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# Australian Standard 2430, Part 2—1981

## CLASSIFICATION OF HAZARDOUS AREAS
# Part 2—DUSTS (INCLUDING INHERENTLY EXPLOSIVE DUSTS)

STANDARDS ASSOCIATION OF AUSTRALIA
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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Electrical and Electronic Manufacturers Association

Australian Gas Association

Australian Institute of Petroleum Limited

Australian Liquefied Petroleum Gas Association

Confederation of Australian Industry

Department of Industrial Relations, N.S.W.

Department of Minerals and Energy, Victoria

Department of Mineral Resources, N.S.W.

Department of Industry and Commerce

Department of Transport, Australia

Grain Elevators Board of New South Wales

Insurance Council of Australia

Royal Australian Chemical Institute

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AUSTRALIAN STANDARD

# CLASSIFICATION OF HAZARDOUS AREAS

# Part 2 DUSTS (INCLUDING INHERENTLY EXPLOSIVE DUSTS)

## AS 2430, Part 2—1981

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# PREFACE

This standard was prepared by the Association's Committee on Classification of Hazardous Locations for the guidance of industry and relevant statutory authorities concerned with the classification of hazardous areas. It is Part 2 of a series dealing with specific hazardous atmospheres.

This standard deals with the classification of hazardous areas according to the probability of the existence of an inherently explosive dust or explosive dust/air mixture.

The content of this standard is solely concerned with the classification of hazardous areas and not with the types of equipment or ignition sources which can be used in such areas. Such types of equipment are covered in standards published by the specific technology group, i.e. electrical, mechanical, gas, chemical.

This standard may require reference to the following Australian standard:

AS 1152 Test Sieves

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STANDARDS ASSOCIATION OF AUSTRALIA

# Australian Standard
# for
# CLASSIFICATION OF HAZARDOUS AREAS

## PART 2—DUSTS (INCLUDING INHERENTLY EXPLOSIVE DUSTS)

## FOREWORD

Many gases, vapours and dusts which are generated, processed, handled and stored in industry are combustible. When ignited they may burn rapidly and with considerable explosive force if mixed with air in the appropriate proportions.

Areas where gases and vapours, dusts, flyings and fibres occur in dangerous quantitites are classified as hazardous. This standard deals with the zonal classification of hazardous areas where dusts and inherently explosive dust are present. For classification of explosive gas atmospheres (Zones 0, 1 and 2), refer to AS 2430, Part 1.

Unlike the gas or vapour zones, dust zones cannot be divided into normal and abnormal conditions dependent upon time, since dust, unlike gas, is not self-correcting by ventilation over a stipulated period. In fact, it is the very opposite in that accelerated ventilation may lead to dust clouds and therefore give a greater, not a lesser, hazardous condition.

Area classification is a method of analysing the environment where explosive atmospheres may occur, to allow the proper selection of apparatus to be installed in that environment. Such environments are those where a risk of fire or explosion can occur only if an explosive atmosphere and a source of ignition can coexist. The aim of the classification procedure is to ensure the satisfactory presence of apparatus in these environments.

Where it is necessary to use apparatus in an environment in which there may be an explosive atmosphere and it is not possible to—

(a) eliminate the likelihood of an explosive atmosphere occurring around the source of ignition; or

(b) eliminate the source of ignition;

then measures should aim at reducing the likelihood of occurrence of either or both of the above factors so that the likelihood of coincidence is so small as to be acceptable.

In most practical situations where combustible materials and apparatus are used it is difficult to ensure that an explosive atmosphere will never occur. It may also be difficult to ensure that apparatus will never give rise to a source of ignition. Reliance is therefore placed on the use of apparatus which has an extremely low likelihood of creating a source of ignition in situations where an explosive atmosphere has a high likelihood of occurring. Conversely where the likelihood of an explosive atmosphere occurring is reduced, apparatus which has an increased likelihood of becoming a source of ignition may be used. To apply this approach the first step is to assess the likelihood of an explosive atmosphere's occurring in accordance with the definitions of the zones of hazard.

The area classification should be carried out by those who have full knowledge both of the process systems and equipment concerned and of safety and personnel. The agreement reached on the area classification should be formally recorded.

