

AS/NZS IEC 60079.25:2022
IEC 60079-25:2020



Australian/New Zealand Standard™

Explosive atmospheres

Part 25: Intrinsically safe electrical systems



AS/NZS IEC 60079.25:2022

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Explosive atmospheres

Part 25: Intrinsically safe electrical systems

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-014, Equipment for Explosive Atmospheres, to supersede AS/NZS 60079.25:2011.

The objective of this document is to provide the specific requirements for design, construction and assessment of intrinsically safe systems, Type of Protection “i”, intended for use, as a whole or in part, in locations in which the use of Group I, II or III Ex Equipment is required.

This document is intended for use by the designer of the system, e.g. a person who could be a manufacturer, a specialist consultant or a member of the end-user’s staff.

This document supplements and modifies the general requirements of AS/NZS IEC 60079.0 and the intrinsic safety standard AS/NZS 60079.11. Where a requirement of this document conflicts with a requirement of AS/NZS IEC 60079.0 or AS/NZS 60079.11, the requirement of this document takes precedence.

The installation requirements of Group II or Group III systems designed in accordance with this document are specified in AS/NZS IEC 60079.14. Group I installation requirements are presently not provided in AS/NZS IEC 60079.14. Installation requirements for Group I are being considered.

This document is identical with, and has been reproduced from, IEC 60079-25:2020, *Explosive atmospheres – Part 25: Intrinsically safe electrical systems*.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

Part 25: Intrinsically safe electrical systems

FOREWORD

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International Standard IEC 60079-25 has been prepared by subcommittee 31G: Intrinsically safe apparatus, of IEC technical committee 31: Equipment for explosive atmospheres.

This third edition cancels and replaces the second edition published in 2010 and constitutes a technical revision.

The significance of the changes between IEC 60079-25, Edition 2 (2010) and IEC 60079-25, Edition 3 (2019) are as listed below:

Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
References to 'electrical systems' changed to 'systems' and note added that installation requirement for Group I are being considered.	1	X		
Normative references updated to remove references that were outdated or not mentioned in the body of the standard.	2	X		
Reference to IEC Electropedia and ISO Online Browsing platform added, abbreviations dropped from title. Definition of 'system designer' deleted, definitions of 'certified intrinsically safe electrical system', and 'uncertified intrinsically safe electrical system' dropped.	3	X		
'Intrinsically safe electrical system' changed to 'intrinsically safe system'.	3.1	X		
Definition for 'multi-circuit cable' added.	3.2	X		
'Maximum' changed to 'total' on definitions of cable capacitance and cable inductance.	3.4, 3.5	X		
'Maximum' deleted on definition of cable inductance to resistance ratio.	3.6	X		
FISCO changed to definition from abbreviation.	3.9	X		
The requirement for the system designer to sign and date the document dropped, editorial changes for clarity made, and a reference to Annex E made to show typical descriptive system documents.	4	X		
Title of clause changed to 'Grouping and temperature classification', ambient temperature range added to things to be included in the system document and reworded for clarity.	5		X	
Notes moved and reworded among the clauses.	6.1, 6.2, 6.3, 6.4	X		
Changed from 'Ambient temperature rating' which was moved to Clause 5, and new section renamed 'Non-intrinsically safe circuits' added.	7		X	
Clause reorganized into sections and some rewording done for clarity.	8	X		
Title changed to 'Requirements of single and multi-circuit cables'.	9	X		
Requirement for insulation thickness moved into this clause, and it now applies to all cables.	9.1		X	
Title changed to 'Dielectric strength' and consolidation of requirements for single circuit and multi-circuit cables. Requirement for dielectric testing changed to twice the circuit voltage with a minimum of 500VAC.	9.2		X	
Dielectric strength requirements for single circuit cables consolidated here.	9.2.1	X		
Dielectric strength requirements for multi- circuit cables consolidated here.	9.2.2	X		
Multi-circuit cables shall not be used for intrinsically safe circuits with voltages exceeding 90 V.	9.2.2			C1
Title changed to 'Intrinsic safety parameters of cables'	9.3	X		

Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Title changed to 'Enclosures'	10	X		
Most of the old Clause 12 moved to IEC 60079-14.	11			C2
This clause was Clause 13 in the previous edition, and the entire clause has been re-arranged for clarity and easier reading.	12	X		
This General clause has been re-written in list format to make it easier to understand, and analysis of single and multiple power supplies moved to 12.4 and 12.5 respectively.	12.1		X	
This clause added to clarify fault applications in assemblies of certified equipment.	12.2		X	
This clause added to provide guidance on how to handle non-certified items in larger assemblies.	12.3		X	
Analysis of single power source information consolidated here and amplified.	12.4		X	
Analysis of multiple power sources information consolidated in this clause. Information added for clarity.	12.5		X	
The circuit analysis example dropped in text for simple apparatus, new Annex F added with more information.	12.6	X		
Section added to provide more information on determining capacitance, inductance and L/R that was moved from Annex A.	12.7		X	
Requirements for Type A, B, and C cables reworded for clarity.	12.8	X		
Information on evaluation of capacitance and inductance moved to 12.7.	Annex A	X		
Changed from normative to informative	Annex B	X		
Reordered and rewritten for greater clarity.	Annex C	X		
Annex updated for clarity.	Annex E	X		
The former Annex F on surge protection has been removed.	Annex F			C3
Annex G in the previous edition was on testing of cable parameters and has been removed from this edition. Annex G is now FISCO systems.	Annex G	X		

NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version. More guidance may be found by referring to the Redline Version of the standard.

Explanations:**A) Definitions****Minor and editorial changes**

clarification
decrease of technical requirements
minor technical change
editorial corrections

These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change, or a reduction in level of existing requirement.

Extension

addition of technical options

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition.

Major technical changes

addition of technical requirements
increase of technical requirements

These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be considered for products in conformity with the preceding edition. For these changes additional information is provided in clause B) below.

NOTE These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

B) Information about the background of 'Major Technical Changes'

B1 – A limitation of 90 V for multi-circuit system has been added since for this voltage level a dielectric test of at least 500 V AC or 700 V DC is normally used to validate the insulation.

B2 – Most of the earthing and bonding requirements have been removed and moved to IEC 60079-14, and the surge protection requirements that were in the old Clause 12 were added here in Clause 11. The rest of the old Clause 12 was also removed and moved to IEC 60079-14.

B3 – The former Annex F on surge protection has been removed and will be covered in IEC 60079-14. Annex F is now Simple Apparatus, which was Annex H in the previous edition.

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

FDIS	Report on voting
31G/318/FDIS	31G/321/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 in the IEC 60079 series, published 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 stability 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 October 2020 have been included in this copy.

EXPLOSIVE ATMOSPHERES –

Part 25: Intrinsically safe electrical systems

1 Scope

This part of IEC 60079 contains the specific requirements for design, construction and assessment of intrinsically safe systems, Type of Protection “i”, intended for use, as a whole or in part, in locations in which the use of Group I, II or III Ex Equipment is required.

NOTE 1 This standard is intended for use by the designer of the system e.g. a person who could be a manufacturer, a specialist consultant or a member of the end-user's staff.

This document supplements and modifies the general requirements of IEC 60079-0 and the intrinsic safety standard IEC 60079-11. Where a requirement of this standard conflicts with a requirement of IEC 60079-0 or IEC 60079-11, the requirement of this standard takes precedence.

The installation requirements of Group II or Group III systems designed in accordance with this standard are specified in IEC 60079-14.

NOTE 2 Group I installation requirements are presently not provided in IEC 60079-14. Installation requirements for Group I are being considered.

