BRITISH STANDARD

BS EN
50482:2008

Instrument transformers — Three-phase inductive voltage transformers having U_m up to 52 kV

ICS 17.220.20

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 50482:2008. It supersedes BS 7729:1994 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/38, Instrument transformers.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 May 2008

ISBN 978 0 580 56558 8

Amendments/corrigenda issued since publication

Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50482

January 2008

ICS 17.220.20

Supersedes HD 587 S1:1993

English version

Instrument transformers - Three-phase inductive voltage transformers having U_m up to 52 kV

Transformateurs de mesure - Transformateurs inductifs de tension triphasés avec U_m jusqu'à 52 kV

Messwandler - Dreiphasige Spannungswandler mit U_m bis 52 kV

This European Standard was approved by CENELEC on 2007-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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

Ref. No. EN 50482:2008 E

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 38X, Instrument transformers.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50482 on 2007-09-01.

This European Standard supersedes HD 587 S1:1993. It is to be used in conjunction with EN 60044-2:1999.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2008-09-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2010-09-01

_____

Contents

Figures

Table

1 General

1.1 Scope

This European Standard specifies the requirements and tests for new three-phase voltage transformers with U_m up to 52 kV and frequencies from 15 Hz to 100 Hz, for use with electrical instruments or electrical protective devices.

NOTE Single-phase voltage transformers connected in a three-phase bank are not covered in this document.

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 60044-2:1999, Instrument transformers – Part 2: Inductive voltage transformers
(IEC 60044-2:1997, mod.)

EN 60270:2001, High-voltage test techniques – Partial discharge measurements (IEC 60270:2000)

HD 588.1 S1:1991, High-voltage test techniques – Part 1: General definitions and test requirements
(IEC 60060-1:1989 + corr. March 1990)

2 Definitions

Clause 2 of EN 60044-2:1999 is applicable with the following additions:

2.3 Additional definitions for three-phase inductive voltage transformers

2.3.1
three-phase voltage transformer
a voltage transformer which has three line-to-neutral primary windings the neutral point of which can be earthed or unearthed and in which one or more of the three line-to-neutral secondary windings can be connected for three-phase operation or residual voltage operation

2.3.2
rated output of a three-phase voltage transformer
the per phase value of the apparent power (in volt-amperes at a specified power factor) that a three-phase voltage transformer is intended to supply to the secondary circuit, at the rated secondary voltage and with rated per-phase burden connected to it

3 General requirements

Clause 3 of EN 60044-2:1999 applies.

4 Normal and special service conditions

Clause 4 of EN 60044-2:1999 applies.

5 Ratings

5.1 Standard values of rated voltages

5.1.1 Rated primary voltages

The standard values of rated line-to-line primary voltage of three-phase voltage transformer shall be one of the values of nominal system voltage designated by EN 60044-2:1999.

NOTE The performance of a voltage transformer as a measuring or protection transformer is based on the rated primary voltage, whereas the rated insulation level is based on one value of the highest voltages for equipment of EN 60071.

5.1.2 Rated secondary voltages

The rated line-to-line secondary voltage shall be chosen according to practice at the location where the transformer is to be used. The values given below are considered standard values for three-phase voltage transformers:

– 100 V and 110 V;

– 200 V, for extended secondary circuits.

NOTE Whenever possible, the rated transformation ratio should be a simple value. If one of the following values: 10 – 12 – 15 – 20 – 25 – 30 – 40 – 50 – 60 – 80 and their decimal multiples is used for the rated transformation ratio together with one of the rated secondary voltages of this subclause, the majority of the standard values of nominal system voltage of IEC 60038 will be covered.

5.1.3 Rated secondary voltages for residual windings

The rated secondary voltages of windings intended to be connected in broken-delta with similar windings to produce a residual voltage are given in 13.3.

5.2 Standard values of rated output

The standard values of rated output per phase at a power factor of 0,8 lagging, expressed in volt-amperes, are:

$$\underline{10} – 15 – \underline{25} – 30 – \underline{50} – 75 – \underline{100} – 150 – 200 \text{ VA}$$

The underlined values are preferred values.

NOTE For a given transformer, provided one of the values of rated output is standard and associated with a standard accuracy class, the declaration of other rated outputs, which may be non-standard values but associated with other standard accuracy classes, is not precluded.

5.3 Standard values of rated voltage factor

Subclause 5.3 of EN 60044-2:1999 applies.

5.4 Limits of temperature rise

Unless otherwise specified below the temperature rise of a voltage transformer at the specified voltage, at the rated frequency and at the rated burden or at the highest burden, if there are several rated burden, at any power factor between 0,8 lagging and unity, shall not exceed the appropriate value given in Table 3 of EN 60044-2:1999.

a) All three-phase transformers, irrespective of voltage factor (VF) and time rating, shall be capable of operating continuously with a balanced three-phase voltage of 1,2 times rated primary voltage. The steady state temperature rise shall not exceed the limits given in Table 3 of EN 60044-2:1999.

b) Three-phase earthed transformers having a voltage factor of 1,5 for 30 s or 1,9 for 30 s shall after the application of 1,2 times rated primary voltages for sufficient time to reach stable thermal conditions, be capable of operating with a balanced three-phase voltage of respectively 0,866 or 1,1 times the rated primary voltage applied for 30 s, one line terminal of the primary winding being connected to the neutral of that winding. The temperature rise shall not exceed by more than 10 K the value specified in Table 3 of EN 60044-2:1999.

c) Three-phase earthed transformers having a voltage factor of 1,9 for 8 h shall after the application of 1,2 times rated primary voltage for sufficient time to reach stable thermal conditions, be capable of operating with a balanced three-phase voltage of 1,1 times rated line-to-line voltage applied for 8 h, one line terminal of the primary winding being connected to the neutral point of the winding. The temperature rise shall not exceed by more than 10 K the value specified in Table 3 of EN 60044-2:1999.

