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**Railway applications – Electric equipment for rolling stock –
Part 2: Electrotechnical components – General rules**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS –
ELECTRIC EQUIPMENT FOR ROLLING STOCK –****Part 2: Electrotechnical components – General rules****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60077-2 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This second edition cancels and replaces the first edition of IEC 60077-2, issued in 1999. It constitutes a technical revision.

This edition includes the following main technical changes with regard to the previous edition:

- a) Short circuit breaking capacity;
- b) Rated short-time withstand current;
- c) Critical currents range;
- d) Climatic conditions are specified.

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

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

FDIS	Report on voting
9/2267/FDIS	9/2279/RVD

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The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

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RAILWAY APPLICATIONS – ELECTRIC EQUIPMENT FOR ROLLING STOCK –

Part 2: Electrotechnical components – General rules

1 ~~Scope and object~~

In addition to the rules given in IEC 60077-1, this part of IEC 60077 provides general rules for all electrotechnical components installed in power circuits, auxiliary circuits, control and indicating circuits, etc., on railway rolling stock.

The purpose of this document is to adapt the general rules given in IEC 60077-1 to all electrotechnical components for rolling stock, in order to obtain uniformity of requirements and tests for the corresponding range of components.

Electrotechnical components are mainly switchgear and controlgear, including also relays, valves, resistors, fuses, etc., irrespective of the nature of their control.

~~NOTE 1~~ The incorporation of electronic components or electronic subassemblies into electrotechnical components is now common practice. Although this document is not applicable to electronic equipment, the presence of electronic components does not give grounds to exclude such electrotechnical components from the scope of this document.

Electronic subassemblies ~~should~~ comply with the relevant standard.

~~NOTE 2~~ Some of these rules ~~may~~, after agreement between the user and the manufacturer, ~~be~~ **are** used for electrotechnical components installed on vehicles other than railway rolling stock, such as mine locomotives, trolleybuses, etc.

This document states:

- a) the characteristics of the components;
- b) the service conditions with which components have to comply;
- c) the tests intended to confirm compliance of the components with these characteristics under these service conditions, and the methods to be adopted for these tests;
- d) the information to be marked on, or given with, the apparatus.

This document does not cover industrial electrotechnical components which comply with their own product standard. In order to ensure satisfactory operation of these components for rolling stock, this document ~~should be~~ **is** used to specify only the particular requirements for railway application. In that case, a specific document ~~should~~ **would** state the additional requirements with which the industrial components are to comply, e.g.:

- to be adapted (for example for control voltage, environmental conditions, etc.); or
- to be installed and used so as not to have to endure specific railway conditions; or
- to be additionally tested to prove that these components can satisfactorily withstand railway conditions.

In the event of there being a difference in requirements between this document and a railway rolling stock relevant product standard, then the product standard requirements take precedence.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050(446):1983, International Electrotechnical Vocabulary (IEV) – Chapter 446: Electrical relays~~

~~IEC 60050(604):1987, International Electrotechnical Vocabulary (IEV) – Chapter 604: Generation, transmission and distribution of electricity – Operation~~

IEC 60050-811:1991 2017, International Electrotechnical Vocabulary (IEV) – Chapter 811: Electric traction

IEC 60068-2-1:1990, Environmental testing – Part 2-1: Tests – Test A: Cold

IEC 60068-2-2:1974, Environmental testing – Part 2-2: Tests – Test B: Dry heat

~~IEC 60068-2-3:1969, Environmental testing – Part 2: Tests – Test Ca: Damp heat, steady state~~

IEC 60068-2-30, Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)

IEC 60068-2-52:1996, Environmental testing – Part 2-52: Test methods – Test Kb: Salt mist, Cyclic (Sodium, chloride solution)

IEC 60068-2-78, Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state

IEC 60077-1:2017, Railway applications – Electric equipment for rolling stock – Part 1: General service conditions and general rules¹⁾

~~IEC 60077-3, —, Railway applications – Electric equipment for rolling stock – Part 3: Electrotechnical components – Rules for d.c. circuit-breakers¹⁾~~

~~IEC 60077-4, —, Railway applications – Electric equipment for rolling stock – Part 4: Electrotechnical components – Rules for a.c. circuit-breakers¹⁾~~

~~IEC 60077-5, —, Railway applications – Electric equipment for rolling stock – Part 5: Electrotechnical components – Rules for HV fuses¹⁾~~

IEC 60417, Graphical symbols for use on equipment (available at <http://www.graphical-symbols.info/equipment>)

IEC 60529:1989, Degrees of protection provided by enclosures (IP Code)

¹⁾ ~~To be published.~~

IEC TR 60943:~~1998~~, *Guidance concerning the permissible temperature rise for parts of electrical equipment, in particular for terminals*

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Railway applications – Electric equipment for rolling stock –
Part 2: Electrotechnical components – General rules**

**Applications ferroviaires – Equipements électriques du matériel roulant –
Partie 2: Composants électrotechniques – Règles générales**

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

APPLICATIONS FERROVIAIRES – ÉQUIPEMENTS ÉLECTRIQUES DU MATÉRIEL ROULANT –

Partie 2: Composants électrotechniques – Règles générales

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La Norme internationale IEC 60077-2 a été établie par le comité d'études 9 d'IEC: Matériels et systèmes électriques ferroviaires.

