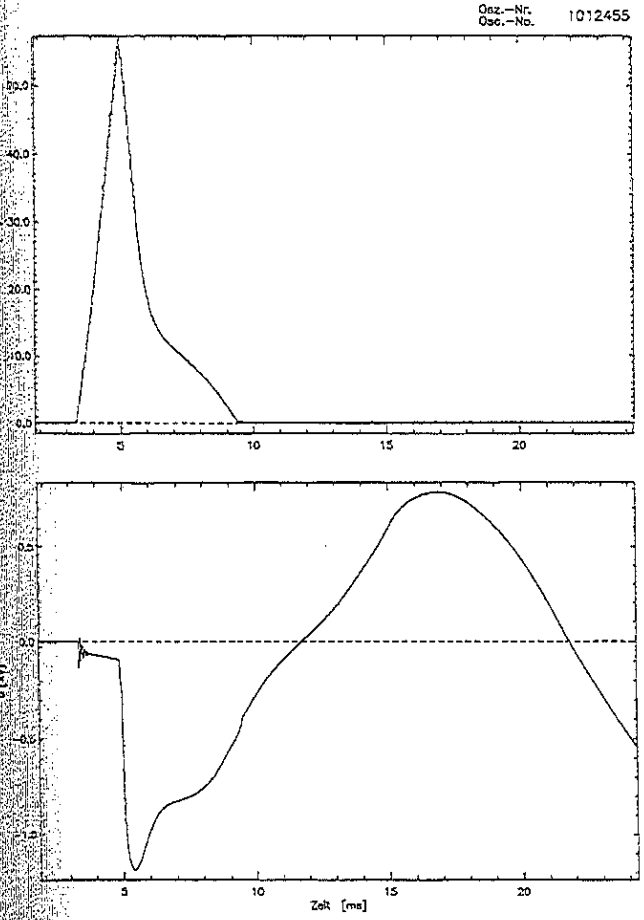
Test duty		I3	I4	I5
Size		NH3	NH3	NH3
No. of test object		20	21	22
Rated current of fuse-link	A	630	630	630
Test voltage	V	440	440	440
Prospective symmetrical rms. short-circuit current I_p	A	2750	2160	1440
Power factor cos φ		0.42	0.47	0.39
Break time	s	34	77	580
Volume resistivity	MΩ	> 0.1	> 0.1	> 0.1
Notes		1)	-	1)
Indication		o.k.	o.k.	o.k.

Notes:
o.k.: The test object was able to properly break
- no permanent arcing
- no flashover
- no ejection of flames which may be dangerous to the surroundings.

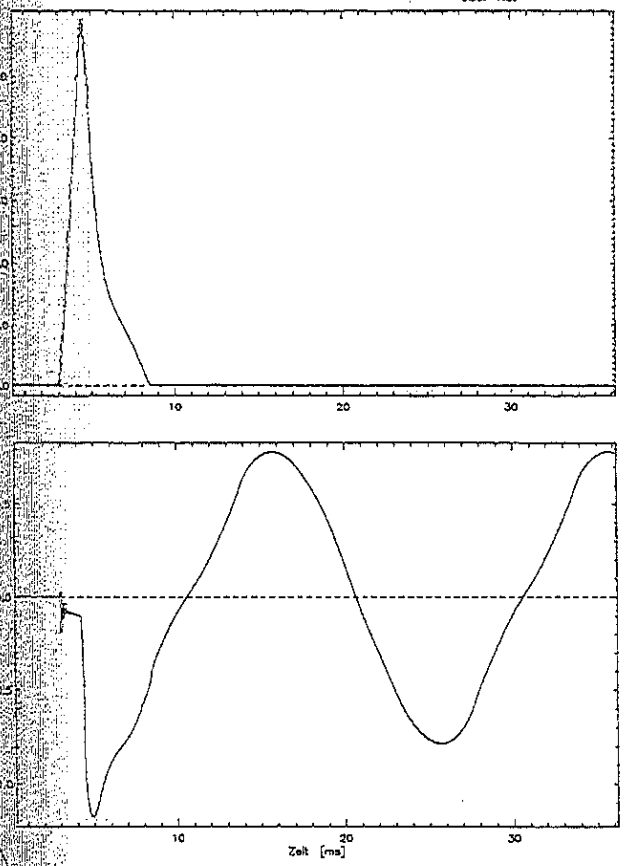
Condition of test object after test:
The test object did not show any damage with exception.
1) Cracking in ceramic cartridge.
The indicator responded.