Table 3 of EN 60044-2:1999 as well as the text and the notes, except a), b), and c) above apply.

6 Design requirements

6.1 Insulation requirements

These requirements apply to all types of inductive voltage transformers. For gas-insulated voltage transformers supplementary requirements may be necessary (presently under consideration in IEC/TC 38).

6.1.1 Rated insulation levels, primary windings

The rated insulation level shall be one of those given in Table 4 of EN 60044-2:1999.

6.1.2 Other requirements for primary winding insulation

6.1.2.1 Power-frequency withstand voltage

Subclause 6.1.2.1 of EN 60044-2:1999 applies.

6.1.2.2 Power-frequency withstand voltage for earthed terminal

Subclause 6.1.2.2 of EN 60044-2:1999 applies.

6.1.2.3 Partial discharges

Partial discharge requirements are applicable to inductive three-phase voltage transformers having U_m greater than or equal to 7,2 kV. The partial discharge level shall not exceed the limits specified in Table 1, at the partial discharge test voltages specified in the same table after prestressing according to the procedures of 9.2.3.3.

Table 1 – Permissible partial discharge levels for various neutral earthing system and test voltages

Type of network earthing	Type of voltage transformer	Single-phase partial discharge test voltage	Permissible partial discharge level pC
Earthed neutral system VF ≤ 1,5	Earthed transformer	U_m 1,2 U_m / √ 3	50 20
	Unearthed transformer	U_m 1,2 U_m / √ 3	50 20
Isolated or non-effectively earthed neutral system VF > 1,5	Earthed transformer	U_m 1,2 U_m / √ 3	50 20
	Unearthed transformer	U_m 1,2 U_m / √ 3	50 20

6.1.2.4 Chopped lighting-impulse

Subclause 6.1.2.4 of EN 60044-2:1999 applies.

6.1.3 Between-section insulation requirements

Subclause 6.1.3 of EN 60044-2:1999 applies.

6.1.4 Insulation requirements for secondary windings

Subclause 6.1.4 of EN 60044-2:1999 applies.

6.1.5 Requirements for external insulation

6.1.5.1 Pollution

For outdoor inductive voltage transformers, with ceramic insulators, susceptible to contamination, the creepage distances for given pollution levels are given in Table 8 of EN 60044-2:1999.

6.2 Short-circuit withstand capability

The voltage transformer shall be designed and constructed to withstand without damage, when energized at rated voltage, the mechanical and thermal effects of an external three-phase short-circuit for the duration of 1 s.

7 Classification of tests

Clause 7 of EN 60044-2:1999 applies.

8 Type tests

8.1 Temperature-rise tests

Subclause 8.1 of EN 60044-2:1999 applies.

8.2 Short-circuit withstand capability test

Subclause 8.2 of EN 60044-2:1999 applies.

8.3 Impulse test on primary winding

8.3.1 General

The impulse tests shall be performed in accordance with HD 588.1 S1.

The impulse voltage tests generally consist of voltage applications at reference and rated voltage levels. The reference impulse voltage shall be between 50 % and 75 % of the rated impulse withstand voltage. The peak value and waved-shape of the impulse voltage shall be recorded.

Evidence of failure in the test may be given by variation in the records at both reference and rated impulse withstands voltages.

8.3.2 Lightning impulse test

The test voltage shall have the appropriate value given in Table 4 of EN 60044-2:1999 depending on the highest voltage for equipment and the specified insulation level.

8.3.2.1 Earthed primary windings

The test voltage shall be applied between each line terminal of the primary winding and earth. The neutral point of the primary winding, the non-tested line terminals, the frame, case (if any) and the core (if intended to be earthed) shall be earthed during the test.

The test shall be performed with both positive and negative polarities. Fifteen consecutive impulses of each polarity, not corrected for atmospheric conditions, shall be applied to each of the three terminals.

8.3.2.2 Unearthed primary winding

The test voltage shall be applied between each line terminal of the primary winding and earth; the other line terminals, the frame; case (if any) and the core (if intended to be earthed) shall be earthed during the test.

The test shall be performed with both positive and negative polarities. Fifteen consecutive impulses of each polarity, not corrected for atmospheric conditions, shall be applied to each of the three terminals.

NOTE The application of 15 positive and 15 negative impulses is specified for testing the external insulation. If other tests are agreed between manufacturer and purchaser to check the external insulation, the number of lightning impulses may be reduced to three of each polarity, not corrected for atmospheric conditions.

8.3.2.3 Test evaluation

In order to improve the failure detection, an additional quantity shall be recorded.

At the manufacturer's discretion, the earth connection may be made through a suitable current recording device. The secondary terminals may be connected together and earthed or may be connected to a suitable device for recording the voltage wave appearing across the secondary winding(s) during test.

