




<p>TEST REPORT IEC 61643-11 Low-voltage surge protective devices Part 11: Surge-protective devices connected to low-voltage power systems- Requirements and test methods</p>	
<p>Report Number : 6152977.50 Date of issue : 2023-03-01 Total number of pages..... : 22</p>	
<p>Name of Testing Laboratory preparing the Report..... : DEKRA Testing and Certification (Shanghai) Ltd.</p>	
<p>Applicant's name : Zhuhai Telehof Electrics Company Limited Address : No.6 Jinhua Road, Xiaolin, Hongqi Town, Jinwan District, 519090 Zhuhai City Guangdong, China</p>	
<p>Test specification: Standard..... : IEC 61643-11:2011 Test procedure : KEMA-KEUR Non-standard test method : N/A</p>	
<p>TRF template used : IECEE OD-2020-F1:2021, Ed.1.4 Test Report Form No. : IEC61643_11C Test Report Form(s) Originator : OVE Master TRF..... : Dated 2021-10-07</p>	
<p>General disclaimer: 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 NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.</p>	
<p>Test item description : Trade Mark(s)..... : Manufacturer..... : Model/Type reference : Ratings :</p>	<p>Surge Protective Devices  Zhuhai Telehof Electrics Company Limited No.6 Jinhua Road, Xiaolin, Hongqi Town, Jinwan District, 519090 Zhuhai City Guangdong, China BT PCM TN xyz (RM), BT PCM TNC xyz (RM), BT PCM TNS xyz (RM), BT PCM TT 1+1 xyz (RM), BT PCM TT 3+1 xyz (RM) and BT PCM xyz (RM) Note 1: xyz could be 150, 275, 320 or 385 which corresponds to the voltage rating Note 2: RM represents the remote signalling function offered. Test class II / Type 2; I_{SCCR}: 1500 A; IP20; See further information on page 7 to 8</p>

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	Testing Laboratory:	DEKRA Testing and Certification (Shanghai) Ltd.
Testing location/ address		3F #250 Jiangchangsan Road, Building 16 Headquarter Economy Park Shibe Hi-Tech Park, Jing'an District, Shanghai 200436, China
Tested by (name, function, signature)		Baal He 
Approved by (name, function, signature) ...:		Robert Hong 
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ...:		
<input checked="" type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature)..:		
Approved by (name, function, signature) ...:		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address		
Tested by (name, function, signature)		
Witnessed by (name, function, signature)..:		
Approved by (name, function, signature) ...:		
Supervised by (name, function, signature) :		
List of Attachments (including a total number of pages in each attachment):		
Attachment 1: EUROPEAN GROUP DIFFERENCES according to EN 61643-11:2012 +A11:2018. (11 pages)		

Summary of testing:**Tests performed (name of test and test clause):**

Full type testing

Testing location:

DEKRA Testing and Certification (Shanghai) Ltd.
3F #250 Jiangchangsan Road, Building 16
Headquarter Economy Park Shibe Hi-Tech
Park, Jing'an District, Shanghai 200436,
China

SPTL LPD Testing Center of Shanghai
Lightning Protection Center
No. 2030, Laifang Road, Songjiang District,
Shanghai, P.R. China

Summary of compliance with National Differences (List of countries addressed):**EUROPEAN GROUP DIFFERENCES covered.**

The product fulfils the requirements of EN 61643-11:2012+A11:2018 (insert standard number and edition and delete the text in parenthesis, leave it blank or delete the whole sentence, if not applicable)

Use of uncertainty of measurement for decisions on conformity (decision rule):

No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

Other: (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

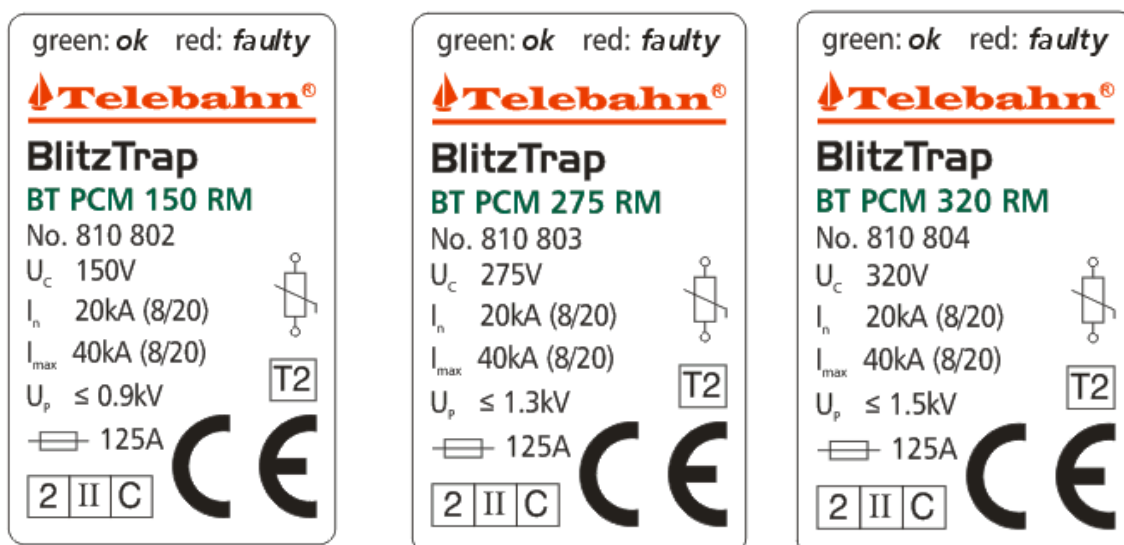
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

