CESI

Copy No. 1 Certificate No B8023851

Type Test Certificate

of Electrical and Thermal Performance

Test object	Polymer-housed metal-oxide surge arresters
Designation	PA-DM Rated voltage 3 kV to 54 kV Nominal discharge current 10 kA Rated frequency 50/60 Hz
Manufacturer	Joint-Stock Company " Polymer-Apparat" Ak. Kostantinova str., 1 195427 Saint-Petersburg - Russian Federation
Tested for	Joint-Stock Company " Polymer-Apparat" Ak. Kostantinova str., 1 195427 – Saint-Petersburg - Russian Federation
Date(s) of tests	From September 18th, 2017 to February 28th, 2018
Tested by	CESI S.p.A. Via Rubattino, 54 20134 Milano - Italy

The test object, constructed in accordance with the description, drawings and photographs incorporated in this document has been subjected to the series of proving tests in accordance with STL Guides and:

IEC 60099-4 (2014-06)
Sub-clauses 10.8.3 to 10.8.8 and 10.8.15

This Type Test Certificate has been issued by CESI following exclusively the STL Guides.
The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard(s) and to justify the ratings assigned by the Manufacturer as listed on the ratings page.
The Certificate applies only to the test object. The responsibility for conformity of any equipment having the same designations with that tested rests with the Manufacturer.

This Certificate comprises 8 sheet in total.

November 23, 2018

Date of issue

Faccheni Fabio
B8023851 3081 AUT
STL Member Laboratory

The Manager - Arcidiaco Lorenzo
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测思 Centro Elettrotecnico Sperimentale Italiano

STL

The Short-Circuit Testing Liaison (STL) provides a forum for voluntary international collaboration between testing organisations. The basic aim is the harmonised application of IEC and Regional Standards to the type testing of electrical high-voltage power equipment

LIST OF STL MEMBERS AND RELATED CERTIFICATION BODIES

STL Member	Related Certification Body
CESI * Centro Elettrotecnico Sperimentale Italiano S.p.a. Via Rubattino 54, 20134 Milano MI, Italy	CESI Via Rubattino 54, 20134 Milano MI, Italy
CPRI Central Power Research Institute Post Box No 8066, Prof. Sir C. V. Raman Road Bangalore – 560 080, India	
ESEF Ensemble des Stations d'Essais à Grande Puissance Françaises, EDF-R&D, Avenue des Renardières, 77818 Moret-Sur-Loing Cedex, France	ASEFA 33 avenue du General Leclerc Fontenay aux Roses, France
Intertek (ASTA) Centre Court, Meridian Business Park, Leicester, LE19 1WD, United Kingdom	Intertek Centre Court, Meridian Business Park, Leicester, LE19 1WD, United Kingdom
JSTC Japan Short-Circuit Testing Committee c/o The Japan Electrical Manufacturers' Association, 17-4, Ichiban-cho, Chiyoda-ku, Tokyo 102-0082, Japan	
KEMA KEMA Testing, Inspections & Certification Utrechtseweg 310, 6812 AR Arnhem, The Netherlands	KEMA, Certification Business Unit Utrechtseweg 310, 6812 AR Arnhem, The Netherlands.
KERI Korea Electrotechnology Research Institute 12, Bulmosan-ro 10 beon-gil, Seongsan-gu, Changwon-si, Gyeongsangnam-do, 642-120, South Korea	KERI Certification Korea Electrotechnology Research Institute 12, Bulmosan-ro 10 beon-gil, Seongsan-gu, Changwon-si, Gyeongsangnam-do, 642-120, South Korea
PEHLA Gesellschaft für elektrische Hochleistungsprüfungen Hallenweg 40, 68219 Mannheim, Germany	PEHLA Product Certification Hallenweg 40, D-68219 Mannheim, Germany.
SATS Scandinavian Association for Testing of Electric Power Equipment, c/o SINTEF Energy Research AS 7465 Trondheim, Norway	SATS Certification c/o SINTEF Energy Research, 7465, Trondheim, Norway
STLNA Short-Circuit Testing Liaison of the Nations of the Americas, c/o NEMA, 1300 North 17th Street, Suite 1847 Rosslyn, VA 22209 USA	

