SLOVENSKI STANDARD

SIST EN 60077-4:2003

december 2003

Železniške naprave – Električna oprema za vozna sredstva – 4. del: Elektrotehnične komponente – Pravila za močnostna stikala za izmenični tok (IEC 60077-4: 2003)

Railway applications - Electric equipment for rolling stock - Part 4: Electrotechnical components - Rules for AC circuit-breakers (IEC 60077-4:2003)

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN 60077-4:2003</u> https://standards.iteh.ai/catalog/standards/sist/db2f748f-4303-45fb-96a7e126289ee682/sist-en-60077-4-2003

ICS 29.280

Referenčna številka SIST EN 60077-4:2003(en)

© Standard je založil in izdal Slovenski inštitut za standardizacijo. Razmnoževanje ali kopiranje celote ali delov tega dokumenta ni dovoljeno

iTeh STANDARD PREVIEW (standards.iteh.ai)

EUROPEAN STANDARD

EN 60077-4

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2003

ICS 45.060

English version

Railway applications -Electric equipment for rolling stock Part 4: Electrotechnical components -Rules for AC circuit-breakers (IEC 60077-4:2003)

Applications ferroviaires -Equipements électriques pour le matériel roulant Partie 4: Composants électrotechniques -Règles pour disjoncteurs à courant monophasé (CEI 60077-4:2003) Bahnanwendungen -Elektrische Betriebsmittel auf Bahnfahrzeugen Teil 4: Elektrotechnische Bauteile -Regeln für AC-Leistungsschalter (IEC 60077-4:2003) (standards.iteh.ai)

> <u>SIST EN 60077-4:2003</u> https://standards.iteh.ai/catalog/standards/sist/db2f748f-4303-45fb-96a7e126289ee682/sist-en-60077-4-2003

This European Standard was approved by CENELEC on 2003-04-01. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, 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

© 2003 CENELEC - All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

Foreword

The text of document 9/718/FDIS, future edition 1 of IEC 60077-4, prepared by IEC TC 9, Electrical equipment and systems for railways, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60077-4 on 2003-04-01.

This European Standard shall be read in conjunction with EN 60077-1.

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) 2004-01-01

 latest date by which the national standards conflicting with the EN have to be withdrawn

(dow) 2006-04-01

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given for information only. In this standard, annex ZA is normative and annexes A and B are informative. Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60077-4 was approved by CENELEC as a European Standard without any modification. (standards.iteh.ai)

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-441	1984	International Electrotechnical Vocabulary (IEV) Chapter 441: Switchgear, controlgear and fuses	-	-
IEC 60060-1 + corr. March	1989 19 <mark>9</mark> 0	High-voltage test techniques Part 1: General definitions and test VIII requirements	HD 588.1 S1	1991
IEC 60077-1 (mod)	1999 https://sta	Railway applications - Electric equipment for rolling stock Part 1: General service conditions and general rules e126289ee682/sist-en-60077-4-2003	EN 60077-1 5fb-96a7-	2002
IEC 60077-2 (mod)	1999	Part 2: Electrotechnical components - General rules	EN 60077-2	2002
IEC 60571 ¹⁾	1998	Electronic equipment used on rail vehicles	-	-
IEC 60694	1996	Common specifications for high-voltage switchgear and controlgear standards	EN 60694 + corr. May	1996 1999
IEC 60850 ²⁾	2000	Railway applications - Supply voltages of traction systems	-	-
IEC 61373	1999	Railway applications - Rolling stock equipment - Shock and vibration tests	EN 61373	1999
IEC 62271-100 ³⁾	2001	High-voltage switchgear and controlgear Part 100: High-voltage alternating- current circuit-breakers	EN 62271-100	2001

¹⁾ Instead of IEC 60571, the European Standard EN 50155:2001 "Railway applications - Electronic equipment used on rolling stock" applies.

[,] Instead of IEC 60850:2000, the European Standard EN 50163:1995 (under revision) applies.

