

**TEST REPORT**

EN 61643-21:2001+A2:2013

Low voltage surge protective devices - Part 21: Surge protective devices connected to telecommunications and signalling networks - Performance requirements and testing methods

Report Reference No.: JAT23081702137SR-2

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Applicant's name: Zhuhai Telehof Electrics Co.,Ltd

Address: 3/F ,Phase I , No.6 Jinhua Road, Xiaolin ,Hongqi Township, Jinwan District, Zhuhai City, China

Manufacturer's name: Zhuhai Telehof Electrics Co.,Ltd

Address: 3/F ,Phase I , No.6 Jinhua Road, Xiaolin ,Hongqi Township, Jinwan District, Zhuhai City, China

Test specification:

Standard.....: EN 61643-21:2001+A2:2013

Test procedure: LVD

Non-standard test method.....: None

Test item description: Surge Protection Device for Information Technology System

Brand Name: Telebahn

Model/Type reference: See model list and difference

Ratings: See model list and difference

Copy of marking plate



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: 2023-08-12

Date (s) of performance of tests: 2023-08-12 to 2023-08-21

General remarks:

The test results presented in this report relate only to the object tested.
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 "(see Enclosure #)" refers to additional information appended to the report.
 "(see appended table)" refers to a table appended to the report.

General product information:



Model list and difference:

Model	Rating
BS LC../BS SC.. BS LD../BS SD.. /BS L CD../BS SHFD../BS HFD..	UN:5-110V Uc:7V-180VDC IL:0.5-1A Iimp:2.5kA-5kA(total) In:10kA-20kA ta:1ns R:1-2.2Ω
BS LC..4M/BS SC..4M BS LD..4M/BS SD..4M /BS L CD..4M/BS SHFD..4M/BS HFD..4M/BS RS	UN:5-110V Uc:7V-180VDC IL:0.5-1A Iimp:2.5kA-5kA(total) In:10kA-20kA ta:1ns R:1-2.2Ω
BS RK SD../BS RK SC.. BS RK C..	UN:5-110V Uc:7V-180VDC IL:0.5-1A Iimp:0.5kA-1kA(total) In:5kA-10kA ta:1ns R:1-2.2Ω
BS RK 5../BS RK 24.. BS 4RK..	UN:5-110V Uc:7V-180VDC IL:0.5-1A Iimp:1kA-2kA(total) In:10kA-20kA ta:1ns R:1-5.1Ω
BS LSA../BS LSA X..	UN:5-110V Uc:7V-180VDC IL:0.5-1A Iimp:1kA-2kA(total) In:5kA-10kA ta:1ns R:1-22Ω
BS TTY../BS AD../BS RS485..	UN:5-110V Uc:7V-180VDC IL:0.5-10A Iimp:1kA-2kA(total) In:5kA-10kA ta:1ns R:1-4Ω
BS NP 4TP../BS NP 4TP..1X /BS NP 4TP..2X/BS NP 4TP..3X	UN:5-60V Uc:7V-70VDC IL:0.5-1A Iimp:1kA-2kA(total) In:5kA-10kA ta:1ns Vs:1000Mbit/s
BS RJ45../BS POE.. /BS RJ11../BS RJ12../BS RMT../	UN:5-60V Uc:7V-70VDC IL:0.5-1A Iimp:1kA-2kA(total) In:5kA-10kA ta:1ns Vs:1000Mbit/s
BS G.../BS GF../BS N..	UN:90-230V Uc:90V-250VDC IL:0.5-10A Iimp:1kA In:5kA-10kA ta:100ns F:0-6GHz



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	BS RS...P	UN:5-48V Uc:8V-55VDC IL:0.5-3A In:3kA ta:1ns F:40MHz
	BS PI SCD..M	UN:5-48V Uc:8V-55VDC IL:0.55A In:10kA ta:1ns fg:67MHz
	BS V..IN../BS RJ45..IN../BS VS...	UN:5-60V Uc:7V-70VDC IL:0.5-1A Iimp:1kA-2kA(total) In:5kA-10kA ta:1ns Vs:1000Mbit/s Power:UN:230/400V Uc:255-380V In:3-5kA I _{max} :6-10kA