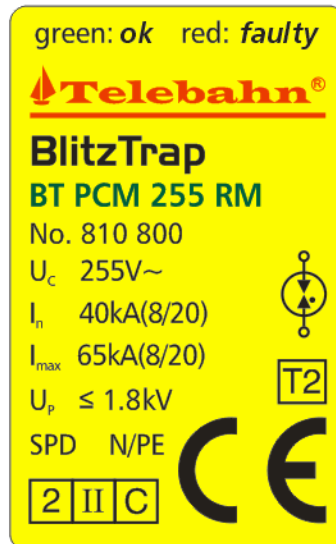
Copy of marking plate

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.



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 :	
Number of ports	One port / Two port
SPD design topology	Voltage switching / Voltage limiting / Combination
SPD classified for test class	I / II / III
Location	Indoor / Outdoor
Accessibility	Accessible / Inaccessible
Mounting method	Fixed / Portable
SPD Disconnecter	Internal / External / Both
Protection functions	Thermal / Leakage current / Overcurrent
Overcurrent protection	Specified / Not specified
Degree of protection (IP code)	IP20
Temperature range	Normal / Extended
Required SPD-disconnectors	125 A gL/gG fuse
SPD failure behaviour:.....	open circuit / short circuit
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	2018-02-06
Date (s) of performance of tests.....	2018-02-06 to 2018-05-11
General remarks:	
"(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 <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per Sub-clause 4.2.5 of IEC 60529:	
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.....:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) :	
Zhuhai Telehof Electrics Company Limited No.6 Jinhua Road, Xiaolin, Hongqi Town, Jinwan District, 519090 Zhuhai City Guangdong, China	

General product information and other remarks:

The original Test Reports Ref. No. 6023130.50 to 6023130.54 dated 2018 July 18.

Depending on the intended application of an SPD within a low-voltage power distribution system according to the installation instructions, there could be a different combination by 1P, 2P, 3P, 4P, 1P+N and 3P+N.

Models BT PCM TT 1+1 xyz (RM) and BT PCM TT 3+1 xyz (RM) are designed for the combination of L-N protection with MOV Module BT PCM xyz (RM) and N-PE protection with GDT Module BT PCM 255 RM

Amendment 1 Report:

The original Test Reports Ref. No. 6023130.50 to 6023130.54 dated 2018 July 18 was modified on 2023 March 1 to include the following changes and/or additions:

Update the applicable European standard from EN 61643-11:2012 to the latest EN 61643-11:2012 +A11: 2018.

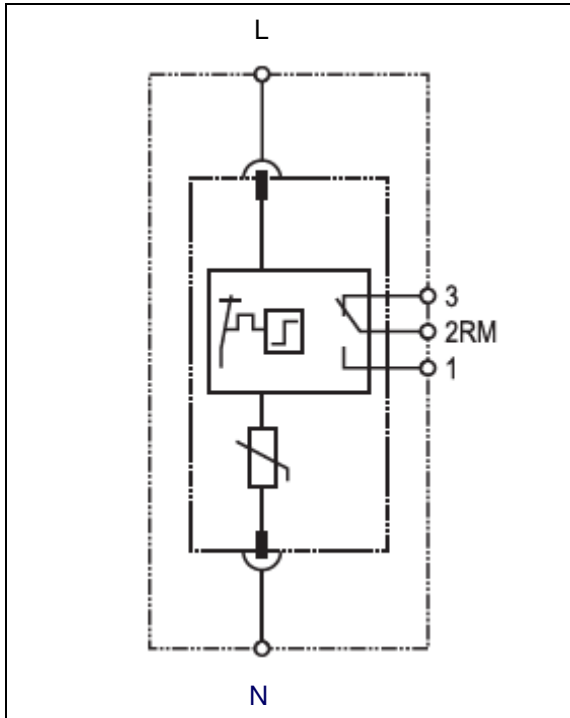
By evaluation, no additional testing was considered necessary. This test report shall be read in conjunction with original Test Reports 6023130.50 to 6023130.54.