The transformer has passed the test if for each polarity:

– no disruptive discharge occurs in the non self-restoring internal insulation;

– no flashovers occur across the non self-restoring external insulation;

– no other evidence of insulation failure is detected (i.e. variations in the wave-shape of the recorded quantities).

8.4 Wet test for outdoor type transformers

Subclause 8.4 of EN 60044-2:1999 applies.

9 Routine tests

9.1 Verification of terminal markings

Subclause 9.1 of EN 60044-2:1999 applies.

9.2 Power frequency tests on primary winding and partial discharge measurement

9.2.1 General

Subclause 9.2.1 of EN 60044-2:1999 applies.

9.2.2 Test voltage

The test voltages shall have the appropriate values given in Table 4 of EN 60044-2:1999 depending on the highest voltage for equipment.

When there is a considerable difference between the specified highest voltage for equipment (U_m) and the specified rated primary voltages, the induced voltage shall be limited to five times the rated primary voltage.

Alternatively, at the discretion of the manufacturer, the induced voltage test may be made by a succession of single-phase tests. In this case any winding may be earthed at any terminal at the discretion of the manufacturer, but the test shall be repeated with such alternative connections as may be necessary to produce in turn the required test voltage between line terminals and between each line terminal and earth. Exciting the primary winding directly with a balanced three-phase voltage of the specified value may also make the test.

The test voltage shall be measured at the high-voltage side in each case. The frame, case (if any) and the core (if intended to be earthed) shall be connected together and earthed.

9.2.2.1 Unearthed voltage transformers

Unearthed voltage transformers shall be submitted to the following tests:

a) Separate source withstand test

The test voltage shall be applied for 60 s between earth and all the terminals of the primary winding(s) connected together. The frame, case (if any), core (if intended to be earthed) and all terminals of the secondary windings shall be connected together and to earth.

b) Induced over-voltage withstand test

The induced voltage test shall normally be made by exciting the secondary winding with a balanced three-phase voltage at such a value as to induce the specified test voltage in the primary windings.

9.2.2.2 Earthed voltage transformers

Earthed voltage transformers shall be submitted to the following tests:

a) Separate source withstand voltage test (when applicable)

The test voltage shall have the appropriate value given in 6.1.2.2 and shall be applied for 1 min between the terminal of the primary winding intended to be earthed and earth. The frame, case (if any), core (if intended to be earthed) and all terminals of the secondary windings shall be connected together and to earth.

b) Induced over-voltage withstand test

The test shall be performed as specified in 9.2.2.1. The neutral point of the primary winding intended to be earthed in service shall be earthed during the test.

9.2.3 Measurement of partial discharges

9.2.3.1 Test circuit and instrumentation

The test circuit and the instrumentation used shall be in accordance with EN 60270:2001. Some examples of the test circuits are shown in Figures 10 and 11.

The instrument used shall measure the apparent charge *q* expressed in pico Coulomb (pC). Its calibration shall be performed in the measuring circuit; see an example in Figure 12.

A partial discharge level of 5 pC shall be detectable.

NOTE 1 The noise shall be sufficiently lower than the sensitivity (e.g. not larger than 2 pC). Pulses that are known to be caused by external disturbance can be disregarded.

NOTE 2 When electronic signal processing and recovery are used in order to reduce the background noise, it shall be demonstrated by varying parameters that it is capable of detecting repeatedly occurring pulses.

9.2.3.2 Single-phase test voltage application

The single-phase test voltage shall be applied as follows:

a) For earthed transformers the test voltage shall be applied between each primary terminal in turn and the neutral earthed together with the core and case if applicable.

b) For unearthed transformers the test voltage shall be applied between each primary terminal in turn and the other two primary terminals connected together and earthed together with the core and case if applicable.

The test voltage can be induced from the secondary side but the voltage level and the partial discharge level shall be measured on the primary side.

The frequency of the test voltage can be increased to avoid saturation of the core.

As an alternative to the single-phase tests and subject to agreement between manufacturer and purchaser a special test circuit can simulate the correct voltage stressing.

If the neutral system is not defined, the values specified for isolated or resonant earthed systems are valid.

9.2.3.3 Partial discharge test procedure

The partial discharge level shall not exceed the limits specified in Table 1, when measured at the partial discharge test voltages specified in the same table, after a prestressing performed according to procedures A or B:

a) Procedure A

The partial discharge test voltages are reached while decreasing the voltage after the power frequency withstand test.

b) Procedure B

The test is performed after the power frequency withstand test. The applied voltage is raised to 80 % of the power frequency withstand voltage, maintained for not less than 60 s, then reduced without interruption to the specified partial discharge test voltages.

If not otherwise specified, the choice of procedure is left to the manufacturer. The test method used shall be indicated in the test report.

9.3 Power-frequency tests between section and on secondary windings

Subclause 9.3 of EN 60044-2:1999 applies.

10 Special test

VOID

11 Markings

11.1 Rating plate and markings

Subclause 11.1 of EN 60044-2:1999 applies, with the following additions and modification:

After item b), **add**:

c) the word: three-phase voltage transformer;

Renumber the current items c) to j) into d) to k)

After renumbered item d), **add**:

NOTE The rated voltages are line voltages.

11.2 Terminal markings

11.2.1 General rules

Subclause 11.2.1 of EN 60044-2:1999 applies.

