

Australian Standard[®]

Classification of hazardous areas

Part 1: Explosive gas atmospheres

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Australian Electrical and Electronic Manufacturers Association
Australian Gas Association
Australian Institute of Petroleum
Australian Liquefied Petroleum Gas Association
Confederation of Australian Industry
Department of Defence
Department of Labour, Vic.
Department of Industrial Relations, N.S.W.
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Classification of hazardous areas
Part 1: Explosive gas atmospheres

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PREFACE

This edition of this standard was prepared by the Association's Committee on Classification of Hazardous Locations to supersede AS 2430, Part 1—1982. The standard is intended for the guidance of industry and relevant statutory authorities concerned with the classification of hazardous areas. It is Part 1 of a series dealing with specified hazardous atmospheres.

This standard deals with the classification of hazardous areas according to the probability of the existence of an explosive mixture of gas, vapour or mist with air in the atmosphere.

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.

In its terminology, definitions and general treatment of the subject, this standard is similar to the following report issued by the International Electrotechnical Commission:

IEC 79 Electrical Apparatus for Explosive Gas Atmospheres
Part 10: Classification of Hazardous Areas

The major changes between this standard and the previous edition are as follows:

- (a) Closer alignment with IEC 79-10.
- (b) The addition of some important clarifications in the Scope and Application Clauses.
- (c) The elimination of the two 'time criterion' methods for determining hazardous areas and distinguishing between Zones 0, 1 and 2.
- (d) The removal of the specific occupancy Appendix from this standard. (It is now published as AS 2430, Part 3.)

CONTENTS

	<i>Page</i>
FOREWORD	3
1 SCOPE	4
2 APPLICATION	4
3 REFERENCED DOCUMENTS	4
4 DEFINITIONS	4
5 GENERAL	5
6 BASIC PRINCIPLES	5
7 DETERMINATION OF THE TYPE AND EXTENT OF ZONES	7
8 VENTILATION	8
9 PROPERTIES OF FLAMMABLE LIQUIDS, GASES AND VOLATILE SOLIDS	9
APPENDIX A. SOURCES OF RELEASE	10

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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 quantities are classified as hazardous. This standard deals with the zonal classification of hazardous areas where explosive gas atmospheres are present. For classification of combustible dust areas, refer to AS 2430, Part 2.

The word 'zone' is internationally accepted as indicating the probability of the presence of a flammable, combustible or explodable material, and the extent, dimension, shape of hazardous area and volume in which the hazardous material can be expected.

This standard covers the following zones:

- ZONE 0: In which an explosive gas atmosphere is present continuously, or is present for long periods.
- ZONE 1: In which an explosive gas atmosphere is likely to occur in normal operation.
- ZONE 2: In which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur it will exist for a short period only.

The area classification should be carried out by those who have full knowledge both of the processes, 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 flashpoint, boiling point, melting point, ignition temperature, ignition energy, vapour pressure, vapour density and flammability limits.

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

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
CLASSIFICATION OF HAZARDOUS AREAS

PART 1 — EXPLOSIVE GAS ATMOSPHERES

1 SCOPE. This standard provides guidance for the classification of hazardous areas according to the existence of or likelihood of the existence of an explosive gas/air mixture.

NOTE: Areas classified as Zones 0, 1 or 2 in accordance with this standard are sometimes referred to as Class I areas.

It applies to open and enclosed areas, in all above-ground situations, where there may be a risk due to the presence of flammable gas or vapour mixed with air under normal atmosphere conditions (see Note 1).

This standard does not apply to —

- (a) underground workings including coal mining;
- (b) processing and manufacture of explosives;
- (c) areas which may be affected by oxygen enrichment;
- (d) areas where risks may arise due to the presence of combustible dusts (see Note 3); or
- (e) potential catastrophic failures such as the bursting of pressure vessels, pipelines or tanks.

NOTES:

1. Normal atmospheric conditions include variations above and below reference levels of 101.3 kPa and 20°C provided the variations have a negligible effect on the explosion properties of the flammable materials.
2. The design, construction and installation of plant and equipment have a significant bearing on classification. However, this standard does not specify any requirements for such design, construction or installation.
3. The classification of hazardous areas where combustible dusts are present (Class II areas) is covered in AS 2430, Part 2.

2 APPLICATION. This standard is intended for application by occupiers of premises and sites for the purpose of recognizing and classifying hazardous areas.

NOTES:

1. Responsibility for the recognition and classification of hazardous areas is normally vested in the occupier.
2. Where a statutory authority has jurisdiction, it may be necessary to have the classification arrived at by the occupier ratified by the statutory authority.
3. If necessary, the occupier should seek assistance from those competent in classification principles and procedure. Statutory authorities normally do not perform this function.

3 REFERENCED DOCUMENTS. The following documents are referred to in this standard:

AS 1940	SAA Flammable and Combustible Liquids Code
AS 2106	Methods for the Determination of the Flashpoint of Flammable Liquids (Closed Cup)
AS 2430	Classification of Hazardous Areas Part 2 — Combustible Dusts Part 3 — Specific Occupancies

NFPA 325M Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids

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

4.1 Area, hazardous - an area in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of potential ignition sources.

NOTES:

1. For the purpose of this standard, an area is regarded as a three-dimensional region or space.
2. Examples of potential ignition sources are electrical equipment, naked flames, sparks from grinding and welding operations, and hot surfaces.

4.2 Area, non-hazardous — an area in which an explosive atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of potential ignition sources.

4.3 Authority, Statutory — the person or body responsible for the implementation of legislation relating to the handling, processing or storage of materials constituting a hazard.

4.4 Boiling point — the temperature of a liquid boiling at an ambient pressure of 101.3 kPa.

NOTE: For liquid mixtures, the initial boiling point should be used. 'Initial boiling point' in respect of liquid mixtures indicates the lowest value of the boiling point for the range of liquids present.

4.5 Explosive gas atmosphere — mixture with air, under normal atmospheric conditions (see Clause 1, Note 1), of flammable materials in the form of gas, vapour, or mist, in which, after ignition, combustion spreads throughout the unconsumed mixture.

NOTES:

1. This definition specifically excludes dusts and fibres in suspension in air.
2. Although a mixture which has a concentration above the upper explosive level (UEL) is not an explosive gas atmosphere, in certain cases for area classification purposes it is advisable to consider it as an explosive gas atmosphere.

4.6 Explosive limit, lower (LEL) — the concentration of flammable gas, vapour or mist in air, below which an explosive gas atmosphere will not be formed.

4.7 Explosive limit, upper (UEL) — the concentration of flammable gas, vapour or mist in air, above which an explosive gas atmosphere will not be formed.

4.8 Flammable gas or vapour - gas or vapour which, when mixed with air in certain proportions, will form an explosive gas atmosphere.

NOTE: All vapours of flammable liquids are flammable vapours.