

Coupling capacitors and capacitor dividers —

(Implementation of
CENELEC HD 597 S1)

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Power Electrical Engineering Standards Policy Committee (PEL/-) to Technical Committee PEL/46, upon which the following bodies were represented:

- Association of Consulting Engineers
- British (AC) Capacitor Manufacturers' Association (BEAMA Ltd.)
- ERA Technology Ltd.
- Electricity Association
- Rotating Electrical Machines Association (BEAMA Ltd.)

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Text of HD 597 S1	5
National annex NA (informative) Cross-references	Inside back cover

National foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee. It is identical with IEC 358:1990 *Coupling capacitors and capacitor dividers* published by the International Electrotechnical Commission (IEC).

This British Standard implements CENELEC Harmonization Document HD 597 S1.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the HD title page, pages 2 to 28, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Descriptors: Power capacitor, coupling capacitor, capacitor voltage divider, test

English version

Coupling capacitors and capacitor dividers

(IEC 358:1990)

Condensateurs de couplage et diviseurs
capacitifs
(CEI 358:1990)

Kopplungskondensatoren und kapazitive Teiler
(IEC 358:1990)

This Harmonization Document was approved by CENELEC on 1991-12-10. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

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

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 358:1990 could be accepted without textual changes, has shown that no CENELEC common modifications were necessary for the acceptance as Harmonization Document.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as HD 597 S1 on 10 December 1991.

The following dates were fixed:

- latest date of announcement of the HD at national level (doa) 1992-06-01
- latest date of publication of a harmonized national standard (dop) 1992-12-01
- latest date of withdrawal of conflicting national standards (dow) 1992-12-01

For products which have complied with the relevant national standard before 1992-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1997-12-01.

Annexes designated “normative” are part of the body of the standard.

In this standard, Annex ZA is normative.

Contents

	Page
Foreword	2
Section 1. General	
1 Scope	5
2 Object	5
3 Definitions	5
4 Service conditions	8
Section 2. Quality requirements and tests	
5 Test requirements	9
6 Classification of tests	9
7 Capacitance measurement at power frequency	10
8 Capacitor loss measurement	11
9 Voltage tests	11
10 Voltage test between low voltage terminal and earth terminal	13
11 Discharge test	13
12 High frequency measurements (only for coupling capacitors and capacitor dividers intended for carrier coupling)	14
13 Partial discharge test	14
14 Determination of the temperature coefficient	16
15 Sealing test	16
16 Cantilever test	16
Section 3. Insulation levels and creepage distance	
17 Insulation levels and test voltages	17
18 Creepage distance	18
Section 4. Safety requirements	
19 Connections to metal parts	19
20 Protection of the environment	19
21 National regulations	19
Section 5. Markings	
22 Marking of the capacitor unit	19
23 Marking of the capacitor stack	19
Section 6. Guide for installation and operation	
24 General	20
25 Choice of rated voltage	20
26 Choice of insulation level	20
27 Operating temperature	21
28 Special conditions	21
29 Mechanical stress	22

	Page
Appendix A Capacitor diagrams	23
Appendix B High frequency characteristics of coupling capacitors for power line carrier circuits	24
Annex ZA (normative) Other international publications quoted in this standard with the references of the relevant European publications	28
Figure A.1 — Capacitor for overvoltage protection	23
Figure A.2 — Capacitor for power line carrier coupling	23
Figure A.3 — Capacitor divider (part of capacitor voltage transformer, not used for connection for power line carrier coupling)	23
Figure A.4 — Capacitor divider (part of capacitor voltage transformer, with connection for power line carrier coupling)	24
Figure B.1 — Bridge method for measuring the high frequency capacitance and equivalent series resistance of a coupling capacitor	26
Figure B.2 — Wiring diagram of the measuring circuit for the high frequency capacitance and equivalent series resistance of a coupling capacitor	27
Table I	9
Table II	15
Table III — Standard insulation levels for $12 \text{ kV} \leq U_m < 300 \text{ kV}$	17
Table IV — Standard insulation levels for $U_m \geq 300 \text{ kV}$	18

Section 1. General

1 Scope

This standard is applicable to:

- a) coupling capacitors for power line carrier (PLC) systems on high voltage overhead power lines, the power-frequency range being 15 Hz to 60 Hz, and the carrier frequency range 30 kHz to 500 kHz;
- b) capacitor dividers of capacitor voltage transformers. Additional requirements for capacitor voltage transformers are given in IEC Publication 186;
- c) capacitors with one terminal either permanently earthed or at low voltage as used for overvoltage protection and other similar uses.

NOTE 1 Diagrams of capacitors to which this standard applies are given in Figure A.1 to Figure A.4 in Appendix A.

NOTE 2 The following capacitors are excluded from this standard:

- shunt capacitors for a.c. power systems having a rated voltage above 660 V (IEC Publication 871);
- shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 660 V (IEC Publication 831);
- shunt power capacitors of the non self-healing type for a.c. systems having a rated voltage up to and including 660 V (IEC Publication 931);
- capacitors for inductive heat generating plants operating at frequencies between 40 and 24 000 Hz (IEC Publication 110);
- series capacitors (IEC Publication 143);
- capacitors for motor applications and the like (IEC Publication 252);
- capacitors to be used in power electronics circuits (IEC Publication under consideration);
- capacitors for use in tubular fluorescent and other discharge lamp circuits (IEC Publication 566);
- capacitors for suppression of radio interference (IEC Publication 384-14);
- capacitors intended to be used in various types of electrical equipment and therefore considered as components;
- capacitors intended for use with d.c. voltage superimposed on the a.c. voltage.

