

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Explosive atmospheres –
Part 31: Equipment dust ignition protection by enclosure “t”**

**Atmosphères explosives –
Partie 31: Protection du matériel contre l’inflammation des poussières par
enveloppe «t»**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2008 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, 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 either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, 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 la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: 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.

- Catalogue of IEC publications: www.iec.ch/searchpub

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 It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

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

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch

Tel.: +41 22 919 02 11

Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique internationale (CEI) 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 CEI

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

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: csc@iec.ch

Tél.: +41 22 919 02 11

Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Explosive atmospheres –
Part 31: Equipment dust ignition protection by enclosure “t”**

**Atmosphères explosives –
Partie 31: Protection du matériel contre l’inflammation des poussières par
enveloppe «t»**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 60079-31
Edition 1.0 2008-11

EXPLOSIVE ATMOSPHERES –

Part 31: Equipment dust ignition protection by enclosure "t"

INTERPRETATION SHEET 1

This interpretation sheet has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

The text of this interpretation sheet is based on the following documents:

DISH	Report on voting
31/1605/DISH	31/1616/RVDISH

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

IEC 60079-31:2008 Edition 1.0, Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure "t"

Question 1:

The requirements given in 5.2.2 of IEC 60079-31:2008 (Edition 1) permit threaded entries for dust protected enclosures to be tapered threads or parallel threads with not less than five threads, with a minimum tolerance of medium or fine according to ISO 956-1 and ISO 965-3.

Does the description of threads include other thread forms such as ISO 228-1 threads (these threads are commonly referred to as BSPP or Type G threads and BSPT or Type R threads)?

Answer 1:

No, only metric and NPT threaded entries are permitted for enclosures having equipment dust ignition protection by enclosure.

NOTE It has been determined that some sizes of Type G and NPT threads will engage but will result in a mismatched thread engagement. The intention of the restriction to only metric and NPT regarding threaded entries for dust ignition protection by enclosure is to minimize the risk of mismatch of thread forms in enclosure entries.

Question 2:

Where a thread adapter is fitted and assessed as a factory-assembled part of the dust protected enclosure, what are the permitted thread forms?

Answer 2:

A thread adapter may use thread forms other than metric and NPT, whether as an Ex Equipment thread adapter or as a thread adapter fitted and assessed as a factory-assembled part of the dust protected enclosure.

Question 3:

Can a blanking element be installed in a thread adapter which is fitted and assessed as a factory-assembled part of the dust protected enclosure?

Answer 3:

Yes, a blanking element can be installed in a thread adapter which is fitted and assessed as a factory-assembled part of the dust protected enclosure.

Question 4:

What is the required marking when a thread adapter is fitted and assessed as a factory assembled part of the dust protected enclosure?

Answer 4:

Clause 16.2 of IEC 60079-0 (Editions 6 and 7) requires identification of the specific thread type and size of threaded entries. In the case where the thread adapter is fitted and assessed as a factory-assembled part of the dust protected enclosure, the requirement for identification applies to the thread form of the adapter for the field wiring connection.

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Terms and definitions	6
4 Level of protection	6
4.1 General.....	6
4.2 Additional requirements for level of protection “ta”.....	6
4.2.1 Thermal protection	6
5 Construction.....	7
5.1 Joints	7
5.1.1 General	7
5.1.2 Gaskets and seals	7
5.1.3 Cemented joints	8
5.1.4 Operating rods, spindles and shafts.....	8
5.1.5 Windows.....	8
5.2 Cable glands and conduit entries.....	8
5.2.1 Cable glands	8
5.2.2 Conduit entries	8
6 Verification and tests	9
6.1 Type tests	9
6.1.1 Type tests for dust exclusion by enclosures.....	9
6.1.2 Thermal tests	9
6.1.3 Pressure test	10
6.2 Routine tests	10
7 Marking	10
Bibliography.....	11
Table 1 – Ingress protection	9
Table 2 – Conditions for the determination of maximum surface temperature.....	9

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –**Part 31: Equipment dust ignition protection by enclosure "t"**

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.
- 2) The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60079-31 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This first edition of IEC 60079-31 has been developed from the first edition of IEC 61241-1 (2004) which it now cancels and supersedes.

The significant changes with respect to the previous edition are listed below:

- Title changed to Equipment dust ignition protection by enclosure "t"
- Combination and rationalisation of practice A and B into a single practice, and some constructional requirements that may have applied to only one practice now apply to all enclosures
- Introduction of three levels of protection, "ta", "tb" and "tc"
- Defined test voltage ranges and overload conditions for thermal tests.
- Introduction of a pressure test prior to the IP test
- Restrictions on power and voltage levels for level of protection "ta"

- Introduction of a variant of the IP6X test for level of protection “ta”
- Compulsory dust layer thermal test for protection level “ta” by surrounding the enclosure with dust to a depth of at least 500 mm on all available surfaces

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

FDIS	Report on voting
31/765/FDIS	31/775/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.

A list of all parts of the IEC 60079 series, under the general title *Explosive atmospheres*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site 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.

The contents of the corrigendum of March 2009 and Interpretation Sheet 1 of February 2022 have been included in this copy.

<https://standards.itec.ai/catalog/standards/sist/60079-31-2008>
<https://standards.itec.ai/catalog/standards/sist/60079-31-2008>

EXPLOSIVE ATMOSPHERES –

Part 31: Equipment dust ignition protection by enclosure "t"

1 Scope

This part of IEC 60079 is applicable to electrical equipment protected by enclosure and surface temperature limitation for use in explosive dust atmospheres. It specifies requirements for design, construction and testing of electrical equipment.

This standard supplements and modifies the general requirements of IEC 60079-0. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirement of this standard shall take precedence.

This standard does not apply to dusts of explosives, which do not require atmospheric oxygen for combustion, or to pyrophoric substances.

This standard does not apply to electrical equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines endangered by firedamp and/or combustible dust.

This standard does not take account of any risk due to an emission of flammable or toxic gas from the dust.

NOTE 1 The application of electrical equipment in atmospheres, which may contain combustible dust as well as explosive gas, whether simultaneously or separately, may require additional protective measures.

NOTE 2 Where the equipment has to meet other environmental conditions, for example, protection against ingress of water and resistance to corrosion, additional methods of protection may be necessary. The method used should not adversely affect the integrity of the enclosure.

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 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

IEC 60079-7, *Explosive atmospheres – Part 7: Equipment protection by increased safety "e"*

IEC 60127 series, *Miniature fuses*

IEC 60691, *Thermal-links – Requirements and application guide*

ISO 965-1, *ISO general-purpose metric screw threads – Tolerances – Part 1: Principles and basic data*

ISO 965-3, *ISO general-purpose metric screw threads – Tolerances – Part 3: Deviation for constructional screw threads*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60079-0, as well as the following definitions, apply.

NOTE Additional definitions applicable to explosive atmospheres can be found in IEC 60050-426[1]¹.

3.1 dust ignition protection by enclosure “t”

type of protection for explosive dust atmospheres where electrical equipment is provided with an enclosure providing dust ingress protection and a means to limit surface temperatures

3.2 joint

place where the corresponding surfaces of two parts of an enclosure, or the conjunction of enclosures, come together

3.3 gasket

a compressible element provided in a joint to provide protection against the ingress of dust

4 Level of protection

Type of protection “t” is divided into three levels of protection “ta”, “tb” and “tc”. For each level of protection, an equipment protection level (EPL) has been assigned based on the risk of the equipment becoming an ignition source in a hazardous atmosphere.

4.1 General

Equipment with dust ignition protection by enclosure “t” shall be either

- level of protection ta (EPL “Da”), or
- level of protection tb (EPL “Db”), or
- level of protection tc (EPL “Dc”).

The requirements of this standard shall apply to all levels of protection “t” unless otherwise stated.

4.2 Additional requirements for level of protection “ta”

For level of protection “ta”, the requirements of IEC 60079-31 shall apply, in addition to the following. The power supply to level of protection “ta” equipment shall be rated for a prospective short circuit current of not more than 10 kA.

4.2.1 Thermal protection

4.2.1.1 General

Where the equipment is capable of exceeding the maximum surface temperature as a result of an abnormal operating condition, a protective device shall be provided either external to the equipment or directly integrated into the equipment. The protective device shall be capable of interrupting the maximum current of the circuit in which it is installed. Where the equipment contains a cell or battery and a control device is provided to prevent overheating of the cell or battery, the control device can also be considered as a protective device, providing it also protects the complete equipment from exceeding the maximum surface temperature.

¹ Figures in square brackets refer to the bibliography.

NOTE The response time of the thermal protective devices should be taken into account and demonstrated by the manufacturer that they are adequate for the necessary overtemperature protection.

4.2.1.2 Protective devices

The equipment shall be protected by an integral thermal protective device. This thermal protective device shall not be a self-resettable type and must be duplicated unless it complies with IEC 60127 or IEC 60691, then only one device is necessary. Alternatively, if it can be demonstrated that an overcurrent protective device can be used to provide thermal protection, such a device may be used to combine temperature protection and overcurrent protection. The overcurrent protective device shall comply with IEC 60127 and shall be rated at not more than 170 % of the maximum rated current. When an overcurrent protective device is not also used as a thermal protective device, it is permissible for the overcurrent protective device to be located outside of the enclosure of the electrical equipment. In this case, the marking shall include the symbol "X" in accordance with IEC 60079-0 and the Specific Conditions of Use shall detail the required overcurrent protective device.

4.2.1.3 Temperature limitation

The temperature of internal devices and components shall not exceed the temperature rating of the equipment under the test conditions of the thermal test in 6.1.2.

5 Construction

5.1 Joints

5.1.1 General

All joints in the structure of the enclosure, whether permanently closed or designed to be opened from time to time, shall fit closely together within the tolerances specified in the documentation. They shall be effectively sealed against the ingress of dust and shall comply with the following particular requirements and be subjected to the test of 6.1.1:

NOTE The use of grease alone to maintain the integrity of the seal is not considered to satisfy this requirement.

- The number of engaged threads for all threaded joints, employing parallel threads without an additional seal or gasket shall be not less than five threads, with a minimum tolerance of medium or fine according to ISO 965-1 and ISO 965-3.
- Hinges shall not be used as a means of maintaining a seal unless:
 - correct compression of the gasket is achieved without causing undue movement, stress or distortion to the gasket; and
 - they are manufactured from materials that would not give rise to sufficient wear that may affect the correct function of the sealing means .

Where necessary, a means shall be provided for mating parts to facilitate correct alignment.

5.1.2 Gaskets and seals

Gaskets under compression in joints may be used to ensure the effectiveness of the enclosure sealing.

All gaskets and seals shall be of one-piece continuous construction, i.e. with an uninterrupted periphery.

NOTE 1 One-piece construction would also include gaskets and seals that have been permanently joined to form an uninterrupted periphery while maintaining the mechanical properties of the gasket or seal material.

NOTE 2 Unless all gaskets are secured to one face of the mating surface, either by adhesive or mechanically secured, the design of the enclosure should be such that determination of the correct location of the gaskets can be made.