11.2.2 Terminal identifier

Markings shall be in accordance with Figures 1, 2, 3 and 4 (corresponding to Figures 8, 10, 12 and 15 of EN 60044-2:1999), as appropriate. Other requirements of Subclause 11.2 of EN 60044-2:1999 apply.

12 Accuracy requirements for three-phase inductive measuring voltage transformers

12.1 Accuracy class designation for measuring voltage transformers

Subclauses 12.1 and 12.1.1 of EN 60044-2:1999 apply.

12.2 Limits of voltage error and phase displacement for measuring voltage transformers

Subclause 12.2 of EN 60044-2:1999 applies.

12.3 Type test for accuracy of measuring voltage transformers

To prove compliance with 12.3 of EN 60044-2:1999 type test shall be made at 80 %, 100 % and 120 % of rated voltage at rated frequency and at 25 % and 100 % of rated burden.

For three-phase transformers the limits of error given in Subclause 12.3 of EN 60044-2:1999 apply in principle to the corresponding voltages of the primary and secondary windings, the transformer being energized by a balanced three-phase voltage. For earthed transformers, however, the test for compliance with Subclause 12.3 of EN 60044-2:1999 may, if necessitated by the test equipment, be made by comparing in succession the corresponding line-to-neutral-point voltages, the transformer being energized by a balanced three-phase voltage applied to the terminals of the primary winding.

NOTE For three-phase voltage transformers having a residual voltage winding as well as a three-phase secondary winding the above tests should be made with rated burden connected to the residual voltage winding if not otherwise agreed.

12.4 Routine test for accuracy of measuring voltage transformers

Subclause 12.4 of EN 60044-2:1999 applies.

12.5 Markings of the rating plate of three-phase measuring voltage transformer

Subclause 12.5 of EN 60044-2:1999 applies.

13 Additional requirements for three-phase inductive protective voltage transformers

13.1 Accuracy class designation for protective voltage transformers

Subclause 13.1 of EN 60044-2:1999 applies.

13.1.1 Standard accuracy classes for protective voltage transformers

Subclause 13.1.1 of EN 60044-2:1999 applies.

13.2 Limits of voltage error and phase displacement for protective voltage transformers

Subclause 13.2 of EN 60044-2 applies.

13.3 Rated voltages for secondary windings intended to produce a residual voltage

Subclause 13.3 of EN 60044-2:1999 applies.

13.4 Output for secondary windings intended to produce a residual voltage

13.4.1 Rated output

Subclause 13.4.1 of EN 60044-2:1999 applies.

13.4.2 Rated thermal limiting output

Subclause 13.4.2 of EN 60044-2:1999 applies.

13.5 Accuracy class for secondary windings intended to produce a residual voltage

Subclause 13.5 of EN 60044-2:1999 applies.

13.6 Type test for protective voltage transformers

13.6.1 Temperature rise test for residual voltage winding

Subclause 13.6.1 of EN 60044-2:1999 applies.

13.6.2 Test for accuracy

To prove the compliance with 13.2 tests shall be made at 2 %, 5 %, and 100 % of rated voltage and at rated voltage multiplied by the rated voltage factor, at rated frequency and at 25 % and 100 % of rated burden at a power factor of 0,8 lagging.

For three-phase earthed transformers the following shall apply:

a) The limits of error at 2 %, 5 %, and 120 % rated or 190 % of rated primary voltages in 13.2 apply to the line-to-neutral-point voltages of all three phases, the transformer being energized by a balanced three-phase voltage of a value equal to 2 %, 5 %, or 120 % of the rated primary voltage.

b) The limits of error at 150 % or 190 % of rated primary voltage in 13.2 apply to the line-to-neutral-point voltage of any two sound phases, the transformer being energized as described in 1) and 2) below.

   1) For transformers having a voltage factor of 1,5 the connections of the test circuit are shown in Figure 5; the voltage error and phase displacement shall be determined at such a supply voltage that 150 % of rated line-to-earth voltage is impressed on the line terminals of the non-short-circuit phases and the neutral point terminal of the primary winding, and with burdens equal to 25 % and 100 % of rated burden.

   2) For transformers having a voltage factor of 1,9 the connections of the test circuit are shown in Figure 6; the voltage error and phase displacement shall be determined with a balanced three-phase supply voltage of 110 % rated primary voltage applied to the line terminals of the primary winding, and with burdens equal to 25 % and 100 % of rated burden.

For three-phase unearthed transformers the limits of error at 2 %, 5 % and 120 % rated voltage in Clause 13 apply, the transformer being energized by a balanced three-phase voltage of a value equal to 2 %, 5 %, or 120 % of the rated primary voltage.

13.6.3 Test on residual voltage windings

Three-phase voltage transformers having residual voltage windings shall be tested under the following conditions:

a) For transformers having a rated voltage factor not exceeding 1,5 the connections of the test circuit are shown in Figure 7; the voltage error and phase displacement shall be determined at such a supply voltage that 150 % of rated primary voltage is impressed on the non short-circuited line terminals and the neutral-point terminal of the primary winding, and with burdens equal to 25 % and 100 % of the rated burden of the residual voltage winding.

b) For transformers having a rated voltage factor of 1,9 the connections of the test circuit are shown in Figure 8; the voltage error and phase displacement shall be determined with a balanced three-phase supply voltage equal to 110 % of rated primary voltage applied to the line terminals of the primary winding, and with burdens equal to 25 % and 100 % of rated burden of the residual voltage winding.

c) Subject to a separate specification, transformers referred to in b) may be tested with the circuit connections in Figure 9; the voltage error and phase displacement shall be determined with burdens equal to 25 % and 100 % of the rated burden of the residual voltage winding, and a single-phase supply voltage equal to 0,55 $U_p\sqrt{3}$ where U_p is the rated primary voltage of the transformer.