Model spectrum of the following SPDs is covered by this report:

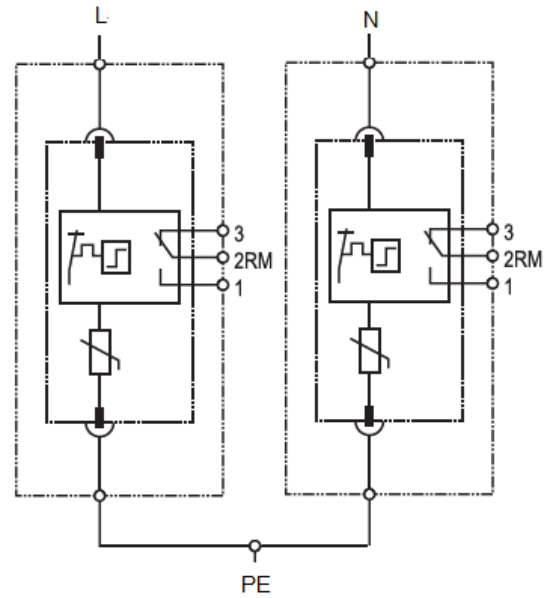
Model/Type reference	Mode(s)	U _c (V~)	I _n (kA)	I _{max} (kA)	U _p (kV)	No. of pole(s)
BT PCM 150 (RM)	L-N/L-PE	150	20	40	0,9	1
BT PCM TN 150 (RM)	L-PE N-PE	150	20	40	0,9	2
BT PCM TT 1+1 150 (RM)	L-N N-PE	150 255	20 40	40 65	0,9 1,8	2
BT PCM TT 3+1 150 (RM)	L-N N-PE	150 255	20 40	40 65	0,9 1,8	4
BT PCM TNC 150 (RM)	L-PEN	150	20	40	0,9	3
BT PCM TNS 150 (RM)	L-PE N-PE	150	20	40	0,9	4
BT PCM 275 (RM)	L-N/L-PE	275	20	40	1,3	1
BT PCM TN 275 (RM)	L-PE N-PE	275	20	40	1,3	2
BT PCM TT 1+1 275 (RM)	L-N N-PE	275 255	20 40	40 65	1,3 1,8	2
BT PCM TT 3+1 275 (RM)	L-N N-PE	275 255	20 40	40 65	1,3 1,8	4
BT PCM TNC 275 (RM)	L-PEN	275	20	40	1,3	3
BT PCM TNS 275 (RM)	L-PE N-PE	275	20	40	1,3	4

Model/Type reference	Mode(s)	U _c (V~)	I _n (kA)	I _{max} (kA)	U _p (kV)	No. of pole(s)
BT PCM 320 (RM)	L-N/L-PE	320	20	40	1,5	1
BT PCM TN 320 (RM)	L-PE N-PE	320	20	40	1,5	2
BT PCM TT 1+1 320 (RM)	L-N N-PE	320 255	20 40	40 65	1,5 1,8	2
BT PCM TT 3+1 320 (RM)	L-N N-PE	320 255	20 40	40 65	1,5 1,8	4
BT PCM TNC 320 (RM)	L-PEN	320	20	40	1,5	3
BT PCM TNS 320 (RM)	L-PE N-PE	320	20	40	1,5	4
BT PCM 385 (RM)	L-N/L-PE	385	20	40	1,8	1
BT PCM TN 385 (RM)	L-PE N-PE	385	20	40	1,8	2
BT PCM TT 1+1 385 (RM)	L-N N-PE	385 255	20 40	40 65	1,8 1,8	2
BT PCM TT 3+1 385 (RM)	L-N N-PE	385 255	20 40	40 65	1,8 1,8	4
BT PCM TNC 385 (RM)	L-PEN	385	20	40	1,8	3
BT PCM TNS 385 (RM)	L-PE N-PE	385	20	40	1,8	4

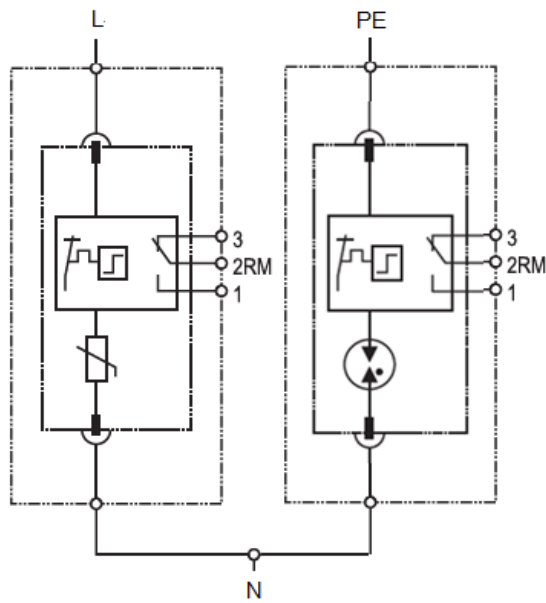
Product Circuit Diagram:



