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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

Report Number. .....:	180301688SHA-002
Date of issue .....:	2018-04-24
Total number of pages.....	18
Applicant's name.....:	YUEQING BARFUSE ELECTRIC CO., LTD
Address .....:	Yonghe san Rd, no.15, Chengdong Industry zone, Yueqing, Zhejiang, China
Test specification:	
Standard.....:	IEC 60269-2: 2013 +A1:2016
Test procedure.....:	CB Scheme
Non-standard test method……..:	N/A
Test Report Form No.....:	IEC60269_2C
Test Report Form(s) Originator.....:	EZU
Master TRF.....:	Dated 2014-06

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Test item description ..... :	STRIP TYPE FUSE RAIL
Trade Mark ..... :	BARFUSES BATTLE FOR SAFETY
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	BTR2
Ratings ..... :	Un=690V, In=250A; Ip=690V/50kA; System C

Testing procedure and testing location:			
☒	Testing CB Laboratory:	Intertek Testing Services Shanghai	
Testing location/ address ..... :		Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China	
☒	Associated CB Testing Laboratory:	Inspection Center of Products' Quality of Low Voltage Electric Apparatus in Zhejiang Province	
Testing location/ address ..... :		No. 400 Guangqiong Rd. Jiaxing Zhejiang CHINA	
Tested by (name + signature) ..... :		Quiet Lin	
Approved by (name + signature) ..... :		Allen Wang	
☐	Testing procedure: TMP/CTF Stage 1:		
Testing location/ address ..... :			
Tested by (name + signature) ..... :			
Approved by (name + signature) ..... :			
☐	Testing procedure: WMT/CTF Stage 2:		
Testing location/ address ..... :			
Tested by (name + signature) ..... :			
Witnessed by (name + signature) ..... :			
Approved by (name + signature) ..... :			
☐	Testing procedure: SMT/CTF Stage 3 or 4:		
Testing location/ address ..... :			
Tested by (name + signature) ..... :			
Witnessed by (name + signature) ..... :			
Approved by (name + signature) ..... :			
Supervised by (name + signature) ..... :			

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

Summary of testing:

Clause	Testing Items	Testing Location
8.1.4	Arrangement of the fuse and dimensions	CBTL
8.1.5.1	Resistance	CBTL
8.2	Verification of the insulating properties and of the suitability for isolation	ACTL
8.3	Temperature rise, power dissipation	ACTL
8.4.3.1	Verification of conventional non-fusing and fusing current	ACTL
8.4.3.2	Verification of rated current of “g” fuse-link	ACTL
8.4.3.3	Verification of time-current characteristics and gates	ACTL
8.4.3.4	Overload	ACTL
8.4.3.5	Conventional cable overload protection	ACTL
8.4.3.6	Operation of Indicating device and striker	ACTL
8.5	Verification of the breaking capacity	ACTL
8.6	Verification of the cut-off current characteristics	ACTL
8.7	Verification of I2t characteristics and overcurrent discrimination	ACTL
8.8	Degree of protection	CBTL
8.9	Resistance to heat	CBTL
8.10	Non-deterioration of contacts	ACTL
8.11.1	Mechanical strength	ACTL
8.11.2	Miscellaneous test	ACTL

Number of fuse-holder to be tested

Test according to subclause		Number of samples				
		#01	#02	#03		
8.1.4	Dimensions	x				
8.2	Insulating properties and suitability for isolation	x				
8.11.2.2	Resistance to abnormal heat and fire	x				
8.11.1.2	Mechanical strength of the fuse-base		x			
8.3	Temperature rise, power dissipation			x		
8.11.1.1	Mechanical strength of fuse-holder			x		
8.3	Temperature rise, power dissipation			x		
8.10.1.1	Contacts		x			
8.11.1.2	Mechanical strength of the fuse-base		x			
8.5.5.1	Peak withstand current of a fuse-base		x			
8.9	Resistance to heat			x		
8.11.2.4	Non-deterioration of of insulating parts of fuse-link and fuse-base			x		
8.11.1.2	Mechanical strength of the fuse-base			x		
8.10.1.2	Direct terminal clamps [b)]					
8.11.2.3	Resistance to rusting		x			

Note:
a) The test sequence is according to IEC 60269-2, Table 302
b) Clause 8.10.1.2 is not applicable, no such direct terminal clamps.