Model list:

Base with GDT	BS SD 110	BS RK SC 24	BS LD 48/4M
Base without GDT	BS SD 180	BS RK SC 36	BS LD 60/4M
BS LC..Series	BS SD 250	BS RK SC 48	BS LD 180/4M
BS LC 5	BS SCD 24	BS RK SC 110	BS LDD 5/4M
BS LC 12	BS L CD..Series	BS RK SC 180	BS LDD 12/4M
BS LC 24	BS L CD(limp 2.5kA)	BS RK SD..Series	BS LDD 24/4M
BS LC 30	BS L CD(limp 1.5kA)	BS RK SD 5	BS LDD 48/4M
BS LC 36	BS L CD/5V	BS RK SD 12	BS ..HFD../4M Series
BS LC 48	BS L CD/12V	BS RK SD 24	BS SHFD 5/4M
BS LC 60	BS L CD/19V	BS RK SD 36	BS SHFD 12/4M
BS LC 110	BS L CD/24V	BS RK SD 48	BS SHFD 24/4M
BS LC 250	BS L CD/48V	BS RK SD 110	BS SHFD 48/4M
BS LC 280	BS L CD/60V	BS RK SD 180	BS HFD 5/4M
BS LC 500	BS L CD/110V	BS RK SD 5-M	BS HFD 12/4M
BS LD..Series	BS L CD F(24V)	BS RK SD 12-M	BS HFD 24/4M
BS LD 5	BS TC-ID..	BS RK SD 24-M	BS HFD 48/4M
BS LD 12	BS TC-ID 5	BS RK SD 48-M	BS SC 24-4M
BS LD 24	BS TC-ID 12	BS RK SD 110-M	BS LS CD 24/4M
BS LD 30	BS TC-ID 24	BS RK SD 48/0	BS LCD../4M Series
BS LD 36	BS SHFD..Series	BS RKW...Series	BS LCD 5/4M
BS LD 48	BS SHFD 5	BS RKW SHFD 5-2	BS LCD 12/4M
BS LD 60	BS SHFD 12	BS RKW SHFD 12-2	BS LCD 24/4M
BS LD 110	BS SHFD 24	BS RKW SHFD 24-2	BS LCD 48/4M
BS LD 250	BS SHFD 36	BS RK SHFD 5	BS LCD 60/4M
BS LD 280	BS SHFD 48	BS RKW SHFD 12	BS LCD 180/4M
BS LD 500	BS SHFD 60	BS RKW SHFD 24	BS RS485../4M Series
BS SC..Series	BS SHFD 110	BS RKW HFD 5	BS RS485 5/4M
BS SC 5	BS SHFD 180	BS RKW HFD 12	BS L B 4M
BS SC 12	BS HFD..Series	BS RKW HFD 24	BS SCY 110/4M
BS SC 15	BS HFD 5	BS RK C...Series	BS SCY 250/4M
BS SC 24	BS HFD 12	BS RK C 5	BS LC../2M Series
BS SC 30	BS HFD 24	BS RK C 12	BS LC 5/2M
BS SC 48	BS HFD 48	BS RK C 24	BS LC 12/2M
BS SC 60	BS HFD 60	BS RK C 48	BS LC 24/2M
BS SC 110	BS HFD 110	BS RK C 60	BS LC 48/2M
BS SC 180	BS HFD 180	BS LC../4M Series	BS LC 60/2M
BS SC 250	BS S..Series	BS LC 5/4M	BS LC 180/2M
BS SC 110/11	BS S 12	BS LC 12/4M	BS LD../2M Series
BS SD..Series	BS S 24	BS LC 24/4M	BS LD 5/2M
BS SD 5	BS S 48	BS LC 48/4M	BS LD 12/2M
BS SD 12	BS S 60	BS LC 60/4M	BS LD 24/2M
BS SD 15	BS S 110	BS LC 180/4M	BS LD 48/2M
BS SD 24	BS S 180	BS LD../4M Series	BS LD 60/2M
BS SD 30	BS RK SC..Series	BS LD 5/4M	BS LD 180/2M
BS SD 48	BS RK SC 5	BS LD 12/4M	BS LDD 5/2M
BS SD 60	BS RK SC 12	BS LD 24/4M	BS LDD 24/2M
BS..HFD../2M Series	BS 4RK S 110	BS RK 48 RS-II	BS LSA 10G 110
BS SHFD 5/2M	BS 4RK S 180	BS RK 48 RS-ID	BS LSA 10G 110S
BS HFD 5/2M	BS RK 5...Series	BS RK 48 ST-II	BS LSA 1G 110



