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Generic specification of transformers for electronic equipment

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Generic specification of transformers for electronic equipment

1 Scope This Japanese Industrial Standard specifies the basis for determining the ratings such as the voltage, current and power, and the performance, dimensions and other items of transformers for electronic equipment (hereafter referred to as "transformers"), and for symbolizing the above.

Remarks 1 Unless otherwise specified, the voltage and the current shown in this Standard mean the r.m.s. value.

2 The following standards are cited in this Standard:

JIS C 5311 *Testing methods of power transformers for electronic equipment*

JIS Z 8601 *Preferred numbers*

IEC 742 *Isolating transformers and safety isolating transformers—Requirements*

IEC 1007 *Transformers and inductors for use in electronic and telecommunication equipment—Measuring methods and test procedures*

2 Definitions For the purpose of this Standard, the following principal definitions apply.

- (1) **rated output capacity** The maximum apparent power capable of being supplied continuously to the load side at the rated frequency and rated input voltage. Total sum of the rated winding outputs when there are two or more secondary windings.
- (2) **rated input voltage** The supply voltage at which the transformer is designed and used to operate in proper conditions.
- (3) **rated output voltage** The terminal voltage capable of being supplied continuously to the load side at the rated frequency and rated input voltage.
- (4) **rated output current** The maximum value of the current capable of being loaded continuously at the rated ambient temperature.
- (5) **rated frequency** The supply frequency at which the transformer is designed and used to operate in proper condition.
- (6) **rated winding output capacity** The maximum apparent power capable of being supplied continuously from each secondary winding to the load side at the rated frequency and rated input voltage.
- (7) **rated load** The load connected to the secondary winding when the rated output voltage and current are supplied from the secondary winding of the transformer.

- (8) **secondary winding terminal voltage** The terminal voltage of each secondary winding when the rated input voltage is applied to the primary winding and the rated output currents are passed through all the secondary windings at the rated frequency.
- (9) **voltage deviation** The ratio (percentage) of the secondary winding terminal voltage minus the rated output voltage to the rated output voltage, when the rated output current is passed while the rated input voltage at the rated frequency is applied to the primary winding.
- (10) **voltage regulation** The ratio (percentage) of the difference between no-load voltage and secondary winding terminal voltage to the secondary winding terminal voltage.
- Remarks : This means that the formula same as that of IEC 742 is employed.
- (11) **no-load voltage** The voltage induced in each secondary winding, when the rated input voltage at the rated frequency is applied to the primary winding, with all the secondary windings open.
- (12) **no-load current** The current flowing through the primary winding, when the rated input voltage at the rated frequency is applied to the primary winding, with all the secondary windings open.
- (13) **no-load loss** The power consumed in the transformer, when the rated input voltage at the rated frequency is applied to the primary winding, with all the secondary windings open.
- (14) **total loss** The power consumed in the transformer, when the rated input voltage at the rated frequency is applied to the primary winding, with all the secondary windings loaded with the rated output current.
- (15) **efficiency** The ratio (percentage) of the product of the secondary winding terminal voltage and rated output current to the sum of the product of the secondary winding terminal voltage and rated output current plus the total loss.
- (16) **primary winding** The winding connected to the source side circuit. It is also called input winding or source side winding.
- (17) **secondary winding** The winding connected to the load side circuit. It is also called output winding or load side winding.
- (18) **tap** The lead provided in a winding for the purpose of changing voltage.
- (19) **neutral terminal** The neutral terminal means the following:
- (a) The terminal connected to the point of connection, when two windings constructed so that their various constants are equal, are connected at their ends of different polarity.
 - (b) The terminal connected to the common point of connection of the windings of star connection or zigzag-star connection.

- (20) **tap voltage** The voltage between the specified terminal and the tap terminal, other than the rated voltage.
- (21) **unbalance degree of neutral voltage (δ)** The values obtained from the following formulae, when the output voltages between neutral terminal and both side terminals of a single phase transformer are denoted as U_1 and U_2 :

$$(a) \quad \delta_a = \frac{U_1 - U_2}{U_1 + U_2} \times 100 (\%) \quad \dots\dots\dots \text{JIS C 5310}$$

$$(b) \quad \delta_b = \frac{U_1 - U_2}{U_1} \times 100 (\%) \quad \dots\dots\dots \text{IEC 1007}$$

Provided that $U_1 \geq U_2$ and (a) shall be used unless especially specified.

- (22) **polarity** The indication of the direction of the phase of induced voltage in other winding with respect to that of the reference winding. It is called additive polarity if the voltage is in the same direction and subtractive polarity if the opposite direction.
- (23) **category temperature range** The range of ambient temperature within which the transformer is capable of being used in the state of continuous operation (at the rated output).
- (24) **temperature rise of winding** The difference between the measured temperature of each winding and the ambient temperature when the transformer is operated continuously (at the rated output).

3 Type designation

3.1 Structure of type designation The type designation shall be formed in the following arrangement.

$\left[\begin{array}{c} \text{Symbol denoting} \\ \text{transformer} \\ \\ 3.2.1 \end{array} \right]$	$\left[\begin{array}{c} \text{Symbol denoting} \\ \text{number of phases} \\ \text{and frequency} \\ \\ 3.2.2 \end{array} \right]$	$\left[\begin{array}{c} \text{Symbol denoting} \\ \text{shape} \\ \\ 3.2.3 \end{array} \right]$
Example : TP	1	2

$\left[\begin{array}{c} \text{Symbol denoting} \\ \text{mounting method} \\ \\ 3.2.4 \end{array} \right]$	$\left[\begin{array}{c} \text{Symbol denoting rela-} \\ \text{tion between mounting} \\ \text{position and terminal} \\ \\ 3.2.5 \end{array} \right]$	$\left[\begin{array}{c} \text{Symbol denoting} \\ \text{kind of terminal} \\ \\ 3.2.6 \end{array} \right]$
Example : 4	1	1

$\left[\begin{array}{c} \text{Symbol denoting} \\ \text{classification by} \\ \text{rated output} \\ \\ 3.2.7 \end{array} \right]$	$\left[\begin{array}{c} \text{Symbol denoting} \\ \text{other necessary} \\ \text{items} \\ \\ 3.2.8 \end{array} \right]$
Example : G	