Certificates

STL as a collaboration does not itself issue Type Test Certificates. Each STL Member issuing a Type Test Certificate is responsible for the validity and contents of that Certificate. A Type Test Certificate is issued by STL Members based on tests performed by an STL Member Laboratory within their accredited scope to ISO/IEC 17025. If the Type Test Certificate is issued under accreditation of ISO/IEC 17065 the name of the issuing body is the one of the Certification Body related to the STL Member.

STL Guides

STL Members pledge that when testing for certification to a Standard in respect of which an STL Guide has been issued they will test only in accordance with the agreed interpretation of the Standard as given in the STL Guide. In addition, STL Members have agreed to present Certificates in the form given in the STL General Guide.

For further information contact your local STL Member from the list above. Detailed contact data are available also at www.stl-liaison.org , or contact the Secretariat of STL at: Centre Court, Meridian Business Park, Leicester, LE19 1WD, United Kingdom.

* for additional information on CESI and his Member Laboratories IPH and FGH link to the Members site of STL homepage.

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1 RATINGS ASSIGNED BY THE MANUFACTURER AS PROVED BY THE TESTS

Polymer-housed metal-oxide surge arresters	
Manufacturer	**Joint-Stock Company " Polymer-Apparat"**
Type / Designation	PA - DM
Rated voltage - U_r	3 kV to 54 kV (see details in table at page 5)
Continuous operating voltage - U_c	2,4 kV to 43,2 kV (see details in table at page 5)
Rated frequency	50/60 Hz
Arrester classification	Distribution DH
Nominal discharge current – I_n	10 kA
Repetitive charge transfer rating – Q_{rs}	0,4 C
Thermal charge transfer rating - Q_{th}	1,1 C
Power frequency voltage versus time curve with prior duty	
- for 1 s	1,08 U_r
- for 10 s	1,04 U_r
- for 100 s	1,00 U_r
- for 1000 s	0,96 U_r
Power frequency voltage versus time curve without prior	
- for 10 s	1,13 U_r
- for 1000 s	1,04 U_r
Min. reference voltage at the reference current of 1 mA	2,8 kV to 50,25 kV (see details in table at page 5)
Maximum residual voltage at I_n = 10 kA	7,7 kV to 138,2 kV (see details in table at page 5)

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The table here below specifies details of the ratings of the surge arresters belonging to the homogeneous series arresters type PA-DM as proved by the type tests

Surge arrester type	Rated [kV]	Continuous operating voltage [kV]	Minimum reference voltage at the reference current of 1 mA [kV]	Maximum residual voltage at In = 10 kA [kV]	Outline drawing (see document B8018613)
PA – DM-03	3	2,4	2,8	7,7	Figure 2
PA – DM-05	5	4	4,65	12,8	
PA – DM-06	6	4,8	5,60	15,4	
PA – DM-08	8	6,4	7,45	20,5	
PA – DM-09	9	7,2	8,36	23	
PA – DM-10	10	8	9,31	25,6	Figure 4
PA – DM-11	11	8,8	10,25	28,2	
PA – DM-12	12	9,6	11,16	30,7	
PA – DM-13	13	10,4	12,11	33,3	
PA – DM-14	14	11,2	13,02	35,8	
PA – DM-15	15	12	13,96	38,4	
PA – DM-16	16	12,8	14,91	41,0	Figure 5
PA – DM-17	17	13,6	15,82	43,5	
PA – DM-18	18	14,4	16,76	46,1	
PA – DM-19	19	15,2	17,67	48,6	
PA – DM-20	20	16	18,62	51,2	Figure 6
PA – DM-21	21	16,8	19,56	53,8	
PA – DM-22	22	17,6	20,47	56,3	
PA – DM-23	23	18,4	21,42	58,9	
PA – DM-24	24	19,2	22,33	61,4	
PA – DM-25	25	20	23,27	64,0	Figure 7
PA – DM-26	26	20,8	24,22	66,6	
PA – DM-27	27	21,6	25,13	69,1	
PA – DM-28	28	22,4	26,07	71,7	
PA – DM-29	29	23,2	26,98	74,2	
PA – DM-30	30	24	27,93	76,8	Figure 8
PA – DM-33	33	26,4	30,73	84,5	
PA – DM-36	36	28,8	33,53	92,2	
PA – DM-39	39	31,2	36,29	99,8	
PA – DM-42	42	33,6	39,09	107,5	Figure 9
PA – DM-45	45	36	41,89	115,2	
PA – DM-48	48	38,4	44,69	122,9	Figure 10
PA – DM-51	51	40,8	47,49	130,6	Figure 11
PA – DM-54	54	43,2	50,25	138,2	

