



DPC: 23 / 30445651 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 06 June 2023

Origin: International

Latest date for receipt of comments: 23 August 2023

Project No. 2021/02838

Responsible committee: EXL/31 Equipment for explosive atmospheres

Interested committees:

Title: BS EN IEC 60079-42 Explosive atmospheres

Part 42: Electrical safety devices for the control of potential ignition sources for Ex-Equipment

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

**WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD.
THIS DRAFT IS NOT CURRENT BEYOND 23 August 2023**

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <http://standardsdevelopment.bsigroup.com>

Responsible Committee Secretary: **Mr Christopher Brown (BSI)**Direct tel: **02089967441**E-mail: **christopher.brown@bsigroup.com**

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



31/1706/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC 60079-42 ED1

DATE OF CIRCULATION:

2023-06-02

CLOSING DATE FOR COMMENTS:

2023-09-22

SUPERSEDES DOCUMENTS:

31/1592/RR

IEC TC 31 : EQUIPMENT FOR EXPLOSIVE ATMOSPHERES

SECRETARIAT:

United Kingdom

SECRETARY:

Mr Tom Stack

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

Explosive atmospheres - Part 42: Electrical safety devices for the control of potential ignition sources for Ex-Equipment

NOTE FROM TC/SC OFFICERS:

Copyright © 2023 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

CONTENTS

FOREWORD	4
INTRODUCTION	6
1 Scope	7
2 Normative references	8
3 Terms and definitions	8
4 Basic requirements	9
5 Ignition prevention by safety devices	10
5.1 General concept of ignition risk reduction	10
5.2 Safety characteristics of a safety device	10
5.3 Associated safety device	11
6 Functional requirements for a safety device	11
6.1 General requirements	11
6.2 Specification of the safety function	11
6.3 Requirements for achieving the safety integrity	11
6.3.1 Simple safety devices	11
6.3.2 Complex safety device	12
7 Testing and verification	12
7.1 Type tests	12
7.2 Proof tests	12
8 Marking	12
8.1 General	12
8.2 Electrical safety device controlling an electrical ExEUC, integral to the ExEUC	12
8.3 ExEUC with another associated type of protection, integral to the ExEUC	12
8.4 Associated electrical safety device controlling an electrical ExEUC, located outside the ExEUC, ...	13
9 Instructions	13
Annex A (informative) Guidance for assessment of a simple safety device	14
Annex B (informative) Examples for the application of safety devices	15
B.1 General	15
B.2 Ex Equipment with a residual ignition source caused by high temperatures of a brake	15
B.2.1 Problem	15
B.2.2 Consequences	15
B.2.3 Solution	15
B.3 Risk reduction by ignition control and mitigation, bucket elevator example	15
B.3.1 Problem	15
B.3.2 Ignition Hazard Assessment	16
B.3.3 Safety controls to prevent ignition	16
B.3.4 Safety Controls with explosion mitigation	17
B.4 Control of high temperatures	18
B.4.1 Problem	18
B.4.2 Ignition hazard assessment	18
B.4.3 Safety controls	19
Annex C (informative) Use of the Safe Motor Temperature (SMT) sub-function with converter-fed motors	20

