PD IEC TS 60079-42:2019

BSI Standards Publication

Explosive atmospheres

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

Documents
Document Sharing Hub

Full document details: PD IEC TS 60079-42:2019

National foreword

This Published Document is the UK implementation of IEC TS 60079-42:2019.

The UK participation in its preparation was entrusted to Technical Committee EXL/31, Equipment for explosive atmospheres.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2019
Published by BSI Standards Limited 2019

ISBN 978 0 539 11982 4

ICS 29.260.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 November 2019.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: PD IEC TS 60079-42:2019

IEC TS 60079-42

Edition 1.0 2019-04

TECHNICAL SPECIFICATION

SPECIFICATION TECHNIQUE

colour inside

Explosive atmospheres
Part 42: Electrical Safety Devices for the control of potential ignition sources from Ex-Equipment

Atmospheres explosive
Partie 42: Dispositifs électriques de sécurité pour la commande des sources potentielles d'inflammation des appareils Ex

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.260.20

ISBN 978-2-8322-6807-0

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

AVA Documents
Document Sharing Hub

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

Full document details: PD IEC TS 60079-42:2019

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 8
3 Terms and definitions 8
4 Basic requirements 8
5 Ignition prevention by safety devices 9
5.1 General concept of ignition risk reduction 9
5.2 Safety characteristics of a safety device 9
5.3 Associated safety device 10
6 Functional requirements for a safety device 10
6.1 General requirements 10
6.2 Specification of the safety function 10
6.3 Requirements for achieving the safety integrity 10
6.3.1 Simple safety devices 10
6.3.2 Complex safety device 11
7 Testing and Verification 11
7.1 Type tests 11
7.2 Proof tests 11
8 Marking 11
9 Instructions 11
Annex A (informative) Guidance for assessment of a simple safety device 13
Annex B (informative) Examples for the application of safety devices 14
B.1 General 14
B.2 Ex Equipment with a temperature controlled surface 14
B.2.1 Problem: 14
B.2.2 Consequence: 14
B.2.3 Solution: 14
B.3 Current-dependent safety device for thermal protection of motors with type of protection Ex eb 15
B.3.1 Problem: 15
B.3.2 Consequence: 15
B.3.3 Solution: 15
B.4 Risk reduction by ignition control and mitigation, bucket elevator example 16
B.4.1 Problem 16
B.4.2 Ignition Hazard Assessment 17
B.4.3 Safety controls to prevent ignition 17
B.4.4 Safety Controls with explosion mitigation 18
B.5 Control of high temperatures 19
B.5.1 Problem 19
B.5.2 Ignition hazard assessment 19
B.5.3 Safety controls 20
Annex C (informative) Use of the Safe Motor Temperature (SMT) sub-function with converter-fed motors 21
C.1 General 21
C.2 Reliability of the safety motor temperature control function. 22

AVA Documents
Document Sharing Hub

C.3 Control without temperature sensors 22
C.4 Control with temperature sensors 22
Bibliography 24

Figure B.1 –Safety Device to limit the temperature rise 15
Figure B.2 – Overload protection device to limit the temperature rise of a motor under stall and overload conditions 16
Figure B.3 – Bucket elevator principle 17
Figure B.4 – Bucket elevator sensors for ignition hazard detection 18
Figure B.5 – Controls with explosion mitigation 19
Figure C.1 – Overview 21
Figure C.2 – Control without temperature sensors 22
Figure C.3 – Control with temperature sensors 23

Table 1 – Minimum RRF for a safety device for ignition risk reduction 9
Table A.1 – Relationship between λ_d and RRF 13
Table C 1– SMT safety sub function Risk Reduction Factors (RRF) 22

Documents
Document Sharing Hub

Full document details: PD IEC TS 60079-42:2019

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES

Part 42: Electrical Safety 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.

Documents
Document Sharing Hub

Full document details: PD IEC TS 60079-42:2019

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.

Documents
Document Sharing Hub

Full document details: PD IEC TS 60079-42:2019

INTRODUCTION

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

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

Documents
Document Sharing Hub

Full document details: PD IEC TS 60079-42:2019

EXPLOSIVE ATMOSPHERES

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

1 Scope

This part of IEC 60079, which is a Technical Specification, provides guidance for equipment manufacturers where electrical safety devices are used to reduce the likelihood of potential ignition sources becoming effective in Ex Equipment located in Explosive Atmospheres. Electrical safety devices perform a safety function to control potential ignition sources from both, electrical or non-electrical Ex Equipment in explosive atmospheres.

This document may also be applied to a combination of elements performing a safety function. For example:

- Sensor
- Logic system
- Final element

This Technical Specification can also be used for assessing the safety device independently, without being designed for a specific Ex Equipment.

A safety device can be a measure to achieve a required EPL of the Ex Equipment with respect to a potential ignition source. The combination of the safety device and the Ex Equipment could then comply with the relevant standards of the IEC 60079 series and the ISO 80079 series with respect to the Equipment Protection Level. However, increasing the EPL of Ex Equipment by the simple addition of a safety device is not within the scope of this document.

This document does not apply to:

- mechanical control equipment such as pressure relief valves, mechanical governors and other mechanical safety devices
- the use of gas detection
- control equipment to prevent the occurrence of explosive atmospheres, e.g. inerting systems and ventilation systems
- mitigation of an explosion

NOTE Some potential ignition sources might not be practicably controlled by safety devices.

Electrical safety devices, where the level of safety integrity is identified under other parts of the IEC 60079 series, this document can be used as a reference for the realization of the level of safety integrity.

Electrical safety devices may be installed either as part of or separate to the Ex Equipment under control (EEUC) and may be located inside or outside the hazardous area.

Documents
Document Sharing Hub

Full document details: PD IEC TS 60079-42:2019