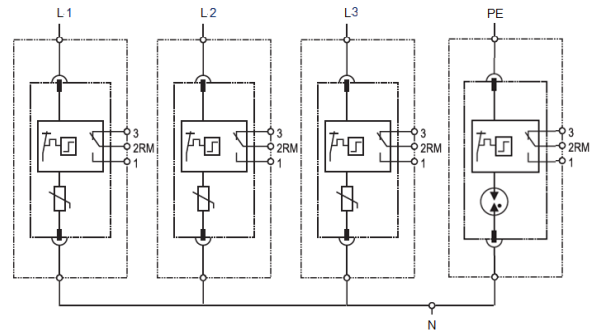
BT PCM xyz (RM)



BT PCM TN xyz (RM)

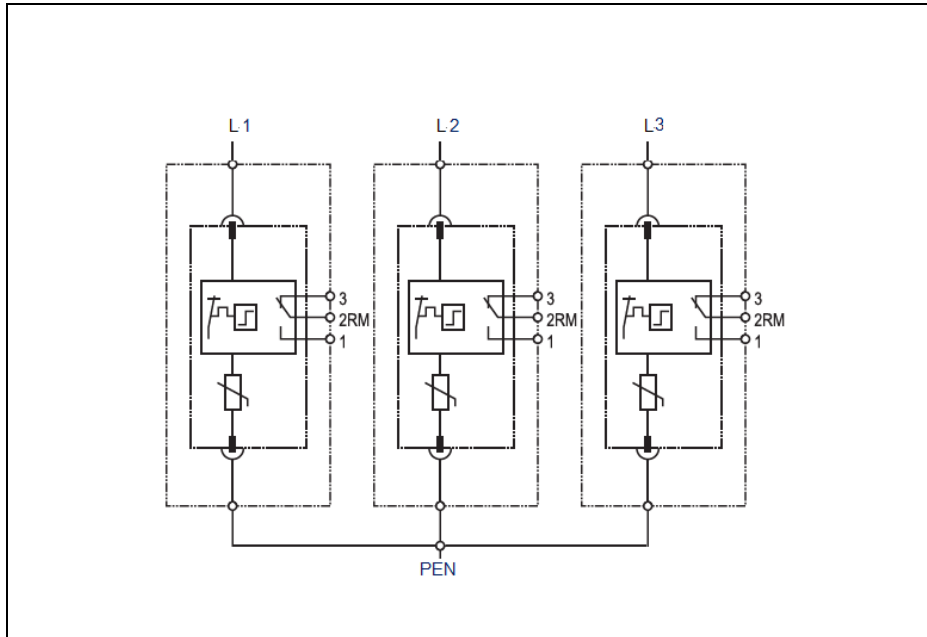


BT PCM TT 1+1 xyz (RM)

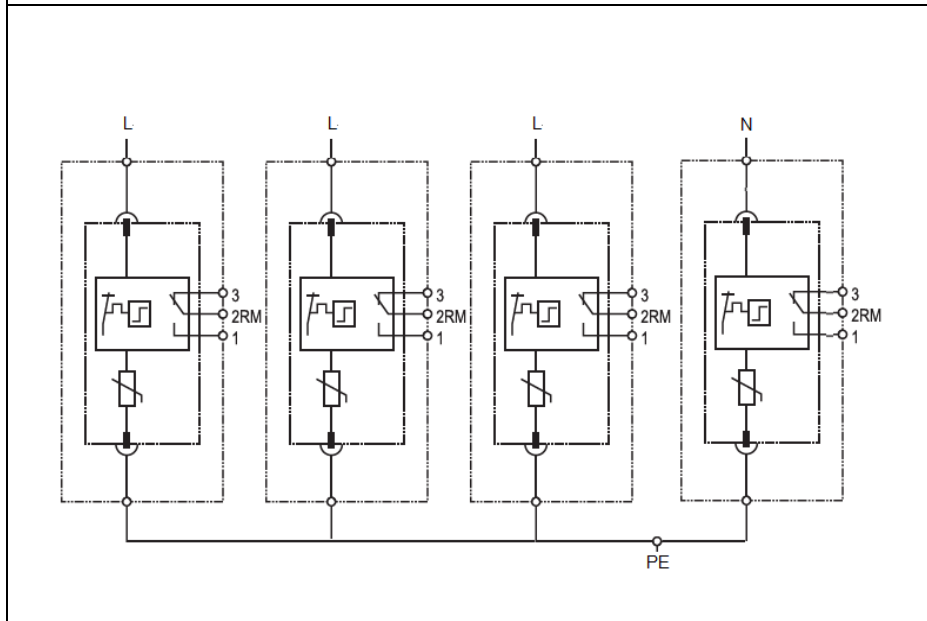


BT PCM TT 3+1 xyz (RM)

Product Circuit Diagram:



BT PCM TNC xyz (RM)



BT PCM TNS xyz (RM)

If not otherwise specified all tests have been carried out on three samples per test sequence. Terminal tests have been carried out on three terminals of each construction used.

Impulse tests have been carried out according to chapters 8.1.1 to 8.1.4.

