

BRITISH STANDARD

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100015-1 1992

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AMD 7443

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

Basic specification: Protection of electrostatic sensitive devices

Part 1. General requirements

The European Standard EN 100015-1 : 1992 has the status of a
British Standard

Système harmonisé d'assurance de la qualité
des composants électroniques
Spécification de base: Protection des produits
sensibles aux décharges électrostatiques
Partie 1. Règles générales

Harmonisiertes Gütebestätigungssystem für
Bauelemente der Elektronik
Grundspezifikation: Schutz von
Elektrostatisch Gefährdeten Bauelementen
Teil 1. Allgemeine Anforderungen

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Electronic Components Standards Policy Committee (ECL/-) to Technical Committee ECL/23, upon which the following bodies were represented:

Association of Franchised Distributors of Electronic Components
 British Electro-static Manufacturers' Association
 British Electrostatic Control Association
 British Plastics Federation
 British Telecommunications plc
 EEA (The Association of Electronics, Telecommunications and Business Equipment Industries)
 Electronic Components Industry Federation
 GAMBICA (BEAMA Ltd.)
 Health and Safety Executive
 Ministry of Defence
 National Supervising Inspectorate

This British Standard, having been prepared under the direction of the Electronic Components Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 20 December 1991

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National foreword

This British Standard has been prepared under the direction of the Electronic Components Standards Policy Committee. It is identical with CECC 00015/1 : 1991 'Basic Specification: Protection of Electrostatic Sensitive Devices Part 1 : General requirements', published by the CENELEC Electronic Components Committee (CECC).

This standard supersedes BS 5783 : 1987 which is withdrawn. It is envisaged that further Parts of CECC 00015 will be published as follows.

CECC 00015 : Part 2 : Particular requirements for low humidity areas;
CECC 00015 : Part 3 : Particular requirements for clean rooms;
CECC 00015 : Part 4 : Particular requirements for areas with high voltages present.

On publication of the further Parts of CECC 00015 equivalent Parts of BS CECC 00015 will be published in due course.

In 1992 the CENELEC Electronic Components Committee (CECC) accepted CECC 00015/1 : 1991 as European Standard EN 100015-1 : 1992.

Cross-references

International standard	Corresponding British Standard
IEC 93	BS 6233 : 1982 Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials (Identical)

The Technical Committee has reviewed the provisions of ISO 2878 to which reference is made in the text and has decided that they are acceptable for use in conjunction with this British Standard. A related British Standard to ISO 2878 is BS 2050 : 1978 'Specification for electrical resistance of conducting and antistatic products made from flexible polymeric material'.

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

UDC

Descriptors: Quality, electronic components, electrostatic sensitive devices

English version

Basic Specification:

Protection of electrostatic sensitive devices. Part 1: General requirements

Spécification de Base:
Protection des produits sensibles
aux décharges électrostatiques.
Partie 1: Règles générales

Grundspezifikation:
Schutz von elektrostatisch
gefährdeten Bauelementen.
Teil 1: Allgemeine Anforderungen

This European Standard was approved by the CENELEC Electronic Components Committee (CECC) on 30 June 1992. The text of this standard consists of the text of CECC 00015/1 Issue 1 1991 of the corresponding CECC Specification. CENELEC members are bound to comply with 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 General Secretariat of the CECC 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 CECC General Secretariat has the same status as the official versions.

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. The membership of the CECC is identical, with the exception of the national electrotechnical committees of Greece, Iceland and Luxembourg.

CECC

CENELEC Electronic Components Committee
Comité des Composants Electroniques du CENELEC
CENELEC Komitee für Bauelemente der Elektronik

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Cenelec Electronic Components Committee

CECC

Système Harmonisé d'Assurance de la Qualité
des Composants Electroniques

SPECIFICATION DE BASE:

PROTECTION DES PRODUITS SENSIBLES AUX DECHARGES ELECTROSTATIQUES

PARTIE I:
REGLES GENERALES

Harmonized System of Quality Assessment for
Electronic Components

BASIC SPECIFICATION:

PROTECTION OF ELECTROSTATIC SENSITIVE DEVICES

PART I:
GENERAL REQUIREMENTS

Harmonisiertes Gütebestätigungssystem für
Bauelemente der Elektronik

GRUNDSPEZIFIKATION:

SCHUTZ VON ELEKTROSTATISCH GEFÄHRDETEN BAUELEMENTEN



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CECC 00015/I

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FOREWORD

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby accepted by all member countries without further testing.