48	C.1	General.....	20
49	C.2	Reliability of the safety motor temperature control function.	21
50	C.3	Control without temperature sensors.....	21
51	C.4	Control with temperature sensors.....	22
52		Bibliography.....	23
53		FOREWORD.....	4
54		INTRODUCTION.....	6
55	1	Scope.....	7
56	2	Normative references	8
57	3	Terms and definitions	8
58	4	Basic requirements.....	9
59	5	Ignition prevention by safety devices	10
60	5.1	General concept of ignition risk reduction	10
61	5.2	Safety characteristics of a safety device	10
62	5.3	Associated safety device.....	11
63	6	Functional requirements for a safety device.....	11
64	6.1	General requirements	11
65	6.2	Specification of the safety function.....	11
66	6.3	Requirements for achieving the safety integrity	11
67	6.3.1	Simple safety devices	11
68	6.3.2	Complex safety device.....	12
69	7	Testing and verification.....	12
70	7.1	Type tests	12
71	7.2	Proof tests	12
72	8	Marking.....	12
73	8.1	General.....	12
74	8.2	Electrical safety device controlling an electrical ExEUC, integral to the	
75		ExEUC.....	12
76	8.3	ExEUC with another associated type of protection, integral to the ExEUC.....	12
77	8.4	Associated electrical safety device controlling an electrical ExEUC, located	
78		outside the ExEUC,.....	13
79		ExEUCExEUC.....	13
80		ExEUCExEUC.....	13
81		ExEUCExEUC.....	13
82	9	Instructions.....	13
83		Annex A (informative) Guidance for assessment of a simple safety device.....	14
84		Annex B (informative) Examples for the application of safety devices	15
85	B.1	General.....	15
86	B.2	Ex Equipment with a residual ignition source caused by high temperatures of	
87		a brake	15
88	B.2.1	Problem.....	15
89	B.2.2	Consequences.....	15
90	B.2.3	Solution	15
91	B.3	Risk reduction by ignition control and mitigation, bucket elevator example	15
92	B.3.1	Problem.....	15
93	B.3.2	Ignition Hazard Assessment	16
94	B.3.3	Safety controls to prevent ignition.....	16

95	B.3.4 — Safety Controls with explosion mitigation	17
96	B.4 — Control of high temperatures	18
97	B.4.1 — Problem	18
98	B.4.2 — Ignition hazard assessment	18
99	B.4.3 — Safety controls	19
100	Annex C (informative) Use of the Safe Motor Temperature (SMT) sub-function with	
101	converter-fed motors	20
102	C.1 — General	20
103	C.2 — Reliability of the safety motor temperature control function.	21
104	C.3 — Control without temperature sensors	21
105	C.4 — Control with temperature sensors	22
106	Bibliography	23
107	FOREWORD	4
108	INTRODUCTION	6
109	1 — Scope	7
110	2 — Normative references	8
111	3 — Terms and definitions	8
112	3.2 — 8	
113	3.5 — 9	
114	Regular expected occurrence	9
115	4 — Basic requirements	9
116	5 — Ignition prevention by safety devices	10
117	5.1 — General concept of ignition risk reduction	10
118	5.2 — Safety characteristics of a safety device	10
119	5.3 — Associated safety device	11
120	6 — Functional requirements for a safety device	11
121	6.1 — General requirements	11
122	6.2 — Specification of the safety function	11
123	6.3 — Requirements for achieving the safety integrity	11
124	6.3.1 — Simple safety devices	11
125	6.3.2 — Complex safety device	12
126	7 — Testing and verification	12
127	7.1 — Type tests	12
128	7.2 — Proof tests	12
129	8 — Marking	12
130	8.1 — General	12
131	8.2 — Electrical safety device controlling an electrical ExEUC, integral to the	
132	ExEUC	12
133	8.3 — ExEUC with another associated type of protection, integral to the ExEUC	12
134	8.4 — Associated electrical safety device controlling an electrical ExEUC, located	
135	outside the ExEUC, ...	13
136	— ExEUCExEUC	13
137	— ExEUCExEUC	13
138	— ExEUCExEUC	13
139	9 — Instructions	13
140	Annex A (informative) Guidance for assessment of a simple safety device	14
141	Annex B (informative) Examples for the application of safety devices	15
142	B.1 — General	15

