

**Harmonized system of quality
assessment for electronic components**

Sectional specification: Fixed inductors for electromagnetic interference suppression (Inductors for which safety tests are required)

The European Standard EN 138100:1996 has the status of a
British Standard

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Committees responsible for this British Standard

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- FEI (Federation of the Electronics Industry)
- Ministry of Defence
- National Supervising Inspectorate — BSI PC
- Society of British Aerospace Companies Ltd.

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National foreword

This British Standard has been prepared by Subcommittee EPL/40/1, and is the English language version of EN 138100:1996 *Sectional specification: Fixed inductors for electromagnetic interference suppression (Inductors for which safety tests are required)*, published by the Electronic Committee (CECC) of the European Committee for Electrotechnical Standardization (CENELEC).

EN 138100 has been prepared by the Technical Committee CENELEC/TC CECC/SC 40XA (formerly WG3), Capacitors, and the United Kingdom participation in the drafting was provided by Subcommittee EPL/40/1.

Cross-references

Publication referred to	Corresponding British Standard
EN 138000:1996	BS EN 138000:1997 <i>Harmonized system of quality assessment for electronic components. Generic specification: Fixed inductors for electromagnetic interference suppression (Inductors for which safety tests are required)</i>
EN 60060-2:1994 (IEC 60-2:1994) ^a	BS EN 60060 <i>High-voltage techniques</i> Part 2:1995 <i>Measuring systems</i>
EN 60062:1993 (IEC 62:1992) ^a	BS EN 60062:1994 <i>Marking codes for resistors and capacitors</i>
EN 60068-1:1994 (IEC 68-1:1988)	BS EN 60068 <i>Environmental testing</i> Part 1:1995 <i>General and guidance</i>
IEC 85:1984 ^a	BS 2757:1986 <i>Method for determining the thermal classification of electrical insulation</i>
IEC 294:1969 ^a	BS 5692:1979 <i>Method for measurement of the dimensions of a cylindrical electronic component having two axial terminations</i>

^a Undated in text.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 22, 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.

English version

Sectional Specification:
Fixed inductors for electromagnetic interference
suppression (Inductors for which safety tests are required)

Rahmenspezifikation:
Drosseln zur Unterdrückung
elektromagnetischer Störungen
(Drosseln, für die Sicherheitsprüfungen
vorgeschrieben sind)

This European Standard was approved on 1994-04-30. 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.

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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

Foreword

This European Standard was prepared by CLC/TC CECC/SC 40XA (former WG3).

The text of the draft based on document CECC (Secretariat) 3136 was submitted to the formal vote; together with the voting report, circulated as CECC (Secretariat) 3532 it was approved as EN 138100 on 1994-04-30.

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) 1996-12-15
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1997-12-15

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1 General

1.1 Scope

This specification applies to fixed inductors for electromagnetic interference suppression which fall within the scope of the Generic specification EN 138000.

The scope of this specification is restricted to fixed inductors for which safety tests are appropriate. This implies that inductors specified according to this specification will either be connected to mains supplies, when compliance with the mandatory tests of Table 1 is necessary, or used in other circuit positions where the equipment specification prescribes that some or all of these safety tests are required.

This specification applies to fixed inductors which will be connected to an a.c. mains or other supply with a nominal voltage not exceeding 500 V d.c. or a.c. (r.m.s.) between conductors and with a nominal frequency not exceeding 400 Hz.

The object of this specification is to prescribe preferred ratings and characteristics and to select from the generic specification EN 138000 the appropriate quality assessment procedures, tests and measuring methods and to give general performance requirements for this type of inductor. This specification also provides a schedule of safety tests to be used by national Testing Stations in countries where approval by such stations is required.

1.2 Related documents

EN 138000, Generic Specification: Fixed inductors for electromagnetic interference suppression (Inductors for which safety tests are required).

IEC 62, Marking codes for resistors and capacitors.

IEC 63, Preferred number series for Capacitors and Resistors.

IEC 63 Amendment 1 (1967)

IEC 63 Amendment 2 (1977)

IEC 68, Environmental Testing.