5 Appendices

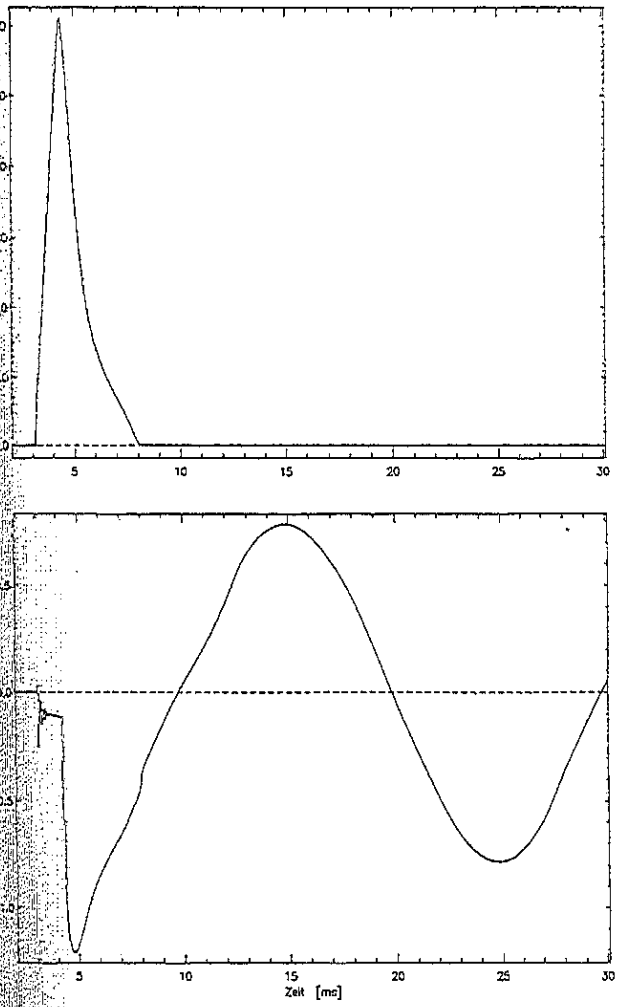
5.1 Oscillograms



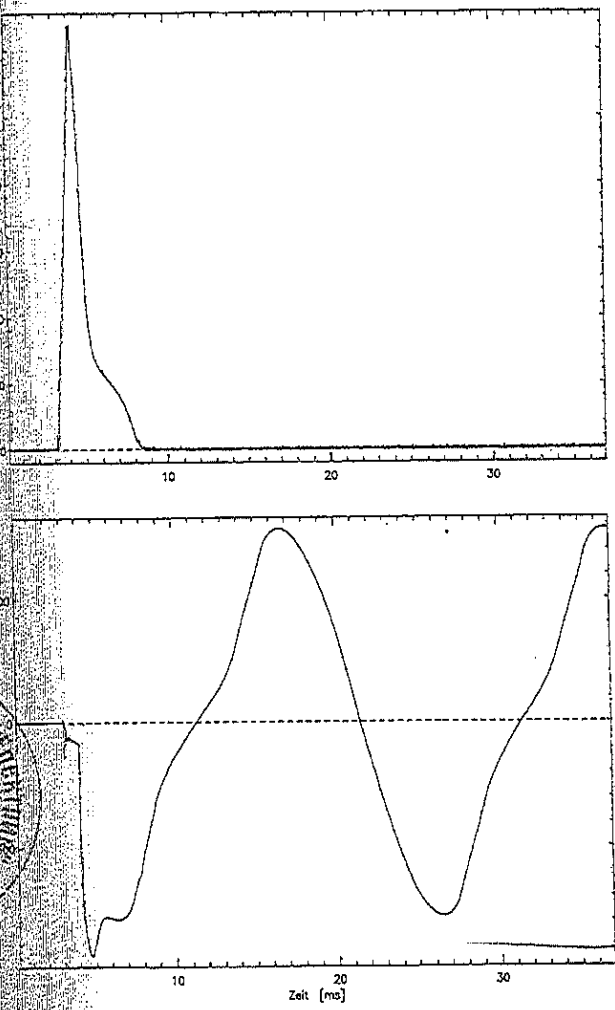
Osz.-Nr. / Osc.-No. 1012456



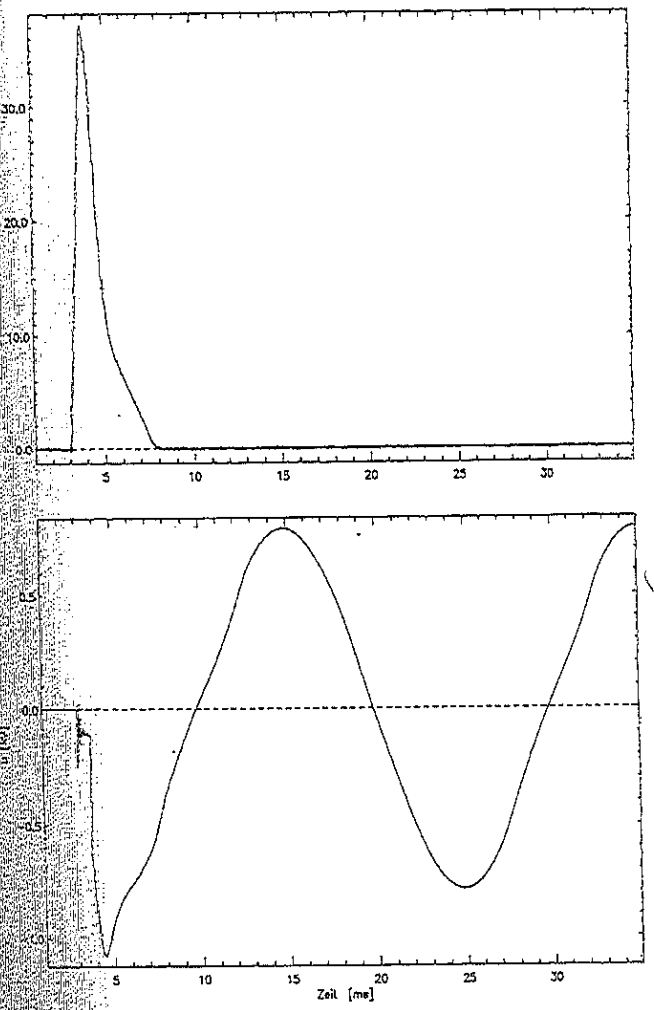
Osz.-Nr. / Osc.-No. 1012457

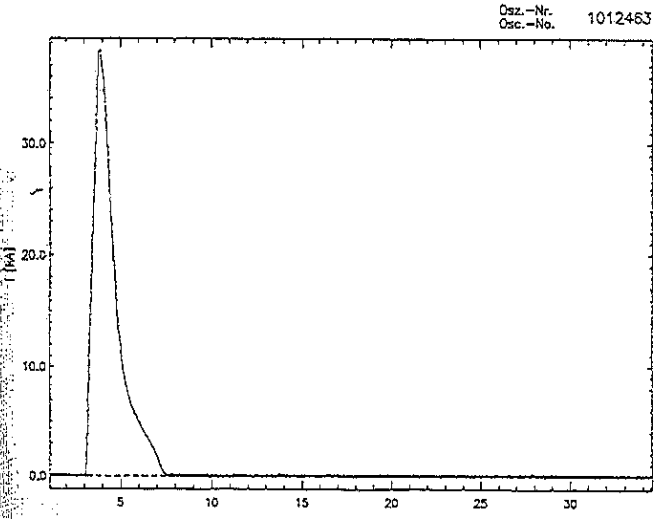


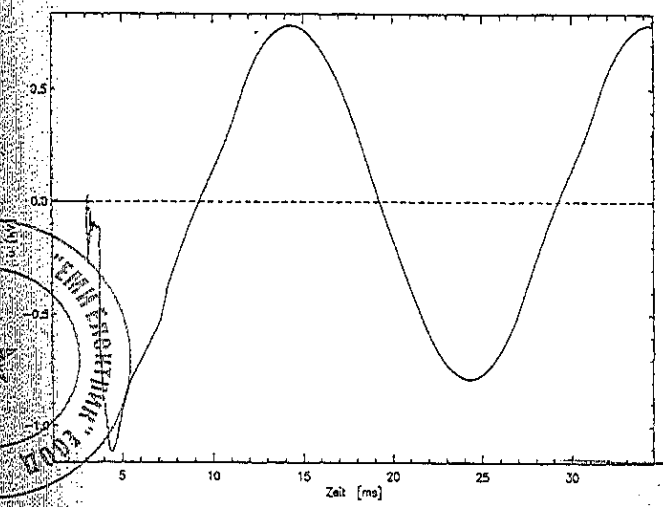
Osz.-Nr. / Osc.-No. 1012461

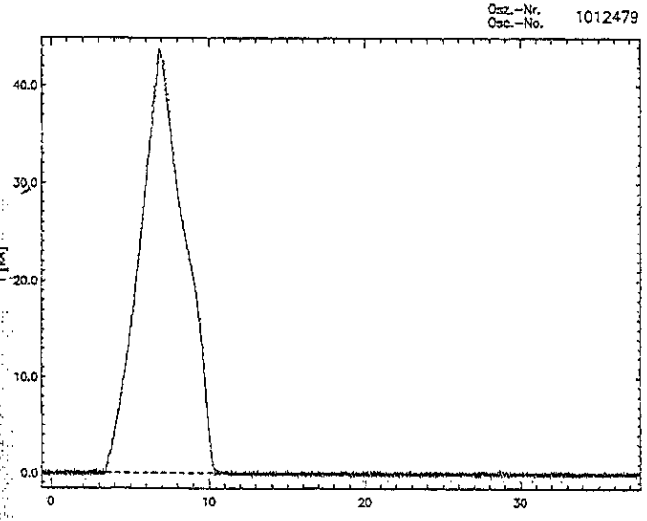


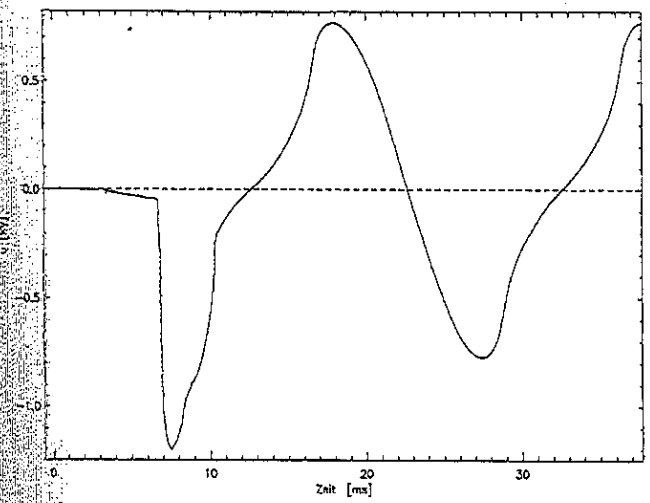
Osz.-Nr. / Osc.-No. 1012462

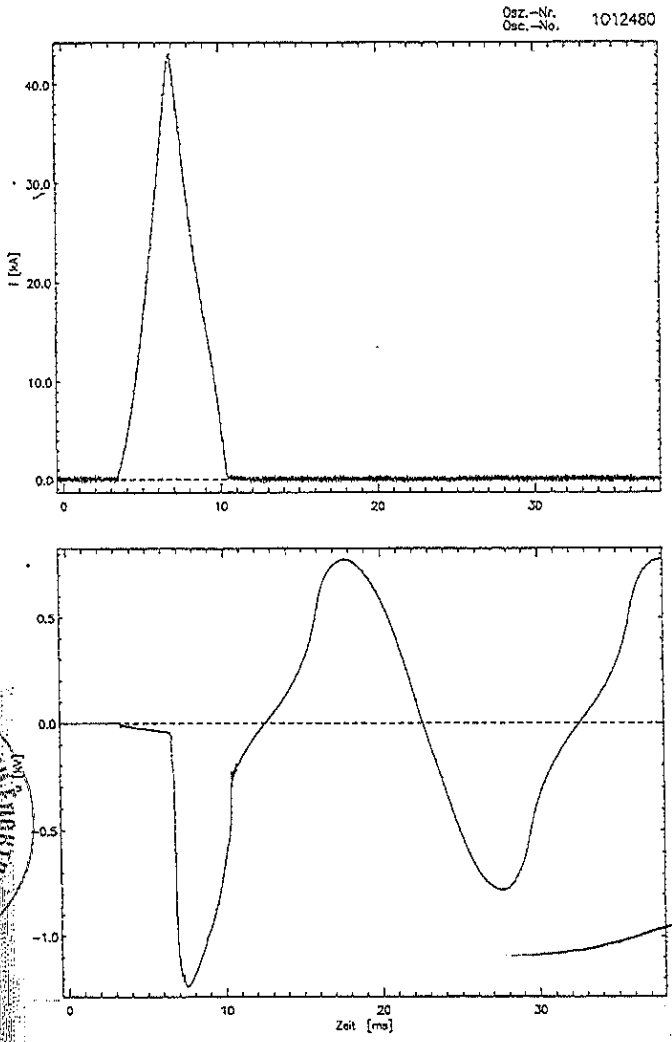


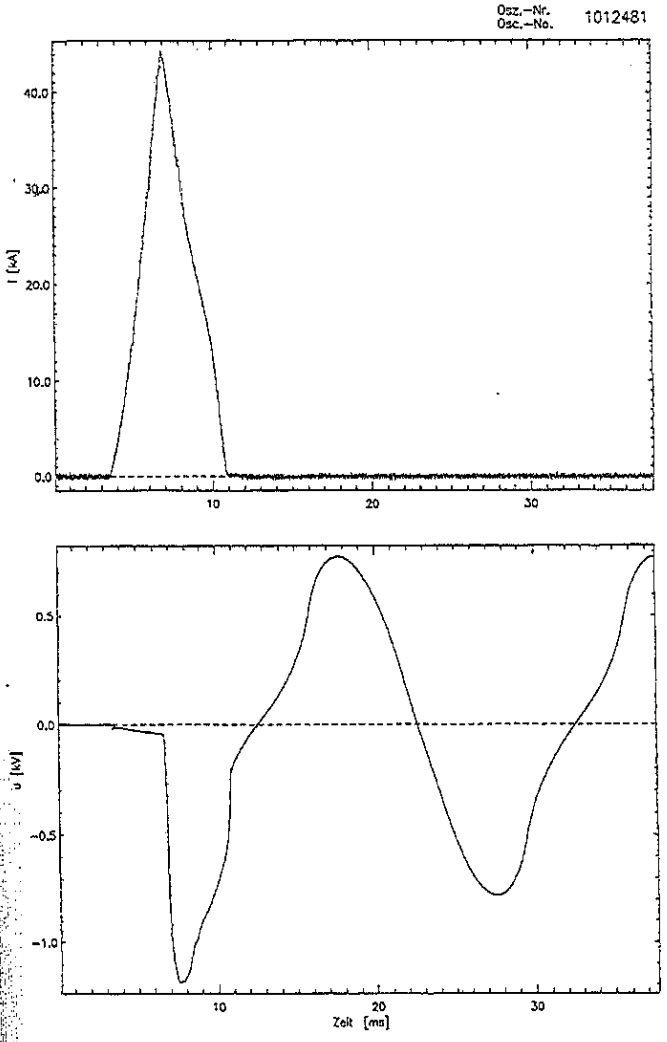

Osz.-Nr.
Osc.-No. 1012463
i [kA]
30.0
20.0
10.0
0.0
5
10
15
20
25
30


0.5
0.0
-0.5
-1.0
5
10
15
20
25
30
Zeit [ms]


Osz.-Nr.
Osc.-No. 1012479
i [kA]
40.0
30.0
20.0
10.0
0.0
0
10
20
30

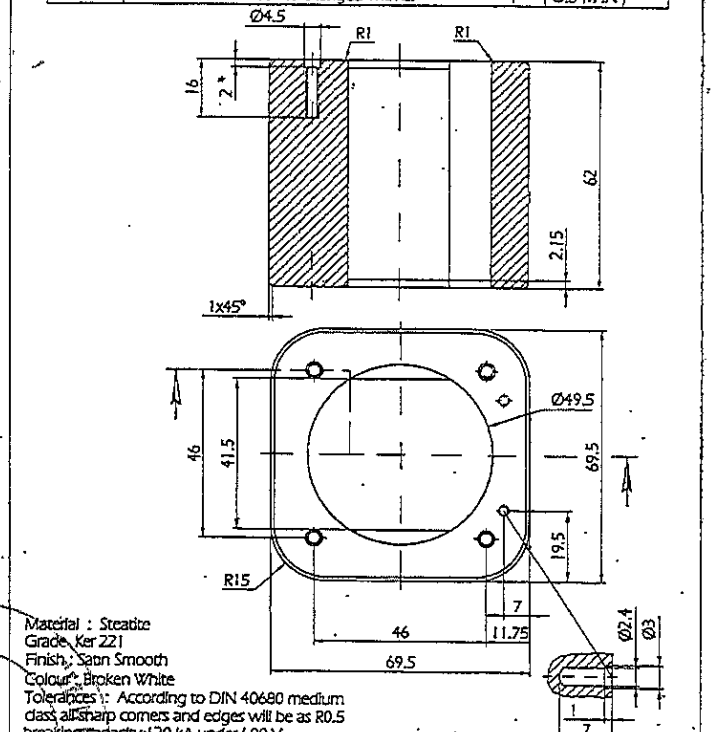

0.5
0.0
-0.5
-1.0
0
10
20
30
Zeit [ms]


Osz.-Nr.
Osc.-No. 1012480
I [kA]
40.0
30.0
20.0
10.0
0.0
0
10
20
30
u [kV]
0.5
0.0
-0.5
-1.0
Zeit [ms]


Osz.-Nr.
Osc.-No. 1012481
I [kA]
40.0
30.0
20.0
10.0
0.0
10
20
30
u [kV]
0.5
0.0
-0.5
-1.0
Zeit [ms]

5.2 Drawings

Rev. Nr.	Remarks	D.F. Nr
02	3 distance has changed with 2.*	(Ö.S-M.N)



Material : Steatite
Grade: Ker 221
Finish : Satin Smooth
Colour : Broken White
Tolerances : According to DIN 40680 medium class all sharp corners and edges will be as R0.5
breaking capacity 120 kA under 400 V
Notes: all dimensions are in mm.

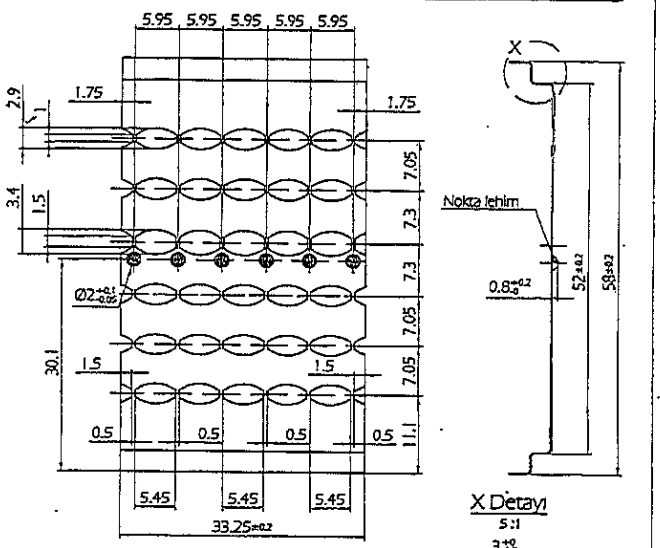
General tolerance : ±0.2

Adet	Kalıpçı / Tedarikçi	Malzeme	Açıklama	Stok Kodu
1	Ker 221	Steatit		1 001 401
BCS	Supplier's Name	Material	Weight	Stock Code

Approval	R.USTA	FEDERAL ELEKTRİK YATIRIM ve TİC. A.Ş.
Controlled by	Ö.SALATAN	
Drawing by	F.GÜLEÇ	
Date	23.03.2000	
Scale	2:1	Name: Fuse Body — Drawing no: 14.06.01

C:\Arge\221\01\1406.01-2.dwg

Rev. No	Açıklama	D.Faaliyet No:
03	Kalınlık değiştirildi.	Söyleme-Yaz S.Montaj(08.01.2001)



A. Akımı	Adet	Stok Kodu
500A	5	2 001 052
630A	6	2 001 053

NOT : 2.9x5.95 , 3.4x5.95 pecklerin toleransı : ±0.05
Ø 2' lik lehimlerin eksenlerinin toleransı : ±0.01

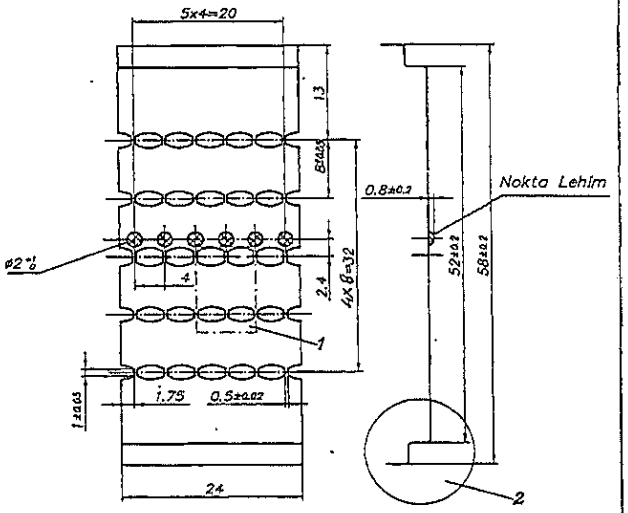
Genel tolerans : ± 0.1

Adet	Kalıpçı / Tedarikçi	Malzeme	Açıklama	Stok Kodu
		ECu	0.25x	

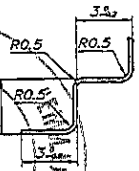
Onay	R.USTA	FEDERAL ELEKTRİK YATIRIM ve TİC. A.Ş.
Kontrol	Ö.SALATAN	
Resim	A.ÇİÇEK	
Tarih	08.01.2001	İmza
Ölçek	2:1	Erişyen Şerit Tel — 14.06.04

C:\Arge\Arge\01\140604-3.dwg

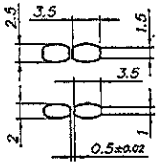
Rev. No	Açıklama	Dağıtım Kontrol
01	Yeni Tasarım	



Açıklama 2
5:1



Açıklama 1
2:1



Boy	Anma Akımı	Bant Ebadı Genişlik×kalınlık	Adet	Stok Kodu
NH2	250 A.	24x0.20	2	2-001-043
	315 A.	24x0.20	3	2-001-044
	400 A.	24x0.22	4	2-001-045
NH3	315 A.	24x0.20	3	2-001-054
	400 A.	24x0.20	4	2-001-055

		E-Cu			
Adet	Kalıpçı / Tedarikçi	Malzeme		Ağırlık (Gr.)	Stok Kodu
	Onay H. KARANIK		FEDERAL ELEKTRİK		
	Kontrol Ö. SALATAN		YATIRIM ve TİC. A.Ş.		
	Resim M.OTURAK				
	Tarih 25.04.1996	İmza			
NH	Ölçek 2:1	Eriyen Şerit Tel			13.06.04.4

TÜRKAK
TÜRK AKREDİTASYON KURUMU
TURKISH ACCREDITATION AGENCY
tarafından akredite edilmiş

IHP Uluslararası Yüksek Güç Test Laboratuarı
1.Organize Sanayi Bölgesi 2.Yol No:13
Hanlı / SAKARYA Tel: (0264) 291 45 30

AB-0989-T
0315.15-1
03-15

Deney Raporu
Test Report

Müşterinin adı / adresi *Customer name / address*	FEDERAL ELEKTRİK YATIRIM VE TİCARET A.Ş. 1.Organize Sanayi Bölgesi ADAPAZARI / TÜRKİYE
İstek numarası *Order no*	0315.15
Numunenin adı ve tarifi *Name and identity of test item*	Federal Trademark, Size 3, 125A – 630A , 500V, gG/gL Class Low Voltage Fuse-Link 630A, 690 V, Low Voltage Fuse Base
Deney Metodu *Test Method*	IEC 60269-1: 2006-11+ A1: 2009, TS HD 60269-2: 2014-02
Numunenin kabul tarihi *The date of receipt of test item*	01.05.2016
Numune alma prosedürü *The procedure of receiving the test item*	-
Deneyin yapıldığı tarih *Date of test*	01.05.2016 – 20.12.2016
Deney sonucu *Test Result*	**The samples passed the tests requested.**
Açıklamalar *Remarks*	-
Raporun Sayfa Sayısı *Number of pages of the report*	47

Bu rapor sadece test edilen numune(ler) için geçerlidir.
This report is valid only for the sample(s) tested.