Summary of compliance with National Differences

The products comply with the standard EN 60269-1:2007+A1:2009+A2:2014 and HD 60269-2:2013

Copy of marking plate

Made In China

Product Model:	BTR2-250A	STRIP TYPE FUSE RAIL	
Rated voltage:	AC690V50HZ	Rated current:	250A
Applicaton Category	AC-21B	Isolation code:	
Fuse Size:	SIZE I	Dissipated power:	32W

Test item particulars.....:	
Classification of installation and use.....:	**Rail installed**
Supply Connection.....:	**Copper bus-rail with screws and copper conductor with pillar terminals**
Fuse system .....:	~~A/B/~~**C**~~/D/E/F/G/H/I/J/K~~
.....:	
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 ..... :	**2018-03-20**
Date (s) of performance of tests ..... :	**2018-03-20 ~ 2018-04-20**

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.

This test report is valid only being read together with the test reports of 180301688SHA-001

Manufacturer's Declaration per sub-clause 4.2.5 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) ..... : Same as applicant
General product information: Un=690V, In=250A; Ip=690V/50kA; System C; Uimp=6kV Rated acceptable power dissipation 32W

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Requirements IEC 60269-1		
FUSE SYSTEM C – FUSE-RAILS (NH FUSE SYSTEM)			
5	CHARACTERISTICS OF FUSES		
5.2	Rated voltage (V) as specified ..... :	690V (fuse-holder)	P
5.3.2	Rated current (A) of fuse-rails (see Figure 301) ..... :	250A	P
5.5.1	Rated power (W) acceptance of fuse-rails (see Figure 301) .....:	32W	P
6	MARKING		
	Markings are legible		P
6.1	Fuse-holder marked by:		--
	- IEC 60269-2..... :		P
	- size..... :	Size 1	P
	Marking of rated current and rated voltage are discernible from the front		P
6.2	Fuse-links marked by:		--
	- IEC 60269-2..... :		N/A
	- size or reference..... :		N/A
	- rated breaking capacity ..... :		N/A
	Marking of rated current and rated voltage are discernible from the front		N/A
	Fuse-links are marked as described in Table 104.. :		N/A
7	STANDARD CONDITIONS FOR CONSTRUCTION		
7.1	Mechanical design Sample: #01		--
	Reference A / Reference B /Reference C	Reference B	P
	dimension marking c max: prescribed (mm); measured (mm) .....:		N/A
	dimension marking d_1: prescribed (mm); measured (mm) .....:		N/A
	dimension marking d_2 min: prescribed (mm); measured (mm) .....:		N/A
	dimension marking h_1 min: prescribed (mm); measured (mm) .....:	Prescribed: 40 mm Measured: 46 mm	P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	dimension marking h_2 max: prescribed (mm); measured (mm) .....:	Prescribed: 175 mm Measured: 142 mm	P
	dimension marking m_1: prescribed (mm); measured (mm) .....:	Prescribed: 280-305 mm Measured: 300 mm	P
	dimension marking m_2: prescribed (mm); measured (mm) .....:	Prescribed: 185±2,5 mm Measured: 186 mm	P
	dimension marking m_3 max: prescribed (mm); measured (mm) .....:	Prescribed: 280 mm Measured: 277 mm	P
	dimension marking m_4: prescribed (mm); measured (mm) .....:	Not such lug terminals	N/A
	dimension marking m_5: prescribed (mm); measured (mm) .....:	Not such lug terminals	N/A
	dimension marking n_2 max: prescribed (mm); measured (mm) .....:	Prescribed: 100 mm Measured: 98,0 mm	P
	dimension marking r min: prescribed (mm); measured (mm) .....:	Prescribed: 17 mm Measured: 27,1 mm	P
	dimension marking s max: prescribed (mm); measured (mm) .....:	Prescribed: 38 mm Measured: 34,5 mm	P
	dimension marking t min : prescribed (mm); measured (mm) .....:	Prescribed: 21 mm Measured: 31,0 mm	P
	dimension marking v: prescribed (mm); measured (mm) .....:	Prescribed: 80±3 mm Measured: 82,4 mm	P
	dimension marking z max: prescribed (mm); measured (mm) .....:	Prescribed: 5 mm Measured: 3,80 mm	P
7.1.2	Connections, including terminals cross-sectional ranges (Table 301) ..... : torques to be applied (Table 111) (lug terminal) .... :	Cu, 25 to 120 mm2 M10, 32 Nm	P
7.2	Insulating properties		--
	Creepage distances and clearances of fuses and fuse-accessories meet requirements of IEC 60664-1 for overvoltage category III and pollution degree 3 . :		P
8	TESTS		
	IEC 60269-1 applies with the following supplementary requirements		
8.1.6	Testing of fuse-holders		--
	Tested according to Table 302..... :		P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.11.1.2	Mechanical strength of the fuse-base (Sample: #02)		--
	Contact force are tested on all three phases of a new fuse-rail ..... :		P
	Test-link inserted three times in the fuse-base ..... : (Dimensions of blade contacts see Figure 101) (Withdrawal force F lied within limits in Table118)	Limits: 110~350N Measured: L1: 250N L2: 270N L3: 280N	P
	Steel screws are fastened three times at the terminals, torque of 1,2 times value specified by manufacturer or value of Table 111 ..... :	38,4Nm	P
	If measured values too low, dynamic test in accordance with 8.5.5.1 ..... :	See 8.5.5.1	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
8.10	Verification of non-deterioration of contacts (Sample: #02)		--
8.10.1	Arrangement of the fuse		--
	Figure 301 and Figure 302		P
	for lug terminals, torgue in Table 111..... :	32Nm	—
	Insulation of conductors removed over the whole length ..... :		P
8.10.1.2	Direct terminal clamps		--
	Test performed on 9 terminal clamps of three fuse-rails	No such terminal clamps	N/A
	Distance between fuse-rails centres of at least three times e2 (see Figure 101)		N/A
	Torque of tightened of screws ..... :	Nm	—
	Conductor cross-section ..... :	mm2	—
8.10.2	Test method		--
	Test current (A) for load period ..... :	313A	P
	Duration (s) of load period ..... :	45min	P
	Duration (s) of non-load period ..... :	18min	P
	Test voltage (V) ..... :	Convenient low voltage	—

