
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 6: Requirements and tests concerning pressurised corrugated tanks

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**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 6: Requirements and tests concerning pressurised corrugated tanks**

Transformateurs 50 Hz de distribution
triphases à immersion dans l'huile,
de 50 kVA à 2 500 kVA
avec tension supérieure pour l'équipement
ne dépassant pas 36 kV
Partie 6: Prescriptions et essais relatifs aux
cuves sous pression

Drehstrom-Öl-Verteilungstransformatoren
50 Hz, 50 kVA bis 2 500 kVA
mit einer höchsten Spannung
für Betriebsmittel bis 36 kV
Teil 6: Anforderungen und Prüfungen
für druckbeanspruchte Wellwandkessel

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This Harmonization Document was approved by CENELEC on 2002-02-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

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

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and 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

This Harmonization Document was prepared by the Technical Committee CENELEC TC 14, Power transformers.

The text of the draft was submitted to the formal vote and was approved by CENELEC as HD 428.6 S1 on 2002-02-01.

- latest date by which the existence of the HD has to be announced at national level (doa) 2002-08-01
 - latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 2003-02-01
 - latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 2005-02-01
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1 Scope

This part 6 of HD 428 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

This standard is related to the same references as in HD 428.1.

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 °C (the sum of maximum ambient temperature + 40 °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 $0,00075 \text{ K}^{-1}$ (for mineral oil).

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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.

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