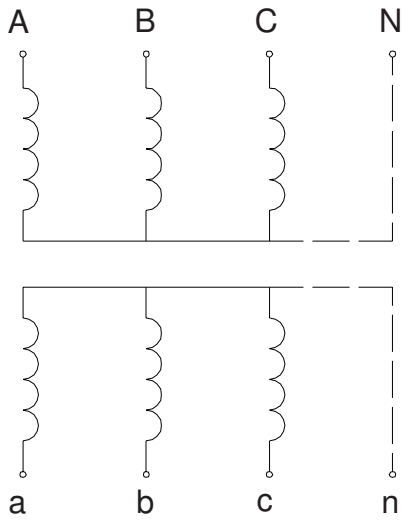
NOTE For three-phase transformers having a three-phase winding as well as a residual voltage winding, the tests specified in 13.5 should be made with rated burden connected to the three-phase secondary winding, unless otherwise agreed between purchaser and manufacturer.

13.7 Routine test for protective transformers

Subclause 13.7 of EN 60044-2:1999 applies.

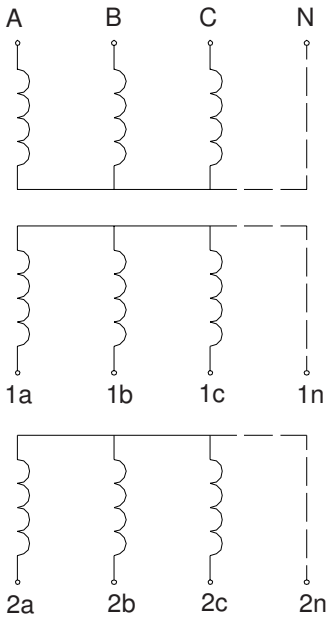
13.8 Markings of the rating plate of a three-phase protective voltage transformer

The rating plate shall carry the appropriate information in accordance with 11.1. The accuracy class shall be indicated after the corresponding rated output.



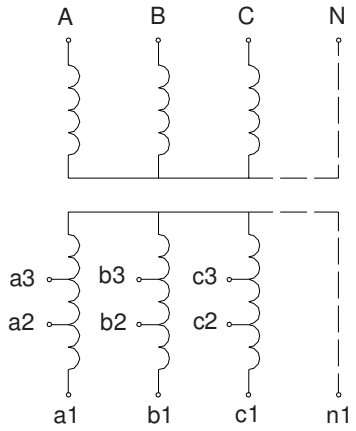
NOTE Dotted lines refer to earthed transformers.

Figure 1 – Three-phase transformer with a single secondary



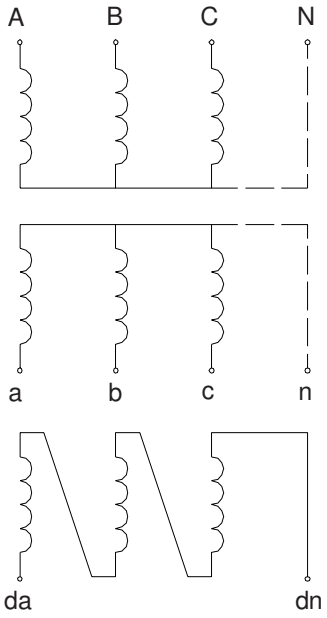
NOTE Dotted lines refer to earthed transformers.

Figure 2 – Three-phase transformer with two secondaries



NOTE Dotted lines refer to earthed transformers.

Figure 3 – Three-phase transformer with one multi-tap secondary



NOTE Dotted lines refer to earthed transformers.