IEC 85, Thermal evaluation and classification of electrical insulation.

IEC 279, Measurement of the winding resistance of an a.c. machine during operation at alternating voltage.

IEC 294, Measurement of the dimensions of a cylindrical component having two axial terminations.

ISO 3, Preferred numbers — series of preferred numbers.

NOTE The above references apply to the current editions, except for IEC 68 for which the edition referenced in the generic specification

1.3 Information to be given in a detail specification

Detail specifications shall be derived from the relevant blank detail specification.

Detail specifications shall not specify requirements inferior to those of the generic or sectional specification. When more severe requirements are included they shall be listed in Sub-clause 1.9 of the detail specification and indicated in the test schedules, for example by an asterisk.

NOTE The information given in Sub-clause 1.3.1 may for convenience, be presented in tabular form.

The following information shall be given in each detail specification and the values quoted shall preferably be selected from those given in the appropriate clause of this sectional specification.

1.3.1 Outline drawing and dimensions

There shall be an illustration of the inductor as an aid to easy recognition and for comparison of the inductor with others. Dimensions and their associated tolerances, which affect interchangeability and mounting, shall be indicated upon the drawing. All dimensions shall preferably be stated in millimetres.

Normally the numerical values shall be given for the length of the body, the width and height of the body or for cylindrical types, the body diameter, and the length and diameter of the terminations. When necessary, for example when a number of items (inductance values/voltage ranges) are covered by a detail specification, the dimensions and their associated tolerances shall be placed in a table below the drawing.

When the configuration is other than described above, the detail specification shall state such dimensional information as will adequately describe the inductor. When the inductor is not designed for use on printed boards, this shall be clearly stated in the detail specification.

1.3.2 Mounting

The detail specification shall specify the method of mounting recommended for normal use and the method which is mandatory for the application of the vibration, shock, bump and endurance tests. The design of the inductor may be such that special mounting fixtures or heat sinks are required in its use. In this case the detail specification shall prescribe the mounting fixtures and they shall be used in the application of the vibration, bump or shock tests. The specified heat sink shall be used in the application of the endurance test.

1.3.3 Ratings and characteristics

The ratings and characteristics shall be in accordance with the relevant clauses of this specification.

1.3.3.1 Particular characteristics

Additional characteristics may be listed, when they are considered necessary to specify adequately the inductor for design and application purposes.

1.3.4 Marking

Deviations from Sub-clause 1.5 of this sectional specification shall be specifically stated.

1.4 Terminology

See 2.2 of EN 138000

1.5 Marking

1.5.1 The information given in the marking is normally selected from the following list; the relative importance of each item is indicated by its position in the list:

- a) manufacturer's name (or trade mark)
- b) manufacturer's type designation
- c) recognized approval mark
- d) rated inductance and tolerance
- e) rated voltage
- f) rated current
- g) Identification of termination or circuit diagram
- h) rated temperature
- i) climatic category
- j) year and month (or week) of manufacture (this may be in code form)
- k) reference to the detail specification.

1.5.2 Marking on the inductor may be omitted when the manufacturer considers that there is insufficient space, and this fact is recorded in the detail specification. When present the marking shall be sufficient to provide a clear identification of the inductor.

1.5.3 The package containing the inductor(s) shall be clearly marked with all the information listed in Sub-clause 1.5.1 excepted g).

1.5.4 Any additional marking shall be so applied that no confusion can arise.

2 Preferred ratings and characteristics

2.1 Preferred characteristics

The values given in detail specification shall preferably be selected from the following:

2.1.1 Preferred climatic categories

Electromagnetic interference suppression inductors covered by this specification are classified into climatic categories according to the general rules given in IEC 68-1.

The lower and upper category temperatures and the duration of the damp heat, steady state test should be within the following:

Lower category temperature: -65°C , -55°C , -40°C , -25°C and -10°C

Upper category temperature: $+85^{\circ}\text{C}$, $+100^{\circ}\text{C}$, $+125^{\circ}\text{C}$ and $+155^{\circ}\text{C}$.

Duration of the damp heat, steady state test: 21 and 56 days.

