IEC 60079-19

Edition 3.0 2015-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Explosive atmospheres –
Part 19: Equipment repair, overhaul and reclamation

Atmosphères explosives –
Partie 19: Réparation, révision et remise en état de l'appareil

IEC 60079-19:2010-11/AMD1:2015-03(en-fr)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

Plus de 60 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

IEC 60079-19

Edition 3.0 2015-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Explosive atmospheres – Part 19: Equipment repair, overhaul and reclamation

Atmosphères explosives – Partie 19: Réparation, révision et remise en état de l'appareil

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.260.20

ISBN 978-2-8322-2433-5

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

FOREWORD

This amendment has been prepared by subcommittee 31J: Classification of hazardous areas and installation requirements, of IEC technical committee 31: Explosive atmospheres.

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

FDIS	Report on voting
31J/249/FDIS	31J/250/RVD

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

The committee has decided that the contents of this amendment and the base 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.

2 Normative references

*Add, after "*IEC 60079-7, *Explosive atmospheres – Part 7: Equipment protection by increased safety "e"" the following new references:*

IEC 60079-7:1990, *Electrical apparatus for explosive gas atmospheres – Part 7: Increased safety "e"*

IEC 60079-7:2001, *Electrical apparatus for explosive gas atmospheres – Part 7: Increased safety "e"*

*Replace "*IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"" with the following new references:*

IEC 60079-15:2005, *Electrical apparatus for explosive gas atmospheres – Part 15: Construction, test and marking of type of protection "n" electrical apparatus*

IEC 60079-15:2010, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

8.2.4 Insulation

Replace the existing text of Subclause 8.2.4 by the following new text:

Comprehensive details of the insulation system of windings, including the type of impregnation varnish, are normally included in the certificate documentation. Where this does not apply, full information shall be sought from the manufacturer or determined by detailed inspection of the original winding.

8.2.6.1 General

Replace the existing text of Subclause 8.2.6.1 by the following new text:

The electrical construction of Type of Protection "e" equipment decisively influences the explosion safety and the repairer shall be in full possession of the necessary information and equipment. The whole of the winding shall be restored to the original condition except that a partial winding replacement may be possible on larger equipment where this may be practicable.

Replace the existing title and text of Subclause 8.2.6.1.1 by the following new text:

8.2.6.1.1 For machines with a rated voltage of 1 000 V or less; machines evaluated to IEC 60079-7:1969, 1990 or 2001:

The following repair techniques are acceptable:

- stator windings replaced with those provided by the manufacturer;
- stator windings replaced based on manufacturer's winding data;
- copy winding techniques;

The following winding data are required to be able to repair the stator winding and maintain the original t_E:

a) type of winding – for example, single-layer, double-layer, etc.;
b) winding diagram;
c) number of turns/conductors/slot, parallel paths per phase;
d) interphase connections;
e) conductor size;
f) insulation system, including slot insulation and the generic varnish system or process such as VPI or trickle;
g) measurement or calculation of resistance/phase or between terminals.
h) coil pitch
i) winding projection, including clearance between coils and enclosure

NOTE 1 Converter-fed motors are not protected using the concept of t_E, but are protected either with embedded temperature sensors or by the inherent design of the converter.

Where copy rewind techniques are being used, all of the following are required:

a) Where there is a risk of damaging the core when stripping out the old winding, a core flux test shall be conducted, at an appropriate value, such as 1,5 T (50 Hz) or 1,32 T (60 Hz), before and after stripping winding to verify condition of core. The core losses after stripping shall be no greater than 110 % of the core losses before stripping.
b) Removal of stator winding shall be by use of chemical stripping, controlled pyrololysis (temperature controlled burn out) where the stator temperature does not exceed 370 °C or cold stripping process.
c) The cross section area of the conductor shall be no less than the cross section area of the original winding and not greater than 103 % of the cross section area of the original winding.

d) The type of winding used on the original winding shall be used for the rewind – for example, single-layer, double-layer, lap, concentric, etc.

e) The number of conductors/slot, and parallel paths per phase shall be as in the original winding.

f) The mean length turn of the coil shall be no greater than the original winding coil or preferably reduced.

g) The stator winding projection shall be the same as the original winding.

h) Embedded temperature sensors shall be fitted in the same location as the temperature sensors in the original winding.

i) The generic varnish system process shall be the same as used in the original winding, such as trickle epoxy resin, solvent free resin using VPI, or triple dip with pre-heating and cure in resin with solvent

j) After impregnation but before curing, the stator bore shall be cleaned. This is in order to minimise the need for stator bore cleaning after the stator winding is cured, which can increase stray losses.

k) The resistance/phase or between terminals shall be within ± 5 % of the original winding.

NOTE 2 The EASA/AEMT Rewind Study titled *The Effects of Repair/Rewinding on Motor Efficiency* published by EASA & AEMT provides additional information on Best Practice during rewinding & repair. This document is available as a free download from www.easa.com or www.iecex.com.

Replace the existing title and text of Subclause 8.2.6.1.2 by the following new text:

8.2.6.1.2 For machines with a rated voltage of greater than 1 000 V; machines evaluated to IEC 60079-7:1990 or 2001:

In addition to the revised requirements of 8.2.6.1.1:

Unless the insulation system has been previously subjected to the stator incendivity tests of IEC 60079-7:1990 or 2001, the complete motor windings shall be subjected to the stator incendivity tests of IEC 60079-7:1990 or 2001, as applicable.

NOTE 1 Equipment evaluated against the requirements of IEC 60079-7:1969 or 1990 was not subjected to additional requirements for high-voltage machines. These machines, if returned to original condition, will likely only comply with the requirements of the standard to which they were originally evaluated.

NOTE 2 Additional information on the evaluation of stator windings and insulation systems based on the IECEx Decision Sheet DS2013/006 (available from www.iecex.com) can be found in Annex D.

9.2.6.1 General

Replace the existing text of Subclause 9.2.6.1 by the following new text:

The electrical construction of type of protection "n" equipment decisively influences the explosion safety and the repairer shall be in full possession of the necessary information and equipment. The whole of the winding shall be restored to the original condition except that a partial winding replacement may be possible on larger equipment where this may be practicable.

For machines evaluated to IEC 60079-15:1987 or 2001, one of the following repair options shall be employed:

- stator windings replaced with those provided by the manufacturer;
- repair based on manufacturer's winding data;
- copy winding technique, which includes determination of winding connections, conductor size, turns, coil pitch, winding projection, and may include a determination of the original coil resistance.

For machines with a rated voltage of 1 000 V or less evaluated to IEC 60079-15:2005 or 2010, one of the following repair options shall be employed:

- stator windings replaced with those provided by the manufacturer;
- repair based on manufacturer's winding data;
- copy winding technique, which includes determination of winding connections, conductor size, turns, coil pitch, winding projection, and may include a determination of the original coil resistance.

For machines with a rated voltage of greater than 1 000 V, one of the following repair options shall be employed, ensuring that, unless the insulation system has been previously subjected to the stator incendivity tests of IEC 60079-15:2005 or 2010, the motor windings shall be subjected to the stator incendivity tests of IEC 60079-15:2005 or 2010. For IEC 60079-15:2005, the end user has the option of advising that the risk factors used for the original assessment against IEC 60079-15:2005 indicated a low potential for stator winding discharge, and therefore the stator incendivity tests were not performed:

- stator windings replaced with those provided by the manufacturer;
- stator windings replaced based on manufacturer's winding data;
- copy winding techniques.

The following winding data are required to be able to repair the stator winding and maintain the original t_E:

a) type of winding – for example, single-layer, double-layer, etc.;
b) winding diagram;
c) number of turns/conductors/slot, parallel paths per phase;
d) interphase connections;
e) conductor size;
f) insulation system, including slot insulation and the generic varnish system or process such as VPI or trickle;
g) measurement or calculation of resistance/phase or between terminals;
h) coil pitch;
i) winding projection, including clearance between coils and enclosure.

