

Safety and isolating single-phase transformers

Isolating transformer: this is a transformer with protective measures of separation between the input and the output windings, designed to limit the risks due to contacts between the earth and any live conductor which may become exposed due to failure of the insulation. Rated primary voltage ≤ 1000 V ac – Rated frequency ≤ 500 Hz – Open circuit secondary voltage ≤ 1000 V ac and 1000 V in dc not steady. Max. power 25 KVA if single-phase; Max. power 40 KVA if multiphase.

- Safety transformer: this is an isolating transformer for powering circuits with a very low safety voltage. Rated primary voltage ≤ 1000 V ac - Rated frequency ≤ 500 Hz - Open circuit secondary voltage ≤ 50 V ac, effective value, and/or 120 V in dc steady. Max. power 10 KVA if single-phase; Max. power 16 KVA if multiphase.

- Protection class: this is the safety protection against dangerous currents.

- Class I: this is a transformer in which the protection against direct and indirect contacts is based not only on the fundamental insulation but also on an additional safety measure consisting of a protective conductor that is part of the fixed electrical system of the installation.

- Class II: this is a transformer in which the protection against direct and indirect contacts is based not only on the fundamental insulation but also on additional safety measures consisting of double or reinforced insulation. These precautions do not contemplate earthing of the transformer. Insulation class: this refers to the insulating materials and makes the following distinctions: A (105°C) E (120°C) - B (130°C) F (155°C) - H (180°C)

- Rated ambient temperature: (T_a) rated ambient temperature means 40°C. If requested otherwise the rated power of the transformer must be downgraded in relation to the temp. With T_a 50°C ($P_n = -15\%$) - With T_a 60°C ($P_n = -30\%$) - With T_a 70°C ($P_n = -40\%$)

- Temperature rise: (DT) this is the temperature that the transformer reaches during regular operation, considering an ambient temperature of 40°C. Maximum allowed DT for insulation class A is 60°C, E 75°C, B 80°C, F 100°C and H 125°C

- Rated primary voltage: this is the supply voltage for the specific operation of the transformer. It may reach a limit value 1.06 times the rated voltage value, unless otherwise agreed, without causing malfunction.

- Rated secondary voltage: this is the secondary voltage when the transformer is powered at the rated primary voltage, at rated frequency, with the rated secondary current and rated power factor. It is measured during regular operation of the transformer and with the rated ambient temperature.

- Short-circuit-proof transformer: this is a transformer in which the temperature rise does not exceed the specified limits when the transformer is overloaded or short-circuited and which can operate normally after removal of the overload or the short circuit.

- Non-short-circuit transformer: this is a transformer which is intended to be protected against an excessive temperature through an associated external protective device (E.g.: fuses)

- Inherent-type short-circuit-proof transformer: this transformer is short-circuit proof provided the temperature, in the event of overload or short-circuit and in the absence of any protective device, does not exceed the specified limits and which can operate normally after removal of the overload or the short circuit. (E.g.: small transformers with very high internal resistance or transformers with uncoupled primary/secondary windings)

- Non-inherent-type short-circuit-proof transformer: this transformer is short-circuit proof because it is equipped with an external protective device that opens the primary or secondary circuit or reduces the current in the primary or in the secondary circuit, when the transformer is overloaded or short circuited and continues to operate after removal of the overload or the short circuit (Examples of protective devices are fuses, overload release, thermal cutouts, bimetallic strips, thermistors or mechanical automatic tripping devices).

Symbols to European standard CEI 61558-1-2