Deney laboratuvarı olarak faaliyet gösteren IHP Uluslararası Yüksek Güç Test Laboratuvarı, TÜRKAK'tan AB-0989-T ile IEC 17025:2012 standardına göre akredite edilmiştir.
IHP Uluslararası Yüksek Güç Test Laboratuvarı accredited by TÜRKAK under registration number AB-0989-T for IEC 17025:2012 as test laboratory"
Türk Akreditasyon Kurumu(TÜRKAK) deney raporlarının tanını Avrupa Akreditasyon Birliği(EA) ile Çok Taraflı Anlaşma ve Uluslararası Laboratuvar Akreditasyon Birliği(ILAC) na anlaşması imzalamıştır.
Turkish Accreditation Agency (TURKAK) is a signatory to t -operation for Accreditation (EA) Multilateral Agreement (MLA) and to the International Laboratory Accreditat (ILAC) Mutual Recognition Arrangement (MRA) for the recognition of test reports.
Deney ve /veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri (o deney metotları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.
The test and/or measurement results, the uncertainties (if applicab ce probability and test methods are given on the following pages which are part of this report.

Mühür Seal	Tarih Date	De Per	Su Test	Li La	üdürü boratory
IHP ULUSLARARASI YÜKSEK GÜÇ TEST LABORATUVARI LTD. ŞTİ.	05.05.2017				

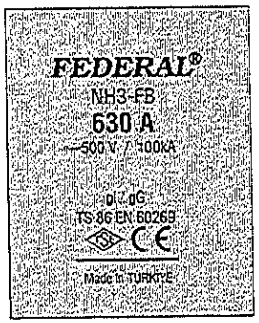
На основание чл. 2 от ЗЗЛД

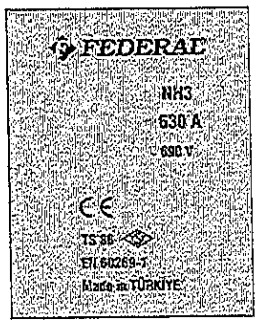
На основание чл. 2 от ЗЗЛД

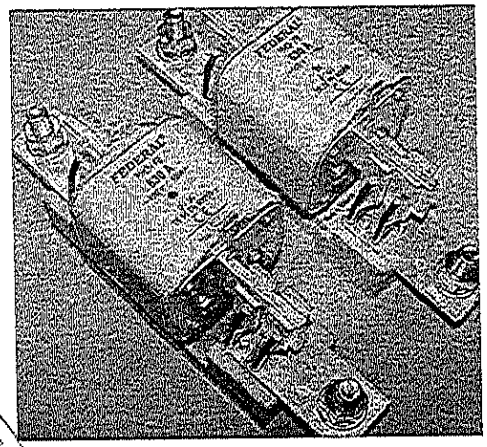
List of Attachments (including a total number of pages in each attachment):	
Summary of testing:	
Tests performed (name of test and test clause): 8.1.4 Dimensions 8.1.5.1 Resistance 8.3 Temperature rise, power dissipation 8.4.3.1 Verification of conventional non-fusing and fusing current 8.4.3.2 Rated current 8.4.3.3 Time-current characteristics, gates 8.4.3.4 Overload 8.4.3.5 Conventional cable overload protection 8.4.3.6 Indicating device c) 8.7 I²t characteristic 8.9 Resistance to heat 8.10 Non-deterioration of contacts 8.11.1 Mechanical strength 8.11.2.2 Resistance to abnormal heat and fire 8.11.2.3 Resistance to rusting	**Testing location:** IHP Test Laboratory/Sakarya/TURKEY
Summary of compliance with National Differences **List of countries addressed:** ☒ **The product fulfils the requirements of IEC 60269-1**	

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.







Test item particulars	:
Classification of installation and use	: Fuses for use by authorized persons
Supply Connection	: At both sides
	:
Possible test case verdicts:	
- test case does not apply to the test object	: N/A
- test object does meet the requirement	: P (Pass)
- test object does not meet the requirement	: F (Fail)
Testing	:
Date of receipt of test item	: 01.05.2016
Date (s) of performance of tests	: 01.05.2016 – 20.12.2016

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 6.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided : ☐ Yes ☐ Not applicable

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) :