BS SHFD 24/2M	BS RK 5 TR-II	BS RK 48 ST-ID	BS TVSS...Series
BS HFD 24/2M	BS RK 5 TR-ID	BS RK 60...Series	BS TVSS 10/G48
BS 4RK SC...Series	BS RK 5 TR-DI	BS RK 60 ST-II	BS TVSS 10/G5
BS 4RK SC 5	BS RK 5 TR-DD	BS RK 60 ST-ID	BS TVSS 20/G48
BS 4RK SC 12	BS RK 5 TC-II	BS RK 60 ST-DI	BS TVSS 20/G5
BS 4RK SC 24	BS RK 5 TC-ID	BS RK 60 ST-DD	BS RJ45...(4P) Series
BS 4RK SC 48	BS RK 5 TC-DI	BS RK 60 ST-II F	BS RJ45 5V (4P)
BS 4RK SC 60	BS RK 5 TC-DD	BS RK 60 ST-ID F	BS RJ45 24V (4P)
BS 4RK SC 180	BS RK 5 RS-II	BS RK 60 ST-DI F	BS RJ45 48V (4P)
BS 4RK SD...Series	BS RK 5 RS-ID	BS RK 60 ST-DD F	BS RJ45G 5 (4P)
BS 4RK SD 5	BS RK 5 RS-II F	BS SCD 6A-38 DI	BS RJ45G 24 (4P)
BS 4RK SD 12	BS RK 12...Series	BS SCD 6A-38 DD	BS RJ45G 48 (4P)
BS 4RK SD 24	BS RK 12 ST-3	BS TTY...Series	BS NP 4TP...Series
BS 4RK SD 48	BS RK 12 ST-3 DI	BS TTY 5	BS NP 4TP 5V
BS 4RK SD 60	BS RK 12 ST-3-DD	BS TTY 12	BS NP 4TP 24V
BS 4RK SD 110	BS RK 24...Series	BS TTY 24	BS NP 4TP 48V
BS 4RK SD 180	BS RK 24 ST-II	BS TTY 32	BS NP 4TP G5
BS 4RK SCD...Series	BS RK 24 ST-ID	BS TTY 110	BS NP 4TP G24
BS 4RK SCD 5	BS RK 24 ST-DI	BS AD...Series	BS NP 4TP G48
BS 4RK SCD 12	BS RK 24 ST-DD	BS AD 24	BS NP 4TP E1000 5V
BS 4RK SCD 24	BS RK 24 ST-II F	BS AD 24 S	BS NP 4TP E1000 5V M
BS 4RK SCD 48	BS RK 24 ST-ID F	BS RS485...Series	BS NP 4TP 1X...Series
BS 4RK SCD 60	BS RK 24 ST-DI F	BS RS485 5	BS NP 4TP 1X 5V
BS 4RK SCD 110	BS RK 24 ST-DD F	BS ALD 36	BS NP 4TP 1X 24V
BS 4RK SDD...Series	BS RK 24 TR-II	BS ALD 60	BS NP 4TP 1X 48V
BS 4RK SDD 5	BS RK 24 TR-ID	BS LSC...Series	BS NP 4TP 1X E1000 5V
BS 4RK SDD 24	BS RK 24 TR-DI	BS LSA C5L	BS NP 4TP 1X E1000 12V
BS 4RK SDD 48	BS RK 24 TR-DD	BS LSA C12L	BS NP 4TP 1X E1000 24V
BS 4RK SHFD...Series	BS RK 24 ST-3	BS LSA C24L	BS NP 4TP 1X E1000 5V M
BS 4RK SHFD 5	BS RK 24 ST-3 DD	BS LSA C48L	BS NP 4TP 1X G5
BS 4RK SHFD 12	BS RK 24 ST-3 DI	BS LSA C60L	BS NP 4TP 1X G24
BS 4RK SHFD 24	BS RK 24 ST-II LT	BS LSA C110L	BS NP 4TP 1X G48
BS 4RK SHFD 48	BS RK 24 PA-II	BS LSA C5R	BS NP 4TP 2X...Series
BS 4RK HFD...Series	BS RK 24 PA-ID	BS LSA C12R	BS NP 4TP 2X 5V
BS 4RK HFD 5	BS RK 24 RS-II	BS LSA C24R	BS NP 4TP 2X 24V
BS 4RK HFD 12	BS RK 24 RS-ID	BS LSA D110R	BS NP 4TP 2X 48V
BS 4RK HFD 24	BS RK 24 TR-DI F	BS LSA D250R	BS NP 4TP 2X E1000 5V
BS 4RK HFD 48	BS RK 32...Series	BS LSA D24R	BS NP 4TP 2X E1000 12V
BS 4RK S...Series	BS RK 32 TR-DD	BS LSA C110L S	BS NP 4TP 2X E1000 24V
BS 4RK S 5	BS RK 32 TR-DI	BS LSA X...Series	BS NP 4TP 2X E1000 5V M
BS 4RK S 12	BS RK 48...Series	BS LSA X C110	BS NP 4TP 2X G5
BS 4RK S 24	BS RK 48 ST-3	BS LSA X D250R	BS NP 4TP 2X G24
BS 4RK S 48	BS RK 48 ST-3 DI	BS LSA X C110S	BS NP 4TP 2X G48
BS 4RK S 60	BS RK 48 ST-3 DD	BS LSA X C280S	BS NP 4TP 3X...Series
BS NP 4TP 3X 5V	BS RJ45 NI(A)	BS GC N	BS V 2IN1/12V
BS NP 4TP 3X 24V	BS RJ45 NI(B)	BS BNC G	BS V 2IN1/48V
BS NP 4TP 3X 48V	BS POE...Series	BS G UHF	BS V 3IN1/24V
BS NP 4TP 3X G5	BS POE 5V	BS L4J N	BS V 3IN1/220V
BS NP 4TP 3X G24	BS POE 7.5V	BS L4JY N	BS V 3IN1/12V
BS NP 4TP 3X G48	BS POE 7.5V(A)	BS GC NS	BS V 3IN1/48V
BS NP 4TP 3X E1000 5V	BS POE 7.5V(B)	BS G TNC	BS VS 3IN1/24V(A)
BS NP 4TP 3X E1000 12V	BS POE 5V/16	BS G SMA	BS VS 3IN1/12V(A)
BS NP 4TP 3X E1000 24V	BS POE 48V(A)	BS N GC	BS VS 3IN1/48V(A)
BS RJ45G 48(A)-15	BS POE 48V-K(A)	BS BNC GA	BS VS 3IN1/12V(B)



