



**SLOVENSKI STANDARD**  
**SIST IEC/TR 60616:1997**

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**Terminal and tapping markings for power ransformers**

Terminal and tapping markings for power transformers

Marquage des bornes et prises de transformateurs de puissance

**Ta slovenski standard je istoveten z: IEC/TR 60616**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## TERMINAL AND TAPPING MARKINGS FOR POWER TRANSFORMERS

## FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendations and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

## PREFACE

This report has been prepared by IEC Technical Committee No. 14, Power Transformers.

A first draft was discussed at the meeting held in Athens in 1972, as a result of which, a draft, Document 14(Central Office)26, was submitted to the National Committees for approval under the Six Months' Rule in January 1974. In view of the number of basic comments on Document 14(Central Office)26, it was referred back to Technical Committee No. 14 for further consideration, and this took place at the meeting held in Helsinki in 1977. At this meeting, it was agreed that the document should be published for guidance, rather than as a mandatory standard, and it is therefore published as a report.

The following countries voted explicitly in favour of publication:

Argentina	Netherlands
Austria	Norway
Belgium	Poland
Czechoslovakia	Romania
Denmark	South Africa (Republic of)
Finland	Spain
Germany	Switzerland
Hungary	Turkey
Israel	Union of Soviet Socialist Republics
Italy	United States of America
Japan	Yugoslavia

The Australian National Committee voted against publication of document 14(Central Office)26, because it considers the numbering system should be in numerical order throughout the winding. Furthermore, the use of the letters U, V and W is not favoured.

*Other IEC publication quoted in this report:*

Publication No. 445: Identification of Apparatus Terminals and General Rules for a Uniform System of Terminal Marking, Using an Alphanumeric Notation.

## TERMINAL AND TAPPING MARKINGS FOR POWER TRANSFORMERS

### 1. Scope

This report gives guidance on markings for the terminals and tapplings of power transformers in accordance with the rules given by IEC Technical Committee No. 16 for a uniform alphanumeric system of terminal markings \*.

Only simple examples are illustrated, more complicated cases, e.g. two units in one tank, being subject to agreement between the manufacturer and the purchaser.

### 2. Method of identifying terminals and tapplings of power transformers

#### 2.1 Characters

For compliance with the guidance of this report, an alternate sequence employing capital (upper case) roman letters and one or more arabic numeral characters shall be used for marking the terminals and tapplings of power transformers. The letters I and O shall not be used.

*Note.* — Where reference is made to these markings in correspondence, drawings, etc., the use of capital (upper case) letters is preferred; however, in those cases where difficulties would otherwise arise the use of small (lower case) letters, having the same significance is permitted.

Care should be taken when confusion might arise between two similar characters.

In a complete marking, the letters and numerical characters which are not required for clear identification may be omitted. Should numerical character groups having different significance be immediately adjacent to each other, they shall, to avoid confusion, be separated by a full stop. For example, if in 1U11, U is not required, 1.11 would be the abbreviated notation.

#### 2.2 End points of phase-windings

The two end points of phase-windings which lead to line or neutral terminals shall be marked by the reference numbers 1 and 2.

Where phase-windings have at their ends tapplings which are to be connected to on-load tap-changers, off-load tap-changers, etc., which lead to line or neutral terminals, the corresponding line or neutral terminal shall be denoted by 1 or 2 as appropriate.

In applying this system of terminal and tapping marking for the purpose of drawing winding diagrams, all windings are assumed to be wound in the same direction; thus the polarity between the end points 1 and 2 of all windings on one leg is always the same.

*Note.* — For auto-transformers, where two windings of a phase have a common end, see Sub-clause 2.4.

\* IEC Publication 445: Identification of Apparatus Terminals and General Rules for a Uniform System of Terminal Marking, Using an Alphanumeric Notation.

### 2.3 Line and neutral terminals

The line terminals of the windings of a three-phase power transformer shall be denoted by reference letters U, V, W. These shall precede the reference numbers referred to in Sub-clause 2.2. Where clarification is necessary, these reference letters can also be used before the reference numbers referred to in Sub-clauses 2.5 and 2.6.

The neutral terminal of a winding having star or zigzag connection shall be denoted by the letter N.

For single-phase transformers, this marking is not required.

### 2.4 Identification of windings

The various windings of a transformer shall be denoted by reference numbers which shall precede the reference letters referred to in Sub-clause 2.3. The high-voltage winding shall be denoted by the reference number 1, and the other windings with 2, 3, 4 ... in descending sequence of their rated voltage.

For auto-transformers where two windings of a phase have a common end, this end should be marked 2 (an example is given in Figure 2c), page 13).

*Note.* — If several windings have the same rated voltage, their respective numbering should be agreed between the manufacturer and the purchaser.

### 2.5 Series/parallel connections

Where phase-windings consist of several parts which can be connected either in series or in parallel, the end points of these parts shall be denoted by the reference numbers 1, 2, 3, 4 ... , the line or neutral ends of the phase-windings being denoted by 1 and 2, as stated in Sub-clause 2.2.

### 2.6 Marking of tappings

The tappings which lead to on-load tap-changers, off-load tap-changers, etc., shall be marked with numeral character groups in a naturally ascending sequence, the numbers being higher than those at the line and neutral ends and those at the ends of parts of phase-windings for series and parallel connection. The numbering shall commence at the tapping nearest to the end marked 1. The marking of tapped windings which can be reversed shall be based on that connection which gives the highest effective number of turns for the winding connected to the tap-changer.