SPDs according test class I: Calculation of charge Q and specific energy W/R applied during additional duty test acc. to 8.3.4.4

I (kA)	Q (As) within 5 ms	W/R (kJ/Ω)
0,1* I _{imp} = _____		
0,25* I _{imp} = _____		
0,5* I _{imp} = _____		
0,75* I _{imp} = _____		
1,0* I _{imp} = _____		

If the SPD is an integral part of a product covered by another standard, the requirements of the other standard were applied to those parts of the product, which do not belong to the SPD section of the product. The SPD section was judged according to the general (7.1), the electrical (7.2), the environmental and material (7.4) requirements. The mechanical requirements of other standards shall also be applied to the SPD.

Unless otherwise specified, a.c. values given in this report are r.m.s. values.

If not otherwise specified the tests have been performed in free air and at an ambient temperature of $(20 \pm 15)^\circ\text{C}$.

If not otherwise specified, for all tests where a power supply at U_{REF} or U_{C} is required, the voltage tolerance for testing was $+0/-5\%$.

If the SPD is supplied with integral cables, the full length of these cables forms part of the SPD under test, except for the determination of the measured limiting voltage 8.3.3, where a lead length of 150 mm was used.

SPD disconnectors have been selected according to the manufacturer's instructions and connected for testing according to Table 3.

For SPDs having more than one mode of protection, for which the manufacturer declares a voltage protection level, the tests have been performed on each mode, with the values chosen according to the manufacturer's declaration, using new samples each time. For three phase devices in which the protective component circuitry per given mode is identical, the testing may be performed on each of the three phases which fulfils the three sample requirement.

For SPDs with a designated N terminal which may be applied in systems without distributed neutral according to the manufacturer's instructions, separate testing has been performed for the L-PE mode of protection with the neutral being unconnected.

If the manufacturer sets different requirements for the external SPD disconnector(s) depending upon the prospective short-circuit current of the supply system, all relevant test sequences have been performed for every combination of required SPD disconnector(s) and corresponding prospective short-circuit currents.

Throughout the entire type testing procedure, the status shown by the indicator(s) give a clear sign of the status of the part to which it is linked. Where there is more than one method of status indication, for example local and remote indication, each type of indication was checked.

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 61643_11B EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES (Low-voltage surge protective devices- Part 11: Surge protective devices connected to low-voltage power systems – Requirements and test methods)			
Differences according to : EN 61643-11:2012+A11:2018			
Attachment Form No. : EU_GD_IEC61643_11B			
Attachment Originator : DEKRA			
Master Attachment : Date (2019-04)			
Copyright © 2012 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			