Figure 4 – Three-phase transformer with one residual voltage winding

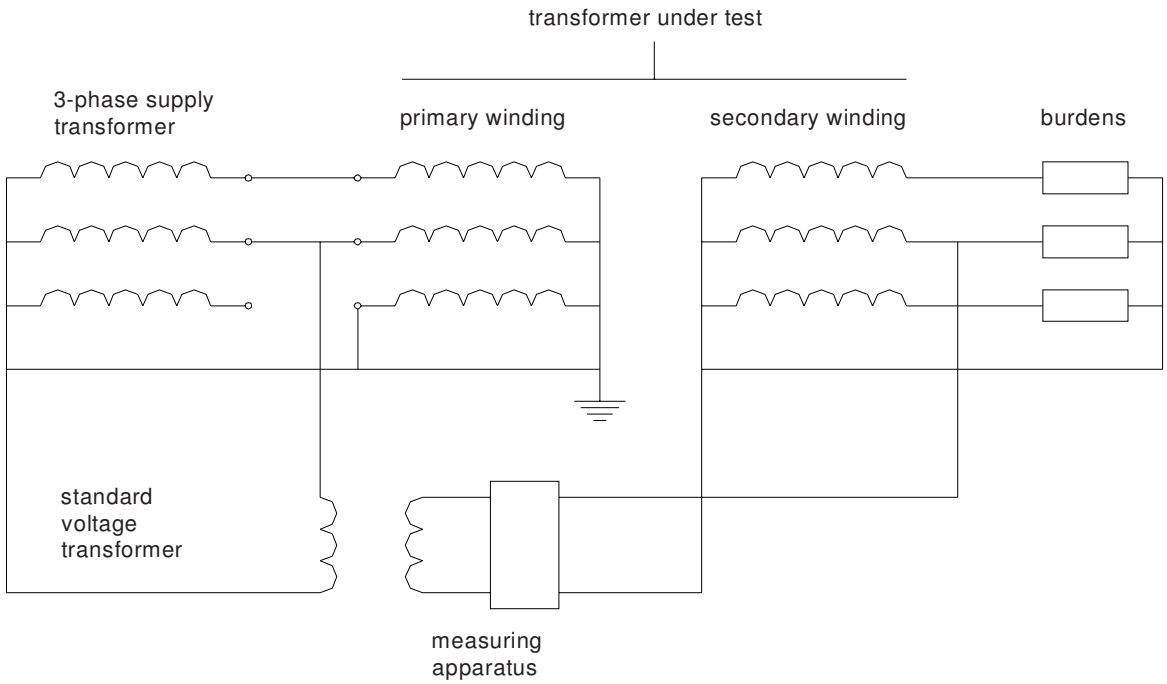


Figure 5 – Circuit for accuracy test on a voltage transformer having a rated voltage factor of 1,5

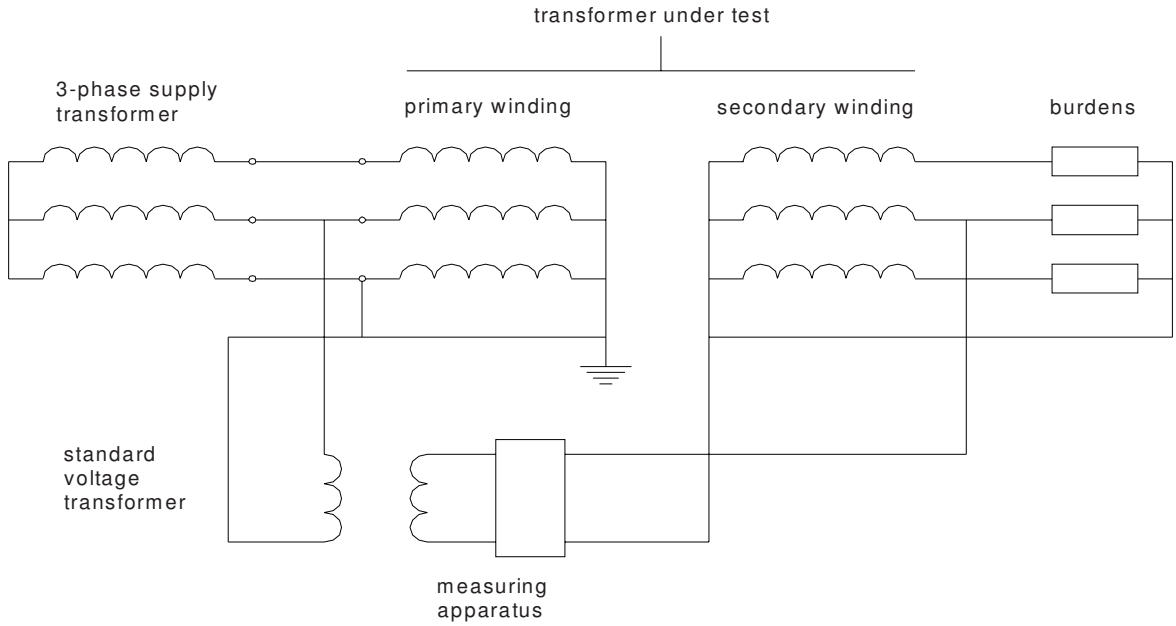


Figure 6 – Circuit for accuracy test on a voltage transformer having a rated voltage factor of 1,9

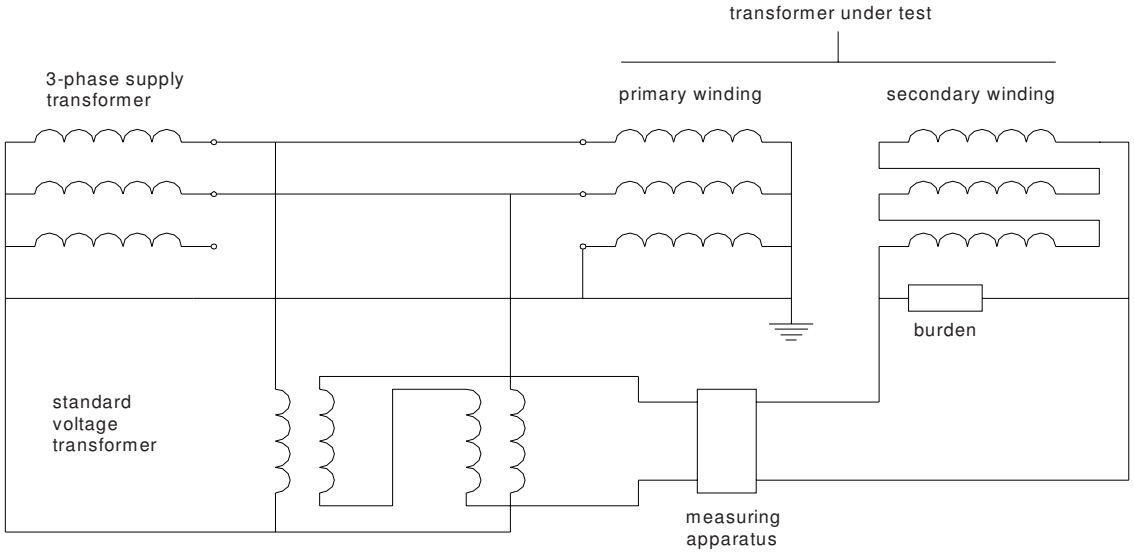


Figure 7 – Circuit for accuracy test on the residual voltage winding of a voltage transformer having a rated voltage factor not exceeding 1,5

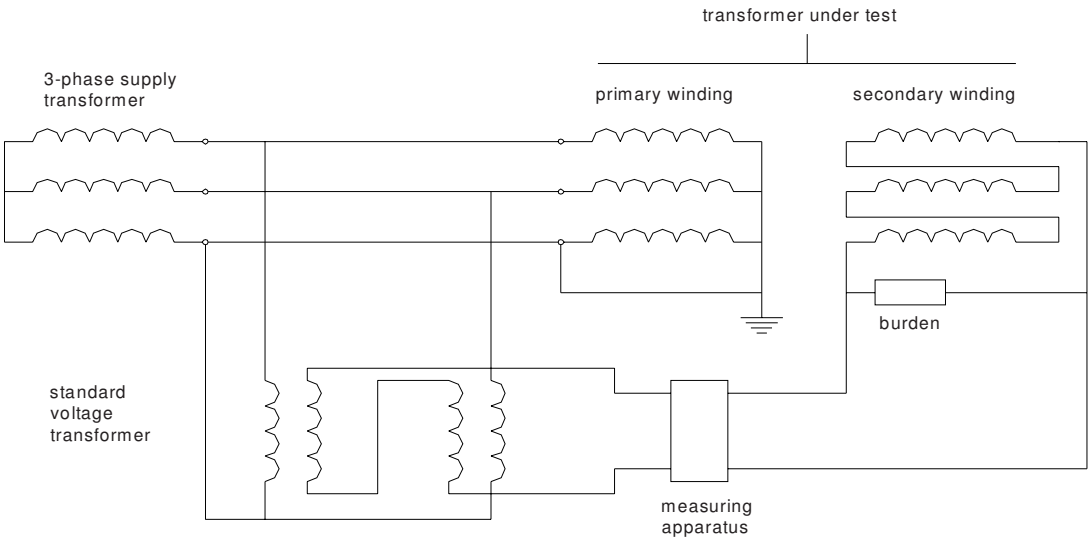


Figure 8 – Circuit for accuracy test on the residual voltage winding of a voltage transformer having a rated voltage factor not exceeding 1,9

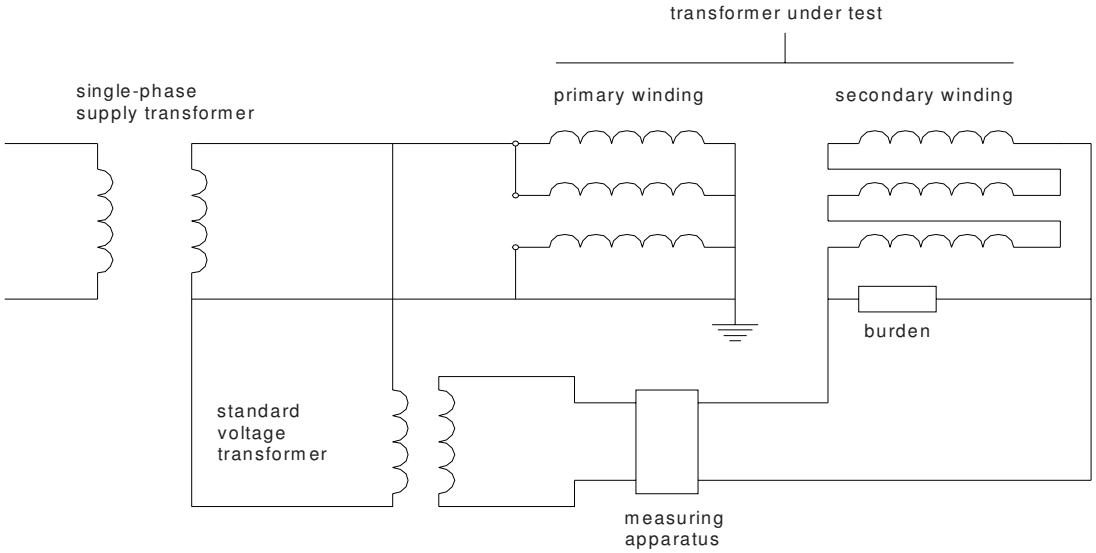
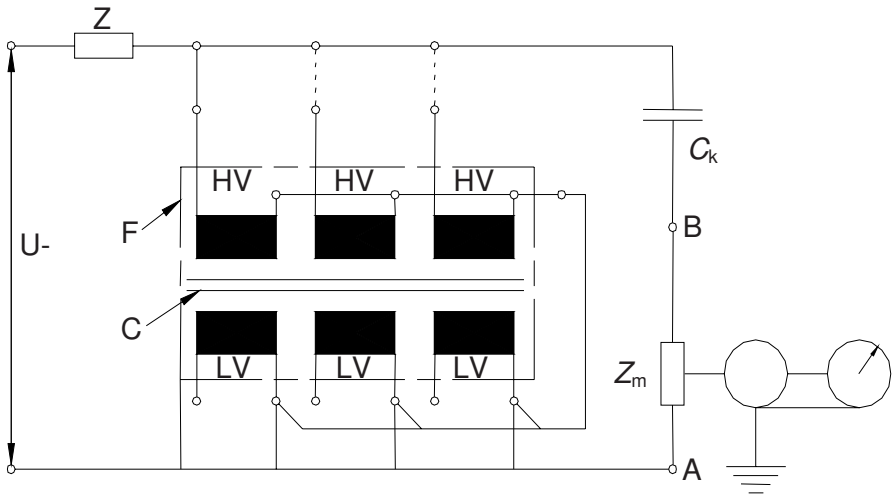


