

Electrical apparatus with protection by enclosure for use in the presence of combustible dusts —

Part 2: Guide to selection, installation and maintenance

UDC [621.3 - 213 + 621.316.9]:620.1.05/.113

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Electrotechnical Engineering Standards Committee (GEL/-) to Technical Committee GEL/114, upon which the following bodies were represented:

- Association of British Mining Equipment Companies
- Association of Consulting Engineers
- BEAMA Ltd.
- British Coal
- British Electrical Systems Association (BEAMA Ltd.)
- British Gas plc
- British Industrial Truck Association
- Chief and Assistant Chief Fire Officers' Association
- Civil Aviation Authority (Airworthiness Division)
- Council for Electrical Equipment for Flammable Atmospheres (BEAMA Ltd.)
- Department of Transport (Marine Directorate)
- ERA Technology Ltd.
- Electrical Contractors' Association
- Energy Industries Council
- Engineering Equipment and Materials Users' Association
- Fire Offices Committee
- GAMBICA (BEAMA Ltd.)
- Gland Manufacturers' Technical Committee
- Health and Safety Executive
- Lighting Industry Federation Ltd.
- Ministry of Defence
- Rotating Electrical Machines Association (BEAMA Ltd.)
- Sira Limited
- Trades Union Congress
- United Kingdom Offshore Operators' Association

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Department of the Environment
(Building Research Establishment, Fire Research Station)
- Royal Ordnance

This British Standard, having been prepared under the direction of the General Electrotechnical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 29 January 1988

© BSI 12-1998

The following BSI references relate to the work on this standard:
Committee reference GEL/114
Draft for comment 85/30795 DC

ISBN 0 580 16259 1

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
0 Introduction	1
1 Scope	1
2 Definitions	1
3 Classification of hazardous areas	2
4 Other hazards	3
5 Selection of electrical apparatus	3
6 Installation of apparatus	5
7 Inspection, testing and maintenance of apparatus and installations	7
Appendix A Light metal construction and the associated frictional sparking risks	10
Appendix B Procedure for area classification	10
Appendix C Data for combustible dusts	12
Figure 1 — Identification of zones on drawings	12
Table 1 — Properties of combustible dusts	13
Publications referred to	Inside back cover

Foreword

This Part of BS 6467 has been prepared under the direction of the General Electrotechnical Engineering Standards Committee.

At the present time, there is no other existing British, European or International Standard for this subject. In the drafting of this Part, account has been taken of the work which is being done in Subcommittee 31H of the International Electrotechnical Commission (IEC).

This Part is a guide to the selection, installation and maintenance of electrical apparatus complying with the requirements of BS 6467-1. These requirements are based on the maximum surface temperature of the enclosure and on the restriction of dust ingress to the enclosure by the use of “dust-tight” or “dust-protected” enclosures.

A British Standard is under consideration to deal with the safe use in a combustible dust atmosphere of electrical apparatus complying with BS 5501, which is designed specifically for explosive gas atmospheres. It should be stressed that the combination of a combustible dust and a flammable gas or vapour has been shown to present what may be an enhanced risk compared with that presented by the individual constituents and there is no directly relevant British Standard either existing or in preparation. All such cases will require specialist advice.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

The electrical apparatus for which the design, construction and methods of test are specified in BS 6467-1 will afford the required level of safety only when it is selected, installed and maintained in a proper manner. The purpose of this Part of BS 6467 is to give guidance on the appropriate steps to be taken.

It should be stressed that the highest level of safety is always obtained by siting electrical apparatus outside the hazardous area. However, there will be occasions when this is not practicable and this guidance is concerned with the use of electrical apparatus complying with BS 6467-1 under those circumstances. It may also be possible to use other electrical apparatus, particularly in the less hazardous Zone Y, with an acceptable degree of risk.

1 Scope

This Part of BS 6467 gives guidance on the selection, installation and maintenance of electrical apparatus with protection by enclosure, as specified in BS 6467-1, for use outside dust-handling equipment where combustible dust, but not dust from materials regarded as “explosives”, may be present in quantities that could lead to a fire or explosion hazard. It does not apply to electrical apparatus for use in mines susceptible to firedamp nor does it take account of any risk because of an emission of flammable gas or vapour from the dust. The recommendations of this Part are based on the electrical apparatus being able to operate safely under a dust layer having a maximum thickness of 5 mm, which is the value at which the ignition characteristics of dust layers have been assessed. It follows that the guide is not relevant to electrical apparatus within dust handling equipment as there can be no sure knowledge of the maximum thickness of dust on the electrical apparatus.

NOTE 1 This guide does not consider the use of electrical apparatus in atmospheres which may contain flammable gas or vapour as well as combustible dust.

NOTE 2 In the UK it is a legal requirement to minimize the release of dust and to prevent the formation of dust layers by good house-keeping. It is the responsibility of the user of this standard to determine the applicable legislation and to ensure that the selected apparatus and the details of its installation conform.