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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)	N/A
	d) Test of 750 cycles, measured values did not exceed the limits given in subsequent parts of IEC 60269	(see appended table)	N/A
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)	L1: 270N L2: 240N L3: 250N	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 ..... :		P
8.10.2.2	Direct terminal clamps	No such terminal clamps	--
	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		P
	Limit value after 250th cycle ≤ 15%	1,72%	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 ..... :	3K (max.)	P
8.10.3.2	Direct terminal clamps	No such terminal clamps	--

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Permissible tolerance for resistance Rcl0 for Al conductors : R cl 0 max ≤ 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
8.11.1.2	Mechanical strength of the fuse-base (Sample: #02)	After Clause 8.10.1.1	--
	Contact force are tested on all three phases of a new fuse-rail ..... :		P
	Test-link inserted three times in the fuse-base ..... : (Dimensions of blade contacts see Figure 101) (Withdrawal force F lied within limits in Table118)	Limits: 110~350N Measured: L1: 270N L2: 240N L3: 250N	P
	Steel screws are fastened three times at the terminals, torque of 1,2 times value specified by manufacturer or value of Table 111 ..... :	38,4Nm	P
	If measured values too low, dynamic test in accordance with 8.5.5.1 ..... :	See 8.5.5.1	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
8.5.5.1	Verification of peak withstand current of a fuse-base (Sample: #02)		--
	Covered by verification of non-deterioration of contacts according to 8.10	Not covered	N/A
	Measured values of withdrawal forces according to 8.10.2.1 are below the values in Table 118, verification of peak withstand current according to 8.5.5.1.1 of fuse system C ..... :		N/A
8.5.5.1.1	Arrangement of the fuse		--

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	three-phase arrangement cut-off currents are below the values given in Table 112 ..... : Test set-up is given in figure 302 ..... : Cross-section of busbars (Figure 302) ..... :	See test result on the report: 180301688SHA-001	P
8.5.5.1.2	Test method		--
	fuse-base 1 (Figure107) resilient spring travel is limited to elastic range..... : contacts opened up three times ..... :		P
	fuse-base 2 (see 8.11.1.2) Fmax according to Table 118	Tested on the same fuse-base	P
8.3	Verification of temperature rise and power dissipation (Sample: #03)		--
8.3.1	Arrangement of the fuse		--
	Tightened by torque (Nm) ..... :	32	—
8.3.2	Measurement of the temperature rise	See test result on the report: 180301688SHA-001	--
	Protective covers and fuse-carriers as provided by manufacturer mounted ..... :		P
8.11.1.1	Mechanical strength of fuse-holders (Sample: #03)		--
	Test set-up subjected to temperature rise test at rated current ..... :	250A Terminals:44K max.	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)..... :	250A Terminals:47K max.	P
8.3	Verification of temperature rise and power dissipation (Sample: #03)	After clause 8.11.1.1	--
8.3.1	Arrangement of the fuse		--
	Tightened by torque (Nm) ..... :	32	—