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
5	CHARACTERISTICS OF FUSES		
5.2	Rated voltage (V) as specified ..... :	500 V	P
5.3.1	Rated current (A) of the fuse-link in accordance with specified values ..... :	125, 160, 200, 250, 315, 355, 400, 500, 630A	P
5.3.2	Rated current (A) of the fuse-holder ..... :	630 A	P
5.4	Rated frequency (Hz) ..... :	50 Hz	P
5.5	Max. rated power dissipation (VA) of fuse-link ..... :	48 W	P
	Rated acceptable power dissipation (VA) of fuse-holder ..... :	60 W	P
5.6	Limits of time-current characteristics based on reference ambient air temperature Ta of +20°C	+20°C	P
5.6.1	Time-current zones deviated from standardized, or available in manufacturers documentation (with tolerances) ..... :		N/A
5.6.2	Conventional times and currents see Table 2 ..... :		P
5.6.3	Gates..... :		P
5.7	Breaking range and breaking capacity		
5.7.1	Breaking range and utilization category ..... :	gL/gG	P
5.7.2	Rated breaking capacity (A) of fuse-link corresponds to the rated voltage (V), and is equal or higher than given minimum (A) in subsequent part of this standard ..... :	100 kA/500 V	P
5.8	Cut-off current and I^2t characteristics are referred to the values of voltage, frequency and power factor		P
5.8.1	Cut-off current characteristics, if required, given by the manufacturer according to Figure 4 ..... :		P
5.8.2	Pre-arcing I^2t characteristics for pre-arcing times of less than 0,1 s down to a time corresponding to the rated breaking capacity given by the manufacturer :		P
	The operating I^2t characteristics with specified voltages as parameter for pre-arcing times less than 0,1 s given by the manufacturer ..... :		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
6	MARKINGS		
	Markings are durable and easily legible		P
6.1	Fuse-holders marked by:		
	- name of manufacturer or trade mark which enable identification of fuse-holder ..... :	FEDERAL	P
	- manufacturer's identification reference enabling to find all characteristics listed in 5.1.1 ..... :	NH3-FA	P
	- rated voltage (V) ..... :	690 V	P
	- rated current (A) ..... :	630 A	P
	- kind of current and rated frequency (Hz) ..... :	~	P
6.2	Fuse-link(s) except small fuse-link(s) marked by:		
	- name of manufacturer or trade mark which enable identification of fuse-links ..... :	FEDERAL	P
	- manufacturer's identification reference enabling to find all characteristics listed in 5.1.2 ..... :	NH3-FB	P
	- rated voltage (V) ..... :	500 V	P
	- rated current (A) ..... :	125,160,200 ,250, 315, 355, 400, 500, 630 A	P
	- breaking range and utilization category (if applicable) (5.7.1) ..... :	gL/gG	P
	- kind of current ..... :	~	P
	- rated frequency (Hz), if applicable (5.4)	-	N/A
	Small fuse-links marked by:		
	- trademark ..... :		N/A
	- list reference of manufacturer ..... :		N/A
	- rated voltage (V) ..... :		N/A
	- rated current (A) ..... :		N/A
6.3	Symbols for the kind of current and frequency in accordance with IEC 60417		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
7	STANDARD CONDITIONS FOR CONSTRUCTION		
7.1	Mechanical design		
7.1.1	Replacement of fuse-links easily and safely		P
7.1.2	Connections, including terminals		
	Contact force is not transmitted through insulating material other than ceramic or other material with characteristics not less suitable, unless		P
	there is sufficient resilience in the metallic parts to compensate any possible shrinkage or other deformation of the insulating material		P
	Terminals cannot turn or be displaced when the connecting screws are tightened		P
	Terminals shall be such, that the conductors cannot be displaced		P
	Parts gripping the conductors are of metal		P
	Gripping parts cannot unduly damage conductors		P
	Terminals readily accessible under the intended conditions of installation		P
7.1.3	Fuse-contacts		
	Fuse-contacts are such that necessary contact force is maintained under the conditions of service and operation		P
	Contact is such that electromagnetic forces occurring during operation under conditions in accordance with 7.5 not impair electrical connections between		
	a) fuse-base and fuse-carrier		N/A
	b) fuse-carrier and fuse-link		N/A
	c) fuse-link and fuse-base		P
	Fuse contacts are so constructed and of such material that, when fuse is properly installed and service conditions are normal, adequate contact is maintained		
	a) after repeated engagement and disengagement		P
	b) after being left undisturbed in service for long period		P
7.1.4	Construction of a gauge-piece		
	Gauge-piece is so designed that it withstands normal stresses occurring during use		N/A
7.1.5	Mechanical strength of fuse-link		
	Fuse-link have adequate mechanical strength and its contacts are securely fixed		P
7.2	Insulating properties and suitability for isolation		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Fuses are such that they do not lose insulating properties at voltages to which they are subjected in normal service		P
	Fuse passes the tests for verification of insulating properties and suitability for isolation in accordance with 8.2		P
7.3	Temperature rise, power dissipation of the fuse-link and acceptable power dissipation of the fuse-holder		
	See Table 5 ..... :		P
	Requirements are verified by tests according to 8.3		P
7.4	Operation		
	Fuse-link is so designed and proportioned that, when tested in its appropriate test arrangement at rated frequency and ambient air temperature of (20±5)°C		
	- is able to carry continuously any current not exceeding its rated current		P
	- is able to withstand overload conditions as they may occur in normal service (see 8.4.3.4)		P
	Fuse-link satisfy these conditions if it passes the tests prescribed in 8.4		P
7.5	Breaking capacity		
	Fuse is capable of breaking, at rated frequency and at voltage not exceeding the recovery voltage specified in 8.5, any circuit having prospective current between		
	- current I_f (for "g" fuse-links) ..... :		P
	- current k_2I_n (for "a" fuse-links) ..... :		N/A
	- for a.c., rated breaking capacity at power factors not lower than those in Table 20 ..... :	100 kA	P
	- for d.c., rated breaking capacity at time constants not greater than those limits in Table 21 ..... :		N/A
	Arc voltage not exceed values given in Table 6..... :		P
	Fuse satisfy these conditions if it passes the tests prescribed in 8.5		P
7.6	Cut-off current characteristic		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Values of cut-off current measured as specified in 8.6 are less than, or equal to, the values corresponding to cut-off current characteristics assigned by the manufacturer		P
7.7	I^2t characteristics		
	Pre-arcing I^2t values verified according to 8.7 (Table 7) ..... :		P
	Operating I^2t values verified according to 8.7 ..... :		P
7.8	Overcurrent discrimination of fuse-links ..... :		P
7.9	Protection against electric shock		
	The degree of protection when the fuse is under normal service conditions: ..... :	IP	N/A
	The degree of protection when replacing the fuse-link: ..... :	IP	N/A
	The degree of protection when the fuse-link and fuse-carrier is removed: ..... :	IP	N/A
7.9.1	Clearances and creepage distances		
	Clearances are not less than the values given in Table 9 ..... :	See Clause 8.2.3	P
	Creepage distances correspond to material group, as defined in 2.7.1.3 of IEC 60664-1, corresponding with rated voltage given in Table 10 ..... :	See Clause 8.2.3	P
7.9.2	Leakage currents of fuses suitable for isolation		
	Value of leakage current (mA) not exceed		
	- 0,5 mA per pole for fuses in new conditions ..... :	< 0,05 mA	P
	- 2 mA per pole for fuses having been submitted to test according to 8.5 ..... :		-
7.9.3	Additional constructional requirements for fuses for linked fuse-carriers, suitable for isolation		
	Fuse-holder are marked with the symbol IEC 60617-S00369		N/A
	When fuse is in open position, with fuse-link remaining inside the fuse-carrier, isolating distance between the fuse contacts in accordance with the isolating function are provided		N/A
	Indication of this position is provided by the position of the fuse-carrier		N/A
	There exists a locking means in order to lock the fuses in the isolated position, locking is possible only in this position		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Fuses are designed so that the fuse-carrier remains attached to the fuse-base giving correct indication of the open position, and of locking		N/A
7.10	Resistance to heat		
	All components are sufficiently resistant to heat which may occur in normal use (see 8.9 and 8.10)		P
7.11	Mechanical strength		
	All components of fuse are sufficiently resistant to mechanical stresses which may occur in normal use (see 8.3 to 8.5 and 8.11.1)		P
7.12	Resistance to corrosion		
	All metallic components of fuse are resistant to corrosive influences which may occur in normal use		P
7.12.1	Resistance to rusting		
	Ferrous components are so protected that they meet relevant tests (see 8.2.2.3.2 and 8.11.2.3)		P
7.12.2	Resistance to season cracking		
	Current-carrying parts are sufficiently resistant to season cracking (see 8.2.2.3.2 and 8.11.2.1)		P
7.13	Resistance to abnormal heat and fire		
	All components of fuse are sufficiently resistant to abnormal heat and fire (see 8.11.2.2)		P
7.14	Electromagnetic compatibility		
	Fuses within the scope of this standard are not sensitive to normal electromagnetic disturbances		N/A
	No immunity tests are required		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
8	TESTS		
8.1.2	At the beginning of each test, the fuse is approximately at the ambient temperature		P
8.1.3	Tests made on fuses in clean and dry condition		P
8.1.4	Arrangement of the fuse and dimensions		
	Except for degree of protection test (see 8.8), fuse are mounted in free air in draught-free surroundings in the normal operation position and on insulating material of sufficient rigidity		P
	Before tests are started, specified external dimensions are measured and results compared with dimensions specified in the relevant data sheet of the manufacturer or specified in subsequent parts	Part 2. Figure 101	P
8.1.5	Testing of fuse-links		
	Fuse-links tested with the kind(s) of current for which they are rated	AC	P
	Fuse-links tested for a.c. with frequency for which they are rated	50 Hz	P
8.1.5.1	Complete tests		
	Internal resistance R measured by a current ≤ 0,1 In		P
	Measuring current (A) ..... :	0,3	P
	Ambient air temperature in range of 20 ± 5 °C		P
	The values of resistance	(see appended table)	P
8.1.5.2	Testing of fuse-links of a homogeneous series		
	Fuse-links tested like a homogeneous series ..... :	Yes/No	P
	If yes: fuse-links have identical enclosures in form and construction (except of fuse-elements and contacts)		P
	- the same arc-extinguishing medium and same completeness of filling		P
	- fuse-elements of identical materials		P
	- their cross-section of fuse-elements not exceed the cross-section of fuse-links having the highest rated current		P
	- number of fuse-elements do not exceed number of fuse-elements of fuse-links with the highest rated current		P
	- minimum distances between adjacent fuse-elements and between the fuse-elements and the inner surface of the cartridge is not less than those in the fuse-link with the highest rated current		P
	- fuse-links used with a given fuse-holder, or		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- fuse-links intended to be used in an arrangement identical for all rated currents of the homogeneous series		P
	- value of $RI_n^{3/2}$ does not exceed the value for the fuse-link with largest rated current of the homogeneous series (R measured as indicated in 8.1.5.1)		P
	the rated breaking capacity of fuse-links not greater than that of the fuse-link with the largest rated current within the homogeneous series		P
	- if not, the fuse-links with greater breaking capacity subjected to tests no. 1 and no. 2		N/A
	The fuse-link having the largest rated current tested completely according to Table 11	630 A	P
	The fuse-link having the smallest rated current tested only according to Table 12	125 A	P
	The fuse-links between the largest and smallest rated current tested according to Table 13	160, 200, 250, 315, 400, 500 A	P
8.1.6	Testing of fuse-holders		
	The fuse-holders are subjected to the tests according to Table 14		P
8.2	Verification of the insulating properties and of the suitability for isolation		P
8.2.1	Arrangement of the fuse-holder		
	The fuse-holder fitted with a fuse-links of the largest dimensions for the type of fuse-holder concerned		P
	The fuse-base fixed to a metal plate, unless otherwise specified		P
	Fuse-link is replace a while live - surfaces of fuse-link, of device for replacing it or of fuse-carrier, if of insulating material, are provided with metal coverings connected during tests to the frame of the apparatus; if of metal, they are connected direct to the frame		P
8.2.2	Verification of the insulating properties		
	Points of application of the test voltage	1890 V	P
	The test voltage is applied between:		
	a) live parts and the frame with the fuse-link and the device for replacing it, or		P
	the fuse-carrier, if any, in position		N/A
	no breakdown of insulation or flashover during 1 min of the applying test voltage		P
	b) the terminals without fuse-link, device for replacing or the fuse-carrier		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	no breakdown of insulation or flashover during 1 min of the applying test voltage		P
	c) live parts of different polarity in the case of multipole fuse-holder with fuse-links, fuse-carrier(s) or device(s) for replacing the fuse-links		N/A
	no breakdown of insulation or flashover during 1 min of the applying test voltage		N/A
	d) live parts which in the case of a multipole fuse-holder reach different potential after the fuse-link operates (equipped by fuse-carrier or device for replacing without fuso-link)		N/A
	no breakdown of insulation or flashover during 1 min of the applying test voltage		N/A
	The values of test voltage (V) as specified in Table 15 ..... :	1890 V	P
8.2.2.3.2	Fuse-holder is subjected to humid atmospheric conditions		P
	Relative humidity of ambient air (%) ..... :	%95	P
	Ambient air temperature (°C) ..... :	25 °C	P
	Duration of treatment (h) ..... :	48 h	P
	Insulation resistance is measured between the points prescribed in 8.2.2.1 by applying d.c. voltage of approximately 500 V	500 Vdc	P
	Points of measuring:		
	a) min. measured value (MΩ) ..... :	> 1 MΩ	P
	b) min. measured value (MΩ) ..... :	> 1 MΩ	P
	c) min. measured value (MΩ) ..... :		N/A
	d) min. measured value (MΩ) ..... :		N/A
	The insulation resistance not less than MΩ ..... :	> 1 MΩ	P
8.2.3	Verification of the suitability for isolation		
	Clearances and creepage distances are verified by dimensional measurement and by voltage test		
	Points of application of the test voltage		N/A
	The test voltage is applied between:		
	terminals when the fuse-link and device for replacing it, are removed		N/A
	Test voltage (kV) for verification of the rated impulse withstand voltage is given in Table 16 ..... :		N/A
	The 1,2/50 µs impulse voltage applied 5 times for each polarity at intervals of 1 s minimum		N/A
	no breakdown of insulation or flashover during of the applying test voltage		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	no disruptive discharge during the test		N/A
8.2.4.2	Fuse-holder is subjected to humid atmospheric conditions		N/A
	Relative humidity of ambient air (%) ..... :	%95	P
	Ambient air temperature (°C) ..... :	25 °C	P
	Duration of treatment (h) ..... :	48 h	P
	Insulation resistance is measured between the points prescribed in 8.2.2.1 by applying d.c. voltage of approximately 500 V	500 Vdc	P
	Points of measuring:		
	a) min. measured value (MΩ) ..... :	> 1 MΩ	P
	b) min. measured value (MΩ) ..... :	> 1 MΩ	P
	c) min. measured value (MΩ) ..... :		N/A
	d) min. measured value (MΩ) ..... :		N/A
	The insulation resistance not less than 1 MΩ ..... :	>1 MΩ	P
8.3	Verification of temperature rise and power dissipation		
8.3.1	One fuse used for test (unless otherwise stated by the manufacturer) mounted in free air		P
	Test performed at an ambient air temperature of (20±5) °C	20°C	P
	Ambient air temperature during the test (°C) ..... :		P
	Cross-sectional area (see Table17) (mm^2 or mm x mm) ..... :	2 x 185 mm^2	P
	Tightened by torque; torque (Nm) ..... :	32 Nm	P
8.3.2	The temperature of the fuse measured by method of measuring ..... :	Thermocouples	P
8.3.3	Measurement of the power dissipation of the fuse-link		
	One fuse used for test (unless otherwise stated by the manufacturer) mounted in free air		P
	Test performed at an ambient air temperature of (20±5) °C		P
	Ambient air temperature during the test (°C) ..... :	22°C	P
	Cross-sectional area (see Table17) (mm^2 or mm x mm) ..... :	2 x 185 mm^2	P
	Tightened by torque; torque (Nm) ..... :	32 Nm	P
8.3.4.1	Temporature rise of the fuse-holder		
	Applied a.c. current (A) for test equal to the rated current of the fuse-holder ..... :	630 A	P
	Test made with fuse-link (A), or ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	with a dummy fuse-link specified in subsequent parts ..... :	Part 2 Figure 105	P
	Temperature rise limits T for contacts and terminals (Table 5):		
	spring loaded contacts;(silver plated: limited only by the necessity of not causing any damage to adjacent parts) ..... :	unenclosed / enclosed 52 K	P
	bolted contacts; limit:(K) ..... :	unenclosed / enclosed	N/A
	terminals; (silver plated) limit:≤70 K ..... :	unenclosed / enclosed 43 K	P
8.3.4.2	Power dissipation of a fuse-link		
	The test made with a.c. at the current (A) equal to the rated current of the fuse-link ..... :	630 A	P
	The points of measuring ..... :	Part 2 Figure 106 , S points	P
	Measured value of power (W) dissipation in limits (W) specified in subsequent parts ..... :	43,5 W	P
8.3.5	The acceptable power dissipation (W) of fuse-holder not less than the rated power dissipation of the corresponding fuse-links ..... :	60 W	P
	After the tests prescribed in 8.3, the insulating parts of the fuse-holders cooled down to ambient temperature withstood the test voltage according to 8.2 ..... :		P
	No deformation after tests of 8.3		P
8.4	Verification of operation		
8.4.1	The test arrangement as specified in 8.1.4		P
	Length (m) of conductors (see 8.3.1) ..... :	2 m	P
	their cross-sectional area (mm^2) as specified in Table 17 ..... :	50 mm^2 (125A fuse-link) 70 mm^2 (160A fuse-link) 95 mm^2 (200 A fuse-link) 120 mm^2 (250A fuse-links) 185 mm^2 (315A fuse-link) 185 mm^2 (355A fuse-link) 240 mm^2 (400A fuse-link) 2x150 mm^2 (500A fuse-link) 2x185 mm^2 (630A fuse-link)	P
8.4.2	Ambient air temperature during test within (20±5) °C	20-22 °C	P
8.4.3.1	Verification of conventional non-fusing and fusing current		
	a) the fuse-link subjected to the conventional non-fusing current (I_{nf}) (see Table 2) ..... :	1,25 In	P
	the fuse-link did not operate within the conventional time of (h) (Table 2) ..... :	2 h (125A,160A) 3 h (200, 250, 315, 400A) 4 h (500, 630)	P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	b) the same fuse-link, after cooled down to ambient temperature, subjected to the conventional fusing current (I_f) (see Table 2) ..... :	1,6 In	P
	the fuse-link operated within the conventional time of (minutes) (Table 2) ..... :	31 min (125A fuse-link) 38 min (160A fuse-link) 42 min (200A fuse-link) 33 min (250A fuse-link) 39 min (315A fuse-link) 48 min (355A fuse-link) 41 min (400A fuse-link) 48 min (500A fuse-link) 45 min (630A fuse-link)	P
8.4.3.2	Verification of rated current of "g" fuse-links		
	One fuse-link submitted to a pulse test for 100 h	100h	P
	On-period equal to conventional time (h) ..... :	2 h (125A,160A) 3 h (200, 250, 315, 400A) 4 h (500, 630)	P
	Off-period of 0,1 of the conventional time ..... :	0,2 h (125A,160A) 0,3 h (200, 250, 315, 400A) 0,4 h (500, 630)	P
	Test current (A) equal to 1,05 of the rated current . :	1,05 In	P
	After the test, the fuse-link not have changed its characteristics		
8.4.3.1	a) the fuse-link subjected to the conventional non-fusing current (I_{nf}) (see Table 2) ..... :	1,25 In	P
	the fuse-link did not operate within the conventional time of (h) (Table 2) ..... :	2 h (125A,160A) 3 h (200, 250, 315, 400A) 4 h (500, 630)	P
8.4.3.3	Verification of time-current characteristics and gates		
8.4.3.3.1	The time-current characteristics verified on the basis of the test according to 8.5		P
	Values of pre-arcing and operating times within the time-current zones:		
	- indicated by the manufacturer		P
	- specified in subsequent parts ..... :		N/A
	Verification for smaller current ratings, if only one largest rated current fuse-link is subjected to the test according to 8.5 (in case of homogeneous series):		
	"g" fuse-links (except "gD", "gG" and "gM")		N/A
	Tests made in connection with verification of the gates (see8.4.3.3.2)		N/A
	Ambient air temperature within (20±5) °C ..... :		N/A
	rated current In (A) of the fuse-link ..... :		
	test performed at voltage (V) ..... :		
	test 3a) prospective current (A) equal to kIn (10 ≤ k ≤ 20) ..... :		N/A
	pre-arcing time (s) ..... :		
	specified pre-arcing time (s) max./min. ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	test 4a) prospective current (A) equal to kIn ($5 \le k \le 8$) :		N/A
	pre-arcing time (s) :		
	specified pre-arcing time (s) max./min. :		N/A
	test 5a) prospective current (A) equal to kIn ($2,5 \le k \le 4$) :		N/A
	pre-arcing time (s) :		
	specified pre-arcing time (s) max./min. :		N/A
	Verification for smaller current ratings, if only one largest rated current fuse-link is subjected to the test according to 8.5 (In case of homogeneous series):		
	"a" fuse-links		N/A
	Ambient air temperature within (20±5) °C :		N/A
	rated current In (A) of the fuse-link :		
	test performed at voltage (V) :		
	test 3a) prospective current (A) equal to nk_2 In ($5 \le n \le 8$) :		N/A
	pre-arcing time (s) :		
	specified pre-arcing time (s) max./min. :		N/A
	test 4a) prospective current (A) equal to nk_2 In ($2 \le n \le 3$) :		N/A
	pre-arcing time (s) :		
	specified pre-arcing time (s) max./min. :		N/A
	test 5a) prospective current (A) equal to nk_2 In ($1 \le n \le 1,5$) :		N/A
	pre-arcing time (s) :		
	specified pre-arcing time (s) max./min. :		N/A
8.4.3.3.2	Verification of gates		P
	"gG" and "gM" fuse-links		P
	rated current of the fuse-link (A) :	125,160,200 ,250, 315, 355, 400, 500, 630 A	
	test performed at voltage (V) :	10-15 V	
	a) testing current (A); pre-arcing time (s) higher than 10 s :	368A; >10 s (125A fuse-link) 474A; >10 s (160A fuse-link) 617A; >10 s (200A fuse-link) 752A; >10 s (250A fuse-link) 1057A; >10 s (315A fuse-link) 1427A; >10 s (400A fuse-link) 1791A; >10 s (500A fuse-link) 2214A; >10 s (630A fuse-link)	P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	b) testing current (A); pre-arcing time (s) less than 5 s :	715A; 3,4 s (125A fuse-link) 950A; 3,1 s (160A fuse-link) 1250A; 2,8 s (200A fuse-link) 1650A; 3,2 s (250A fuse-link) 2200A; 2,8 s (315A fuse-link) 2840A; 3,0 s (400A fuse-link) 3800A; 3,7 s (500A fuse-link) 5100A; 3,4 s (630A fuse-link)	P
	c) testing current (A); pre-arcing time (s) higher than 0,1 s :	1110A; 0,24 s (125A fuse-link) 1453A; 0,31 s (160A fuse-link) 1922A; 0,28 s (200A fuse-link) 2601A; 0,33 s (250A fuse-link) 3434A; 0,41 s (315A fuse-link) 4527A; 0,30 s (400A fuse-link) 6026A; 0,27 s (500A fuse-link) 8089A; 0,25 s (630A fuse-link)	P
	d) testing current (A); pre-arcing time (s) less than 0,1 s :	1910A; 32ms (125A fuse-link) 2590A; 31ms (160A fuse-link) 3420A; 20ms (200A fuse-link) 4500A; 38ms (250A fuse-link) 6000A; 38 ms (315A fuse-link) 8060A; 23 ms (400A fuse-link) 10600A;31 ms (500A fuse-link) 14140A;24 ms (630A fuse-link)	P
	"aM" fuse-links		N/A
	rated current of the fuse-link (A) :		
	test performed at voltage (V) :		
	Cross-sectional area (see Table18) (mm^2 or mm x mm) :		
	e) testing current (A); pre-arcing time (s) higher than 60 s :		N/A
	f) testing current (A); pre-arcing time (s) less than 60 s :		N/A
	g) testing current (A); pre-arcing time (s) higher than 0,2 s :		N/A
	h) testing current (A); pre-arcing time (s) less than 0,10 s :		N/A
8.4.3.4	Overload		
	The test arrangement is same as that for the temperature rise test (see 8.3.1)		P
	Three fuse-links submitted to 50 pulses having the same duration and test current :	50 pulses	P
	test performed at voltage (V) :	10-15 V	
	"g" fuse-links:		
	test current (A) equal to 0,8 times the current stated for a pre-arcing time of 5 s :	572A (125A fuse-links) 4080A (630A fuse-links)	P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	duration of each pulse 5 s	5 s	P
	time (s) interval between pulses equal to 20 % of the conventional time (s) specified in Table 2 ..... :	24 min (125A fuse-links) 48 min (630A fuse-links)	P
	"a" fuse-links:		N/A
	rated current In (A) of fuse-link ..... :		N/A
	test current (A) equal to $k_1 I_n \pm 2\%$ ..... :		N/A
	the pulse duration (s) corresponds to that indicated on the overload curve for $k_1 I_n$ stated by manufacturer ..... :		N/A
	time (s) intervals between pulses equal to 30 times the pulse duration ..... :		N/A
	fuse-links having ambient air temperature subjected to a current (A) equal to current for the overload test	572A (125A fuse-links) 4080A (630A fuse-links)	P
	pre-arcing time (s) of sample lies within the manufacturers time-current zone ..... :	1) 9 s 2) 10 s (125A fuse-links) 3) 9 s 1) 10 s 2) 10 s (630A fuse-links) 3) 11 s	P
8.4.3.5	Conventional cable overload protection test (for "gG" fuse-links only)		
	fuse-link mounted as specified in 8.4.1		P
	provided with PVC insulated copper conductors of cross-sectional area (mm^2) (see Table 19) ..... :	35 mm^2 (125A fuse-link) 50 mm^2 (160A fuse-link) 70 mm^2 (200A fuse-link) 120 mm^2 (250A fuse-link) 185 mm^2 (315A fuse-link) 240 mm^2 (400A fuse-link)	P
	fuse and conductor connected to it, preheated with rated current (A) of fuse-link ..... :	In	P
	for a time (h) equal to the conventional time ..... :	2 h (125A,160A) 3 h (200A, 250A, 315A, 400A)	P
	test current increased to 1,45 I_z (A) (I_z specified in Table 19) ..... : NOTE :It is not necessary to perform this test if the product 1,45 I_z is greater than the conventional fusing current.	200,1A >200A (125A fuse-link) 244A; (160A fuse-link) 309A; (200A fuse-link) 434A >400A (250A fuse-link) 568A > 504A (315A fuse-link) 668A> 640A (400A fuse-link)	N/A P P N/A N/A N/A
	the fuse-link operated in time (s) less than the conventional time (s) ..... :	29 min (160A fuse-link) 42 min (200A fuse-link)	P
8.4.3.6	Operation of indicating devices and strikers, if any		
	Operation of indicating device verified in combination with the verification of breaking capacity (see 8.5.5)		P
	The verification of striker operation:		N/A
	"g" fuse-link tested at current (A) equal to current I_4 (see Table 20 and 21) ..... :		N/A
	recovery voltage (V) ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	stated recovery voltage (V) ..... :		N/A
	"a" fuse-link tested at current (A) equal to current $2k_1 I_n$ (A) (see Figure 2) ..... :		N/A
	recovery voltage (V) ..... :		N/A
	stated recovery voltage (V) ..... :		N/A
	Striker operate during all tests made at recovery voltage of at least 20 V		N/A
	No failure of indicating device or striker		N/A
8.5	Verification of the breaking capacity	BUSTYAL Report No R.0107-15	P
8.5.1	The test arrangements as specified in 8.1.4		P
8.5.2	Characteristics of the test circuit as specified		P
	Scheme of test circuit (see Figure 5)		P
	Deviations from specified characteristics of test circuit ..... :		N/A
8.5.3	Measuring instruments		P
8.5.4	Calibration of test circuit		P
	Calibration oscillograms and their evaluation		P
8.5.6	The breaking-capacity tests made at an ambient air temperature of (20 ± 5) °C		P
	Breaking-capacity tests on a.c. fuses		P
8.5.5.1	Table 20, test No. 1 for "g" and "a" fuse-links		P
	Rated breaking capacity of the fuse-links (kA), at voltage (V) ..... :	100 kA, at 500 V	
	Rated current (A) of the fuse-links ..... :	125 A, 630 A	P
	Prospective current I_1 (kA) equal to rated breaking capacity within a tolerance of + 10%, - 0% ..... :	103,1 kA	P
	Power factor ..... :	0,12	P
	Initiation of arcing after voltage zero: within 40° - 65° for sample 1 and within 65° - 90° for sample 2 and 3, or ..... :	1) 2) 3)	N/A
	for sample 1) arcing after voltage zero within 0° + 10°, - 0° ..... :		P
	Power-frequency recovery voltage: voltage (V) i.e (%) of rated voltage within 105% + 5%, - 0% of the rated voltage or 110% + 5%, - 0% of the rated voltage ..... :	1) 546,7 V 2) 548,4 V (630A fuse-link) 3) 547,6 V 1) 549,1 V 2) 549,0 V (125A fuse-link) 3) 549,8 V	P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Cut-off current (A) ..... :	1) 54,59 kA 2) 49,90 kA (630A fuse-link) 3) 52,05 kA 1) 12,11 kA 2) 12,21 kA (125A fuse-link) 3) 12,70 kA	P
8.5.8	Acceptability of No. 1 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		P
	b) fuse-links operated without external effects or damage to the components of the complete fuse		P
	c) no permanent arcing, flashover or ejection of dangerous flames		P
	d) no damage of fuse components hindering from their further use		P
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		P
	f) fuse-link remains in one piece before its removal from the fuse- carrier		P
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	P
8.5.5.1	Table 20, test No. 2 for "g" and "a" fuse-links		P
	Prospective current I_2 (kA) ..... :	45,09 kA	P
	Test made under conditions which approximate those giving maximum arc energy		P
	Power factor ..... :	0,16	P
	Making angle after voltage zero: within tolerance 0° + 20°, - 0° ..... :		P
	Power-frequency recovery voltage: voltage (V) i.e (%) of rated voltage within 105% + 5%, - 0% of the rated voltage or 110% + 5%, - 0% of the rated voltage ..... :	1) 2) 3)	P
	Recovery voltage maintained at a value (V); duration (s) for sample (No.) ..... :	550 V, 15 s for sample 3	P
	For other samples duration 15 s (8.5.5.2)		P
8.5.8	Acceptability of No. 2 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 20, test No. 2* for "g" and "a" fuse-links, for $I_2 \geq I_1$	(see appended table)	N/A
	Prospective current I_2 (kA) for test No. 2 greater than the rated breaking capacity (kA) ..... :		N/A
	Test made on six samples replacing tests of Nos. 1 and 2. Test made with current I_1 (kA) ..... :		N/A
	Making angels differ approximately 30° between each test		N/A
	Power factor ..... :		N/A
8.5.8	Acceptability of No. 2 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
8.5.5.1	Table 20, test No. 3 for "g" and "a" fuse-links		
	Prospective current for "g" fuse-link I_3 (A) equal to 3,2 I_r ..... :		N/A
	Prospective current for "a" fuse-link I_3 (A) equal to 2,5 $k_2 I_n$ ..... :		N/A
	Power factor ..... :		N/A
	Tolerance on current ± 20%		N/A
	Recovery voltage (V) maintained for 15 s (8.5.5.2)		N/A
8.5.8	Acceptability of No. 3 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 20, test No. 4 for "g" and "a" fuse-links		
	Prospective current for "g" fuse-link I_4 (A) equal to 2,0 I_f ..... :		N/A
	Prospective current for "a" fuse-link I_4 (A) equal to 1,6 $k_2 I_n$ ..... :		N/A
	Power factor ..... :		N/A
	Tolerance on current + 20%, - 0%		N/A
	Recovery voltage (V) maintained for 15 s (8.5.5.2) :		N/A
8.5.8	Acceptability of No. 4 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 20, test No. 5 for "g" and "a" fuse-links		
	Prospective current for "g" fuse-link I_5 (A) equal to 1,25 I_f ..... :		N/A
	Prospective current for "a" fuse-link I_5 (A) equal to $k_2 I_n$ ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Power factor ..... :		N/A
	Tolerance on current + 20%, - 0%		N/A
	Recovery voltage (V) maintained for 15 s (8.5.5.2) :		N/A
8.5.8	Acceptability of No. 5 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
	Breaking-capacity tests on d.c. fuses		N/A
8.5.5.1	Table 21, d.c.test No. 1 for "g" and "a" fuse-links		
	Rated breaking d.c. capacity of the fuse-links (kA), at voltage (V) ..... :		
	Rated current (A) of the fuse-links ..... :		N/A
	Rated voltage (V) of the fuse-links ..... :		N/A
	Prospective current I_1 (kA) equal to rated breaking capacity within a tolerance of + 10%, - 0% ..... :		N/A
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 1 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 21, d.c.test No. 2 for "g" and "a" fuse-links		
	a) During test No. 1 arcing commences at a current ≥ 0,5 I_1, test No. 2 was not performed		N/A
	b) Prospective current I_2 (A). Test made under conditions which approximate those giving maximum arc energy ..... :		N/A
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 2 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 21, d.c.test No. 3 for "g" and "a" fuse-links		
	Conventional fusing current (A) ..... :		
	Prospective current I_3 (A) equal to 3,2 I_f ..... :		N/A
	Tolerance on current (%) ± 20% ..... :		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 3 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 21, d.c.test No. 4 for "g" and "a" fuse-links		
	Conventional fusing current (A) ..... :		
	Prospective current I_4 (A) equal to 2,0 I_f ..... :		N/A
	Tolerance on current (%) + 20%, - 0% ..... :		N/A
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 4 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrior		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.5.5.1	Table 21, d.c.test No. 5 for "g" and "a" fuse-links		
	Conventional fusing current (A) ..... :		
	Prospective current I_s (A) equal to 1,25 I_r ..... :		N/A
	Tolerance on current (%) + 20%, - 0% ..... :		N/A
	Time constant ..... :		N/A
	Arcing commences at current (A) ..... :	1) 2) 3)	
	Value of recovery voltage: voltage (V) within tolerances 115 + 5%, - 9% of the rated voltage ..... :	1) 2) 3)	N/A
8.5.8	Acceptability of No. 5 test results		
	a) max. arc voltage (V) did not exceed stated values of 7.5 (Table 6) ..... :		N/A
	b) fuse-links operated without external effects or damage to the components of the complete fuse		N/A
	c) no permanent arcing, flashover or ejection of dangerous flames		N/A
	d) no damage of fuse components hindering from their further use		N/A
	e) no damage of fuse-link such, that it is difficult or dangerous to replace them		N/A
	f) fuse-link remains in one piece before its removal from the fuse- carrier		N/A
	g) resistance (MΩ) between contacts of fuse-links after test not less than 50 000 Ω for the rated voltage of fuse-links to 250 V, 100 000 Ω in all other cases :	1) 2) 3)	N/A
8.6	Verification of the cut-off current characteristics		
8.6.2	The values measured did not exceed cut-off characteristics indicated by the manufacturer (see 5.8.1)		P
8.7	Verification of I^2t characteristics and overcurrent discrimination		