This basic specification has been formally approved by the CECC, and has been prepared for those countries taking part in the System who wish to issue national harmonized specifications for **the Protection of Electrostatic Sensitive Devices**. It should be read in conjunction with the current regulations for the CECC System.

At the date of printing of this specification, the member countries of the CECC are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom, and copies of it can be obtained from the addresses shown on the blue fly sheet.

PREFACE

This specification was prepared by CECC TF - ESD.

The text of this specification was circulated to the CECC for voting in the document(s) indicated below and was ratified by the President of the CECC for printing as a CECC Specification.

Document

CECC (Secretariat) 2599

Date of voting

November 1990

Report on the voting

CECC (Secretariat) 2717

Section one. General

1 General

1.1 Scope

This standard specifies the general requirements for the protection of electrostatic discharge sensitive devices from electrostatic discharges and fields. It applies only to electronic devices and assemblies.

For areas with exposed conductors at potentials greater than 1,25 kV a.c. or 2,5 kV d.c., additional requirements specified in CECC 00 015: Part 4 shall apply (Part 4 is in course of preparation).

CAUTION: Although this standard does not include requirements for personal safety, attention is drawn to the need for all concerned to comply with relevant local statutory requirements regarding the health and safety of all persons in all places of work including those covered by this standard. (Attention is drawn to the fact that electrical potentials in excess of 50 V a.c. or 120 V d.c. may be dangerous to personnel).

1.2 Definitions

For the purposes of this Standard the following definitions apply.

1.2.1 bonding: The connecting together of elements by means of a conductor.

1.2.2 earth bonding point: A dedicated point to which a wrist band cord or similar component can be connected.

1.2.3 electrostatic discharge (ESD): A transfer of electrostatic charge between bodies at different electrostatic potentials caused by direct contact or induced by an electrostatic field.

1.2.4 electrostatic discharge sensitive device (ESDS): A discrete device, integrated circuit or assembly that may be damaged by electric fields or electrostatic discharge encountered in routine handling, testing and transit.

NOTE: Damage includes any degradation or malfunctioning of the device performance.

1.2.5 ESD earth facility: A common facility to which bonded elements in the ESD protected area are connected.

1.2.6 ESD protected area (EPA): An area in which ESDS can be handled with minimum risk of damage as a result of electrostatic discharge or fields, and in which the operator is not exposed to additional risk.

1.2.7 ESDS voltage sensitivity: The maximum voltage at which the ESDS does not suffer any ESD damage.

NOTE: Where no sensitivity information is available, the sensitivity of the ESDS is considered to be < 2000 volts.

1.2.8 ESDS voltage sensitivity of an assembly: The most sensitive ESDS on an assembly will determine the assembly's sensitivity.

1.2.9 field work: Handling ESDS within a temporary EPA with permanently controlled boundaries.

NOTE: It includes installation, commissioning, site inspections, servicing and maintenance of ESDS together with packaging and unpackaging activities associated with these functions.

1.2.10 garment: A coat, jacket, smock, hood, trousers, overall or cap is regarded as a garment for the purpose of this standard.

1.2.11 ground: The uniform potential established in the work area which ensures that the potential of the device and of everything with which it is likely to come into contact is the same.

1.2.12 ground cord: An electrical connection between the earth bonding point and the ESD earth facility.

1.2.13 device hazardous voltage: Any voltage capable of damaging an ESDS.

1.2.14 materials

1) **antistatic material:** Materials exhibiting properties which minimize charge generation when rubbed against or separated from the same or other materials.