The severities for the cold and dry heat tests are the lower and upper category temperatures respectively.

2.2 Preferred values of ratings

2.2.1 Rated inductance and tolerance

Preferred values of rated inductance are values chosen from the E 6 series of preferred values given in IEC 63: Preferred number series for resistors and capacitors.

The preferred tolerances on rated inductance are as follows:

$\pm 30\%$, $-30/+50\%$

2.2.2 Rated voltage (U_R)

Preferred values for rated voltages are:

d.c. inductors: 160, 250 and 500 V

a.c. inductors: 230, 250, 400, 440 and 480 V

NOTE Electromagnetic interference suppression inductors are normally chosen to have their rated voltage equal to or greater than the nominal voltage of the supply system to which they are to be connected. It should, however, be borne in mind that the voltage of the system may rise up to 10 % above the nominal voltage.

2.2.3 Category voltage (U_C)

The category voltage is equal to the rated voltage unless otherwise stated in the detail specification.

2.2.4 Rated temperature

The rated temperature shall not be lower than + 40 °C.

2.2.5 Rated current

The preferred values of rated current are selected from the R10 series of ISO 3.

2.2.6 Passive flammability

When specified the minimum category of passive flammability permitted is category C.

3 Quality assessment procedures

3.1 Primary stage of manufacture

See 3.2 of EN 138000.

3.2 Structurally similar inductors

Inductors are structurally similar when for their range of inductance values they have the following common characteristics:

- a) essentially the same materials
- b) similar design features and manufacturing techniques
- c) same rated voltage.

3.3 Certified records of released lots

The information required in 3.5.1 of EN 138000 shall be made available when prescribed in the detail specification and when requested by a customer. After the endurance test the parameter for which variables information is required is insulation resistance and change of inductance.

3.4 Approval testing

3.4.1 Approval by National Testing Stations

Table 1 is a schedule limited to tests concerning safety requirements to be used by National Testing Stations in countries where approval by such stations is required. Fixed sample size testing is employed according to the provisions of 3.4.3, and a restricted list of measurements after conditioning is used as specified in Annex B.

3.4.2 CECC qualification approval

Table 2, Table 3 and Table 4 are to be used when CECC qualification approval is sought to a detail specification written according to CECC rules; these tables include both safety and performance tests.

The procedures for qualification approval testing are given in 3.4 of the generic specification EN 138000. The schedule to be used for qualification approval testing on the basis of lot-by-lot and periodic tests is given in Sub-clause 3.5 and Table 3 and Table 4 of this specification. The procedure using a fixed sample size schedule is given in 3.4.3 and Table 2 below. For the two procedures the sample sizes and the number of permissible non-conforming items shall be of comparable order. The test conditions and requirements shall be the same. Qualification approval according to the fixed sample sizes of Table 2 is preferred.

3.4.3 Sampling

Each rated voltage shall be separately qualified. The total number of inductors of each rated voltage to be tested in each group is given in Table 1 or Table 2. For each rated voltage the sample shall contain equal numbers of specimens of the highest and lowest inductance and the highest and lowest rated current in the range to be qualified. Where only one inductance value or rated current value is involved, the total number of inductors as stated in Table 1 or Table 2 shall be tested.

Spare specimens are permitted as follows:

- a) One per inductance/rated current combination which may be used to replace the permitted non-conforming items in Group "0".
- b) One per inductance/rated current combination which may be used as replacements for specimens lost due to incidents not attributable to the manufacturer or the test sequence.
- c) The remainder of the spares may be required if it is necessary to repeat any test according to the provisions of Note 9 to Table 1 or Table 2.

The number of samples given in Group "0" assumes that all groups are applicable. If this is not so the numbers may be reduced accordingly.

When additional groups are introduced into the qualification approval test schedule, the number of specimens required for Group 0 shall be increased by the same number as that required for the additional groups.

3.4.4 Tests

The complete series of tests specified in either Table 1 or Table 2 is required for the approval of a series of structurally similar inductors of one rated voltage. The tests of each group shall be carried out in the order given.

The whole sample shall be subjected to the tests of Group 0 and then divided for the other groups.