BS RJ45G 48(A)-8	BS MJ8 POE	BS G NG	BS VS 3IN1/48V(B)
BS NP 15	BS MJ8 5V	BS BNC GF	BS RJ45 V 2 IN 1 S(12V)
BS RJ11 110 3X	BS MJ8 24V	BS G NA	BS RJ45 V 2 IN 1/12V
BS BNC 5V/8	BS RJ45E WP	BS GH BNC	BS RJ45 V 2 IN 1/24V
BS 8BNC 5V	BS ELP...WP Series	BS GH N	BS RJ45 V 2 IN 1 S(24V)
BS 16BNC 5V	BS ELP 48 WP	BS L4 NA	BS RJ45 V 2 IN 1/48V
BS 24BNC 5V	BS LCD/24 WP	BS GF CTV	BS RJ45 V 2 IN 1 S(48V)
BS RJ45G...Series	BS TC TN/JP	BS GF CTV S	BS RJ45 V 2 IN 1/220V
BS RJ45G 5(A)	BS RMT...Series	BS L47/16 A	BS RJ45 V 2 IN 1 S(220V)
BS RJ45G 5(B)	BS RMT 24V(A)	BS L47/16 B	BS RJ45 V 2 IN 1/K
BS RJ45G 12(A)	BS RMT 24V(B)	BS G SMA (F/F)	BS RJ45 V 2 IN 1/DIN
BS RJ45G 12(B)	BS RMT 12V(A)	BS N GB	BS SD TC1
BS RJ45G 24(A)	BS RMT 12V(B)	BS RS..Series	E-3
BS RJ45G 24(B)	BS RJ11...Series	BS RS 9P	E-5
BS RJ45G 48(A)	BS RJ11 110(A)	BS RS 9PA	E-10
BS RJ45G 48(B)	BS RJ11 110(B)	BS RS 15P	E-3a
BS RJ45G 48(A1)	BS RJ11 110 D(A)	BS RS 25P	E-5a
BS RJ45G 48 D(A)	BS RJ11 111 D(B)	BS RS 37P	E-10a
BS RJ45G 48(E)	BS RJ11 110(A)+LED	BS RS 37P A	C-10
BS RJ45G 60(A)	BS RJ11 110(B)+LED	BS Pl...Series	L-10
BS RJ45G 60(B)	BS RJ12 110(A)	BS PI SCD 24 M	T-1
BS RJ45G 48-90W(A)	BS RJ12 110(B)	BS PI SCD 35 M	T-2
BS RJ45...Series	BS BNC....Series	BS PI SCD 48 M	T-3
BS RJ45 5V(A)	BS CAB-V	BS PI SCD 24 M-2	T-4
BS RJ45 5V(B)	BS BNC 5V(AB)	BS PI SCD 35 M-2	R-10a
BS RJ45 5V M(A)	BS BNC 5V(A)	BS PI SCD 48 M-2	R-10b
BS RJ45 5V M(B)	BS BNC 5V(B)	BS PI SCD 24 M-S	PET-16
BS RJ45 E1000 5V(A)	BS V BNC(A)	BS PI SCD 35 M-S	R-...series
BS RJ45 E1000 5V(B)	BS V BNC(B)	BS PI SCD 48 M-S	BS L4 7/16
BS RJ45 24V(A)	BS BNC 12V(A)	BS CLE RJ45G 48 WP	BS F 1.6/5.6
BS RJ45 24V(B)	BS CTV 24(A)	BS LC 24/4M-PG-IP67	CAMCAR Series
BS RJ45 24V-K(A)	BS CTV 24(B)	BS 3LP-IP67-...	DVR Series
BS RJ45 24V-K(B)	BS G...Series	BS 5LP-IP67-...	BS..Ex
BS RJ45 IN...Series	BS G BNC	BS V 2IN1/24V	BS PI SCD 230/24 M
BS RJ45 NI 48	BS G N	BS V 2IN1/220V	



