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SIST EN 50464-4:2007

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English version

**Three-phase oil-immersed distribution transformers
50 Hz, from 50 kVA to 2 500 kVA with highest voltage
for equipment not exceeding 36 kV -
Part 4: Requirements and tests concerning
pressurised corrugated tanks**

Transformateurs triphasés de distribution
immergés dans l'huile,
50 Hz, de 50 kVA à 2 500 kVA,
de tension la plus élevée
pour le matériel ne dépassant pas 36 kV -
Partie 4: Prescriptions et essais relatifs
aux cuves sous pression

Ölgefüllte
Drehstrom-Verteilungstransformatoren
50 Hz, 50 kVA bis 2 500 kVA
mit einer höchsten Spannung
für Betriebsmittel bis 36 kV -
Teil 4: Anforderungen und Prüfungen
für druckbeanspruchte Wellwandkessel

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SIST EN 50464-4:2007

This European Standard was approved by CENELEC on 2006-12-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the Harmonization Document HD 428.6 S1:2002, prepared by the Technical Committee CENELEC TC 14, Power transformers, was submitted to the formal vote for conversion into a European Standard and was approved by CENELEC as EN 50464-4 on 2006-12-01.

The following date was fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2007-12-01

The EN 50464 series consists of the following parts, under the general title “Three-phase oil-immersed distribution transformers 50 Hz, from 50 kVA to 2 500 kVA with highest voltage for equipment not exceeding 36 kV”:

- | | |
|----------|---|
| Part 1 | General requirements |
| Part 2-1 | Distribution transformers with cable boxes on the high-voltage and/or low-voltage side – General requirements |
| Part 2-2 | Distribution transformers with cable boxes on the high-voltage and/or low-voltage side – Cable boxes type 1 for use on distribution transformers meeting the requirements of EN 50464-2-1 |
| Part 2-3 | Distribution transformers with cable boxes on the high-voltage and/or low-voltage side – Cable boxes type 2 for use on distribution transformers meeting the requirements of EN 50464-2-1 |
| Part 3 | Determination of the power rating of a transformer loaded with non-sinusoidal currents |
| Part 4 | Requirements and tests concerning pressurised corrugated tanks |

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1 Scope

This Part 4 of EN 50464 series is applicable to test procedures to verify the mechanical withstand capability of the corrugated tanks of completely oil filled and hermetically sealed distribution transformers.

NOTE Variations of oil temperature due to variations of ambient temperature and loading, result in deformation of tank walls.

2 Normative references

For the purposes of this document, the normative references of EN 50464-1 apply.

3 General conditions

3.1 Temperature variation

For the simulation of the seasonal and daily temperature variations, the average oil temperature is assumed to vary between -25 °C (minimum ambient temperature with disconnected transformer) and $+88\text{ °C}$ (the sum of maximum ambient temperature $+40\text{ °C}$ and maximum allowed average oil temperature rise: $0,8 \times 60\text{ K} = 48\text{ K}$).

3.2 Sealing temperature

When sealing the tank, the average oil temperature shall be chosen between 15 °C and 35 °C and recorded. A manometer connected to the tank cover shall register the value zero.

3.3 Calculation of the volume variation

From the temperature variations above, the oil volume change from the relaxed stage at the sealing temperature shall be calculated using a volume expansion coefficient of $0,000\ 75\text{ K}^{-1}$ (for mineral oil).

4 Test procedure

4.1 General

These tests are considered as special tests.

These tests shall be carried out (in the sequence from 4.2 to 4.4) on a tank which is considered as representative of a range of tanks by agreement between purchaser and supplier.

4.2 Measurement of pressure range

The increase or decrease of the oil volume as calculated in 3.3 shall be added to or extracted from the relaxed tank, and the corresponding overpressure (P+) and underpressure (P-) shall be registered by a manometer connected to the tank cover.

The oil temperature during the measurement shall be the same value as used for sealing $\pm 3\text{ °C}$ (see 3.2).

4.3 Endurance test

To simulate the volume expansion, the tank shall be subjected to 2 000 cycles with overpressure and underpressure. Each cycle comprises one overpressure and one underpressure. To achieve the overpressure and underpressure, the volume of oil calculated in 3.3 shall be added to and extracted from the tank in the quantity calculated in 3.3. The pressure P+ and P- shall be recorded during the test at intervals.

The reading of the manometer with the tank relaxed shall be recorded before (P0) and after the test (P1) and the tank shall be topped up with oil to reach the initial relaxing pressure P0. If requested for the test evaluation, the added volume shall be recorded.

NOTE 1 To avoid mechanical impulses, the test duration should not be too short. A minimum cycle duration of 120 s may be sufficient.

NOTE 2 A pause in the test procedure does not affect the test result.

4.4 Leakage test

After the endurance test, the same tank shall be subjected to a 24 h static leakage test with an overpressure 1,2 times the value recorded during the measurement (see 4.2).

4.5 Evaluation of the tests

After 4.4, the following events shall be observed:

- the tank shall not show leakages as observed by appropriate detecting means;
- no cracks shall occur in the tank;
- heavy and unexplained discrepancies on the pressure readings taken before, during and after the tests under 4.2 and 4.3, have to be considered as possible indexes of abnormal events;
- by agreement between manufacturer and purchaser, a limit for the volume of oil to be added at the end of the test may be specified for checking the permanent deformations of the tank.