

**Type Test Certificate of** Short circuit performance

**Apparatus** Oil-immersed power transformer

**Designation** PC19/11 – 160/10.AL  
Rated power 160 kVA ; Rated voltages 10/0,4 kV ; Rated frequency 50 Hz

**Manufacturer** SACEM Industries – Tunis - TUNISIA

**Tested for** SACEM Industries – Tunis - TUNISIA

**Date(s) of tests** **from** August 29, 2011 **to** September 28, 2011

**Tested by** CESI S.p.A. - Milan - ITALY

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in the reference documents, identified in this certificate, has been subjected to the series of proving tests in accordance with

**IEC 60076-5 (2006)**

**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 in the Test Reports. The values obtained and the general performance are considered to comply with the above Standards and to justify the ratings assigned by the Manufacturer as listed on page No.2.

The Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

Only integral reproduction of this Certificate, or reproductions of this page accompanied by any pages on which are stated the endorsed ratings of the apparatus tested, are permitted without written permission from CESI.

**No. of pages** 3 **No. of pages annexed** -

**Issue date** October 21, 2011

**Prepared** PPR - Arneodo Giorgio  
B1031667 2965 AUT

**Verified** PPR - Vidori Mauro, TPI - Pizzi Franco  
B1031667 1800809 VER B1031667 3019 VER

**Approved** PMI - The Manager - Arcidiaco Lorenzo  
B1031667 821814 APP

**CESI** S.p.A.  
Testing & Certification Division  
Testing Operations Area  
"Milan Platform"  
Manager



**1 - Ratings assigned by the Manufacturer as proved by the tests**

rated power	160 kVA
number of phases	3
rated voltage of the high-voltage winding (primary winding)	10 kV
rated voltage of the low-voltage winding (secondary winding)	400 V
rated current of the high-voltage winding (primary winding)	9,24 A
rated current of the low-voltage winding (secondary winding)	230,9 A
rated frequency	50 Hz
connection symbol	Yzn11
short-circuit impedance	4,12 %
load loss	2109 W
no-load current	0,86 %
no-load loss	393 W

**2 – This Certificate also verifies**

Determination of sound levels.

**3 – Reference documents**

*The following reference documents are integral part of this Certificate*

No.	Description	CESI registration
1	CESI Test Report	B1026340
2	CESI Test Report	B1028525
3	Manufacturer's drawings	B1030349 no. 1 to 12

**4 – Additional references**

The conformity of the product is attested with reference to the Standard mentioned in the front sheet and to the following documents

IEC 60076-1 (2011) clauses 11.2 to 11.5  
IEC 60076-3 (2000) clauses 11 and 12.2.1  
IEC 60076-10 (2001)

**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.

<b>No. Standard and clause</b>	<b>Description of tests</b>	<b>Reference documents</b>
IEC 60076-1 clause 11.2	Measurement of winding resistance	B1026340
IEC 60076-1 clause 11.3	Measurement of voltage ratio and check of phase displacement	B1026340
IEC 60076-1 clause 11.4	Measurement of short-circuit impedance and load loss	B1026340
IEC 60076-1 clause 11.5	Measurement of no-load loss and current	B1026340
IEC 60076-3 clause 11	Separate-source AC withstand voltage test	B1026340
IEC 60076-3 clause 12.2.1	Induced AC withstand voltage test	B1026340
IEC 60076-5 clause 4.2	Dynamic ability to withstand short circuit	B1028525
IEC 60076-10	Determination of sound levels	B1026340

**6 – Identification of the sample**

The Manufacturer guarantees that the tested object is manufactured according to the submitted drawings. CESI checked that these drawings adequately represent in shape and dimensions the essential details and the parts of the tested object.

These drawings identified by CESI and numbered B1030349 no. 1 to 12 have been returned to the Client.