2) **materials with resistivity properties:**

NOTE: For test conditions see annex A.

a) **electrostatic shielding materials.**

Materials which are capable of attenuating an electrostatic field and have one layer of surface resistivity less than 1×10^4 ohm/sq, or volume resistivity less than 1×10^3 ohm x cm per mm of material thickness.

b) electrostatic conductive materials

Materials with a surface resistivity of greater than 1×10^3 ohm/sq and less than 1×10^6 ohm/sq and volume electrostatic conductive materials with a volume resistivity of greater than 1×10^2 ohm x cm and less than 1×10^5 ohm x cm.

c) electrostatic dissipative materials

Materials with a surface resistivity equal to or greater than 1×10^5 ohm/sq and less than 1×10^{12} ohm/sq or a volume resistivity equal to or greater than 1×10^4 ohm x cm but less than 1×10^{11} ohm x cm.

d) insulative materials

Materials with a surface resistivity equal to or greater than 1×10^{12} ohm/sq or a volume resistivity equal to or greater than 1×10^{11} ohm x cm.

1.2.15 materials for packaging: Any material in which ESDS are packed for transportation or storage including bags, boxes, crates, wraps, magazines, cushioning, foams, loose fill, etc.

1) **intimate packaging:** Materials which make contact with an ESDS.

2) **proximity packaging:** Material not making contact with an ESDS, but which is used to enclose one or more devices.

3) **secondary packaging:** Material used primarily to give additional physical protection on the outside of a proximity package.

1.2.16 storage time: Short term storage is less than six months, medium term storage is between six months and five years, long term storage is longer than five years.

1.2.17 triboelectric charging: An electrical charge generated by the frictional movement or separation of two surface.

1.2.18 uncontrolled conditions: All conditions outside an EPA.

Section two. Design consideration to minimize the effects of ESD

2 Design

NOTE: Damage caused by electrostatic discharge can be minimized by using design practice in devices and assemblies to make them less susceptible to ESD damage.

2.1 Identification

When the equipment includes an ESDS during design, the presence of the ESDS shall be indicated at all subsequent stages up to and including layout, procurement and use. Drawings and parts lists shall be annotated in accordance with 3.4, and instructions given on the sequence of assembly, see section 4. Particular attention shall be drawn to protective components, the removal of which would leave the device unprotected.

2.1.1 Warning notices

The design of the equipment and its sub assemblies shall allow for the provision of warning notices or symbols.

NOTE: This information is of particular importance for maintenance and servicing personnel.

2.2 Design of electrostatic discharge sensitive devices (ESDS)

Devices shall be designed to minimize the possibility of damage by electrostatic discharge. For ESDS, a warning shall be given on sales literature, specification, design application notes, packaging and invoices. The voltage sensitivity of the device shall be stated in the manufacturer's sales literature, specification and design application notes.

2.3 Design of assemblies

2.3.1 Electronic assemblies shall be designed to minimize the damage due to ESD.

2.3.2 Consideration shall be given regarding the use of the least sensitive device possible which fits all the necessary parameters of the design.

2.3.3 Consideration shall be given regarding the use of guard tasks where ESDS are used.

2.3.4 To prevent charge and voltage build-up, consideration shall be given to the use of resistive and/or diode protection on edge connectors and other means of connecting inputs to and outputs from assemblies.

2.3.5 Consideration shall be given to the electrical connection of all unused ESDS inputs directly or indirectly to a suitable point, usually an appropriate power supply or ground as close as possible to the ESDS. Other inputs and outputs shall use this protection where appropriate.

2.3.6 Tracks leading to or from ESDS shall be kept as far as possible away from the edges of the printed wiring board except when they lead directly to edge connectors.

2.4 Packaging design

Consideration shall be given at the design stage to ESDS packaging in accordance with section 5.

2.5 System design

2.5.1 Design for service

All systems which contain ESDS and are liable to be serviced in a stand alone configuration shall be designed such that they can be maintained in accordance with this standard. Where size permits, an ESD bonding point shall be provided.

2.5.2 Electrostatic shield

Where possible, an electrostatic shield shall be incorporated to minimize the effect of electrostatic fields.

2.6 Design evaluation procedure

The design shall be formally evaluated with regard to ESD during the design process. This formal evaluation shall include:

- a) design reviews;
- b) evaluation of the product arising from the design;
- c) evaluation of the management of the design procedure itself.

Records of the reviews and evaluations shall be maintained.