2 Object

The object of this standard is:

- a) to formulate uniform rules regarding performance, testing and rating;
- b) to formulate specific safety rules;
- c) to provide a guide for installation and operation.

3 Definitions

3.1

capacitor element (or element)

a device consisting essentially of two electrodes separated by a dielectric (IEV 436-01-03¹⁾)

3.2

capacitor unit (or unit)

an assembly of one or more capacitor elements in the same container with terminals brought out (IEV 436-01-04)

NOTE 1 A common type of unit for coupling capacitors has a cylindrical housing of insulating material and metal end flanges which serve as terminals.

NOTE 2 Units in metal containers usually have one terminal connected to the container and the other brought out through a bushing.

3.3

capacitor stack (or stack)

an assembly of capacitor units connected in series (IEV 436-01-05)

NOTE The capacitor units are usually mounted in a vertical array.

3.4

capacitor

a general term used when it is not necessary to state whether reference is made to a capacitor unit or to a capacitor stack

¹⁾ IEC Publication 50(436) (in preparation).

3.5**rated capacitance of a capacitor (C_N)**

the capacitance value for which the capacitor has been designed

NOTE This definition applies:

- for a capacitor unit, to the capacitance between the terminals of the unit;
- for a capacitor stack, to the capacitance between line and low voltage terminals or between line and earth terminals of the stack;
- for a capacitor divider, to the resultant capacitance:

$$C_1 C_2 / (C_1 + C_2)$$

3.6**rated frequency of a capacitor (f_N)**

the frequency for which the capacitor has been designed (IEV 436-01-14)

3.7**rated voltage of a capacitor (U_N)**

the r.m.s. value of the alternating voltage for which the capacitor has been designed (IEV 436-01-15)

3.8**rated temperature category of a capacitor**

the range of temperature of the ambient air or of the cooling medium for which the capacitor has been designed (IEV 436-01-17)

3.9**capacitor voltage divider**

a capacitor stack forming an alternating voltage divider (IEV 436-02-10)

NOTE 1 See Figure A.3 and Figure A.4, Appendix A.

NOTE 2 A capacitor divider usually forms part of a capacitor voltage transformer.

3.10**coupling capacitor**

a capacitor used for the transmission of signals in a power system (IEV 436-02-11)

3.11**high voltage capacitor (of a capacitor divider) (C_1)**

the capacitor connected between the line terminal and the intermediate voltage terminal of a capacitor divider (IEV 436-02-12)

3.12**intermediate voltage capacitor (of a capacitor divider) (C_2)**

the capacitor connected between the intermediate voltage and the low voltage terminals of a capacitor divider (IEV 436-02-13)

3.13**line terminal**

a terminal intended for connection to a line conductor of a network (IEV 436-03-01)

3.14**earth terminal**

a terminal intended for connection to earth (IEV 436-03-02)

3.15**intermediate voltage terminal of a capacitor divider**

a terminal intended for connection to an intermediate circuit, such as the electromagnetic unit of a capacitor voltage transformer (IEV 436-03-03)

3.16**low voltage terminal of a capacitor divider**

a terminal intended for connection to earth either directly or via an impedance of negligible value at network frequency (IEV 436-03-04)

NOTE In a coupling capacitor, this terminal is also connected to the carrier frequency coupling device.

3.17**capacitance tolerance**

the permissible difference between the actual capacitance and the rated capacitance under specified conditions (IEV 436-04-01)

NOTE The actual capacitance should be measured at, or referred to, the temperature at which the rated capacitance is defined.

3.18**equivalent series resistance of a capacitor**

a virtual resistance which, if connected in series with an ideal capacitor of capacitance value equal to that of the capacitor in question, would have a power loss equal to the active power dissipated in that capacitor under specified operating conditions (IEV 436-04-02)

3.19**high frequency capacitance**

the effective capacitance at a given frequency resulting from the combined effect of the intrinsic capacitance and the self-inductance of a capacitor (IEV 436-04-03)

3.20**open-circuit intermediate voltage of a capacitor divider**

the voltage across the terminals of an intermediate voltage capacitor when a voltage is applied between the line and low voltage terminals, no impedance being connected in parallel with the intermediate voltage capacitor (IEV 436-04-04)

3.21**ratio of a capacitor divider (voltage ratio)**

the ratio of the voltage applied to the capacitor divider to the open-circuit intermediate voltage (IEV 436-04-05)

NOTE 1 This ratio corresponds to the sum of the capacitances of the high voltage and intermediate voltage capacitors divided by the capacitance of the high voltage capacitor:

$$(C_1 + C_2)/C_1$$

NOTE 2 C_1 and C_2 include the stray capacitances, which are generally negligible.

3.22**capacitor losses**

the active power dissipated in the capacitor (IEV 436-04-10)

3.23**tangent of the loss angle (tan δ) of a capacitor**

the ratio between the equivalent series resistance and the capacitive reactance of a capacitor at specified sinusoidal alternating voltage and frequency (IEV 436-04-11)

3.24**highest voltage for equipment (U_m)**

the highest r.m.s. phase-to-phase voltage for which the equipment is designed, in respect of its insulation as well as other characteristics which relate to this voltage in the relevant equipment standards

this voltage shall be equal to or higher than the maximum value of the highest voltage of the system for which the equipment may be used

3.25**rated short-duration power-frequency withstand voltage**

the prescribed r.m.s. value of sinusoidal power-frequency voltage that the equipment shall withstand during tests made under specified conditions and for a duration of 1 min unless otherwise specified

3.26**rated switching (lightning) impulse withstand voltage**

the prescribed peak value of the switching (lightning) impulse withstand voltage which characterizes the insulation of an equipment as regards the withstand tests