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.7.2	The operating I^2t values measured not exceed the values indicated by the manufacturer, or		N/A
	those specified in subsequent parts	I_1 – 4074 kA^2s I_2 – 4709 kA^2s	P
	The pre-arcing I^2t values not less than minimum pre-arcing values given by the manufacturer, or		N/A
	they lie within the limits indicated in Table 7	I_1 - 1659 kA^2s I_2 - 2135 kA^2s	P
8.7.3	Verification of compliance for fuse-links at 0,01 s		
	"gG" and "gM" fuse-links at 0,01 s comply with Table 7	$I_{0.1s}$ – 13225 kA^2s $I_{0.01s}$ – 3720 kA^2s (Annex B1)	P
8.7.4	Verification of overcurrent discrimination		
	The discrimination of the fuse-links verified by means of the time-current characteristics and the pre-arcing and operating I^2t values		P
8.8	Verification of the degree of protection of enclosures		
	Degree of protection IP ..... :	IP	NA
	Verification by test under conditions specified in IEC 60529 ..... :		NA
8.9	Verification of resistance to heat		
	No damage impaired by heat during the previous tests (in particular with respect to 8.3, 8.4, 8.5 and 8.10)		P
8.10	Verification of non-deterioration of contacts		
8.10.1	Three samples provided with standardized dummy fuse-links of the highest current rating (A) intended to be used in the fuse-holder (see subsequent parts) :	630 A dummy fuse-links	P
8.10.2	Test current (A) for load period ..... :	788 A	P
	Duration (s) of load period ..... :	60 min	P
	Duration (s) of no-load period ..... :	24 min	P
	a) Test of 250 cycles, measured values not exceed the limits given in subsequent parts		P
	b) Test of 750 cycles, measured values not exceed the limits given in subsequent parts		N/A
8.11	Mechanical and miscellaneous tests		
8.11.1	Mechanical strength		
	Mechanical characteristics of fuse and its parts judged in the context of normal handling and mounting as well as with results shown after breaking-capacity test (see 8.5), if not otherwise specified in the subsequent parts		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.11.2	Miscellaneous tests		
8.11.2.1	Verification of freedom from season cracking		N/A
	Current-carrying parts made of rolled copper alloy with less than 83% copper content and with all grease removed, placed for 4 h in test cabinet having temperature of (30 ± 10) °C		NA
	After this, samples placed for 8 h in test cabinet, on the bottom of which is ammonium chloride solution having pH value 10 - 11		NA
	After test no cracks visible to the unaided eye		NA
8.11.2.2	Verification of resistance to abnormal heat and fire		NA
8.11.2.2.1	Parts of insulating material, except ceramic, have a limited duration of burning without spreading fire by flames or burning droplets or glowing particles falling from the specimen		NA
8.11.2.2.5	Glow-wire test: (650 ± 10) °C		
	Parts of insulating materials not necessary to retain current-carrying parts in position even though they are in contact with them, made the glow-wire test (650 ± 10) °C		P
	No visible flame, or burning or glowing of the specimen extinguish within max. (s) after removal of the glow-wire. Limit (30 ± 1) s ..... :		P
	No burning of the tissue paper		P
	No scorching of the pinewood board		P
	Glow-wire test: (960 ± 10) °C		
	Parts of insulating materials necessary to retain current-carrying parts and parts of the earthing circuit, if any, in position , made the glow-wire test (960 ± 10) °C		P
	No visible flame, or burning or glowing of the specimen extinguish within max. (s) after removal of the glow-wire. Limit (30 ± 1) s ..... :		P
	No burning of the tissue paper		P
	No scorching of the pinewood board		P
8.11.2.3	Verification of resistance to rusting		
	Tested parts after degreasing (10 min in specified solution) placed for 10 min in air saturated with moisture and after that dried 10 min in an ambient temperature (100 ± 5) °C	10 min. - 10 % solution of ammonium chloride in water	P
	Surface of tested parts show no signs of rust		P

