

Type Test Certificate of Complete type tests

Apparatus Oil-immersed power transformer

Designation PC20/11 – 100/10.AL
Rated power 100 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 29, 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 60076-2 (2011)
IEC 60076-3 (2000), clause 13
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.

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

Issue date October 21, 2011

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CESI S.p.A.
Testing & Certification Division
Testing Operations Area
"Milan Platform"
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1 - Ratings assigned by the Manufacturer as proved by the tests

| | |
|--|-------------|
| rated power | 100 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) | 3,33 A |
| rated current of the low-voltage winding (secondary winding) | 144,3 A |
| rated frequency | 50 Hz |
| connection symbol | Yzn11 |
| short-circuit impedance | 4,28 % |
| load loss | 1695 W |
| no-load current | 0,36 % |
| no-load loss | 214 W |
| rated insulation level of the high-voltage winding (primary winding) | LI 75 AC 28 |
| cooling method | ONAN |

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 | B1026387 |
| 2 | CESI Test Report | B1028532 |
| 3 | CESI Test Report | B1029133 |
| 4 | Manufacturer's drawings | B1030346 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.

| No. Standard and clause | Description of tests | Reference documents |
|--------------------------------|--|----------------------------|
| IEC 60076-1 clause 11.2 | Measurement of winding resistance | B1026387 |
| IEC 60076-1 clause 11.3 | Measurement of voltage ratio and check of phase displacement | B1026387 |
| IEC 60076-1 clause 11.4 | Measurement of short-circuit impedance and load loss | B1026387 |
| IEC 60076-1 clause 11.5 | Measurement of no-load loss and current | B1026387 |
| IEC 60076-3 clause 11 | Separate-source AC withstand voltage test | B1026387 |
| IEC 60076-3 clause 12.2.1 | Induced AC withstand voltage test | B1026387 |
| IEC 60076-2 | Temperature rise test | B1026387 |
| IEC 60076-3 clause 13 | Lightning impulse (LI) test | B1029133 |
| IEC 60076-5 clause 4.2 | Dynamic ability to withstand short circuit | B1028532 |
| IEC 60076-10 | Determination of sound levels | B1026387 |

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 B1030346 no. 1 to 12 have been returned to the Client.