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.2	Measurement of the temperature rise	See test result on the report: 180301688SHA-001	--
	Protective covers and fuse-carriers as provided by manufacturer mounted ..... :		P
8.9	Verification of resistance to heat (Sample: #03)		--
	Tests apply to fuse-link and fuse-base		P
	Fuse-holder with fuse-links having maximum power dissipation are cyclically loaded as pre-treatment... :	100h On-period: 3h Off-period: 18min 400A	P
	After cooling to normal temperature breaking capacity tested at I1 (see 8.5) ..... :	 I1 =690V/50kA See clause 8,5 below	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 I1 and I5 (see 8.5) ..... :	I1 = I5 =	N/A
8.5	Verification of the breaking capacity **(Samples: #03)**	According to IEC 60269-1	--
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 form 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	20°C	P
	Breaking-capacity tests on a.c. fuses		--
8.5.5.1	Table 20, test No. 1 for "g" and "a" fuse-links **(Sample: #03)**		P
	Rated breaking capacity of the fuse-links (kA), at voltage (V) ..... :	690V/50kA	_
	Rated current (A) of the fuse-links ..... :	250A	P

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Prospective current I_1 (kA) equal to rated breaking capacity within a tolerance of + 10%, - 0% ..... :	730V/50,5kA	P
	Power factor ..... :	0,19	P
	Initiation of arcing after voltage zero: within 40° - 65° for sample 1 and within 65° - 90° for sample 2 and 3, or ..... :	65° - 90° for peak withstand current of a fuse-holder. Measured: 62°	P
	for sample 1) arcing after voltage zero within 0° + 10°, - 0° ..... :		N/A
	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 ..... :	730V	P
	Cut-off current (kA) ..... :	#03) 29,5	P
8.5.8	Acceptability of No. 1 test results		P
	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 :		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		P
	Test se-up in heating chamber		P
8.9.1.2	Test method		--
	Temperature of (80+5)°C for 2 h	80°C	P
	160% rated current for 2 h..... :	160% In = 400A	P
	Test voltage ..... :	Any convenient voltage	—

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	3 min after switching off tensile force Fmax (see Table 118) exerted for 15 s	 Fmax = 350N	P
8.9.1.3	Acceptability of test results		--
	Contact pieces not have moved to affect the further use		P
	Dimensions of Figure 301 are considered		P
	Insulating mounting part no broken and no show any signs of cracks		P
8.11.2.4	Non-deterioration of insulating parts of fuse-link and fuse-base (Sample: #03)		--
8.11.2.4.1	Test method		--
	One fuse-rail is tested ..... :	One fuse-rail	—
	Period 168 h ..... :	168h	—
	for equipment comprising moulded elements to support live parts (150±5)°C	150°C	—
	for covers (100±5)°C	100°C	—
	Period greater than 1 h..... :	1h	—
	for sealing compounds; stability of marking .....(150±5)°C		—
	After cooling to ambient temperature the following are tested.		P
	Fuse-links: breaking capacity with I1 and I2 ..... :		N/A
	Fuse-base: mechanical strength in accordance with 8.11.1.2		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		N/A
	Fuse-links operate correctly		N/A
	Marking are durable and easily legible		P
8.11.1.2	Mechanical strength of the fuse-base (Sample: #03)		--

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Test-link inserted three times in the fuse-base ..... : (Dimensions of blade contacts see Figure 101) (Withdrawal force F lied within limits in Table118)	Limits: 110~350N Measured: L1: 250N L2: 270N L3: 250N	P
	Steel screws are fastened three times at the terminals, torque of 1,2 times value specified by manufacturer or value of Table 111 ..... :	38,4Nm	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

IEC 60269-2			
Clause	Requirement + Test	Result - Remark	Verdict

APPENDIX 1

8.10.2	TABLE: Verification of non-deterioration of contacts									
	ambient air temperature (°C) ..... :				22					—
	sample No. 2(contacts)									
	L1-1	L1-2	L2-1	L2-2	L3-1	L3-2				
T 1 (K)	36	31	36	28	32	26				
ΔU initial	-	-	-	-	-	-				
Rcl 0	-	-	-	-	-	-				
ΔU 50	6,97mV	6,93mV	6,91mV	6,87mV	6,83mV	6,92mV				
Rcl 50(mΩ)	0,232	0,229	0,228	0,225	0,224	0,230				
ΔU 250	7,08mV	7,04mV	7,09mV	7,02mV	7,04mV	7,06mV				
Rcl 250(mΩ)	0,236	0,234	0,236	0,231	0,233	0,238				
T 2 (K)	-	-	-	-	-	-				
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

Photo of sample:
See report 180301688SHA-001