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

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”*

IEC 60079-14, *Explosive atmospheres – Part 14: Electrical installations design, selection and erection*

IEC 61158-2, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

3 Terms and definitions

For the purposes of this document, the following terms and definitions, specific to intrinsically safe systems, apply. They supplement the terms and definitions which are given in IEC 60079-0 and IEC 60079-11.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1**intrinsically safe system**

assembly of interconnected items of apparatus, described in a descriptive system document, in which the circuits or parts of circuits, intended to be used in an explosive atmosphere, are intrinsically safe circuits

3.2**multi-circuit cable**

multi-core cable containing more than one intrinsically safe circuit

3.3**descriptive system document**

document in which the items of apparatus, their intrinsic safety parameters and those of the interconnecting wiring are specified

3.4**total cable capacitance**

C_c

total capacitance of the interconnecting cable that can be connected into an intrinsically safe circuit

3.5**total cable inductance**

L_c

total inductance of the interconnecting cable that can be connected into an intrinsically safe circuit

3.6**cable inductance to resistance ratio**

L_c/R_c

value of the ratio inductance (L_c) to resistance (R_c) of the interconnecting cable connected into an intrinsically safe circuit

3.7**linear power source**

power source from which the available output current is determined by a resistor; the output voltage decreasing linearly as the output current increases

3.8**non-linear power source**

power source where the output voltage and output current have a non-linear relationship

Note 1 to entry: For example, a supply with a constant voltage output that can reach a constant current limit controlled by semiconductors

3.9**FISCO****Fieldbus Intrinsically Safe Concept**

intrinsically safe system architecture that is bus-powered and designed in accordance with specific requirements

Note 1 to entry: The requirements are specified in IEC 61158-2, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*.

4 Descriptive system document

A descriptive system document shall be created for all intrinsically safe systems. The descriptive system document shall include the technical justification for the combination of the apparatus and shall include at a minimum the following:

- a) a block diagram of the system listing all the items of apparatus within the system including simple apparatus and the interconnecting wiring;
- b) a statement of the equipment Group subdivision (for equipment Groups II and III), the Level of Protection and the Equipment Protection Level (EPL) for each part of the system, the temperature classification, and the ambient temperature rating in accordance with Clauses 5 and 6;
- c) the requirements and permitted parameters of the interconnecting wiring in accordance with Clause 8;
- d) details of the earthing and bonding points on which intrinsic safety depends;
- e) where applicable, the confirmation of apparatus as simple apparatus in accordance with IEC 60079-11;
- f) the result of the assessment of intrinsically safe systems in accordance with Clause 12; and
- g) a unique document identification.

The requirements found in Clauses 5 through 12 shall be used to determine the content of the descriptive system document.

NOTE The descriptive system document is not the same as the control drawing referred to in IEC 60079-11.

Annex E shows an example of a typical diagram, illustrating the requirements of the descriptive system document.

5 Grouping and temperature classification

Parts of intrinsically safe systems that are intended for use in an explosive atmosphere shall be grouped in accordance with the equipment grouping requirements of IEC 60079-0 and be assigned a temperature class or a maximum surface temperature in accordance with the temperature requirements of IEC 60079-0 and IEC 60079-11.

Associated apparatus not intended for use in an explosive atmosphere shall only be grouped in accordance with the equipment grouping requirements of IEC 60079-0.

Where the intrinsically safe system or parts of the intrinsically safe system are specified as being suitable for operation outside the normal ambient temperature range of $-20\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$, then this shall be specified in the descriptive system document.

NOTE Different parts of the same intrinsically safe system can have different groups. The apparatus used can have different temperature classes and different ambient temperature ratings.

6 Levels of Protection

6.1 General

Each part of an intrinsically safe system intended for use in an explosive atmosphere shall have a Level of Protection “ia”, “ib” or “ic” in accordance with IEC 60079-11 and an EPL in accordance with IEC 60079-0. Separate parts of the system may have a different Level of Protection or EPL.

NOTE For Group I applications, an intrinsically safe system can be “ib” in normal operation with external power, but when power is removed under defined safety circumstances (e.g. ventilation failure) then the system could become “ia” under back up battery power. The Level of Protection will be clearly defined for intended circumstances.