NOTE 3 For electrical apparatus used in explosive gas atmospheres other than in mines susceptible to firedamp, recommendations for the selection, installation and maintenance of electrical apparatus are given in BS 5345.

NOTE 4 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 6467, the following definitions apply.

NOTE Where the word “dust” appears in parentheses in the term, it may be omitted where there is no risk of confusion with the similar term used in connection with explosive gas atmospheres.

2.1 dust

small solid particles that settle out under their own weight but that may remain suspended for some time

NOTE This definition includes what are defined in BS 6069-2 as “dust” and “grit”.

2.2 combustible dust

dust that is combustible or ignitable in mixtures with air

NOTE 1 Most combustible dusts form explosible mixtures with air only between certain concentration limits.

NOTE 2 Although a mixture which is above the upper concentration limit is not an explosible mixture, it can become so by dilution.

NOTE 3 Combustible dusts are capable of being ignited by external ignition sources and will continue to burn at atmospheric temperatures but they will only spontaneously ignite above a certain temperature.

2.3 enclosure

generic term for the means of protection of the electrical apparatus against the ingress of dust

2.4 dust-tight enclosure

an enclosure capable of excluding all observable dust particles

2.5 dust-protected enclosure

an enclosure to which the ingress of dust is not totally prevented but where the quantity of dust entering is not sufficient to interfere with the satisfactory operation of the apparatus

2.6 maximum surface temperature of the enclosure

the highest temperature that is attained, under the most adverse electrical conditions (but within the specified tolerances) by any part of the external surface of the enclosure of an electrical apparatus, that would be able to produce an ignition of the surrounding atmosphere

NOTE 1 The most adverse electrical conditions include overloads and recognized abnormal conditions that may be specified in a British Standard giving specific requirements for the electrical apparatus concerned, for example BS 4999 and BS 5000.

NOTE 2 The maximum surface temperature of the enclosure for any apparatus is stated for the maximum permissible ambient temperature at which compliance with BS 6467-1 is claimed.

NOTE 3 To allow for variations between production samples and that submitted for type test, a higher value is required to be marked (see clause 3 of BS 6467-1:1985) than the maximum value measured during the test when this is linearly corrected for ambient temperature.

2.7 portable electrical apparatus

apparatus that can either be moved while in operation or that can easily be moved from one place to another ready for use, while connected to the supply

2.8 hazard (dust)

presence, or risk of the presence, of a combustible mixture of dust and air

2.9 hazardous area (dust)

area in which combustible mixtures of dust, in cloud or layer form, and air are, or may be expected to be, present in quantities such as to require special precautions for the construction and use of electrical apparatus

2.10 non-hazardous area (dust)

area in which combustible mixtures of dust and air are not expected to be present so that special precautions for the construction and use of electrical apparatus are not required

2.11 source of release (dust)

place from which combustible dust may be released into the atmosphere

2.12 ignition temperature of a dust layer/cloud

lowest temperature at which ignition occurs under defined test conditions of a combustible dust layer/cloud

2.13 area classification (dust)

notional classification of a works, plant or installation (hereinafter referred to as plant) into Zone Z or Zone Y according to the likelihood of the existence of a hazardous area (see 2.9) for the purpose of selection, installation and maintenance of electrical apparatus

NOTE 1 The definitions of the zones in 2.14 and are technically equivalent to those currently in use in Subcommittee 31H of the International Electrotechnical Commission (IEC) but this should not be taken to imply that apparatus complying with BS 6467-1 is acceptable for all cases, for instance it is not recommended for use in the area within the dust containment.

NOTE 2 The definitions, together with the zone designations, will be reviewed when agreement has been reached in the IEC.

NOTE 3 In Zone Z a dust layer may also be present and the possibility should be taken into account.

2.14 Zone Z

area in which combustible dust is, or may be, present as a cloud during normal processing, handling or cleaning operations in sufficient quantity to be capable of producing an explosible concentration of combustible or ignitable dust in a mixture with air

2.15 Zone Y

areas not classified as Zone Z in which accumulations or layers of combustible or ignitable dust may be present under abnormal conditions and give rise to ignitable mixtures of dust and air

2.16 extent of zone

distance in any direction from a source of release to the point where the hazard associated with that zone is considered no longer to exist

3 Classification of hazardous areas

This guide adopts the concept, which is internationally agreed for flammable gases and vapours, of using an area classification (see 2.13) to give an indication of the risk of fire and/or explosion. As the hazard from combustible dusts, unlike that from flammable gases and vapours, will not necessarily be removed by ventilation or diffusion after the release has stopped, a common classification is not practicable. Indeed, in the case of combustible dusts, accelerated ventilation may, by the creation of dust clouds, give a greater rather than less hazardous condition. Furthermore, the formation of dust layers may be cumulative, thus increasing the hazard unless the dust is physically removed.