	CENELEC COMMON MODIFICATIONS (EN)		
7.5.5	Portable SPDs classified as pluggable equipment type A		
	For portable SPDs classified as pluggable equipment Type A, the additional requirements given in Annex ZC apply.	Not portable SPDs	N/A
	Annex ZC applies to portable SPDs classified as pluggable equipment type A according to EN 62368-1.		N/A
	It does not apply to <ul style="list-style-type: none"> – portable SPDs for industrial and similar use – portable SPDs that are designed to be permanently connected to the fixed installation with a reliable earth (e.g. mounted in 19" racks) 		N/A N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>For portable SPDs considered as pluggable equipment type A, the following specific requirements apply.</p> <ul style="list-style-type: none"> – Every mode of protection shall be provided with an appropriate internal disconnecter(s). No external disconnecters shall be required. All tests shall be passed by the SPD itself. – Live terminals shall not be specifically assigned to a line terminal or to a neutral terminal. All live terminals shall be tested in the same way (due to possible inversion) – No exceptions related to N-PE mode of protection of the main document apply to portable SPDs. – Wherever disconnecter operation is required, it shall be provided by internal disconnecter(s) – Internal disconnecters dedicated to the SPD function shall not be resettable or replaceable. – The short circuit current rating I_{sc} shall not be lower than 1 500 A. – All possible protection modes shall be tested, i.e. live to live and live to PE, when applicable 		N/A
	<ul style="list-style-type: none"> – Voltage limiting components shall be rated to a minimum value of 1,25 times the nominal rated voltage of the system for which the SPD is designed, e.g. 230 V + 25 % min. for 230 V AC systems. When a mode of protection contains more than one voltage limiting component in series, this requirement applies to the sum of the voltage ratings of all voltage limiting components connected in series. 		N/A
	For SPDs with no protection mode connected to PE, no additional requirement applies.		N/A
	For SPDs with a protection mode connected to PE, this protection mode shall consist of at least one voltage limiting component (e.g. MOV) and one voltage switching component (e.g. GDT) connected in series.		N/A
	Portable multiservice SPDs designed to protect more than one kind of service e.g. power, data, and telecom system, shall be provided with modes of protection referring to a common reference point.		N/A
	All clearances and creepage distances, including distances along outer surfaces of components, shall comply with the requirements for basic insulation of overvoltage category II and pollution degree 2.		N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ZC.8.3.5.3	Short-circuit current behaviour		
	b) Test at low short-circuit current		
	The prospective short-circuit current shall be set to 100 A.	$U_{REF} = \text{_____ V}$ _____ A $\cos \varphi = \text{_____}$	N/A
	Pass criteria		
C	No mechanical damage		N/A
H	Disconnection shall be provided by one or more internal or external disconnector(s). Their correct indication shall be checked.		N/A
I	SPDs having an IP degree \geq IP 2X – no live parts accessible with standardised test finger applied with a force of 5N, except the ones which are accessible when the SPD is fitted as in normal use.		N/A
J	<p>If disconnection occurs during the test, there shall be clear evidence of effective disconnection of the corresponding protective component(s).</p> <p>If internal disconnection occurs, the test sample is connected at UC and rated frequency for 1 min. The current flow shall not exceed a value of 1 mA.</p>	_____ V _____ mA	N/A
	Currents through components connected in parallel to the relevant protective component(s), are disregarded for this measurement.		N/A
	<p>Current through the PE-terminal shall not exceed 1mA</p> <p>If there is more than one possible connection arrangement for normal use, this check shall be performed for all arrangements.</p>	_____ mA	N/A
K	The short-circuit current from the power source, if any, shall be interrupted within 5 s by one or more internal and/or external disconnector(s).	_____ s	N/A
M	There shall be no explosion or other hazard to either personnel or the facility		N/A
N	There shall be no flashover to the metallic screen and the 6 A gL/gG fuse connecting the screen shall not operate during the test.		N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ZC.8.3.5.3.2	Additional test for SPD's failure mode simulation		
	Pass criteria		
C	No mechanical damage		N/A
H	Disconnection shall be provided by one or more internal or external disconnecter(s). Their correct indication shall be checked.		N/A
I	SPDs having an IP degree \geq IP 2X – no live parts accessible with standardised test finger applied with a force of 5 N, except the ones which are accessible when the SPD is fitted as in normal use.		N/A
J	If disconnection occurs during the test, there shall be clear evidence of effective disconnection of the corresponding protective component(s). If internal disconnection occurs, the test sample is connected at U_c and rated frequency for 1 min. The current flow shall not exceed a value of 1 mA.	____ V ____ mA	N/A
	Currents through components connected in parallel to the relevant protective component(s), are disregarded for this measurement.		N/A
	Current through the PE-terminal shall not exceed 1mA If there is more than one possible connection arrangement for normal use, this check shall be performed for all arrangements.	____ mA	N/A N/A
M	There shall be no explosion or other hazard to either personnel or the facility		N/A
N	There shall be no flashover to the metallic screen and the 6 A gL/gG fuse connecting the screen shall not operate during the test.		N/A
ZC.8.3.8	Behaviour under temporary overvoltages		
	Tests are applied: – between live terminals; – between live terminals and PE, if applicable.		N/A N/A
	Table B.1 is replaced by Table ZC.B.1 with conditions corresponding to the worse conditions of TT and TN systems. U_{ref} is set to minimum 255 V AC.		N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.8.1/8.3.8.1	TOVs caused by faults or disturbances in the low voltage system		
	For SPDs with a U_C greater than or equal to U_T there is no need to perform this test	$U_C = \text{_____ V}$	N/A
	SPDs shall be tested using either the <ul style="list-style-type: none"> TOV voltages U_T given in the relevant tables of Annex B, or, <ul style="list-style-type: none"> TOV voltages stated by the manufacturer according to 7.1.1 c1), whichever values are higher.	$U_T = \text{_____ V}$ $U_T = \text{_____ V}$	N/A
	Table B.1 shall be applied to all SPDs Depending on the information given by the manufacturer on 7.1.1 c1), the additional tables according to Clause B.1 of Annex B shall also be applied. For North American systems – Table B.2 For Japanese systems – Table B.3	under consideration	N/A N/A
	New samples shall be used and fitted as in normal use, according to the manufacturer's instructions		N/A
	The test sample shall be connected to a power frequency voltage of $U_T +0/-5 \%$ for a duration $t_T +5/-0 \%$.		N/A
	Except for loss of neutral tests, this power source for U_T , shall be capable of delivering a current high enough to ensure that the voltage at the SPD terminals does not fall below U_T by more than 5 % during the test. For loss of neutral tests this voltage source shall be capable of delivering a prospective short-circuit current of 10A.		N/A
	Immediately following the application of U_T , a voltage equal to $U_{REF} +0/-5 \%$ with the same current capability, shall be applied to the test sample for a period of 15 min $+5/-0 \%$.	$U_T = \text{_____ V}$ $U_{REF} = \text{_____ V}$	N/A
	For loss of neutral tests, this power source for U_{REF} shall be capable of delivering a prospective short-circuit current equal to the declared short-circuit current rating of the SPD.		N/A
	The time interval between the test periods shall be as short as possible and shall in any case not exceed 100 ms.		N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
a)	Pass criteria TOV failure mode	$U_T = \text{_____ V}$	
C	No mechanical damage		N/A
H	Disconnection shall be provided by one or more internal or external disconnector(s). Their correct indication shall be checked.		N/A
I	SPDs having an IP degree \geq IP 2X – no live parts accessible with standardised test finger applied with a force of 5N, except the ones which are accessible when the SPD is fitted as in normal use.		N/A