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict

APPENDIX 1

8.1.5.1	TABLE: Internal resistance of the fuse-links											
	a) rated current (A) of the fuse-link :						630 A					
	measuring current (A) :											
	ambient air temperature (°C) :						21 °C					
internal resistance	sample No.:											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,072	0,075	0,076	0,069	0,074	0,072	0,076	0,075	0,074	0,076	0,076	0,072
internal resistance	sample No.:											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,073	0,075	0,075	0,076	0,077	0,076	0,074	0,072	0,073	0,076	0,074	0,072

	a) rated current (A) of the fuse-link :						500 A					
	measuring current (A) :											
	ambient air temperature (°C) :						21 °C					
internal resistance	sample No.:											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,115	0,114	0,110	0,113	0,115	0,115	0,112	0,114	0,113	0,115	0,115	0,112
internal resistance	sample No.:											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,112	0,115	0,116	0,114								

	a) rated current (A) of the fuse-link :						400 A					
	measuring current (A) :											
	ambient air temperature (°C) :						21 °C					
internal resistance	sample No.:											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,127	0,130	0,128	0,131	0,127	0,128	0,132	0,129	0,130	0,128	0,129	0,130
internal resistance	sample No.:											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,129	0,129	0,127	0,131								

8.1.5.1	TABLE: Internal resistance of the fuse-links											
	a) rated current (A) of the fuse-link :						315 A					
	measuring current (A) :											
	ambient air temperature (°C) :						21 °C					
internal resistance	sample No.:											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,151	0,155	0,152	0,160	0,157	0,155	0,161	0,157	0,152	0,154	0,155	0,156
internal resistance	sample No.:											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,162	0,158	0,153	0,158								

IEC 60269-1			
Clause	Requirement + Test	Result - Remark	Verdict

	a) rated current (A) of the fuse-link :	250 A
	measuring current (A) :	
	ambient air temperature (°C) :	21 °C

internal resistance	sample No.											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,212	0,208	0,204	0,218	0,222	0,208	0,212	0,220	0,208	0,214	0,222	0,216
internal resistance	sample No.											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,212	0,222	0,206	0,204								

	a) rated current (A) of the fuse-link :	200 A
	measuring current (A) :	
	ambient air temperature (°C) :	21 °C

internal resistance	sample No.											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,272	0,268	0,256	0,270	0,282	0,254	0,266	0,274	0,258	0,278	0,264	0,268
internal resistance	sample No.											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,258	0,278	0,272	0,284								

	a) rated current (A) of the fuse-link :	160 A
	measuring current (A) :	
	ambient air temperature (°C) :	21 °C

internal resistance	sample No.											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,368	0,380	0,372	0,394	0,376	0,388	0,390	0,366	0,384	0,376	0,368	0,388
internal resistance	sample No.											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,378	0,392	0,380	0,378								

	a) rated current (A) of the fuse-link :	125 A
	measuring current (A) :	
	ambient air temperature (°C) :	21 °C

internal resistance	sample No.											
	1	2	3	4	5	6	7	8	9	10	11	12
R (mΩ)	0,582	0,558	0,564	0,574	0,570	0,582	0,590	0,562	0,578	0,586	0,564	0,580
internal resistance	sample No.											
	13	14	15	16	17	18	19	20	21	22	23	24
R (mΩ)	0,588	0,592	0,576	0,580								

TEST REPORT
IEC 60269-2
Low-voltage fuses
Part 2: Supplementary requirements for fuses for use by authorized persons
(fuses mainly for industrial application) - Examples of standardized systems of fuses A to K

List of Attachments (including a total number of pages in each attachment):

Summary of testing:

Tests performed (name of test and test clause):	Testing location:
7.1 Mechanical design	
8.1.4 Arrangement of fuse and dimensions	
8.1.6 Testing of fuse holders	
8.2.5 Resistance to tracking	
8.3 Verification of temperature rise and power dissipation	IHP Laboratory/Sakarya/TURKEY
8.7.4 Verification of overcurrent discrimination	
8.9 Verification of resistance to heat	
8.10 Verification of non-deterioration of contacts	
8.11 Mechanical strength and miscellaneous tests	

Summary of compliance with National Differences

List of countries addressed:

The product fulfils the requirements of IEC 60269-2

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Requirements IEC 60269-1		
	FUSE SYSTEM A – FUSES WITH FUSE-LINKS WITH BLADE CONTACTS (NH FUSE SYSTEM)		
5	CHARACTERISTICS OF FUSES		
5.2	Rated voltage (V) as specified ..... :	500 V	P
5.3.1	Rated current (A) of the fuse-link in accordance with specified values ..... :	125 ,160, 200, 250, 315, 400, 500, 630 A	P
5.3.2	Rated current (A) of the fuse-holder and the size of the fuse-link..... :	630 A	P
5.5	Rated power (W) dissipation of fuse-link see Figure 101 ..... :	48 W	P
	Rated acceptable power (VA) dissipation of fuse-bases given in Figure 102..... :	60 W	P
5.6	Limits of time-current characteristics		P
5.6.1	Time-current characteristics, time-current zones and overload curves..... :		P
5.6.2	Conventional times and current see Table 101 ... :		P
5.6.3	Gates..... :		P
5.7.2	Rated breaking capacity (A) ..... :	100 kA	P
6	MARKING		
	Markings are legible		P
6.1	Fuse-holders marked by:		
	- IEC 60269-2..... :		P
	- size..... :	NH3	P
	Marking of rated current and rated voltage are discernible from the front	630 A, 690 V	P
6.2	Fuse-links marked by:		
	- IEC 60269-2..... :		P
	- size or reference ..... :	NH3	P
	- rated breaking capacity ..... :	100 kA	P
	Marking of rated current and rated voltage are discernible from the front	125 ,160, 200, 250, 315, 400, 500, 630 A	P
	Fuse-links are marked as described in Table 104..... :		P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
7	STANDARD CONDITIONS FOR CONSTRUCTION		
7.1	Mechanical design		
	The dimensions of the fuse-links given in Figure 101		P
	Dimensions:		
	dimension marking a_1: prescribed (mm); measured (mm) ..... :	150 ± 2,5 ; 150	P
	dimension marking a_2: prescribed (mm); measured (mm) ..... :	75 - 10 ; 73,5	P
	dimension marking a_3: prescribed (mm); measured (mm) ..... :	62 ± 2,5 ; 62	P
	dimension marking a_4: prescribed (mm); measured (mm) ..... :	68 ± 2,5 ; 68	P
	dimension marking $b_1$min: prescribed (mm); measured (mm) ..... :	Min 32 ; 32	P
	dimension marking $b_2$min: prescribed (mm); measured (mm) ..... :	Min 11 ;	N/A
	dimension marking $b_3$max: prescribed (mm); measured (mm) ..... :	Max 6 ; 5	P
	dimension marking $b_4$min: prescribed (mm); measured (mm) ..... :	Min 29 ;31	P
	dimension marking c_1: prescribed (mm); measured (mm) ..... :	60 ± 0,8 ; 59	P
	dimension marking c_2: prescribed (mm); measured (mm) ..... :	11 - 2 ; 10	P
	dimension marking d: prescribed (mm); measured (mm) ..... :	$2,5\ ^{+1,5}_{-0,5}$; 2,7	P
	dimension marking $e_1$max: prescribed (mm); measured (mm) ..... :	Max 76 ; 68,5	P
	dimension marking $e_2$max: prescribed (mm); measured (mm) ..... :	Max 75 ; 68,5	P
	dimension marking e_3: prescribed (mm); measured (mm) ..... :	$20\ ^{+5}_{-2}$;	N/A
	dimension marking e_4: prescribed (mm); measured (mm) ..... :	6 ± 0,2 ; 6	P
	dimension marking f max: prescribed (mm); measured (mm) ..... :	Max 18 ; 16,5	P
	dimension marking z max: prescribed (mm); measured (mm) ..... :	5 ;	N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The dimensions of the fuse-base given in Figure 102		P
	Dimensions:		
	dimension marking g: prescribed (mm); measured (mm) ..... :	73 ± 1 ;	N/A
	dimension marking h: prescribed (mm); measured (mm) ..... :	210 ± 1,5; 209	P
	dimension marking $n_1$max: prescribed (mm); measured (mm) ..... :	Max 75 ; 34	P
	dimension marking $n_2$max: prescribed (mm); measured (mm) ..... :	Max 83 ; 48 (bmc) 51 (steatite)	P
	dimension marking $p_1$max: prescribed (mm); measured (mm) ..... :	Max 68 ; 52,5 (bmc) 49 (steatite)	P
	dimension marking p_2: prescribed (mm); measured (mm) ..... :	35 ± 1,5 ;	N/A
	dimension marking r min: prescribed (mm); measured (mm) ..... :	Min 20 ; 28 (bmc) 42 (steatite)	P
	dimension marking s max: prescribed (mm); measured (mm) ..... :	Max 58 ; 44	P
	dimension marking t min: prescribed (mm); measured (mm) ..... :	Min 33 ; 37	P
	dimension marking v: prescribed (mm); measured (mm) ..... :	80 ± 3 ; 78	P
	dimension marking w_1: prescribed (mm); measured (mm) ..... :	30 ± 0,7 ; 30	P
	dimension marking w_2: prescribed (mm); measured (mm) ..... :	25 ± 0,7 ; 25	P
	dimension marking x min: prescribed (mm); measured (mm) ..... :	Min 20 ;21	P
	dimension marking y: prescribed (mm); measured (mm) ..... :	10,5 ± 0,5 ; 11	P
	dimension marking z max: prescribed (mm); measured (mm) ..... :	Max 5 ;	N/A
	dimension marking a min: prescribed (mm); measured (mm) ..... :	Min 35 ; 60	P
	dimension marking b min: prescribed (mm); measured (mm) ..... :	Min 30 ; 35	P
	dimension marking c min: prescribed (mm); measured (mm) ..... :	Min 5 ; 5	P
	dimension marking d : prescribed (mm); measured (mm) ..... :	11 ± 0,25 ; 14 (see note 10 of Figure 102)	P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	dimension marking e : prescribed (mm); measured (mm) ..... :	15 ± 0,5 ; 15	P
7.1.2	Connections, including terminals cross-sectional ranges (Table 105) ..... : torques to be applied (Table 111) (lug terminal) ..... :	32 Nm	P
7.1.3	Contact surfaces should be silver plated ..... :	Yes / No	P
	If no test according to 8.10 are passed with dummies described in 8.10.1		P
7.1.6	Dynamic short-circuit withstand shall meet cut-off currents (Table 112) ..... :		N/A
7.1.7	Construction of fuse-link		
	Blade contacts made of solid material ..... :		P
	If any other construction, manufacturer demonstrate that construction adequate ..... :		N/A
	Endplates not permitted to protrude radially from insulation body ..... :		P
	preferable to insulate the gripping lugs from live parts		N/A
	Fuse-links has an indicator ..... :		P
	Electrically conductive parts of indicator not ejected from the fuse-link during operation ..... :		P
7.2	Insulating properties and suitability for insulation		
	Creepage distances and clearances of fuses and fuse-accessories meet requirements of IEC 60664-1 for overvoltage category III and pollution degree 3. :		P
	Insulating parts of fuse-base supporting live parts meet the test at PTI 400 according to IEC 60112 (test solution A) ..... :		P
7.7	I^2t characteristics		
	maximum pre-arcing I^2t (Table 7 of IEC 60269-1) ..... :		P
	rated currents lower than 16 A and for 224 A (Table 106) ..... :		N/A
	maximum operating I^2t for "aM" fuse-links (Table 107) test No. 2 of the largest rated current of each homogeneous series (Table 20 of IEC 60269-1) ... :		N/A
7.8	Overcurrent discrimination of "gG" fuse-links (see 8.7.4, Table 108) ..... :		P
7.9	Protection against electric shock		
	increased by means of partition walls and covers of fuse-contacts ..... :		N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	operation by authorized persons, instructed in electrical matters, using replacement handles according to this fuse system ..... :		N/A
8	TESTS		
	IEC 60269-1 applies with the following supplementary requirements		
8.1.4	Arrangement of fuse and dimensions	Part 2 Figure 101	P
	Requirements of 7.2 verified on fuse-bases ..... :		P
	Creepage distances and clearances of fuse-links according to 7.2 are verified ..... :	Clearance: 26 mm Creepage distance:27 mm	P
	Clearances verified on fuse-link inserted into model fuse-base according to Figure 111 ..... :		N/A
8.1.6	Testing of fuse-holders		
	In addition to test given in IEC 60269-1 tested according to Table 109 ..... :		P
8.2.2.1	Points of application of test voltage		
	In addition to IEC 60269-1 e) between isolated metal gripping-lugs and terminals of test fuse-bases ..... :		N/A
8.2.3.2	Value of test voltage		
	rated impulse withstand voltage in Table 110 ..... :	8 kV	P
8.2.3.3	Test method		
	5 impulses of both polarities and of shape 1,2/50 µs and rated withstand voltage level according to Table 110 ..... : minimum period between impulses are 1 s ..... :	9,8 KV 5 times – period of 5 s	P
8.2.4	Acceptability of test results		
8.2.4.3	No flash-over or puncture shall occur during test ... :		P
8.2.5	Resistance to tracking		
	insulating parts supporting live parts of fuse-links and fuse-bases tested according to IEC 60112 (test solution A) ..... :		N/A
	Five specimens tested and passed at PTI 400 ..... :		N/A
8.3	Verification of temperature rise and power dissipation		
8.3.1	Arrangement of the fuse		
	Tightened by torque (Nm) ..... :	32 Nm	P
8.3.2	Measurement of the temperature rise		
	Protective covers and fuse-carriers as provided by manufacturer mounted ..... :		N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.4.1	Temperature rise of the fuse-holder	43 K	P
	Dummy (Figure 105) Point at which temperature rise is measured (Figure 106)	60W dummy link Point marked with "E"	P
8.3.4.2	Power dissipation of a fuse-link (Figure 106)		N/A
8.4.3.1	Verification of conventional non-fusing and fusing current		P
	non-fusing current test – second test specimen are used for b)		P
8.4.3.5	Conventional cable overload protection test (for "gG" fuse-links only)		P
	Details of special test are given in Annex AA		N/A
Annex AA	Special test for cable overload protection		
	For fuses with I_n > 16 A of the sizes 000, 00, 0, 1 and 2 ..... :		N/A
AA.1	Arrangement of the fuse		
	Three fuse-links in fuse-bases mounted in a box ... :		N/A
	Ambient air temperature outside the fuse box shall be (30$^{+5}_{0}$°C) ..... :	°C	N/A
AA.2	Test method and acceptability of test results		
	1,13 I_n flowed through the fuse-links for conventional time (see Table 2 of IEC 60269-1) ..... :	A for s	N/A
	None of fuse-links operated ..... :		N/A
	Test current raised without interruption within 5 s to 1,45 I_n ..... :	A	NA
	One fuse-link operated within conventional time .... :		NA
8.5.5.1	Verification of the peak withstand current of a fuse-base		
	not be carried out , if this has already been verified during the breaking capacity test of fuse-links with the highest rating of the size ..... :		N/A
8.5.5.1.1	Arrangement of the fuse		
	single-phase type, 8.5.1 of IEC 60269-1 peak values of the test currents (Table 112)..... : maximum values (see 8.5.5.1.3)..... : dummy fuse-link (Figure 101) ..... :		N/A
8.5.5.1.2	Test method		