Tapped windings of auto-transformers connected between series and common windings or at the end of the series winding, and those having one end connected to the connection between the series winding and the common winding (see example in Figure 3c), page 14), shall be numbered as if the tapped winding belongs to the series winding.

## 3. Examples

*Figure 1, page 12 — Typical markings for phase-windings*

a) Phase-winding with mid-winding tappings.

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Note concerns French text only.

- b) Phase-winding with coarse step and fine step tapplings at one end of winding.
- c) Phase-winding with two parts for connecting in series or parallel.
- d) Phase-winding with two parts connected in series and each having mid-winding tapplings.

The above illustrate the basic method of numbering as defined in Sub-clauses 2.2, 2.5 and 2.6.

*Figure 2, page 13 — Markings for single-phase transformers*

- a) Two-winding transformer without tapplings.
- b) Three-winding transformer without tapplings.
- c) Auto-transformer without tapplings.

These figures illustrate the method of numbering as defined in Sub-clauses 2.2 and 2.4.

*Figure 3, page 14 — Typical markings for single-phase auto-transformers*

- a) Tapped winding between series and common winding.
- b) Tapped winding at the end of the series winding.
- c) Tapped winding having one end connected to the connection between the series winding and the common winding.

*Figure 4, page 15 — Markings for three-phase two-winding transformers*

- a) Connection symbol YN, yn0.
- b) Connection symbol YN, yn6.
- c) Connection symbol YN, d5.
- d) Connection symbol YN, d11.

*Figure 5, page 16 — Marking for three-phase three-winding transformer having connection symbol YN, yn0, d5*

*Figure 6, page 16 — Marking for the low-voltage winding in Figure 5, if it is open-delta connected*

*Figure 7, page 16 — Marking for three-phase auto-transformer*

*Figure 8, page 16 — Marking for booster transformer with energizing winding connected in delta*

Figures 4 to 8 illustrate the marking as defined in Sub-clauses 2.2, 2.3 and 2.4 and show where the numeral characters denoting the end points of a phase-winding may be omitted as permitted in Sub-clause 2.1.



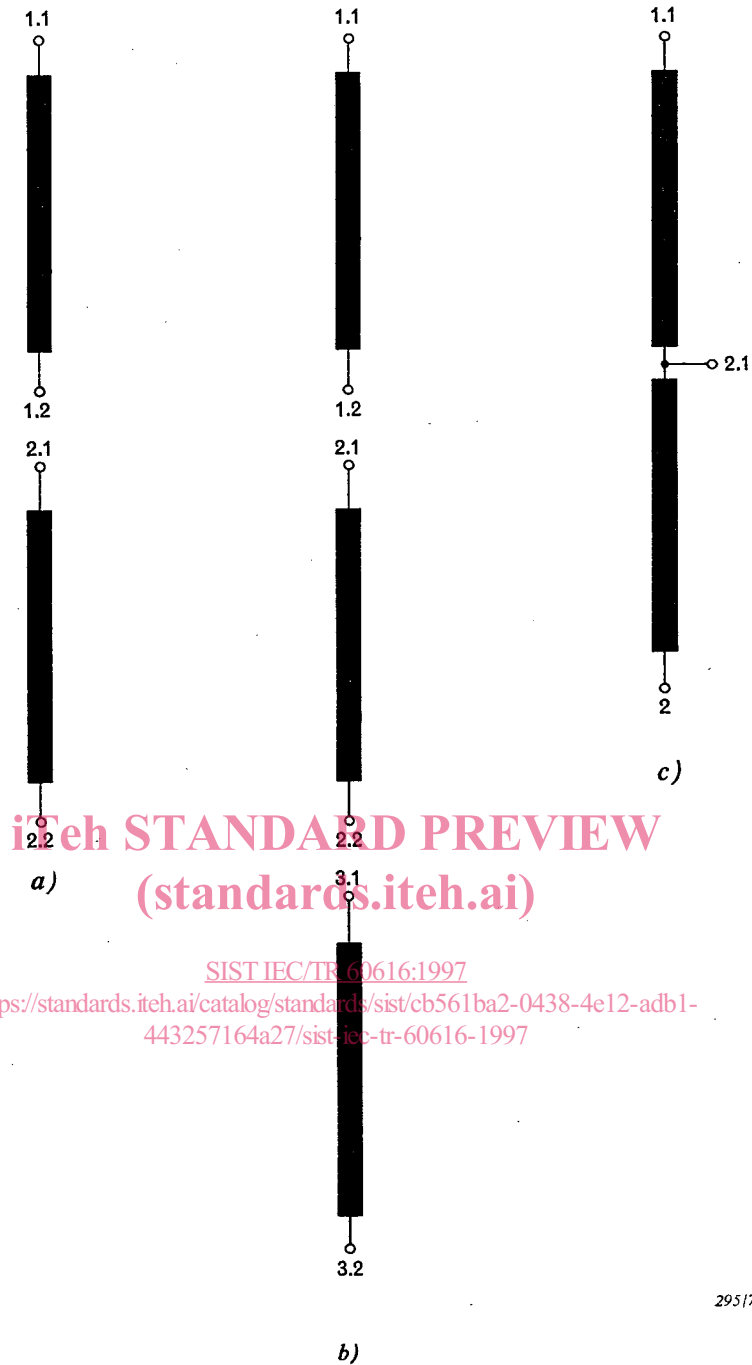


FIG. 2. — Marquages de transformateurs monophasés.  
Markings for single-phase transformers.