Section three. Labels, signs and marking

3.1 Labels

3.1.1 All packaging containing ESDS shall be labelled or marked with the appropriate and specified warning notice, see figs. 1 and 2.

3.1.2 Where possible all ESDS shall be marked. The marking shall be effective for the expected life of the ESDS.

NOTE: Normally embodied and assembled ESDS, in the form of assembled components for example need not be individually marked or labelled, provided the container, housing, carrier or packaging for such ESDS is marked or labelled.

3.1.3 The application of self adhesive labels and marking may generate an electrostatic charge. They shall only be used on proximity or shielding packaging. Self adhesive labels shall not be applied in circumstances which would place the ESDS at risk.

3.1.4 Each label shall show at least the basic warning symbol as shown in figs. 1A or 1B. Where space permits, the label or mark as shown in figure 2 shall be used, additional information may be added but not in a manner that detracts from the warning symbol.

3.1.5 Where an electronic assembly or housing contains one or more ESDS then it shall be marked or labelled, using labels as shown in figures 1 or 2, such that the warning can be clearly seen before the ESDS is placed at risk due to contact.

3.1.6 The highest level of marking or labelling shall be on the housing containing ESDS and on its intimate packaging.

3.1.7 The lowest level of marking on sub assemblies shall be based on the probability of the ESDS being maintained in service or replaced as an individual item.

3.1.8 The specified labelling or marking shall appear on at least the proximity packaging or any of the forms of specified ESDS packaging.

Packaging marking or labelling can take the form of labels, tapes or printing and stamping.

3.1.9 The specified warning labelling or marking shall appear on storage bins, trays, component sleeves and tubes and any specialised containers.

3.2 Signs for ESD protected area (EPA)

Signs as shown in figure 3 shall be clearly visible to personnel before they enter the EPA. At least one sign shall be visible from all normal working positions within the EPA.

The signs shall contain at least all elements shown in fig. 3, additional information may be added but not in a manner that detracts from the basic warning.

Signs shall have a minimum size of 300 mm x 150 mm.

3.3 Marking of earth bonding points, earth grounding points and ESD earth facilities

All earth bonding points, earth grounding points and all ESD earth facilities designated for use within the EPA shall be marked or labelled. The mark or label shall contain at least the elements shown in figs. 4, 5 or 6, additional information may be added but not in a manner that detracts from the basic information.

3.4 Marking of documentation

All documentation relating to the use, procurement, specification, design and movement of ESDS shall contain details to advise or warn the recipient that the subject matter is ESDS and shall be handled in accordance with this standard.