³⁾ IEC 62271-100 supersedes IEC 60056:1987.

iTeh STANDARD PREVIEW (standards.iteh.ai)

NORME INTERNATIONALE INTERNATIONAL STANDARD

CEI **IEC** 60077-4

Première édition First edition 2003-02

Applications ferroviaires – Equipements électriques pour le matériel roulant –

Partie 4: Composants électrotechniques – Règles pour disjoncteurs à courant monophasé

(standards.iteh.ai)

Railway applications – Electric equipment for rolling stock – https://standards.itch.avcatalog/standards/sist/db2f/481-4303-4510-96a/-

e126289ee682/sist-en-60077-4-2003 Part 4:

Electrotechnical components – Rules for AC circuit-breakers

© IEC 2003 Droits de reproduction réservés — Copyright - all rights reserved

Aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'éditeur. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale International Electrotechnical Commission Международная Электротехническая Комиссия CODE PRIX PRICE CODE



Pour prix, voir catalogue en vigueur For price, see current catalogue

CONTENTS

FOI	FOREWORD					
INT	INTRODUCTION					
1	Scop	e	9			
2	Normative references					
3	Definitions					
	3.1	Components	.11			
	3.2	Component parts	.13			
	3.3	Operational features	.15			
	3.4	Making and breaking characteristics – see Annex B	.17			
4	Class	ification	.19			
5	Characteristics					
	5.1	Summary of characteristics	.21			
	5.2	Type of circuit-breaker	.21			
	5.3	Rated values and limiting values for the main circuit	.21			
	5.4	Operational frequencies	.25			
	5.5	Electric and pneumatic control circuits	.25			
	5.6	Electric and pneumatic auxiliary circuits	.25			
	5.7	Over-current release S.T.A.N.D.A.R.D. P.R.F.V.I.F.W.	.27			
	5.8	Recovery voltages	.27			
6	Produ	ict information (Stanual US.Iten.al)	.27			
	6.1	Component documentation	.27			
	6.2	Marking	.27			
7	Norm	al service conditions e126289ee682/sist-en-60077-4-2003	.27			
8	Cons	tructional and performance requirements	.27			
	8.1	Constructional requirements	.27			
	8.2	Performance requirements	.27			
9	Tests		.31			
	9.1	Kind of tests	.31			
	9.2	Tests for verification of constructional requirements	.33			
	9.3	Type tests for verification of performance requirements	.33			
	9.4	Routine tests for verification of performance requirements	.45			
Anr	nex A	informative) Test circuit to verify the making and breaking capacities	.47			
Anr	iex B	informative) Determination of short-circuit making and breaking currents,				
and	of pe	rcentage DC component	.49			
Eia		1 Principle of test circuit	47			
Figi		1 – Principle of test circuit making and bracking surrants, and of	.47			
per	ure в. centac	e DC components.	.49			
р С1 [.]		,-				
Table 1 – Operational performance capability 29						
Tab	Table 2 – List of type test sequences for performance requirements 35					
Table 3 – Tolerances on test values						
Table 4 – Determination of voltage for impulse test 37						

INTERNATIONAL ELECTROTECHNICAL COMMISSION

RAILWAY APPLICATIONS – ELECTRIC EQUIPMENT FOR ROLLING STOCK –

Part 4: Electrotechnical components – Rules for AC circuit-breakers

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, EC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60077-4 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This standard should be read in conjunction with IEC 60077-1.

The text of this standard is based on the following documents:

FDIS	Reports on voting
9/718/FDIS	9/735/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2010. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

INTRODUCTION

This International Standard is Part 4 of the IEC 60077 series.

The purpose of this product standard is to give additional or amended requirements on AC circuit-breakers as a supplement to those given by IEC 60077-2.

During preparation of this product standard, IEC 60056 and IEC 60694 have been considered and their requirements have been kept as far as it has been possible.