2 ADDITIONAL TYPE TESTS

Not applicable.

3 REFERENCE DOCUMENTS

The following reference documents are integral part of this Certificate:

No.	Description	CESI registration
1	Test report	B7019592
2	Test report	B8001026
3	Test report	B7018719
4	Test report	B7018623
5	Test report	B7019737
6	Test report	B7019962
7	Test Report	B7020147
8	Report *	B8018436
9	Drawing PA-VAR.0400.30 – Varistor B34/30	B7020387
10	Drawing PA-DM.001.ST.01 – Section in thermal model surge arrester PA-DM	B7023130
11	Drawing PA.OPN.035.001.054.00 – Metal-oxide Surge arrester PA-DM-098-54-20/20	B7024013
12	Drawing PA-DM.001.ST.02 – Section on thermal model surge arrester PA-DM	B7024364
13	Drawing PA-LTST.ST.01 – Section for verify long thermal stability	B8004656
14	Manufacturer technical file	B8018613

(*) The Report B8018436 specifies the criteria, adopted for the selection of the test samples and for the calculation of the test parameters, in such a way that a type test carried out on one test specimen can cover at the same time all the surge arresters of the homogeneous

4 ADDITIONAL REFERENCES

Not applicable.

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5 RECORD OF PROVING TESTS

The table below lists all the tests performed and the references to the relevant Test Reports containing the test values.

No. Standard and clause	Description of tests	Reference documents
IEC 60099-4 Sub-clause 10.8.3	Residual voltage tests	B7019592 B8018436 B8018613
IEC 60099-4 Sub-clause 10.8.4	Test to verify long term stability under continuous operating voltage	B8001026 B8018436 B8018613
IEC 60099-4 Sub-clause 10.8.5	Test to verify the repetitive charge transfer rating, Qrs	B7018719 B8018436 B8018613
IEC 60099-4 Sub-clause 10.8.6	Heat dissipation behaviour of test sample	B7018623 B8018436 B8018613
IEC 60099-4 Sub-clause 10.8.7	Operating duty test (invalid test)	B7019737 B8018436 B8018613
IEC 60099-4 Sub-clause 10.8.7	Operating duty test	B7019962 B8018436 B8018613
IEC 60099-4 Sub-clause 10.8.8	Power frequency voltage-versus-time test	B7020147 B8018436 B8018613
IEC 60099-4 Sub-clause 10.8.15	Test to verify the dielectric withstand of the internal component (see note 1 below)	n.a.

Note 1: The test to verify the dielectric withstand of the internal components is not required since the operating duty test has been carried out on a dielectrically arrester prorated section

6 IDENTIFICATION OF THE APPARATUS

The Manufacturer guarantees that the tested apparatus is manufactured according to the submitted drawings.
CESI checked that these drawings adequately represent in shape and dimensions the essential details and the main parts of the tested apparatus.
These drawings identified by CESI and numbered
- B7020387 No.1
- B7023130 No.1
- B7024013 No.1
- B7024364 No.1
- B8004656 No.1

have been annexed to the relevant test report.