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Clause	Requirement- Test	Result - Remark	Verdict
4.	Service and test conditions		P
4.1	Service conditions		P
4.1.1	Normal service conditions		P
	Air pressure	80kPa-160kPa	P
	Temperature and humidity service conditions	A controlled environment, temperature range: -5°C and +40°C, humidity: 10% and 80%RH	P
4.1.2	Abnormal service conditions		N/A
4.2	Test temperature and humidity	Temperature: 23°C±2°C, humidity from 45% to 55%	P
4.3	SPD testing	Use connections and terminals	P
4.4	Waveform tolerances		P
5	Requirements		P
5.1	General requirements		P
5.1.1	Identification and documentation		P
	The information indicated in items a) through n) shall either be marked on the body of the SPD, or included in the documentation or on the packaging .		P
	Any abbreviations used shall be explained in the data sheet.		P
	For each test performed on the SPD from clause 6, the test conditions shall be stated in the documentation.		P
	a) Manufacturer's name or trade mark	Zhuhai Telehof Electrics Co., Ltd.	P
	b) Year and week of manufacturer, or serial number	No. 610 009, No. 610 010	P
	c) Model number		P
	d) Service conditions	-40°C -+80°C, and for installation at LPZ 0b-2 or higher, or directly at the upstream of the protected devices, used in the telephone line, ADSL or ISDN line	P



	e) Maximum continuous operating voltage U_c (AC and/or DC)	26V-19V~	P
	f) Rated current	0.5A	P
	g) Voltage protection level U_p	<45V(Line-PG)	P
	h) Impulse reset(if applicable)		P
	i) AC durability		P
	j) Impulse rating (according to Table 3 - category and corresponding parameters e.g. C2: 2k V/ 1kA)		P