This product standard makes reference to the general rules for electrotechnical components given in IEC 60077-2, but for general conditions reference is made directly to IEC 60077-1.

iTeh STANDARD PREVIEW (standards.iteh.ai)

RAILWAY APPLICATIONS – ELECTRIC EQUIPMENT FOR ROLLING STOCK –

Part 4: Electrotechnical components – Rules for AC circuit-breakers

1 Scope

In addition to the general requirements of IEC 60077-2, this part of IEC 60077 gives rules for AC circuit-breakers, the main contacts of which are to be connected to AC overhead contact lines; the nominal voltage of these circuits being in accordance with IEC 60850.

This standard, together with IEC 60077-2, states specifically:

- a) the characteristics of the circuit-breakers;
- b) the service conditions with which circuit-breakers have to comply with reference to:
 - operation and behaviour in normal service,
 - operation and behaviour in short-circuit,
 - dielectric properties;
- c) the tests for confirming the compliance of the components with the characteristics under the service conditions and the methods to be adopted for these tests;
- d) the information to be marked on, or given with the circuit-breaker.

NOTE 1 Circuit-breakers which are dealt with in this standard may be provided with devices for automatic opening under pre-determined conditions other than these of over-current, for example, undervoltage and reversal of power current. This standard does not deal with the verification of operation under such predetermined conditions.

NOTE 2 The incorporation of electronic components or electronic sub-assemblies into electrotechnical components is now common practice.

Although this standard is not applicable to electronic equipment, the presence of electronic components does not provide a reason to exclude such electrotechnical components from the scope.

Electronic sub-assemblies included in the circuit-breakers should comply with the relevant standard for electronics (IEC 60571).

NOTE 3 Certain of these rules may, after agreement between user and manufacturer, be used for electrotechnical components installed on vehicles other than rail rolling stock.

This standard does not cover industrial circuit-breakers which have to comply with IEC 60056. For these, in order to ensure satisfactory operation, this standard should be used to specify only the particular requirements for rolling stock. In such cases, a specific document should state the additional requirements with which the industrial circuit-breakers are to comply, for example:

- either to be adapted (e.g. for control voltage, environmental conditions, etc.);
- or to be installed and used so that they do not have to endure specific rolling stock conditions;
- or to be additionally tested to prove that these components can withstand satisfactorily the rolling stock conditions.

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.

IEC 60050(441):1984, International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and Fuses

IEC 60056:2001, High voltage alternating-current circuit-breaker *

IEC 60060-1:1989, High voltage test techniques – General definitions and test requirements

IEC 60077-1:1999, Railway applications – Electric equipment for rolling stock. – Part 1: General service conditions and general rules

IEC 60077-2:1999, Railway applications – Electric equipment for rolling stock. – Part 2: Electrotechnical components – General rules

IEC 60571:1998, Railway applications – Electronic equipment used on rail vehicles

IEC 60694:1996, Common specification for high voltage switchgear and controlgear standards

IEC 60850:2000, Supply voltage of traction systems teh.ai)

IEC 61373:1999, Railway applications – Rolling stock equipment – Shock and Vibration test

https://standards.iteh.ai/catalog/standards/sist/db2f748f-4303-45fb-96a7-IEC 62271-100:2001, High-voltage_switchgear and control gear – Part 100: High-voltage alternating-current circuit-breakers

3 Definitions

For the purposes of this of IEC 60077, the definitions given in clause 3 of IEC 60077-1 and clause 3 of IEC 60077-2 are applicable together with the following additional definitions.

3.1 Components

3.1.1

indoor circuit-breaker

circuit-breaker designed solely for protected installation against wind, rain, snow, abnormal dirt deposits, abnormal conditions, ice and hoar-frost

[IEV 441-11-04, modified]

3.1.2

outdoor circuit-breaker

circuit-breaker suitable for installation in open air, i.e. capable of withstanding wind, rain, snow, dirt deposits, condensation, ice and hoarfrost

[IEV 441-11-05, modified]

^{*} In preparation.