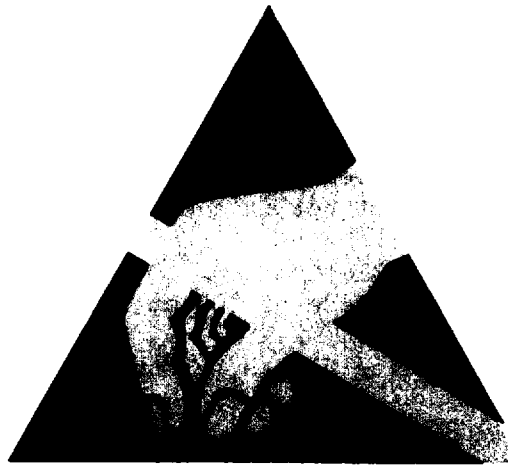


Figure 1A: ESDS basic symbol

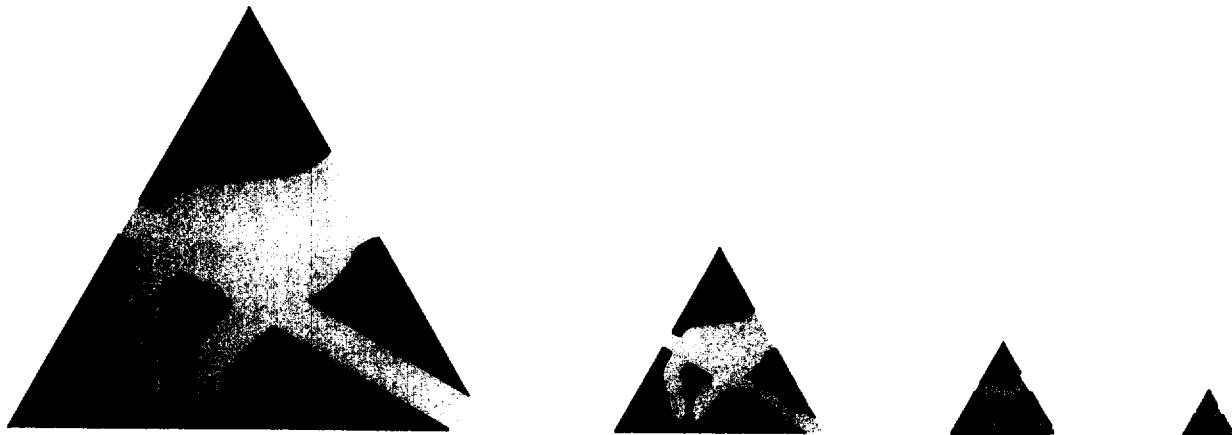


Figure 1B: ESDS simplified symbol

The smallest practical version of the symbol would have a side dimension of 4 mm.

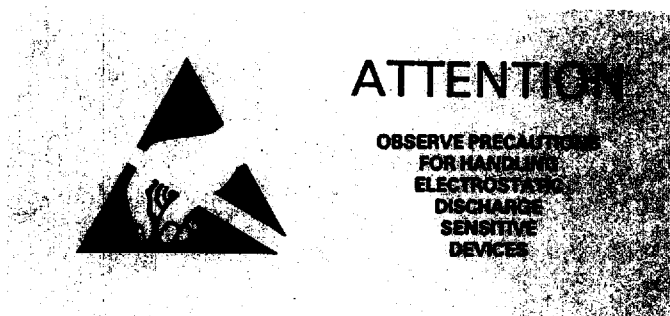


Figure 2: Warning label for ESDS

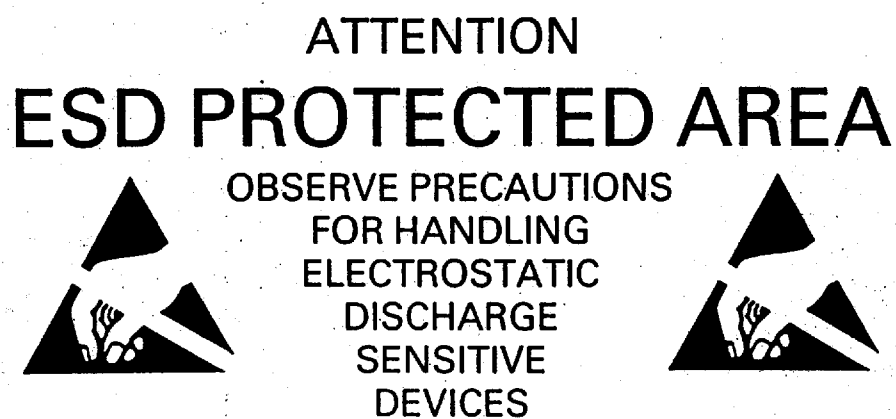


Figure 3: Warning sign for ESD protected areas



Figure 4: Examples of ESD earth facility labels

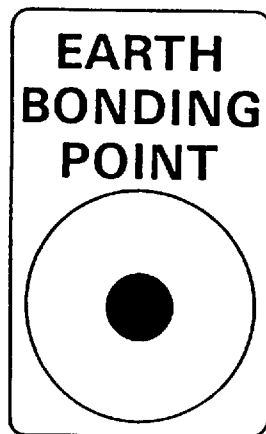


Figure 5: Examples of earth bonding point labels

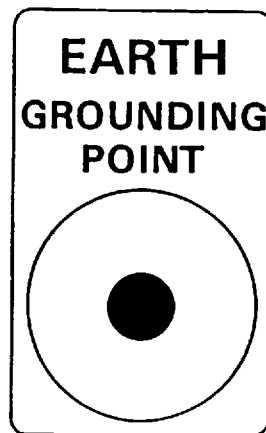


Figure 6: Examples of earth grounding point labels