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Clause	Requirement- Test	Result - Remark	Verdict
	k) Overstressed fault mode		P
	l) Transmission characteristics (appropriate to the intended SPD use)		P
	m) Additional information, where applicable, concerning replaceable component and the use of radioisotopes		N/A
	n) Series resistance(if applicable)	2.2 ohms	P
	o) (SPD-) Category and rating (if the category is printed on the SPD it is recommended to frame the category in a square. Example:)		N/A
5.1.2	Marking	BS LC 24	P
	The SPDs shall be clearly marked with 5.1.1 items: a), b), c), and e).		P
	The marking material shall be wipe resistant to solvents normally used in the SPD application.		P
	Any notes for special handling shall be included in the documentation or on the packaging.		P
	Compliance checked in accordance with 6.1.2		P
5.2	Electrical requirements		P
5.2.1	Voltage-limiting requirements		P
5.2.1.1	Maximum continuous operating voltage(Uc)	26VDC/19VAC	P
	The manufacturer shall state the Uc, and compliance shall be checked in accordance with 6.2.1.1.		P
5.2.1.2	Insulation resistance		P
	The characteristic shall be stated and compliance checked in accordance with 6.2.1.2.		P
5.2.1.3	Impulse-limiting voltage	<45V(Line-PG)	P
	The SPD shall limit a specified impulse voltage when tested at the specified test conditions of		P
	The measured limiting voltage shall not exceed the specified voltage protection level Up.	40V	P
5.2.1.4	Impulse reset		P
	The requirement is applicable only to switching-type SPDs.		P
5.2.1.5	AC durability		P



	The SPD, after having been tested according to 6.2.1.5 using current selecting from table 5, shall meet therelevant requirements of 5.2.1 and 5.2.2, if applicable.		P
5.2.1.6	Impulse durability		P
	The SPD, after having been tested according to 6.2.1.6 using current and voltage waveforms selected from		P



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Clause	Requirement- Test	Result - Remark	Verdict
	table 3, shall meet the relevant requirements of 5.2.1 and 5.2.2, if applicable.		
5.2.1.7	Overstressed fault mode		P
5.2.1.8	Blind spot		P
5.2.2	Current-limiting requirements	No current limiting	N/A
5.2.2.1	Rated current	0.5A	P
	The SPD shall be tested according to 6.2.2.1 to confirm the rated current		N/A
5.2.2.2	Series resistance	2.2 ohms	P
	The SPD shall be tested according to 6.2.2.2 to confirm the specified value and tolerance of any series resistance		N/A
5.2.2.3	Current response time	1ns	P
	Tested according to 6.2.2.3		N/A
5.2.2.4	Current reset time		N/A
	The SPD containing one or more self-resettable current-limiting components shall be tested in accordance with 6.2.2.4		N/A
5.2.2.5	Maximum interrupting voltage		N/A
	Applicable only to SPDs containing self-resettable or manually resettable current-limiting components and confirmation of value is determined by performing the test in 6.2.2.5		N/A
5.2.2.6	Operating duty test		N/A
5.2.2.7	AC durability		N/A
	The SPD shall be subjected to repeated applications of a specified currents.		N/A
	After exposure to these currents, the current-limiting components in the SPD shall meet the requirements of		N/A
5.2.2.8	Impulse durability		N/A
	The SPD shall be subjected to a specified number of surges of specified peak current and shall meet the requirements of 5.2.2.1, 5.2.2.2 and 5.2.2.3		N/A
5.2.3	Transmission requirements		P
5.2.3.1	Capacitance	<0.7nF(Line-Line) <1.3nF(Line-PG)	P
5.2.3.2	Insertion loss		P
5.2.3.3	Return loss		P
5.2.3.4	Longitudinal balance		P
5.2.3.5	Bit error ratio(BER)		P