Cette seconde édition annule et remplace la première édition de l'IEC 60077-2, publiée en 1999. Elle constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) Pouvoir de coupure en court-circuit;
- b) Courant assigné de courte durée admissible;
- c) Plage de courants critiques;

d) Spécification des conditions climatiques.

Cette norme doit être lue conjointement avec l'IEC 60077-1.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
9/2267/FDIS	9/2279/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Une liste de toutes les parties de la série IEC 60077, publiées sous le titre général *Applications ferroviaires – Équipements électriques du matériel roulant*, peut être consultée sur le site web de l'IEC.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous «<http://webstore.iec.ch>» dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

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1 Domaine d'application

La présente partie de l'IEC 60077 donne, en complément des règles énoncées dans l'IEC 60077-1, les règles générales applicables à tous les composants électrotechniques installés dans les circuits de puissance, circuits auxiliaires, circuits de commande et de contrôle, etc., installés sur le matériel roulant ferroviaire.

Le présent document a pour but d'adapter les règles générales données dans l'IEC 60077-1 aux composants électrotechniques du matériel roulant afin d'harmoniser les exigences et les essais à la gamme de composants correspondante.

Les composants électrotechniques sont principalement les appareillages de connexion et de commande, comprenant les relais, les électrovalves, les résistances, les fusibles, etc., quelle que soit la nature de leur commande.

L'incorporation de composants électroniques ou de sous-ensembles électroniques dans les composants électrotechniques est maintenant une pratique courante. Bien que le présent document ne soit pas applicable aux matériels électroniques, la présence de composants électroniques n'est pas une raison suffisante pour exclure ces composants électrotechniques du champ d'application du présent document.

Ces sous-ensembles électroniques sont conformes à la norme appropriée.

Après accord entre utilisateur et fabricant, certaines règles sont utilisées pour les composants électrotechniques installés sur des véhicules autres que ceux du matériel roulant ferroviaire, tels que les locomotives de mine, les trolleybus, etc.

Le présent document énonce:

- a) les caractéristiques des composants;
- b) les conditions de service auxquelles les composants doivent satisfaire;
- c) les essais destinés à confirmer que les composants satisfont à ces caractéristiques dans ces conditions de service et les méthodes correspondantes;
- d) les informations qu'il faut marquer ou fournir avec l'appareil.

Le présent document ne couvre pas les composants électrotechniques industriels qui répondent aux exigences de leurs propres normes de produit(s). Dans le but d'obtenir un fonctionnement satisfaisant de ceux-ci sur le matériel roulant, le présent document est employé uniquement pour spécifier les exigences particulières relatives à l'application ferroviaire. Dans ce cas, un document spécifique indiquerait les exigences complémentaires auxquelles il faut que les composants industriels satisfassent, par exemple:

- pour être adaptés (tension de commande, conditions d'environnement, etc.), ou
- pour être installés et utilisés de sorte qu'ils n'aient pas à subir les conditions particulières du milieu ferroviaire, ou
- pour subir des essais additionnels afin de prouver que ces composants peuvent supporter de manière satisfaisante les conditions ferroviaires.

Dans l'éventualité où une différence existerait entre les exigences du présent document et une norme de produit ferroviaire de matériel roulant pertinente, les exigences de la norme de produit prévaudraient.

2 Références normatives

Les documents suivants cités dans le texte constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60050-811:2017, *Vocabulaire Electrotechnique International – Chapitre 811: Traction électrique*

IEC 60068-2-1, *Essais d'environnement – Partie 2-1: Essais – Essais A: froid*

IEC 60068-2-2, *Essais d'environnement – Partie 2-2: Essais – Essais B: chaleur sèche*

IEC 60068-2-30, *Essais d'environnement – Partie 2-30: Essais – Essai Db: essai cyclique de chaleur humide (cycle de 12 h + 12 h)*

IEC 60068-2-52, *Essais d'environnement – Partie 2-52: Essais – Essai Kb: brouillard salin, essai cyclique (solution de chlorure de sodium)*

IEC 60068-2-78, *Essais d'environnement – Partie 2-78: Essais – Essais Cab: chaleur humide, essai continu*

IEC 60077-1:2017, *Applications ferroviaires – Equipements électriques du matériel roulant – Partie 1: Conditions générales de service et règles générales*

IEC 60417, *Symboles graphiques utilisables sur le matériel* (disponible à <http://www.graphical-symbols.info/equipment>)

IEC 60529, *Degrés de protection procurés par les enveloppes (code IP)*

IEC TR 60943, *Guide concernant l'échauffement admissible des parties des matériels électriques, en particulier les bornes de raccordement*