6.2 Level of Protection “ia”

Where the requirements applicable to apparatus of Level of Protection “ia” (see IEC 60079-11) are satisfied by an intrinsically safe system or part of a system considered as an entity, then that system or part of a system shall be assigned a Level of Protection “ia”.

6.3 Level of Protection “ib”

Where the requirements applicable to apparatus of Level of Protection “ib” (see IEC 60079-11) are satisfied by an intrinsically safe system or part of a system considered as an entity, then that system or part of a system shall be assigned a Level of Protection “ib”.

EXAMPLE A Level of Protection “ia” field instrument powered via a Level of Protection “ib” associated apparatus would be considered as a Level of Protection “ib” system or a Level of Protection “ib” field instrument powered via a Level of Protection “ia” associated apparatus would also be considered as a Level of Protection “ib” system.

6.4 Level of Protection “ic”

Where the requirements applicable to apparatus of Level of Protection “ic” (see IEC 60079-11) are satisfied by an intrinsically safe system or part of a system considered as an entity, then that system or part of a system shall be assigned a Level of Protection “ic”.

EXAMPLE A Level of Protection “ia” field instrument powered via a Level of Protection “ic” associated apparatus would be considered as Level of Protection “ic” system or a Level of Protection “ic” field instrument powered via a Level of Protection “ia” associated apparatus would also be considered as a Level of Protection “ic” system.

7 Non-intrinsically safe circuits

The descriptive system document shall define the limitations for connection of circuits to the non-intrinsically safe terminals of associated apparatus, such as the U_m value(s).

8 Interconnecting wiring / cables used in an intrinsically safe system

8.1 General

The intrinsic safety parameters of the interconnecting wiring upon which intrinsic safety depends, and their derivation, shall be specified in the descriptive system document. If a specific type of wiring is specified, then the justification for its use shall be included in the documentation.

Cables for the interconnecting wiring shall comply with the applicable requirements of Clause 9.

Cable faults shall be assessed in accordance with the requirements of 12.8.

8.2 Cables containing a single intrinsically safe circuit

Cables containing a single intrinsically safe circuit shall comply with the requirements of 9.1, 9.2.1, 9.3 and, where applicable, 9.4.

8.3 Cables containing more than one intrinsically safe circuit

The descriptive system document shall specify the permissible types of multi-circuit cables according to Clause 9, if used for particular circuits. In the particular case where faults between separate circuits have not been taken into account, a note shall be included on the block diagram of the descriptive system document stating the following: ‘Where the interconnecting cable utilizes part of a multi-circuit cable containing other intrinsically safe circuits, the multi-circuit cable shall be in accordance with the requirements of a multi-circuit cable Type A or Type B, as specified in IEC 60079-14.

A multi-circuit cable containing circuits classified as Level of Protection “ia”, “ib” or “ic” shall not contain non-intrinsically safe circuits.

Where Level of Protection “ia”, “ib” or “ic” circuits are run together in a cable of Type A or Type B as specified in 9.5.2 and 9.5.3, each circuit retains its Level of Protection and equipment grouping.

Where Level of Protection “ia”, “ib” or “ic” circuits are run together in a cable of Type C as specified in 9.5.4, the combination of circuits shall be assessed according to 12.8 to determine the Level of Protection, EPL and applicable equipment grouping.

NOTE Assessment according to 12.8 might determine that the combination is no longer intrinsically safe.

9 Requirements of single and multi-circuit cables

9.1 General

If the cable is specified as part of the system, then:

- individual conductors or strands of multi-stranded conductors within the hazardous area shall have a diameter of at least 0,1 mm; and
- the radial thickness of the insulation of each core of multi circuit cable shall be appropriate to the conductor diameter and the nature of the insulation with a minimum of 0,2 mm.

NOTE This clause is not intended to prevent the use of bare conductors that are intended to be bridged out in a signalling system. Such conductors are considered as simple apparatus and not interconnecting wiring.

9.2 Dielectric strength

9.2.1 Cables containing a single intrinsically safe circuit

The insulation of cables used for intrinsically safe circuits shall be capable of withstanding a dielectric strength test with twice the voltage of the intrinsically safe circuit or 500 V_{RMS} (or 700 V DC), whichever is the greater.