J	If disconnection occurs during the test, there shall be clear evidence of effective disconnection of the corresponding protective component(s). If internal disconnection occurs, the test sample is connected at U_C and rated frequency for 1 min. The current flow shall not exceed a value of 1 mA.	_____ V _____ mA	N/A
	Currents through components connected in parallel to the relevant protective component(s), are disregarded for this measurement.		N/A
	Current through the PE-terminal shall not exceed 1mA If there is more than one possible connection arrangement for normal use, this check shall be performed for all arrangements.	_____ mA	N/A N/A
K	The short-circuit current from the power source, if any, shall be interrupted within 5 s by one or more internal and/or external disconnector(s).		N/A
L	The tissue paper shall not catch fire.		N/A
M	There shall be no explosion or other hazard to either personnel or the facility		N/A
b)	Pass criteria TOV withstand mode	$U_T = \text{_____ V}$	
A	Thermal stability shall be achieved		N/A
B	Voltage and current records and visual inspection show no sign of puncture or flashover.		N/A
C	No mechanical damage		N/A
D	Determination of the measured limiting voltage:	$U_P = \text{_____ kV}$	
	according to 8.3.3.1, but only at a crest value corresponding to I_{imp} for test class I	$\text{_____ kA} / \text{_____ kV}$	N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	according to 8.3.3.1, but only at I_n for test class II	_____ kA / _____ kV	N/A
	according to 8.3.3.3, but only at U_{OC} for test class III	_____ kA / _____ kV	N/A
	SPDs tested acc. to class I and II containing switching components: Front-of-wave sparkover voltage acc. to 8.3.3.2 All measured peak values (5 pos./5 neg.) below U_P	_____ V	N/A
E	No excessive leakage currents shall occur after the test		
	If there is more than one possible connection arrangement for normal use, this check shall be performed for all arrangements		N/A
	The SPD shall be connected as for normal use according to the manufacturer's instructions to a power supply at the reference test voltage (U_{REF}). The current that flows through each terminal is measured. Its resistive component (measured at the crest of the sine wave) <ul style="list-style-type: none"> shall not exceed a value of 1 mA or <ul style="list-style-type: none"> the current shall not have changed by more than 20% compared to the initial value determined at the beginning of the test sequence 	$U_{REF} =$ _____ V _____ mA	N/A N/A N/A
	Any resettable or rearmable disconnecter shall be switched off and dielectric withstand shall be checked by application of two times U_C or 1000V a.c. whichever is greater. During the test, no flashover, breakdown of insulation or any other manifestation of disruptive discharge shall occur.	$U_C =$ _____ V test voltage _____ V	N/A N/A
	For SPD modes connected N-PE only, the current through the PE-terminal shall be measured, whereas the terminals are connected to a power supply at U_C . Its resistive component (measured at the crest of the sine wave) <ul style="list-style-type: none"> shall not exceed a value of 1 mA or <ul style="list-style-type: none"> the current shall not have changed by more than 20% compared to the initial value determined at the beginning of the test sequence 	$U_C =$ _____ V $I_{PE} =$ _____ mA _____ %	N/A N/A N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
F	External disconnectors shall not operate during the test and shall be in working order after the test.		N/A
G	Internal disconnectors shall not operate during the test and shall be in working order after the test.		N/A
I	SPDs having an IP degree \geq IP 2X – no live parts accessible with standardised test finger applied with a force of 5 N, except the ones which are accessible when the SPD is fitted as in normal use.		N/A
L	The tissue paper shall not catch fire.		N/A
M	There shall be no explosion or other hazard to either personnel or the facility		N/A
7.2.8.2/8.3.8.2	TOVs caused by faults in the high (medium) voltage system		
	SPDs connected to PE and for use on power distribution systems <ul style="list-style-type: none"> • TOV voltages U_T given in Annex B or, <ul style="list-style-type: none"> • TOV voltages stated by the manufacturer according to 7.1.1 c1) whichever values are higher.	$U_T = \text{_____ V}$ $U_T = \text{_____ V}$	N/A
	Table B.1 shall be applied to all SPDs Depending on the information given by the manufacturer on 7.1.1 c1), the additional tables according to Clause B.1 of Annex B shall also be applied. For North American systems – Table B.2 For Japanese systems – Table B.3	under consideration	N/A N/A
	New samples shall be used and fitted as in normal use, according to the manufacturer's instructions, and connected to a test circuit according to Figure 16 or equivalent		N/A
	The test voltage $U_T +0/-5 \%$ is applied to the test sample at 90 electrical degrees of phase L1 by closing switch S1.		N/A
	After the TOV application time $t_T +0/-5 \%$ switch S2 is closed automatically. This connects the SPD's PE-terminal to the neutral.		N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Test circuit according to Figure 16 and Figure 17 or, alternative test circuit given in Annex E. Other test circuits are permitted as long as they ensure the same stress to the SPD.	_____	N/A N/A N/A
	The prospective short-circuit current of the power source for U_{REF} shall be set to 100 A		N/A
	The prospective short-circuit current delivered by the TOV transformer shall be adjusted to $300A^{+10/-0\%}$ by R2.	_____ A	N/A
	With the exception of SPDs connected neutral to ground, U_{REF} remains applied to the test sample for 15 min without interruption until switch S1 is reopened.		N/A
a)	Pass criteria TOV failure mode		
C	No mechanical damage		N/A
H	Disconnection shall be provided by one or more internal or external disconnecter(s). Their correct indication shall be checked.		N/A
I	SPDs having an IP degree \geq IP 2X – no live parts accessible with standardised test finger applied with a force of 5N, except the ones which are accessible when the SPD is fitted as in normal use.		N/A
J	If disconnection occurs during the test, there shall be clear evidence of effective disconnection of the corresponding protective component(s). If internal disconnection occurs, the test sample is connected at U_C and rated frequency for 1 min. The current flow shall not exceed a value of 1 mA.	_____ V _____ mA	N/A
	Currents through components connected in parallel to the relevant protective component(s), are disregarded for this measurement.		N/A
	Current through the PE-terminal shall not exceed 1mA If there is more than one possible connection arrangement for normal use, this check shall be performed for all arrangements.	_____ mA	N/A N/A
K	The short-circuit current from the power source, if any, shall be interrupted within 5 s by one or more internal and/or external disconnecter(s).		N/A
L	The tissue paper shall not catch fire.		N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
M	There shall be no explosion or other hazard to either personnel or the facility		N/A
b)	Pass criteria TOV withstand mode		
A	Thermal stability shall be achieved		N/A
B	Voltage and current records and visual inspection show no sign of puncture or flashover.		N/A
C	No mechanical damage		N/A
D	Determination of the measured limiting voltage:	$U_P = \text{_____ kV}$	N/A
	according to 8.3.3.1, but only at a crest value corresponding to I_{imp} for test class I	$\text{_____ kA} / \text{_____ V}$	N/A
	according to 8.3.3.1, but only at I_n for test class II	$\text{_____ kA} / \text{_____ V}$	N/A
	according to 8.3.3.3, but only at U_{oc} for test class III	$\text{_____ kA} / \text{_____ V}$	N/A
	SPDs tested acc. to class I and II containing switching components: Front-of-wave sparkover voltage acc. to 8.3.3.2 All measured peak values (5 pos./5 neg.) below U_P	_____ V	N/A
E	No excessive leakage currents shall occur after the test		
	If there is more than one possible connection arrangement for normal use, this check shall be performed for all arrangements		N/A
	The SPD shall be connected as for normal use according to the manufacturer's instructions to a power supply at the reference test voltage (U_{REF}). The current that flows through each terminal is measured. Its resistive component (measured at the crest of the sine wave) <ul style="list-style-type: none">• shall not exceed a value of 1 mA or <ul style="list-style-type: none">• the current shall not have changed by more than 20% compared to the initial value determined at the beginning of the test sequence	$U_{REF} = \text{_____ V}$ _____ mA _____ \%	N/A N/A N/A