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	fuse-base 1 (Figure107) resilient spring travel is limited to elastic range..... : contacts opened up three times..... :		N/A
	fuse-base 2 (see 8.11.1.2) F_{max} according to Table 118		N/A
8.5.5.1.3	Acceptability of test results		
	fuse-links not be ejected		N/A
	no signs of arcing or welding or other damage		N/A
8.5.8	Acceptability of test results		
	Fuse or circuit-breaker not operate during this test		N/A
8.7.4	Verification of overcurrent discrimination		
	verified by I^2t values evaluated from the recorded test results		N/A
	Arrangement of the samples as for the breaking capacity test		P
	two samples tested at the r.m.s. prospective test current I, corresponding to minimum pre-arcing I^2t	3 kA (125A fuse-links) 20 kA (630A fuse-links)	P
	The values of I^2t lie within corresponding limits specified in Table 113..... : For 125A: Min pre-arcing > 36 kA^2s For 630A: Min pre-arcing > 1600 kA^2s	1) 45 kA^2s (125A fuse-links) 2) 40 kA^2s 1) 1640 kA^2s (630A fuse-links) 2) 1650 kA^2s	P
	the other samples tested at the r.m.s. prospective test current I, corresponding to operating I^2t	5,1 kA (125A fuse-links) 37 kA (630A fuse-links)	P
	test voltage (V) ..... :	400 V	
	The test voltage for 690 V fuses is 1,05xUn/3		N/A
	The test voltage for all other fuses is 1,1xUn/3	400V (Measured values were calculated for 318V according to Annex B3)	P
	The values of I^2t lie within corresponding limits specified in Table 113..... : For 125A: Max operating < 104 kA^2s For 630A: Max operating < 5470 kA^2s	1) 94 kA^2s (125A fuse-links) 2) 92 kA^2s 1) 3149 kA^2s (630A fuse-links) 2) 3168 kA^2s	
8.9	Verification of resistance to heat		
	Tests apply to fuse-link and fuse-base		P
	Fuse-holder with fuse-links having maximum power dissipation are cyclically loaded as pre-treatment... :		P
	After cooling to normal temperature breaking capacity tested at I_1 (see 8.5)..... :	I_1 = 100 kA	P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Fuse-links with organic material Fuse-holder with fuse-links having maximum power dissipation are cyclically loaded as pre-treatment.....		N/A
	After cooling to normal temperature breaking capacity tested at I_1 and I_5 (see 8.5)..... :	I_1 = I_5 =	N/A
8.9.1	Fuse-base		
	test below apply if it is not obvious that components are not affected adversely by given temperature and withdrawal forces		P
8.9.1.1	Test arrangement		
	Figure 105 and 108	Figure 105	P
	Test set-up in heating chamber		
8.9.1.2	Test method		
	Temperature of (80^{+5}_{0})°C for 2 h	80°C, 2 h	P
	160% rated current for 2 h..... :	160% I_n = 1008 A, 2 h	P
	Test voltage ..... :	10-12 V	
	3 min after switching off tensile force F_{max} (see Table 118) exerted for 15 s	F_{max} = 400 N, 15 s	P
8.9.1.3	Acceptability of test results		
	Contact pieces not have moved to affect the further use		P
	Dimensions of Figure 102 are considered		P
	Insulating mounting part no broken and no show any signs of cracks		P
8.9.2	Fuse-links with gripping lugs of moulded material or of metal fixed in moulded material		N/A
8.9.2.1	Test arrangement		
	Figure 108		N/A
8.9.2.2	Test method		
	Temperature of (80^{+5}_{0})°C for 2 h		N/A
	150% rated current for conventional time ..... :	A for h	N/A
	Test voltage ..... :	V	
	3 min after fuse-link operated or conventional time expired tensile force F_{max} (see Table 118) exerted for 15 s	F_{max} =	N/A
8.9.2.3	Acceptability of test results		
	Gripping lugs remain fully operational		N/A
	Dimensions of Figure 101 (d and c_2) not be exceeded by more than 2 mm		N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.10	Verification of non-deterioration of contacts		
8.10.1	Arrangement of the fuse		P
	Figure 105	630A, dummy fuse-link	P
	for lug terminals, torque in Table 111 ..... :	32 Nm	
	Insulation of conductors removed over the whole length ..... :	2 m	P
	All covers of contacts and terminals are removed		P
8.10.1.2	Direct terminal clamps		
	Test performed on 10 direct terminal clamps of five fuse-bases		N/A
	Distance between fuse-base centres of at least three times Θ_2 (see Figure 101)		N/A
	Torque of tightened of screws ..... :	Nm	
	Conductor cross-section ..... :	mm^2	
8.10.2	Test method		
	Test current (A) for load period ..... :	1,25 xIn= 788 A	P
	Duration (s) of load period ..... :	0,25 x 240 = 60 min	P
	Duration (s) of no-load period ..... :	0,1 x240 = 24 min	P
	Test voltage (V) ..... :	10- 12 V	
	a) Test of 50 cycles, measured values did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	P
	b) Test of 250 cycles, measured values did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	P
	c) Test of 500 cycles, measured values did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	P
	d) Test of 750 cycles, measured values did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	P
8.10.2.1	Contacts		
	Points between voltage drop is measured (A and B in Figure 106)		P
	Withdrawal force (Table 118); measured force after 250 cycles (N)	1) 270 N 2) 310 N 3) 280 N	P
	Withdrawal force (Table 118); measured force after 750 cycles (N) ..... :	1) 2) 3)	N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	If measured values too low, test of 8.5.5.1 ..... :	Table 118 (210 N – 400 N)	P
8.10.2.2	Direct terminal clamps		N/A
	Points between voltage drop is measured (Figure 110)		N/A
	Test sequence for all types conductors (see Table 116)	(see appended table)	N/A
	Verification of temperature rise (see 8.3.4.1) (see figure 110) ..... :		N/A
8.10.3	Acceptability of test results		
8.10.3.1	Contacts		
	Limit value after 250th cycle ≤ 15%	See Table 1	P
	Limit value after 500th cycle ≤ 30%		N/A
	Limit value after 750th cycle ≤ 40%		N/A
	Difference between last and first measurement of temperature rise less than 20 K ..... :	3 K	P
8.10.3.2	Direct terminal clamps		N/A
	Permissible tolerance for resistance R_{a0} for Al conductors : $R_{cl\,0\,max} \leq 2\ R_{cl\,0\,min}$ ..... :		N/A
	Permissible changes of the resistance from $R_{cl\,50}$ to $R_{cl\,750}$: see Table 117 ..... :		N/A
	Copper or cleaned aluminium conductors ..... :		N/A
	Uncleaned aluminium conductors..... :		N/A
	Change from 50th to 250th cycle		N/A
	Change after 250th to 500th cycle		N/A
	Change after 500th to 750th cycle		N/A
	Change between 50th to 750th cycle		N/A
	Temperature rise at test spot F < 75K		N/A
8.11	Mechanical and miscellaneous tests		
8.11.1.1	Mechanical strength of fuse-holders		
	Test set-up subjected to temperature rise test at rated current ..... :	630A, dummy fuse-link 41K	P
	fuse-link or fuse-carrier are withdrawn and inserted into fuse-base 100 times ..... :	100 times	
	All parts are intact and function normally		P
	Test set-up subjected to further temperature rise test at rated current (values obtained are not more than 5 K or 15 % above the values from temperature-rise test prior) ..... :	44K Difference < 3K	P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.11.1.2	Mechanical strength of the fuse-base		
	Test-link inserted three times in the fuse-base .....: (Dimensions of blade contacts see Figure 101) (Withdrawal force F lied within limits in Table 118)	Figure 101 1) 270 N 2) 280 N 3) 280 N	P
	Steel screws are fastened three times at the terminals, torque of 1,2 times value specified by manufacturer or value of Table 111 .....:	38,2 Nm	P
	Contact pieces not have moved to affect the further use		P
	Insulating mounting part no broken and no show any signs of cracks		P
8.11.1.8	Impact resistance of gripping-lugs of moulded material or of metal fixed in moulded material		
8.11.1.8.1	Test arrangement		N/A
8.11.1.8.2	Facility is given in Figure 109 .....:		N/A
	One fuse-link ...(150±5)°C for 168 h		
	Another one .....-15°C for 72 h		
	One impact on each of gripping-lugs		N/A
8.11.1.8.3	Acceptability of test results		
	No damage capable of hindering their further use		N/A
	No bent out by more than 3 mm		N/A
	Coupling with a handle (Figure 103) not are hindered		N/A
8.11.2.3	Verification of resistance to rusting		
8.11.2.3.1	According to ISO 6988 cyclic moist atmosphere containing 0,2% SO2 (SFW 0,2 S) for 1 cycle		P
8.11.2.3.2	Optional test (severe environmental conditions)		N/A
	Fuse-links and fuse-bases for used in environment of pollution degree ≥3 tested with SFW 2,0 S for 5 cycles .....:		N/A
	They marked accordingly .....:		P
8.11.2.4	Non-deterioration of insulating parts of fuse-link and fuse-base		
8.11.2.4.1	Test method		
	Period 168 h .....:	168 h	P
	for equipment comprising moulded elements to support live parts (150±5)°C	150 °C	P
	for covers (100±5)°C		N/A