5.2.3.6	Near-end crosstalk(NEXT)		P
5.3	Mechanical requirements	Compliance checked	P



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Clause	Requirement- Test	Result - Remark	Verdict
5.3.1	Terminals and connectors		P
	a) Terminals and connectors shall be fastened to the SPD to avoid loosening		P
	b) Screws, current-carrying parts and connectors		P
	1) Connections shall withstand the mechanical stresses occurring in normal use and the mechanical stresses generated by high current surges.		P
	2) For electrical connections, contact pressure is not transmitted through insulating material other than ceramic, pure mica or other material		P
	3) Current-carrying parts and connections including parts intended for grounding conductors, if any, shall be		P
	– Copper, or		P
	– An alloy containing at least 58% copper for cold-worked parts or		N/A
	– An alloy containing at least 50% copper for non-cold-worked parts, or other metal or suitably coated metal		N/A
	c) Screwless terminals for external conductors	screwless terminals	P
	1) Terminals shall be so designed and constructed that		N/A
	- each conductor is clamped individually and the conductor can be connected or disconnected either at the same time or respectively		N/A
	- it is possible to clamp securely any number of conductors up to the maximum provided.		N/A
	d) Insulation pierced connections for external conductors		P
	1) The insulation pierced connections shall make a reliable mechanical connection		P
	Compliance checked by inspection and tested in accordance with 6.3.1.4		P
	2) Screws for making contact pressure shall not serve to fix any other component, Compliance checked by inspection.		P
	3) Screws shall not be of metal which is soft or liable to creep.		P
	e) Corrosion resistant metals		P
	Clamps, lock-nuts, binding clips, thrust washers, wire, and similar parts, shall consist of corrosion resistant metal.		P



5.3.2	Mechanical strength (mounting)		P
	SPDs shall be provided with appropriate means for mounting that will ensure mechanical stability		P
5.3.3	Resistance to ingress of solid objects and to harmful		P



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Clause	Requirement- Test	Result - Remark	Verdict
	ingress of water.		
5.3.4	Protection against direct contact		P
5.3.5	Fire resistance		P
5.4	Environmental requirements		P
	The SPD intended only for the uncontrolled environment of 4.1, shall conform to the following environmental requirements		P
5.4.1	High temperature and humidity endurance		P
5.4.2	Environmental cycling with impulse surges		P
5.4.3	Environmental cycling with a.c surges		P

6	Type test		P
6.1	General tests		P
6.1.1	Identification and documentation	See user manual	P
	Identification and documentation shall meet the requirements of 5.1.1 by		P
6.1.2	Marking		P
	Verification of the markings shall be carried out by inspection,		P
	The following indelibility test shall be applied on markings of all types except those made by impressing, moulding and engraving	Label no curled, marking legible.	P
6.2	Electrical tests		P
6.2.1	Voltage-limiting tests		P
	If not otherwise specified, for all tests where a power supply at UC or at the maximum interrupting voltage is required, the voltage tolerance for testing shall be +0/-5 %. When DC is used the maximum ripple shall not exceed 5 %. When AC is used tests shall be performed at 50 Hz or 60 Hz, except if otherwise specified by the manufacturer.		P
6.2.1.1	Maximum continuous operating voltage(Uc)		P
6.2.1.2	Insulation resistance		P
6.2.1.3	Impulse-limiting voltage		P
6.2.1.4	Impulse reset		P
6.2.1.5	AC durability	No damage	P
6.2.1.6	Impulse durability	No damage	P
6.2.1.6.1	Additional test for Multi-terminal SPDs		P