The properties (which are relevant to area classification) of all process materials should be listed and should include details of the dusts involved.

The initial step is to decide if a process item contains combustible material and if a release can occur. The procedure outlined herein should be applied to each item of process equipment. The type and extent of the zonal areas can then be established.

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# SPECIFICATION

**1 SCOPE.** This standard sets out requirements for the classification of hazardous areas according to the existence of an inherently explosive dust or explosive dust/air mixture.

The standard applies to open and enclosed areas where ambient air temperature and pressure apply. Areas where higher and lower atmospheric temperatures and pressures are present are not excluded provided that their effect on the properties of the flammable materials are taken into account.

This standard does not apply to—

(a) underground workings of coal mines; or

(b) areas which may be affected by oxygen enrichment.

For the purpose of this standard, inherently explosive dusts and explosive dust/air mixtures, flyings and fibres are hereinafter referred to as 'hazardous dusts.'

**2 DEFINITIONS.** For the purpose of this standard, the following definitions apply:

**2.1 Combustible dusts**—dusts which when mixed with air in certain proportions or layered can be ignited by the application of a specific level of energy.

NOTES:

1. Examples of such dusts are starch and coal dust.
2. Layered dusts under certain conditions may glow without ignition.

**2.2 Detonation (chemical)**—decomposition of an explosive in which the rate of heat release is great enough for the explosion to be propagated through the explosive as a steep shock front, at velocities over 600 m/s and pressures above 1 GPa.

**2.3 Dust**—particulate material which is or has been airborne and which passes a 100 $\mu$m mesh sieve complying with AS 1152.

NOTE: Particles smaller than 1 $\mu$m are defined as smoke, but are regarded as dusts for the purposes of this standard.

**2.4 Fibre**—a unit of matter characterized by flexibility, fineness and high ratio of length to thickness.

**2.5 Flyings**—waste fibres which fly out into the atmosphere during carding, drawing, spinning and other processes.

**2.6 Glow temperature**—the lowest temperature of a heated exposed surface at which a dust layer of 5 mm thickness ignites.

NOTE: As the layer thickness increases, the glow temperature may be reduced.

**2.7 Ignition temperature**—the minimum temperature required to initiate or cause self-sustained combustion independently of the heating or heated element. The ignition temperature of a solid is influenced by its physical condition and the rate of heating. Ignition temperature varies with the size, shape and material of the testing container and other factors.

**2.8 Inherently explosive dusts**—dusts of explosives which require only a specific level of energy for ignition. Examples of such dusts are gunpowder, propellant powder and lead styphnate.

NOTE: Such dusts are hazardous whether airborne or not.

**3 GROUPING OF HAZARDOUS DUSTS.** Hazardous dusts are grouped according to the physical properties of the dust. The minimum ignition level of the dust, which provides for easy grouping and is necessary knowledge in the control of ignition sources, is insufficient for this purpose.

The dusts are grouped by the arbitrary selection of physical characteristics to allow convenient identification and matching of the hazard to the required plant enclosures, as set out in Table 1.

**TABLE 1**
**GROUPING OF HAZARDOUS DUSTS**

| Group | Description |
|---|---|
| A | Inherently explosive dusts regardless of particle size which are liable to explode at temperatures of 100°C or below |
| B1 | Inherently explosive dusts regardless of particle size which are dangerous when exposed to temperatures above 100°C |
| B2 | All electrically conductive dusts regardless of particle size. |
| B3 | All non-conductive combustible dusts which have a settling rate of or slower than 5 mm/s in still air |
| C1 | All non-conductive combustible dusts which have a settling rate faster than 5 mm/s in still air |
| C2 | All dusts which when settled on plant surfaces may be susceptible to spontaneous combustion or easy ignition due to carbonization by excessive dryness resulting from exposure to heat of the plant surfaces |
| C3 | All dusts which when settled on surfaces of plant enclosures have an insulating effect which would result in the overheating malfunction or deterioration of the enclosed plant and decrease safety in operation |

NOTES:

1. Where a dust is in accordance with more than one category above, the lower class, alphabetically and numerically, applies.
2. Typical groupings are given in Appendix C.

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