



## Dry type transformers (E2 C2 F1)

For both process, energy supply and distribution, the electric transformer is a vital part of the electrical installation.

For the safety of the installation and the peace of mind of the users, we must be able to count on the resistance of the transformer throughout its life whatever occurs: incidents on network, high load variations or aggressive environment, etc.

The design of any dry type transformer must take into account storage and operating conditions (humidity, condensation, pollution and ambient temperature).

It may or may not include flammability or better still self-extinguishing properties when external flames are put out.

Lastly it may or may not take into account the emission of toxic fumes in the event of pyrolysis or combustion.

The new European standard for dry type transformers covers these aspects.

In addition to the usual dielectric tests, standard HD 464 S1 (1988) defines new tests to demonstrate resistance to 3 types of aggressive conditions: environmental, climatic and fire, where each category has several levels of performance.

Manufacturers must now indicate on dry type transformer identification plates the classes for which they are suitable. Buyers can request the reports of tests conducted in compliance with the standard and this means a true guarantee of the availability and the reliability of the transformers.

**Tadeo Czerweny Tesar electric transformers are classed E2, C2 and F1 according to HD 464 S1, backed up by test reports, and therefore in compliance with standard HD 538.1-S1 of the CENELEC. (Comité Européen de Normalisation Electrotechnique)**

Regarding the above mentioned three classes identified by the CENELEC:

### 3 environmental classes E

This is defined in relation to the condensation or humidity existing in the local environment of the transformer.

**class E0**= clean and dry installation, no condensation or pollution.

**class E1**= occasional condensation and/or limited pollution.

**class E2**= frequent condensation and high pollution or a combination of the two.

### 2 climatic classes C

They are defined in relation to the minimum ambient temperature to which the transformer can be exposed in order to approach the temperature variations sustained during load variations and overloads.

**class C1**= operation at ambient temperatures down to – 5°C;

transport and storage at ambient temperature down to – 25°C;

**installation inside**

**class C2**= operation, transport and storage at ambient temperatures down to – 25°C;

**installation outside**



### **3 fire behaviour classes F**

They are defined in relation to the fire risks and therefore in relation to the needs of goods and security.

**class F0**= no special risk of fire to be considered.

**class F1**= risk of fire exists, limited flammability is acceptable. Self extinguishing of the fire must occur within 60 minutes following the start of the special test in accordance with appendix Z.C.3 as per HD 464 S1 (page 5); materials must be free from halogens; emission of toxic substances and thick smoke must be reduced to a minimum.

**class F2**= class F1 requirements must be fulfilled; in addition, the transformer must be capable of operating for a defined time\* when subjected to an external fire.

\* to be agreed between the manufacturer and the buyer.

- **HD**= CENELEC Harmonization Document

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### **CENELEC** (Comité Européen de Normalisation Electrotechnique) Deliverables

CENELEC concentrates most of its work on 2 major deliverables: The European Standard (EN) and the Harmonization Document (HD). These two documents are referred to commonly as "standards" and must be implemented in all CENELEC member countries, who must also withdraw any conflicting standards

There are a few differences in the implementation process of EN's and HD's. Basically, the EN must be transposed as it is, not adding or deleting anything. The process for HD's is a bit more flexible. It is the technical content that must be transposed, no matter the wording or how many documents are made of it.

In addition to these two major deliverables, CENELEC also produces and approves documents with a different objective and target. Below, you will find a brief explanation to each CENELEC deliverable:

#### **EN - European Standard**

It is a normative document available, in principle, in the three official languages of CENELEC (English, French and German) that cannot be in conflict with any other CENELEC standard. EN's are the most important deliverable published by CENELEC. Its development is governed by the principles of consensus, openness and transparency, a national commitment to implement it in each and every one of the countries member of CENELEC, its technical coherence regarding both national and European levels. Before its implementation, the EN must follow the following steps: Drafting by a CENELEC Technical Committee or Working Group, Inquiry at national level, a formal vote followed by a standstill at national level and the final approval by the Technical Board before its implementation in all member countries.



## **HD - Harmonization Document**

Same characteristics as the EN except for the fact that there is no obligation to publish an identical national standard at national level (may be done in different documents/parts), taking into account that the technical content of the HD must be transposed in an equal manner everywhere.

## **TS - Technical Specification**

A TS is a normative document produced and approved by a Technical Committee (not by CENELEC as such). Several of the compulsory requirements needed to have a standard do not apply to Technical Specifications: there is no standstill, no public enquiry, the vote does not follow the same rules as in the CENELEC Technical Board (where it is weighted). A TS must only be produced in one of the official languages and its maximum lifetime is reduced to two or three years.

Technical Specifications are explained in terms of supporting the European Market and act as a guidance method towards evolving technologies and experimental circumstances that would not gather enough consensus as to publishing an EN.

A TS may not be in conflict with any other CENELEC standard. If a conflicting standard (EN) is published in the meantime, then the TS must be withdrawn.

## **TR - Technical Report**

A Technical Report is an informative document on the technical content of standardization work. Only required in one of the 3 official languages, a TR is approved by the Technical Board or by a Technical Committee by simple majority. No lifetime limit applies.

## **G - Guides**

CENELEC Guides are informative documents related to the "internal system". They may specify information about standardization principles and guidance to standards writers. Guides must be approved at General Assembly or Technical Board level. No lifetime limit applies.

## **CWA - CENELEC Workshop Agreement**

As indicated by their name, CWA's are an agreement developed and approved by a Workshop through consensus reached among identified individuals and organizations. They must be published at least in one of the official languages.