Figure 9 – Alternative circuit for accuracy test on the residual voltage winding of a voltage transformer having a rated voltage factor of 1,9



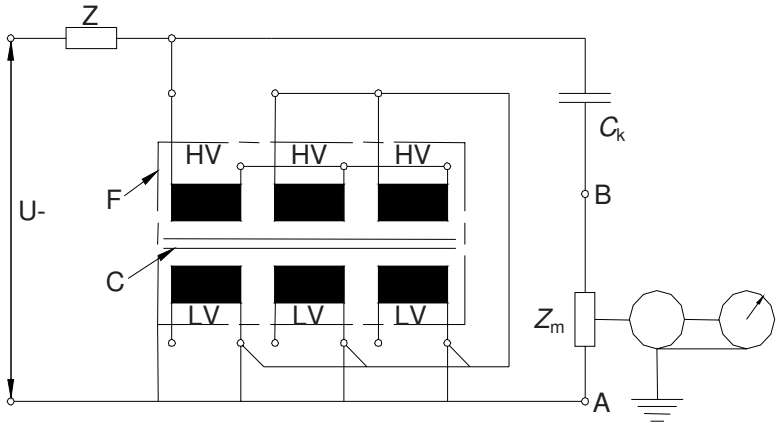
Key

C	:	core	HV	:	high-voltage winding(s)
C_k	:	coupling capacitor	LV	:	low-voltage winding(s)
F	:	frame	Z	:	filter (optional)
			Z_m	:	measuring impedance

Either A or B may be earthed.

C and F to be connected to LV whenever possible.

Figure 10 – Test circuit for partial discharge measurement of a three-phase earthed voltage transformer



Key

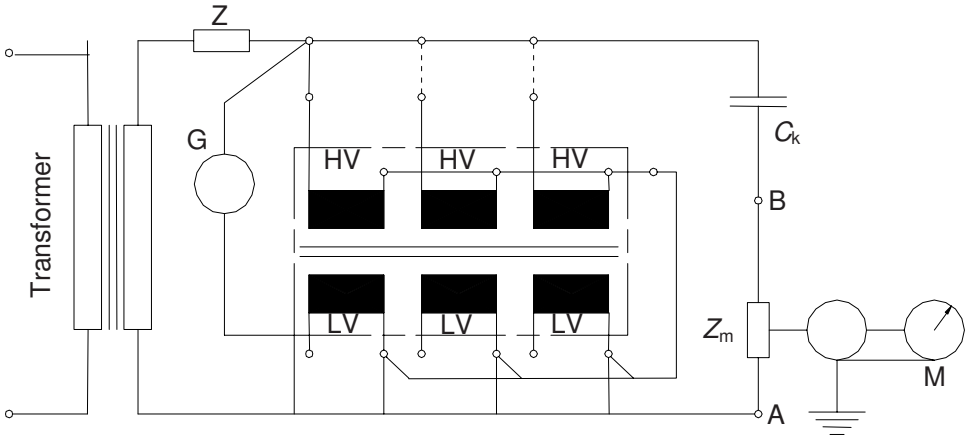
C	:	core	HV	:	high-voltage winding(s)
C_k	:	coupling capacitor	LV	:	low-voltage winding(s)
F	:	frame	Z	:	filter (optional)
			Z_m	:	measuring impedance

Either A or B may be earthed (optionally through a filter).

C and F to be connected to LV whenever possible.

NOTE The capacity of the high-voltage test transformer may be used as a coupling capacity, in which case the filter Z shall be omitted.

Figure 11 – Test circuit for partial discharge measurement of a three-phase unearthed voltage transformer



Key

C	:	core	HV	:	high-voltage winding(s)
C_k	:	coupling capacitor	LV	:	low-voltage winding(s)
F	:	frame	Z	:	filter (optional)
G	:	impulse generator	Z_m	:	measuring impedance

Figure 12 – Example of a calibration circuit used during the measurement of partial discharge of a three-phase voltage transformer

Bibliography

EN 60071-1:2006, Insulation co-ordination – Part 1: Definitions, principles and rules (IEC 60071-1:2006)

IEC 60038, IEC standard voltages

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL