



MALAYSIAN STANDARD

MS IEC 60079-2:2007
(CONFIRMED:2013)

**Explosive atmospheres - Part 2: Equipment
protection by pressurized enclosure "P"
(First revision)
(IEC 60079-2:2007, IDT)**

ICS: 29.260.20

Descriptors: explosive atmospheres, equipment protection, pressurized enclosures 'p'

NOTE. This MS has been reviewed by the responsible committee and confirmed that its contents are current

© Copyright 2013

DEPARTMENT OF STANDARDS MALAYSIA

DEVELOPMENT OF MALAYSIAN STANDARDS

The **Department of Standards Malaysia (STANDARDS MALAYSIA)** is the national standards and accreditation body of Malaysia.

The main function of STANDARDS MALAYSIA is to foster and promote standards, standardisation and accreditation as a means of advancing the national economy, promoting industrial efficiency and development, benefiting the health and safety of the public, protecting the consumers, facilitating domestic and international trade and furthering international cooperation in relation to standards and standardisation.

Malaysian Standards (MS) are developed through consensus by committees which comprise balanced representation of producers, users, consumers and others with relevant interests, as may be appropriate to the subject at hand. To the greatest extent possible, Malaysian Standards are aligned to or are adoption of international standards. Approval of a standard as a Malaysian Standard is governed by the Standards of Malaysia Act 1996 [Act 549]. Malaysian Standards are reviewed periodically. The use of Malaysian Standards is voluntary except in so far as they are made mandatory by regulatory authorities by means of regulations, local by-laws or any other similar ways.

For the purposes of Malaysian Standards, the following definitions apply:

Revision: A process where existing Malaysian Standard is reviewed and updated which resulted in the publication of a new edition of the Malaysian Standard.

Confirmed MS: A Malaysian Standard that has been reviewed by the responsible committee and confirmed that its contents are current.

Amendment: A process where a provision(s) of existing Malaysian Standard is altered. The changes are indicated in an amendment page which is incorporated into the existing Malaysian Standard. Amendments can be of technical and/or editorial nature.

Technical corrigendum: A corrected reprint of the current edition which is issued to correct either a technical error or ambiguity in a Malaysian Standard inadvertently introduced either in drafting or in printing and which could lead to incorrect or unsafe application of the publication.

NOTE: Technical corrigenda are not to correct errors which can be assumed to have no consequences in the application of the MS, for example minor printing errors.

STANDARDS MALAYSIA has appointed **SIRIM Berhad** as the agent to develop, distribute and sell Malaysian Standards.

For further information on Malaysian Standards, please contact:

Department of Standards Malaysia
Ministry of Science, Technology and Innovation
Level 1 & 2, Block 2300, Century Square
Jalan Usahawan
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: 60 3 8318 0002
Fax: 60 3 8319 3131
<http://www.jsm.gov.my>
E-mail: central@jsm.gov.my

OR **SIRIM Berhad**
(Company No. 367474 - V)
1, Persiaran Dato' Menteri
Section 2, P. O. Box 7035
40700 Shah Alam
Selangor Darul Ehsan
MALAYSIA

Tel: 60 3 5544 6000
Fax: 60 3 5510 8095
<http://www.sirim.my>
E-mail: msonline@sirim.my

CONTENTS

	Page
COMMITTEE REPRESENTATION.....	iv
NATIONAL FOREWORD.....	v
FOREWORD.....	vii
INTRODUCTION.....	x
1 Scope.....	15
2 Normative references	15
3 Terms and definitions	17
4 Protection types	21
5 Constructional requirements for pressurized enclosures	27
5.1 Enclosure	27
5.2 Materials	27
5.3 Doors and covers	27
5.4 Mechanical strength	29
5.5 Apertures, partitions, compartments and internal components	29
5.6 Insulating materials	31
5.7 Sealing	31
5.8 Spark and particle barriers	31
5.9 Internal batteries	31
6 Temperature limits.....	33
6.1 General	33
6.2 For type px or type py.....	33
6.3 For type pz	33
7 Safety provisions and safety devices (except for static pressurization)	33
7.1 Suitability of safety devices for hazardous area	33
7.2 Integrity of safety devices	33
7.3 Provider of safety devices	35
7.4 Sequence diagram for type px	35
7.5 Ratings for safety devices	35
7.6 Purging automated for type px.....	35
7.7 Purging criteria.....	37
7.8 Requirements when a minimum flow rate required.....	37
7.9 Safety devices to detect overpressure	37
7.10 Value of overpressure	39
7.11 Pressurizing multiple enclosures	41
7.12 Safety devices on doors and covers	41
7.13 Protection types that may remain energized	41
7.14 Protection types permitted within type py.....	41
8 Safety provisions and safety devices for static pressurization.....	41
8.1 Suitability of safety devices for hazardous area	41
8.2 Protective gas	43
8.3 Internal sources of release	43
8.4 Filling procedure	43
8.5 Safety devices.....	43
8.6 Protection types that may remain energized	43
8.7 Overpressure	43

9	Supply of protective gas	43
9.1	Type of gas	43
9.2	Temperature.....	45
10	Pressurized equipment with an internal source of release.....	45
11	Release conditions	45
11.1	No release.....	45
11.2	Limited release of a gas or vapour.....	45
11.3	Limited release of a liquid.....	45
12	Design requirements for the containment system.....	47
12.1	General design requirements.....	47
12.2	Infallible containment system	47
12.3	Containment system with a limited release	47
13	Protective gas and pressurizing techniques	49
13.1	General	49
13.2	Pressurization with leakage compensation	51
13.3	Pressurization with dilution.....	51
14	Ignition-capable apparatus	53
15	Internal hot surfaces.....	53
16	Type verification and tests.....	55
16.1	Maximum overpressure test.....	55
16.2	Leakage test	55
16.3	Purging test for pressurized enclosures with no internal source of release (pressurization technique may be leakage compensation or continuous flow) and filling procedure test for static pressurization	55
16.4	Purging and dilution tests for a pressurized enclosure with an internal source of release	57
16.5	Verification of minimum overpressure.....	61
16.6	Tests for an infallible containment system	61
16.7	Overpressure test for a containment system with a limited release	63
16.8	Verifying ability of the pressurized enclosure to limit internal pressure	63
17	Routine tests	65
17.1	Functional test.....	65
17.2	Leakage test	65
17.3	Tests for an infallible containment system	65
17.4	Test for a containment system with a limited release	65
18	Marking	65
18.1	Identifying as pressurized.....	65
18.2	Warnings.....	65
18.3	Supplementary marking.....	65
18.4	Internal source of release	67
18.5	Static pressurization.....	67
18.6	Pressurization systems.....	67
18.7	Warnings required in other clauses	67
18.8	Overpressure limited by user.....	67
18.9	Inert gas.....	69
19	Instructions.....	69

Annex A (normative) Purging and dilution tests	71
Annex B (informative) Examples of functional sequence diagram	75
Annex C (informative) Examples of the changes in pressure in ducts and enclosures	79
Annex D (informative) Information to be provided to the user	89
Annex E (normative) Classification of the type of release within enclosures	93
Annex F (informative) Examples for the use of the dilution area concept.....	95
Annex G (normative) Infallibility test for containment system.....	99
Annex H (informative) Introduction of an alternative risk assessment method encompassing “equipment protection levels” for Ex equipment	101
 Bibliography.....	 111
 Figure B.1 – State diagram of a leakage-compensation purge control system	 75
Figure C.1 a) – Protective gas outlet without a spark and particle barrier	79
Figure C.1 b) – Protective gas outlet with a spark and particle barrier.....	81
Figure C.2 – Pressurized enclosures with leakage compensation, enclosures without moving parts	83
Figure C.3 – Pressurized enclosures with leakage compensation, rotating electrical machine with an internal cooling fan	85
Figure C.4 – Pressurized enclosure with a leakage compensation, rotating electrical machine with an external cooling fan	87
Figure F.1 – Diagram showing the use of the dilution area concept to simplify the purge and dilution test requirements	95
Figure F.2 – Diagram showing the use of the infallible containment system concept to simplify the purging and dilution requirements around ICA	97
Figure F.3 – Diagram showing the use of internal partitions around the potential source of release to simplify the purging and dilution requirements around ICA located outside the partitions.....	97
Figure G.1 – Schematic diagram of the infallibility test described in 16.6.2 a)	99
 Table 1 – Determination of protection type.....	 23
Table 2 – Design criteria based upon type of protection	25
Table 3 – Safety devices based upon protection type.....	35
Table 4 – Protective gas requirements for a pressurized enclosure with a containment system	49
Table 5 – Protection types permitted within the dilution area.....	53
Table B.1 – Truth table of a leakage-compensation purge control system	75
Table H.1 – Traditional relationship of EPLs to zones (no additional risk assessment)	105
Table H.2 – Description of risk of ignition protection provided	107

Committee representation

The Electrotechnical-2 Industry Standards Committee (ISC S) under whose authority this Malaysian Standard was adopted, comprises representatives from the following organisations:

Association of the Computer and Multimedia Industry of Malaysia
Department of Standards Malaysia
Federation of Malaysian Manufacturers
Jabatan Kerja Raya Malaysia
Kementerian Perdagangan Dalam Negeri dan Hal Ehwal Pengguna
Malaysian Cable Manufacturers Association
Malaysian Electrical Appliances and Distributors Association
Ministry of International Trade and Industry
Persatuan Pengguna-Pengguna Standard Malaysia
Pusat Tenaga Malaysia
SIRIM QAS International Sdn Bhd (Electrotechnical Testing Section)
SIRIM QAS International Sdn Bhd (Product Certification and Inspection Section)
Suruhanjaya Komunikasi dan Multimedia Malaysia
Suruhanjaya Tenaga
Tenaga Nasional Berhad
The Electrical and Electronics Association of Malaysia
Universiti Multimedia
Universiti Tenaga Nasional

The Technical Committee on Equipment for Explosive Atmospheres which recommends adoption of the IEC Standard consists of representatives from the following organisations:

Association of Consulting Engineers Malaysia
Association of Malaysian Oil and Gas Engineering Consultants
Federation of Malaysian Manufacturers
Malaysian Gas Association
Malaysia LNG Sdn Bhd
Oakwell Industries Sdn Bhd
Offshore Structure Fabrication Association of Malaysia
Petroleum Nasional Berhad
Petronas Carigali Sdn Bhd
Saff-Tass Sdn Bhd
Sarawak Shell Berhad
SIRIM Berhad (Secretariat)
SIRIM QAS International Sdn Bhd (Electrotechnical Testing Section)
SIRIM QAS International Sdn Bhd (Product Certification and Inspection Section)
Suruhanjaya Tenaga
Tenaga Nasional Berhad (Generation Division)
The Electrical and Electronics Association of Malaysia
The Institution of Engineers, Malaysia
Universiti Teknologi Malaysia

NATIONAL FOREWORD

The adoption of the IEC Standard as a Malaysian Standard was recommended by the Technical Committee on Equipment for Explosive Atmospheres under the authority of the Electrotechnical-2 Industry Standards Committee (ISC S).

This Malaysian Standard is identical with IEC 60079-2:2007, *Explosive atmospheres – Part 2: Equipment protection by pressurized enclosure “p”*, published by the International Electrotechnical Commission (IEC). However, for the purpose of this Malaysian Standard, the following apply:

- a) in the source text, “this International Standard” should read “this Malaysian Standard”;
- b) the comma which is used as a decimal sign (if any), to read as a point;
- c) the basis IEC 60079-2 is printed in English and French languages. However, only the English version is retained for this Malaysian Standard; and
- d) references to International Standards should be replaced by equivalent Malaysian Standards as follows:

Referenced International Standards	Corresponding Malaysian Standards
IEC 60034-5, <i>Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification</i>	MS IEC 60034-5, <i>Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification</i>
IEC 60050-151, <i>International Electrotechnical Vocabulary – Chapter 151: Electrical and magnetic devices</i>	MS 2023, <i>International Electrotechnical Vocabulary – Chapter 151: Electrical and magnetic devices</i>
IEC 60050-426, <i>International Electrotechnical Vocabulary – Chapter 426: Electrical apparatus for explosive atmospheres</i>	MS IEC 60050-426, <i>International Electrotechnical Vocabulary – Chapter 426: Electrical apparatus for explosive atmospheres</i>
IEC 60079-0, <i>Electrical apparatus for explosive gas atmospheres – Part 0: General requirements</i>	MS IEC 60079-0, <i>Electrical apparatus for explosive gas atmospheres – Part 0: General requirements</i>
IEC 60529, <i>Degrees of protection provided by enclosures (IP Code)</i>	MS IEC 60529, <i>Degrees of protection provided by enclosures (IP Code)</i>

NATIONAL FOREWORD (*continued*)

- e) references to International Standards in bibliography should be replaced by equivalent Malaysian Standards as follows:

<u>Referenced International Standards</u>	<u>Corresponding Malaysian Standards</u>
IEC 60079-1, <i>Electrical apparatus for explosive gas atmospheres – Part 1: Flameproof enclosures “d”</i>	MS IEC 60079-1, <i>Electrical apparatus for explosive gas atmospheres – Part 1: Flameproof enclosures “d”</i>
IEC 60079-5, <i>Electrical apparatus for explosive gas atmospheres – Part 5: Powder filling “q”</i>	MS IEC 60079-5, <i>Electrical apparatus for explosive gas atmospheres – Part 5: Powder filling “q”</i>
IEC 60079-6, <i>Electrical apparatus for explosive gas atmospheres – Part 6: Oil-immersion “o”</i>	MS IEC 60079-6, <i>Electrical apparatus for explosive gas atmospheres – Part 6: Oil-immersion “o”</i>
IEC 60079-7, <i>Electrical apparatus for explosive gas atmospheres – Part 7: Equipment protection by increased safety “e”</i>	MS IEC 60079-7, <i>Electrical apparatus for explosive gas atmospheres – Part 7: Equipment protection by increased safety “e”</i>
IEC 60079-11, <i>Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”</i>	MS IEC 60079-11, <i>Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”</i>
IEC 60079-13, <i>Electrical apparatus for explosive gas atmospheres – Part 13: Construction and use of rooms or buildings protected by pressurization</i>	MS 1713, <i>Electrical apparatus for explosive gas atmospheres – Part 13: Construction and use of rooms or buildings protected by pressurization</i>
IEC 60079-15, <i>Electrical apparatus for explosive gas atmospheres – Part 15: Construction, tests and marking of type of protection “n” electrical apparatus</i>	MS IEC 60079-15, <i>Electrical apparatus for explosive gas atmospheres – Part 15: Construction, tests and marking of type of protection “n” electrical apparatus</i>
IEC 60079-16, <i>Electrical apparatus for explosive gas atmospheres – Part 16: Artificial ventilation for the protection of analyser(s) houses</i>	MS 1591, <i>Electrical apparatus for explosive gas atmospheres – Part 16: Artificial ventilation for the protection of analyser(s) houses</i>
IEC 60079-18, <i>Electrical apparatus for explosive gas atmospheres – Part 18: Construction, test and marking of type of protection encapsulation “m” electrical apparatus</i>	MS IEC 60079-18, <i>Electrical apparatus for explosive gas atmospheres – Part 18: Construction, test and marking of type of protection encapsulation “m” electrical apparatus</i>

NATIONAL FOREWORD (*concluded*)

Referenced International Standards

Corresponding Malaysian Standards

IEC 60079-26, *Explosive atmospheres – Part 26: Equipment with equipment protection level (EPL) Ga*

MS IEC 60079-26, *Explosive atmospheres – Part 26: Equipment with equipment protection level (EPL) Ga*

IEC 60079-28, *Explosive atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation*

MS IEC 60079-28, *Explosive atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation*

This Malaysian Standard cancels and replaces MS IEC 60079-2:2003.

Compliance with a Malaysian Standard does not of itself confer immunity from legal obligations.

NOTE. IDT on the front cover indicates an identical standard i.e. a standard where the technical content, structure and wording (or is an identical translation) of a Malaysian Standard is exactly the same as in an International Standard or is identical in technical content and structure although it may contain the minimal editorial changes specified in clause 4.2 of ISO/IEC Guide 21-1.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –**Part 2: Equipment protection by pressurized enclosure "p"**

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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 60079-2 has been prepared by technical committee 31: Explosive atmospheres.

This fifth edition cancels and replaces the fourth edition published in 2001 and constitutes a technical revision.

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

- Introduction of the "Equipment protection level concept" – See Annex H.
- 3.13 Eliminate reference to "room" in the definition of pressurization.
- 5.3.3 Restrict to type px.
- 5.3.3 Add warning for type pz and type py for any cover removable without the use of a tool.

- 7.6 Move wording “For type px” to beginning of subclause to clarify 7.6 only applies to type px.
- 7.7 c) Clarify that the instruction label should specify purge time and pressure/flow.
- 18.7 Collect marking requirements throughout the document in the “Marking” clause.

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

FDIS	Report on voting
31/668/FDIS	31/681/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 standard is to be read in conjunction with IEC 60079-0:2004, *Electrical apparatus for explosive gas atmospheres – Part 0: General requirements*.

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

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

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the new edition.

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.