~~B.2~~	~~Ex Equipment with a residual ignition source caused by high temperatures of a brake~~	~~15~~
~~B.2.1~~	~~Problem~~	~~15~~
~~B.2.2~~	~~Consequences~~	~~15~~
~~B.2.3~~	~~Solution~~	~~15~~
~~B.3~~	~~Risk reduction by ignition control and mitigation, bucket elevator example~~	~~15~~
~~B.3.1~~	~~Problem~~	~~15~~
~~B.3.2~~	~~Ignition Hazard Assessment~~	~~16~~
~~B.3.3~~	~~Safety controls to prevent ignition~~	~~16~~
~~B.3.4~~	~~Safety Controls with explosion mitigation~~	~~17~~
~~B.4~~	~~Control of high temperatures~~	~~18~~
~~B.4.1~~	~~Problem~~	~~18~~
~~B.4.2~~	~~Ignition hazard assessment~~	~~18~~
~~B.4.3~~	~~Safety controls~~	~~19~~
~~Annex C (informative)~~	~~Use of the Safe Motor Temperature (SMT) sub-function with converter-fed motors~~	~~20~~
~~C.1~~	~~General~~	~~20~~
~~C.2~~	~~Reliability of the safety motor temperature control function~~	~~21~~
~~C.3~~	~~Control without temperature sensors~~	~~21~~
~~C.4~~	~~Control with temperature sensors~~	~~22~~
~~Bibliography~~		~~23~~
~~Figure B.1~~	~~– Bucket elevator principle~~	~~16~~
~~Figure B.2~~	~~– Bucket elevator sensors for ignition hazard detection~~	~~17~~
~~Figure B.3~~	~~– Controls with explosion mitigation~~	~~18~~
~~Figure C.1~~	~~– Overview~~	~~20~~
~~Figure C.2~~	~~– Control without temperature sensors~~	~~21~~
~~Figure C.3~~	~~– Control with temperature sensors~~	~~22~~
~~Figure B.1~~	~~– Bucket elevator principle~~	~~16~~
~~Figure B.2~~	~~– Bucket elevator sensors for ignition hazard detection~~	~~17~~
~~Figure B.3~~	~~– Controls with explosion mitigation~~	~~18~~
~~Figure C.1~~	~~– Overview~~	~~20~~
~~Figure C.2~~	~~– Control without temperature sensors~~	~~21~~
~~Figure C.3~~	~~– Control with temperature sensors~~	~~22~~
~~Table 1~~	~~– Minimum RRF for a safety device for ignition risk reduction~~	~~10~~
~~Table C.1~~	~~– SMT safety sub function Risk Reduction Factors (RRF)~~	~~21~~
~~Table 1~~	~~– Minimum RRF for a safety device for ignition risk reduction~~	~~10~~
~~Table C.1~~	~~– SMT safety sub function Risk Reduction Factors (RRF)~~	~~21~~

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES

Part 42: Electrical ~~s~~Safety ~~d~~Devices for the control of potential ignition sources from Ex-Equipment

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 Technical Specification IEC 60079-42 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

The text of this Technical Specification is based on the following documents:

FDIS	Report on voting
31/1418/DTS	31/1441/RVDTS

Full information on the voting for the approval of this Technical Specification 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.

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.

This International Technical Specification is to be read in conjunction with the International Standards for the specific types of protection listed in the ISO 80079-37 and the IEC 60079 series.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

248

INTRODUCTION

249 Generally, the probability of potential ignition sources becoming effective is mitigated by
250 applying the protection measures according to the IEC 60079 and the ISO 80079 series. If the
251 probability of an ignition source becoming effective cannot be mitigated by these measures, it
252 could be controlled by using a suitable safety device. The combination of the safety device and
253 the Ex Equipment ~~may~~ could then comply with the relevant standards of the IEC 60079 series
254 and the ISO 80079 series with respect to the Equipment Protection Level.

255 Safety devices, which are used as part of the protection of equipment for explosive atmospheres
256 for control of potential ignition sources, should consider reliability for the intended purpose to
257 recognise the principles for the classification of hazardous areas and explosion protection
258 techniques. This document provides guidance for the application of safety functions to provide
259 a reduction of ignition risk for equipment as part of the IEC 60079 series and ISO 80079 series.
260 It relies on relevant IEC and ISO standards for safety related control systems.

261 ~~The primary purpose of this document is to provide requirements for equipment manufacturers,~~
262 ~~but it may also be used as guidance for users of safety devices.~~

263