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Period greater than 1 h.....:	3 h	P
	for sealing compounds; stability of marking .....(150±5)°C	150°C	P
	After cooling to ambient temperature the following are tested.		P
	Fuse-links: breaking capacity with I_1 and I_2 .....:		P
	Fuse-base: mechanical strength in accordance with 8.11.1.2		P
8.11.1.2	Mechanical strength of the fuse-base		
	Test-link inserted three times in the fuse-base .....: (Dimensions of blade contacts see Figure 101) (Withdrawal force F lied within limits in Table118)	Figure 101 1) 280 N 2) 290 N 3) 300 N	P
	Steel screws are fastened three times at the terminals, torque of 1,2 times value specified by manufacturer or value of Table 111 .....:	38,2 Nm	P
	Contact pieces not have moved to affect the further use		P
	Insulating mounting part no broken and no show any signs of cracks		P
8.11.2.4.2	Acceptability of test results		
	Not have changed of positions of fuse-base contacts to correct functioning		P
	No fracture nor any signs of fracture on insulating body with terminals		P
	Mechanical strength of cemented joints not impaired		P
	Sealing compounds not shifted to extent permitting live parts to exposed		P
	Fuse-links operate correctly		P
	Marking are durable and easily legible		P

APPENDIX 1

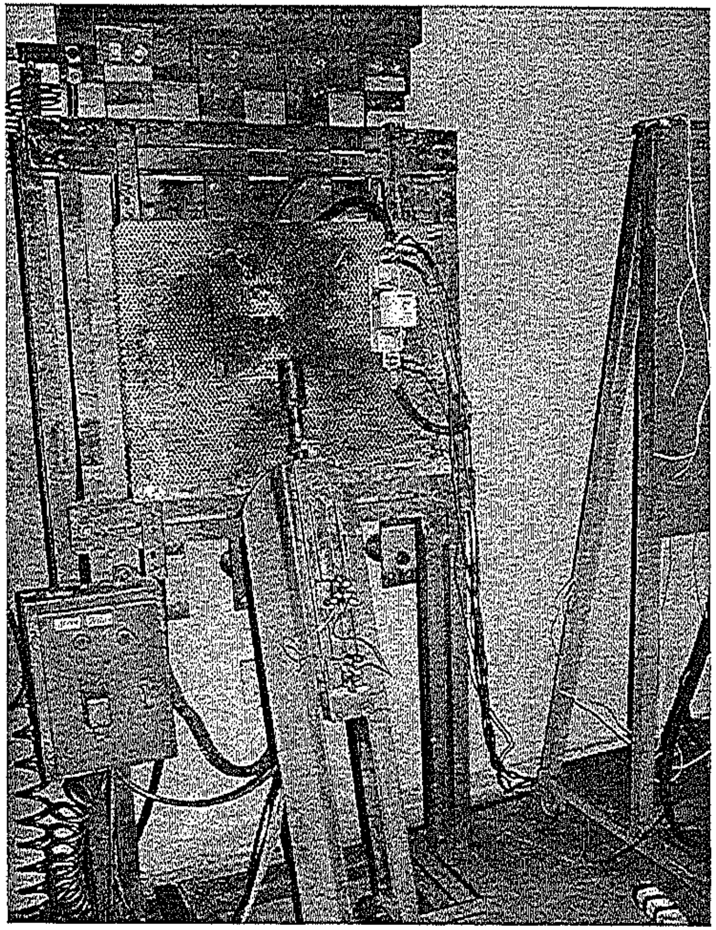
IEC 60269-2				
Clause	Requirement + Test		Result - Remark	Verdict
8.10.2	TABLE 1: Direct terminal clamps			
	ambient air temperature (°C) .....:		20°C - 22°C	

Sample No. (contacts)	1	2	3	4	5	6	7	8	9	10
T 1 (K)	42K	41K	42K							
ΔU initial	1,35 Vdc	1,30 Vdc	1,32 Vdc							
Rcl 0	27,0 mΩ	26,0 mΩ	26,4 mΩ							
ΔU 50	1,38 Vdc	1,35 Vdc	1,36 Vdc							
Rcl 50	27,6 mΩ	27,0 mΩ	27,2 mΩ							
ΔU 250	1,38 Vdc	1,36 Vdc	1,38 Vdc							
Rcl 250	27,6 mΩ	27,2 mΩ	27,6 mΩ							
T 2 (K)	43K	44K	44K							
ΔU 500										
Rcl 500										
ΔU 750										
Rcl 750										
T 3 (K)										

T 1: initial temperature rise / T 2: temperature rise after 250 cycles / T 3: final temperature rise

List of test equipment used:

Test Equipment			
Equipment Name - No	Manufacturer - Type	Features	Traceability
Test transformer (TT01)	Best	440 V 65 kA, 660 V 5 kA	-
Resistive load (RY01-03)	Hilkar	38 ohm, 1300 A / sn	-
Inductive load (EY01-12)	BEST	128 ohm	-
Resistive and inductive load (AY01)	FEDERAL	2,3 ohm, 6 mH	-
Resistive and inductive load (AY03)	IHP	60 mohm, 380 µH	-
Current measuring system (AO01-03)	DIMES L 500 TC	143,29 kA / 2,8763 V	IHP 1014.01
Voltage measuring system(GO01-03)	DIMES L 500 TV	± 1024 V	IHP 1014.02
Rogowski coil (RG05-07)	HEBEMUS 150 K	150 kA / 2 Volt	IHP 1114.03
Fluke current coil (FL01-03)	Fluke 2000 flex	200 A / 2000 A	IHP 0814.02
Voltmeter (V01-03)	Federal FYV - 72	0-500 V	IHP 1014.03
Making breaker (KK01-03)	Preussag NVL 82DA	12 KV, 1250 A Icm=80 kA	-
Making breaker (KK04)	Federal F112E	2500 A, 400 V	-
Making breaker (KK05)	Federal F121E	2000 A, 400 V	-
Current supply (TT04)	Mersan	300 A	-
Current supply (TT05)	Mersan	5000 A	-
Current supply (TT07)	Alnal	2000 A, 5 V	-
Current-voltage supply (AGK 01)	Alnal	220 Vdc, 500 Vac, 10 A	-
Current-voltage supply (AGK 02)	GW instek	30 Vdc, 3 A	-
Transformer-Ammeter (AA01-03)	Federal FAT100-FYA96	3000 / 5 A	IHP 0814.05
Clamp meter (P03)	CIE	1000 A RMS	IHP 1014.07
Isolation test equipment (IT04)	GW instek GPI 825	5 kV AC, 1000 VDC Meger	IHP 1014.04
Oscilloscope (O02)	Textronik TDS 460 A	400 MHz, 4 canal	IHP 0713.02
Dynamometer (KO01)	Lutron FG 5100	100 Kg	IHP 0114.02
Thermometer (SO01)	CIE 306	200 °C	IHP 1114.02
Temperature measuring eq. (SO04)	Agilent 34970A	60 canal, T type termokupl	UMS S3315
Multimetre (M01)	HP 3444001A	1000 V, 3 A	IHP 0914.01
Multimetre (M02)	Fluke 87	10 A, 1000 V	IHP 0914.02
Calipor (KU03)	Mitutoyo	0,01 mm	IHP 0315.01
Torquemeter (TO 01)	Torqueleader	6-80 Nm	IHP 0215.01
Torquemeter (TO03)	Tronic AT 1502 LDIN	0-18 Nm	IHP 0215.02
Impulse test device (DT01)	HİLO PG1012C	0-10 kV, 1,2/50 ms	IHP 0312.03
Climatic chamber (ID01)	Angelantoni CH 600 C	-40+180 °C, 10 - 98 %RH	-
Calibrator (K01)	Wavetek	1050 V, 20A,	046690 FLUKE
Red-hot wire test device (KT01)	Federal	960°C	-
Temperature cabinet (SK01)	Federal	60 °C, 170x225x320 cm	
High Voltage Probe (YG01)	Textronik P6015A	40 kV, x 1000 prob	IHP 0313.23



ВЯРНО С ОРИГИНАЛА

"ЕМИ Електрик" ООД
"EMI Electric" LTD

304

Приложение 3 към Техническо предложение

За Обособена позиция 2

СРОКОВЕ ЗА ДОСТАВКА

№	Наименование	Мярка	Количество със срок на доставка до 7 кал. дни	Количество със срок на доставка до 30 кал. дни
1	2	3	4	5
1	КРШ НН-4, нисък, полиестерен	бр.	5	10
2	КРШ НН-5, нисък, полиестерен	бр.	5	10
3	КРШ НН-6, нисък, полиестерен	бр.	10	20
4	КРШ НН-7, нисък, полиестерен	бр.	2	5
5	КРШ НН-4PL, нисък, полиестерен	бр.	1	3
6	КРШ НН-5PL, нисък, полиестерен	бр.	1	3
7	КРШ НН-6PL, нисък, полиестерен	бр.	1	3
8	КРШ НН-7PL, нисък, полиестерен	бр.	1	3

Забележки:

1/ Срокът на доставките започва да тече от датата на изпращане на поръчката.

2/ Количествата в колона 4, със срок на доставка до 7 /седем/ календарни дни, се доставят след SAP поръчка до посочените в обявлението складове на Възложителя за покриване на спешни нужди на Възложителя. Възложителят може до поръчва посоченото спешно количество веднъж месечно.

3/ В случай, че крайният срок на доставката съвпада с празничен или неработен ден, то доставката се извършва не по-късно от първия работен ден след изтичането на срока.

4/ При поръчки на Възложителя на количества в рамките на потвърдените от Изпълнителя и недоставени в посочените срокове, ще бъдат налагани неустойки, съгласно условията на договора.

5/ Възложителят може да поръча количества по-малки от посочените в колони 4 и 5.

6/ Възложителят може да поръчва количества по-високи от посочените в колони 4 и 5, като това обстоятелство ще бъде посочено текстово в съответната поръчка изпратена към Изпълнителя. С потвърждението на поръчката, Изпълнителят вписва в същата очаквана дата за доставка на количествата надвишаващи посочените в колони 4 и 5.

7/ Количествата за доставка в колони 4 и 5 са отделни и независими едно от друго.

8/ Количествата за доставка в колона 5 не включват в себе си количествата за доставка в колона 4.

9/ Възложителят има право да направи едновременно поръчки за доставка на количества от колони 4 и 5.

Дата 13.03.2018 г.

ПОДПИС и ПЕЧАТ:

на основание чл. 2 от ЗЗЛД

Алексей Родин
Управител
(длъжност на представляващия участника)

Приложение № 4

Д Е К Л А Р А Ц И Я

за приемане на условията в проекта на рамково споразумение и проекта на конкретен договор, неразделна част от рамковото споразумение

Долуподписаният/-ната/ Алексей Николаевич Родин, в качеството ми на

представляващ „ЕМИ ЕЛЕКТРИК" ЕООД, участник в процедура за възлагане на обществена поръчка с реф. № PPD 17-152 и предмет: " Доставка на кабелни разпределителни шкафове", обособена/и позиция/и №2

ДЕКЛАРИРАМ, ЧЕ:

1. Приемам условията в проекта на рамково споразумение, приложен в документацията за участие.

2. Приемам условията в проекта на конкретен договор, неразделна част от рамковото споразумение, приложен в документацията за участие.

Дата 13.03.2018 г.

ПОДПИС и ПЕЧАТ:

на основание чл. 2 от ЗЗЛД

(име и фамилия)
Алексей Родин

Забележка:
Декларацията се подписва от законния представител на участника или от надлежно упълномощено лице, което подава офертата.
Когато участник подава оферта за повече от една обособена позиция, може да бъде изготвена, подписана и подадена само една декларация (според настоящия образец), но на съответното място в декларацията задължително се отбелязват номерата на всички обособени позиции, за които участникът участва. Възможно е по преценка на участника, когато същият участва за повече от една обособена позиция, да изготви и подпише отделни декларации (съобразно настоящия образец) за всяка отделна обособена позиция, за която участва.

Приложение № 5

Д Е К Л А Р А Ц И Я
за срока на валидност на офертата

Долуподписаният/ -ата Алексей Николаевич Родин,
(собствено, бащино, фамилно име)
на основание чл. 2 от ЗЗЛД
в качеството ми на Управител
(посочва се длъжността)
на „ЕМИ ЕЛЕКТРИК" ЕООД,
(посочете наименованието на участника)

участник в процедура за възлагане на обществена поръчка с реф. № PPD 17-152 и предмет: „Доставка на кабелни разпределителни шкафове", обособена/и позиция/и №2
(наименование на поръчката)

ДЕКЛАРИРАМ, ЧЕ:

С подаване на настоящата оферта, направените от нас предложения и поети ангажименти за обособена/и позиция/и №2 , са валидни за срока, посочен в обявлението, считано от крайния срок за подаване на офертите.

Дата 13.03.2018 г.

ПОДПИС и ПЕЧАТ:

на основание чл. 2 от ЗЗЛД
(име и фамилия)
Алексей Родин

Забележка:
Декларацията се подписва от законния представител на участника или от надлежно упълномощено лице, което подава офертата.
Когато участник подава оферта за повече от една обособена позиция, може да бъде изготвена, подписана и подадена само една декларация (според настоящия образец), но на съответното място в декларацията задължително се отбелязват номерата на всички обособени позиции, за които участникът участва. Възможно е по преценка на участника, когато същият участва за повече от една обособена позиция, да изготви и подпише отделни декларации (съобразно настоящия образец) за всяка отделна обособена позиция, за която участва.