6.2.1.7	Overstressed fault mode		P
	Impulse overstress	No hazard	P



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Clause	Requirement- Test	Result - Remark	Verdict
6.2.1.8	Blind spot test		P
6.2.2	Current-limiting tests		N/A
6.2.2.1	Rated current		N/A
6.2.2.2	Series resistance		N/A
6.2.2.3	Current response time		N/A
6.2.2.4	Current reset time		N/A
6.2.2.5	Maximum interrupting voltage		N/A
6.2.2.6	Operating duty test		N/A
6.2.2.7	AC duability		N/A
6.2.2.8	Impulse duability		N/A
6.2.3	Transmission tests	balanced bandwidth	P
6.2.3.1	Capacitance	$C_{1-2}:0.7nF, C_{1-c}:1.3pF;$	P
6.2.3.2	Insertion loss	<5dB	P
6.2.3.3	Return loss	>20dB	P
6.2.3.4	Longitudinal balance		P
6.2.3.5	Bit Error Ratio (BER)	$\leq 10E-9$	P
6.2.3.6	Near-end crosstalk (NEXT)	>60dB	P
6.3	Mechanical tests		P
6.3.1	Terminals and connectors		P
6.3.1.1	General testing procedure		P
6.3.1.2	Terminals with screws	After 10 times of force applied, screwed connections do not work loose or show visible	P
6.3.1.3	Screwless terminals		N/A
6.3.1.4	Insulating pierced connections		P
6.3.1.4.1	Pull-out test on SPD terminals designed for single-core conductors	Cord: 20AWG, 0.81mm ² . Pull torque without jerk: 35N for 1 min. After test, the conductor shows no	P
6.3.1.4.2	Pull-out test on SPD terminals designed for multi-core cables or cords		N/A
6.3.2	Mechanical strength (mounting)		P
6.3.3	Resistance to ingress of solid objects and to harmful ingress of water		P



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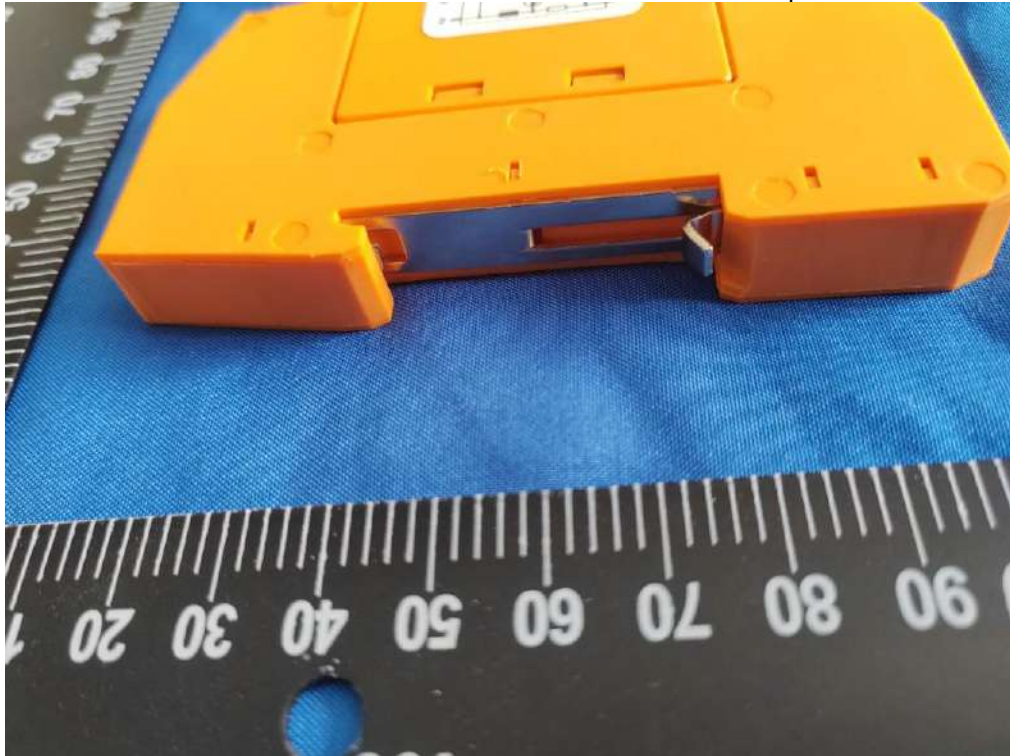
6.3.4	Protection against direct contact	No direct contacts with insulating parts or metal parts	N/A
6.3.5	Fire resistance		P
6.4	Environmental tests		P
6.4.1	High temperature and humidity endurance	Temperature: 80°C, humidity:90%, Supply voltage:24V	P
6.4.2	Environmental cycling with impulse surges	Cycle A	P
6.4.3	Environmental cycling with A.C. surges	Cycle A	P
6.5	Acceptance tests		N/A

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