9.2.2 Cables containing more than one intrinsically safe circuit

Multi-circuit cables shall not be used for intrinsically safe circuits with voltages exceeding 90 V.

Multi-circuit cables shall be capable of withstanding a dielectric strength test of at least:

- a) 500 V_{RMS} or 700 V DC applied between any armouring and/or screen(s) joined together and all the cores joined together; and
- b) 1 000 V_{RMS} or 1 400 V DC applied between a bundle comprising one half of the cable cores joined together and a bundle comprising the other half of the cores joined together. This test is not applicable to multi-circuit cables with conducting screens for individual circuits.

If information from the cable manufacturer is not available, then the dielectric strength test shall be carried out in accordance with an appropriate cable standard or dielectric strength tests of IEC 60079-11.

NOTE It is not a requirement of this standard that the conformity of the manufacturer's specification of the cable needs to be verified.

9.3 Intrinsic safety parameters of cables

The intrinsic safety parameters (C_c and L_c , or C_c and L_c/R_c) for all cables used within an intrinsically safe system shall be determined according to one of the following:

- a) the most onerous intrinsic safety parameters provided by the cable manufacturer;
- b) intrinsic safety parameters determined by measurement of a sample, with the method of testing intrinsic safety parameters of cables given in IEC 60079-14;
- c) where the interconnection comprises two or three cores of a conventionally constructed cable (with or without screen) the following values may be used: 200 pF/m and either 1 µH/m or an inductance to resistance ratio (L_c/R_c) calculated by dividing 1 µH by the manufacturers specified loop resistance per meter. Alternatively, for currents up to $I_o = 3$ A an L/R ratio of 30 µH/Ω may be used.

Where a FISCO system is used, the requirements for the cable parameters shall comply with Annex G.

9.4 Conducting screens

Where conducting screens provide protection for separate intrinsically safe circuits in order to prevent such circuits becoming connected to one another, the screen shall provide a minimum 60 % coverage along the entire length of the cable.

9.5 Types of multi-circuit cables

9.5.1 General

Multi-circuit cables shall be identified as Type A, Type B or Type C for the purposes of applying faults and assessing the safety of the cabling within an intrinsically safe system. The cable types are specified in 9.5.2, 9.5.3, and 9.5.4.

9.5.2 Type A cable

A multi-circuit cable that has conducting screens providing individual protection according to 9.4 for each intrinsically safe circuit.

9.5.3 Type B cable

A multi-circuit cable that is fixed, is protected against damage by installation and does not contain any circuit with a maximum voltage U_o exceeding 60 V.

9.5.4 Type C cable

A multi-circuit cable that is not Type A or Type B.

10 Enclosures

Enclosures used for connection of separate intrinsically safe circuits, such as terminal boxes, shall provide separations for external connection facilities and meet the applicable enclosure requirements in IEC 60079-11.

11 Earthing and bonding of intrinsically safe systems

The descriptive system document should clearly indicate which point or points of the system are intended to be earthed, and any special requirements of such a bond.

The use of surge protection devices which interconnect the circuit and the structure via nonlinear devices such as gas discharge tubes and semiconductors is not considered to adversely affect the intrinsic safety of a circuit, provided that in normal operation the current through the device is less than 10 µA.

NOTE If insulation testing at 500 V is carried out then it might be necessary to disconnect the surge suppression devices to prevent them invalidating the measurement.

Intrinsically safe systems utilizing surge suppression techniques shall be supported by an adequately documented analysis of the effect of indirect multiple earthing, taking into account the criteria set out above. The capacitance and inductance of the surge suppression devices shall be considered in the assessment of the intrinsically safe system.

12 Assessment of an intrinsically safe system

12.1 General

The compliance of an intrinsically safe system shall be demonstrated by the consideration of the following:

- a) suitability of the individual apparatus for the hazardous area according to the applicable installation requirements e.g. IEC 60079-14;
- b) suitability of the individual apparatus for the ambient temperature range;
- c) comparison of input and output characteristics and parameters of the separately evaluated apparatus;

NOTE 1 Occasionally the safety of the field device is completely specified by only one of these parameters. In these circumstances the unspecified parameters are not relevant.

- d) cable parameters of the interconnecting wiring;
- e) faults within cables;
- f) suitability and influence of simple apparatus;
- g) separation of termination, and connection facilities; and
- h) earthing and bonding.

Where all the necessary information is available, it is permissible to apply the fault count to the system as a whole, even when apparatus conforming to IEC 60079-11 is being used. This is an alternative solution to the more usual straightforward comparison of input and output characteristics of the separately certified apparatus.

For Level of Protection “ic” field wiring faults are only considered when Type C cables are specified.

NOTE 2 It is recognized that applying faults to the system as a whole is less stringent than applying faults to each piece of apparatus; nevertheless, this is considered to achieve an acceptable level of safety.

12.2 Systems containing only apparatus certified to IEC 60079-11

Where a system contains only separately evaluated apparatus conforming to IEC 60079-11, the compatibility of all the apparatus included in the system shall be demonstrated. Faults within the apparatus have already been considered and no further consideration of these faults is necessary.

12.3 Systems containing apparatus not separately evaluated to IEC 60079-11

Where a system contains apparatus that has not had a suitable evaluation to IEC 60079-11, then that system shall be analysed as a whole, as if it were an apparatus. See Annex F for information on simple apparatus.

12.4 Systems containing a single power source

Where a system contains a single power source, the output parameters of the power source take into account opening, shorting and earthing of the external interconnecting cable. Consequently, these failures do not need to be further considered.

Where specified the U_i , I_i , and P_i of each apparatus in the system shall be greater than or equal to the U_o , I_o , and P_o respectively of the supply.

NOTE Annex A contains further details of the analysis of these simple circuits.

12.5 Systems containing more than one power source

12.5.1 General

Where a system contains more than one power source, there shall be an assessment under normal and fault conditions for the combined power sources of:

- a) maximum no-load voltage, U_o ;
- b) maximum short circuit current, I_o ; and
- c) maximum steady state power, P_o .

NOTE 1 These parameters can require different sets of fault conditions.

In the assessment of the above, it shall be ascertained from the type of interconnection whether, in normal operation and under fault conditions, it is necessary to consider the voltage sum, the current sum, or both current and voltage sums.

Following derivation of the above, there shall be an assessment of the following parameters for safe connection to the combined power sources:

- i) maximum capacitance, C_o ; and either
- ii) maximum inductance, L_o ; or
- iii) maximum L/R ratio of inductance to resistance for connected cables.

Any test-based verification shall be performed using the spark test apparatus in accordance with IEC 60079-11, considering the safety factor of the combined apparatus.

The U_i , I_i , and P_i of each apparatus in the system shall be greater than or equal to the U_o , I_o , and P_o respectively, as determined above.

NOTE 2 Annex B illustrates the analysis that would be used in the most frequently occurring combinations of linear resistive limited output sources of power. Alternatively, IEC 60079-14 provides a simplified analysis that is applicable for Group II circuits with Level of Protection "ib" where the sources of power are associated apparatus. The analysis can also include spark ignition testing in accordance with IEC 60079-11.

12.5.2 Systems containing linear and non-linear sources of power

The assessment of systems containing more than one power source, one or more of which is non-linear, shall be carried out by a person with appropriate competence and knowledge of the design and safety of non-linear intrinsically safe sources of power. This assessment cannot be achieved on the basis of no-load voltages and short circuit currents only.

Any particular conditions related to such a system shall be clearly stated in the descriptive system document.

If an intrinsically safe system contains more than one power source, and one or more of these sources are non-linear, the assessment method described in Annex B cannot be used. Annex C explains how the system analysis can be conducted if the combination contains a single non-linear power source.

Figure 1 illustrates the principles of the system's analysis.