IEC61643_11B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Any resettable or rearmable disconnecter shall be switched off and dielectric withstand shall be checked by application of two times U_C or 1000V a.c. whichever is greater. During the test, no flashover, breakdown of insulation or any other manifestation of disruptive discharge shall occur.	$U_C = \underline{\hspace{2cm}} \text{ V}$ test voltage $\underline{\hspace{2cm}} \text{ V}$	N/A N/A
	For SPD modes connected N-PE only, the current through the PE-terminal shall be measured, whereas the terminals are connected to a power supply at U_C . Its resistive component (measured at the crest of the sine wave) <ul style="list-style-type: none"> shall not exceed a value of 1 mA or <ul style="list-style-type: none"> the current shall not have changed by more than 20% compared to the initial value determined at the beginning of the test sequence 	$U_C = \underline{\hspace{2cm}} \text{ V}$ $I_{PE} = \underline{\hspace{2cm}} \text{ mA}$ $\underline{\hspace{2cm}} \%$	N/A N/A N/A
G	Internal disconnectors shall not operate during the test and shall be in working order after the test.		N/A
I	SPDs having an IP degree \geq IP 2X – no live parts accessible with standardised test finger applied with a force of 5N, except the ones which are accessible when the SPD is fitted as in normal use.		N/A
K	The short-circuit current from the power source, if any, shall be interrupted within 5 s by one or more internal and/or external disconnecter(s).		N/A
L	The tissue paper shall not catch fire.		N/A
M	There shall be no explosion or other hazard to either personnel or the facility		N/A

-END OF TEST REPORT-