NOTE 1 Converter-fed motors are not protected using the concept of t_E, but are protected either with embedded temperature sensors or by the inherent design of the converter.

Where copy rewind techniques are being used, all of the following are required:

a) A core flux test shall be conducted at an appropriate value, such as 1,5 T (50 Hz) or 1,32 T (60 Hz), before and after stripping winding to verify condition of core. The core losses after stripping shall be no greater than 110 % of the core losses before stripping.
b) Removal of stator winding shall be by use of chemical stripping, controlled pyrololysis (temperature controlled burn out) where the stator temperature does not exceed 370 °C or cold stripping process.
c) The cross section area of the conductor shall be no less than the cross section area of the original winding and not greater than 103 % of the cross section area of the original winding.
d) The type of winding used on the original winding shall be used for the rewind – for example, single-layer, double-layer, lap, concentric, etc.
e) The number of conductors/slot, and parallel paths per phase shall be as in the original winding.
f) The mean length turn of the coil shall be no greater than the original winding coil or preferably reduced.

g) The stator winding projection shall be the same as the original winding.

h) Embedded temperature sensors shall be fitted in the same location as the temperature sensors in the original winding.

i) The generic varnish system process shall be the same as used in the original winding, such as trickle epoxy resin, solvent free resin using VPI, or triple dip with pre-heating and cure in resin with solvent

j) After impregnation but before curing, the stator bore shall be cleaned. This is in order to minimise the need for stator bore cleaning after the stator winding is cured, which can increase stray losses.

k) The resistance/phase or between terminals shall be within ± 5 % of the original winding.

NOTE 2 Additional information on the 'Evaluation of Best Practice During Rewinding & Repair' can be found in Annex D.

Add, after Annex C, the following new Annex D:

Annex D
(informative)

When rewinding electric motors, it is important to maintain the original efficiency of the machine to prevent an increase in losses, which may affect the Ex temperature classification.

Information on the effect of rewinding on the efficiency of motors, together with guidance on best practice during repair and rewinding, is available from the EASA/AEMT Rewind Study titled:-

'The Effect of Repair/Rewind on Motor Efficiency'; published by EASA & AEMT.

This is available as a free download from the IECEx web site:

(http://www.iecex.com/operational.htm, Operating Document OD 301)

or from the EASA web site:

(http://www.easa.com/energy)

Guidance on the data a service facility will need to obtain from the original stator winding, to make a successful copy rewind, is available in IECEx ExTAG Decision Sheet 2013/006 (available as a free download from the IECEx web site:- http://www.iecex.com/extag_decisions.htm)

AVANT-PROPOS

Le présent amendement a été établi par le sous-comité 31J: Classification des emplacements dangereux et règles d'installation, du comité d'études 31 de l'IEC: Equipements pour atmosphères explosives

Le texte de cet amendement est issu des documents suivants:

FDIS	Rapport de vote
31J/249/FDIS	31J/250/RVD

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

Le comité a décidé que le contenu de cet amendement et de la publication de base 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.

2 Références normatives

Ajouter, après "CEI 60079-7, *Atmosphères explosives – Partie 7: Protection de l'équipement par sécurité augmentée "e"*", *les nouvelles références suivantes:*

CEI 60079-7:1990, *Matériel électrique pour atmosphères explosives gazeuses – Septième partie: Sécurité augmentée "e"*

CEI 60079-7:2001, *Matériel électrique pour atmosphères explosives gazeuses – Partie 7: Sécurité augmentée "e"*

Remplacer "CEI 60079-15, *Atmosphères explosives – Partie 15: Protection de l'appareil par mode de protection "n"*" *avec les nouvelles références suivantes:*

CEI 60079-15:2005, *Matériel électrique pour atmosphères explosives gazeuses – Partie 15: Construction, essais et marquage des matériels électriques du mode de protection "n"*

CEI 60079-15:2010, *Atmosphères explosives – Partie 15: Protection de l'appareil par mode de protection "n"*

8.2.4 Isolation

Remplacer le texte existant du Paragraphe 8.2.4 par le nouveau texte suivant: