

IRISH STANDARD

I.S. EN 50178:1998

ICS 29.240

National Standards Authority of Ireland Dublin 9 Ireland

Tel (01) 807 3800 Tel (01) 807 3838

# ELECTRONIC EQUIPMENT FOR USE IN POWER INSTALLATIONS

This Irish Standard was published under the authority of the National Standards Authority of Ireland and comes into effect on: July 10, 1998

NO COPYING WITHOUT NSAI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

© NSAI 1998

Price Code AC

Údarás um Chaighdeáin Náisiúnta na hÉireann

This is a free page sample. Access the full version online.

# EUROPEAN STANDARD NORME EUROPÉENNE EUROPÄISCHE NORM

EN 50178

October 1997

ICS 29.240.00

Descriptors: Electrical installation, industrial electrical installation, electronic equipment, definitions, design, safety, protection against electric shocks, protection against live parts, climatic conditions, electrical properties, mechanical properties, tests, marking

**English version** 

### Electronic equipment for use in power installations

Equipement électronique utilisé dans les installations de puissance

Ausrüstung von Starkstromanlagen mit elektronischen Betriebsmitteln

This European Standard was approved by CENELEC on 1997-07-01. 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, 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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

<sup>© 1997</sup> CENELEC - All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

#### Foreword

This European Standard was prepared by the Task Force CENELEC BTTF 60-1, Assembly of electronic equipment.

A first draft was submitted to CENELEC enquiry (6MP) in August 1994 but failed to be accepted. A second draft was submitted to CENELEC enquiry (2MP) in September 1995 and was accepted. The text of the final draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50178 on 1997-07-01

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) 1998-06-01

latest date by which the national standards conflicting with the EN have to be withdrawn

(dow) 2003-06-01

Annexes designated "informative" are given for information only. In this standard annexes A and B are informative.

Annex A offers additional information e.g. as a basis for design purposes. It also indicates items where new standards are expected to be established. Functions or characteristics presented in the informative annex A may be used as options of the electronic equipment, provided that test methods are specified and test equipment is available. In any case, these points have to be discussed and clarified between customer and manufacturer

Annex B is under consideration. It is intended to contain tables with all important figures and values. It shows a condensed overview on the conditions and requirements for convenience of the user of the standard.

The requirements of this European Standard are based on basic or generic standards issued by IEC or CLC where these standards exist. This is valid especially for safety and environmental requirements. Additional requirements are stipulated where necessary

This European Standard is a harmonized standard for electronic equipment for use in power installations according to the Low Voltage Directive 73/23/EEC. No additional requirements are to be met for compliance with this directive.

Page

#### Contents

	Foreword	2	
	Introduction	10	
1	Scope	11	
2	Normative references	11	
3	Definitions	14	
4	Requirements for entire system	21	
4.1	Normal function	21	
4.2	Damage to persons or material	21	
4.3	EE connected to unearthed supply mains under condition of earth fault	22	
4 4	Earthing requirements (Grounding, earthing and screening)	22	
4.5	Wires and cables for interconnection	22	
4.6	Fuses in neutral and protective conductors	22	
5	Safety requirements	23	
5.1	General requirements	23	
5.2	Requirements for EE with regard to protection against electric shock	25	
5,2.1	Requirements for protection against electric shock	25	
5.2.2	Protection against direct contact	25	
5.2.3	Protection by means of insulation of live parts	25	
5.2.4	Protection by means of enclosures and barriers	27	
5.2.4 1	Distances	27	
5.2.5	Discharge of capacitors	28	
5.2.6	Built-in devices	28	
5.2.7	EE for closed electrical operating areas	28	
5.2.7	Protection in the case of direct contact	28	
	Protection by means of extra-low voltage with protective separation		
5 2.8 1	(SELV- and PELV-system)	28	
	(SELV- and PELV-system)	20	
5.2 8.2	Protection by means of limitation of the discharging energy	29	
5.2.8.3	Protection by means of protective impedance	29	
5.2.8 4	Protection by using limited voltages in control circuits	29	
5.2.8.5	Connectors	29	
5.2.9	Protection with regard to indirect contact	30	
5 2.9 1	Insulation between live parts and exposed conductive parts	30	
5.2.9 2	Protective bonding	30	
5.2.9.3	Rating of protective bonding	31	
5 2.9 4	Protection against corrosion	31	
5.2.9.5	Protective bonding conductor with low cross section	31	
5 2.9 6	EE with voltage above a.c. 1 400 V or d.c. 2 000 V	31	
5.2.97	Interruption	31	
5 2.9 8	Marking	31	
5.2.10	Means of connection for the protective conductor	32	
5.2.11	Leakage current and fault current	32	
5.2 11 1	High leakage current	32	
5.2 11.2	Compatibility with residual-current-operated protective devices in case of low leakage current		
E 2 12	Special features in EE for protective class II	34	
5.2.12	Decisive voltage.	35	
5.2.13	Colid population inculation of exercits	38	
5.2 14	Solid insulation, insulation of circuits	30	
5.2.14 1	Between circuits and exposed conductive parts or accessible surfaces of EE		
5.2.14 2	Between circuits.	oc	
5 2.14 3	Bridging of the insulation via conductive parts	حد	
5 2 15	Clearances and creepage distances, pollution degree		
5.2.15 1	Clearances and creepage distances	39	
5.2.15.2	Pollution degree	46	
5.2.16	Clearances	46	

		Page
5.2.16.1	Clearances between mains-circuits and their environment	
5.2.16.2	Clearances between non-mains-circuits and their environment	49
5.2.16.3	Clearances within a circuit	
5.2.17	Creepage distances	
5.2.18	Protective separation	54
5.2.18.1	Constructive measures	
5.2.18.2	Protective separation by double or reinforced insulation	56
5.2.18.3	Protective separation by protective screening	56
5.2.18.4	Clearances and creepage distances in case of protective separation	57
5.2.18.5	Partial discharge.	57
5.2.18.6	Components and other electrical sub-assemblies	
5.3	Requirements for EEs in installations with regard to protection against electric shock	
5.3.1	Protection with regard to direct contact	58
5.3.1.1	Cables and leads	58
5.3.1.2	Connection of EE with protective separation.	58
5.3.1.3	Built-in devices in installations	59
5.3.1.4	EE in closed electrical operating areas	59
5.3.2	Protection with regard to indirect contact	59
5.3.2.1	Leakage current through the protective conductor	59
5.3.2.2	Permissible touch voltage	00
5.3.2.3	Protection of EE by residual-current-operated protective device	00
6	Environmental requirements and conditions	60
6.1	Climatic condition.	60
6.1.1	Temperature	62
6.1.1.1	Ambient air temperature	62
6.1.1.2	Cooling medium temperature	62
6.1.2	Humidity and air pressure	62
6.1.3	Pollution	62
6.2	Mechanical requirements (general)	53
6.2.1	Mechanical shock	53
6.2.2	Mechanical vibration	53
6.2.2.1	Immunity requirement to mechanical vibration	o
6.2.2 2	Mechanical vibration emission constraints	
6.2.3	Sealing in case of liquid cooling	64
6.2 4	Sealing against dust ingress to EE  Electrical and electromagnetic requirements	64
6.3 6.3.1	Conditions in the system (immunity level for EE)	64
6.3 1 6.3.2	EE connected to a.c. supply mains (immunity)	64
6.3.2 1	Supply voltage variation	64
6 3.2.2	Frequency	65
6 3.3	EE connected to d.c supply mains (immunity)	65
6.3 4	Short-circuit withstand capability (immunity)	65
3. <b>3</b> .5	Immunity from electromagnetic disturbance	66
3.6	Effects of EE(s) on the system (emission)	66
6.3.7	Rating of power electronic equipment.	66
7	Requirements for electronic equipment	66
<i>1</i> 7 1	Design and construction	66
7 1.1 7 1.1	General	66
7.1.1 7.1.2	Quality and reliablility	66
7.1.2 7.1.3	Working life	67
7 1.3 7.1 4	Insulation	67
7.1. <del>5</del> 7.1.5	Component selection and use	67
7.1.5 7.1.5.1	Selection criteria for components	67
7.1.5.2	Hazards arising from components	67
7.1.6	Power supply switching, fusing and usage	68
7.1.6 1	Fire protection and fire risk	68
7 1.6.2	Operation under fault conditions	68
717	Construction	68



	This is a free preview.	Purchase the e	entire publication	at the link below:
--	-------------------------	----------------	--------------------	--------------------

**Product Page** 

- Dooking for additional Standards? Visit Intertek Inform Infostore
- Dearn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation