

Australian/New Zealand Standard™

**Code of practice for handling
combustible dusts**



AS/NZS 4745:2012

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee MS-011, Classification of Hazardous Areas. It was approved on behalf of the Council of Standards Australia on 19 September 2012 and on behalf of the Council of Standards New Zealand on 27 August 2012. This Standard was published on 10 October 2012.

The following are represented on Committee MS-011:

Auckland Regional Chamber of Commerce
Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Institute of Petroleum
Australian Paint Manufacturers Federation
Australian Petroleum Production and Exploration Association
Aviation and Marine Engineers Association
Bureau of Steel Manufacturers of Australia
Department of Labour, New Zealand
Department of Natural Resources and Mines, Qld
Electrical Contractors Association of New Zealand
Energy Networks Association
Engineers Australia
Environmental Protection Authority, New Zealand
Gas Association of New Zealand
Institute of Electrical Inspectors
Institute of Instrumentation, Control & Automation Australia
LPG Australia
Ministry of Economic Development, New Zealand
National Electrical and Communications Association
New Zealand Oil Refining Companies
Responsible Care New Zealand
Royal Australian Chemical Institute
WorkCover New South Wales
WorkSafe Victoria

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using the current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com.au or Standards New Zealand web site at www.standards.co.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS 4745.

Australian/New Zealand Standard

Code of practice for handling combustible dusts

Original was AS/NZS 4745:2004.
Second edition 2012.
Revised incorporating Amendment No. 1 (June 2013).

COPYRIGHT

© Standards Australia Limited/Standards New Zealand

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, Private Bag 2439, Wellington 6140.

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee MS-011, Classification of Hazardous Areas, with the assistance of the Joint Subcommittee MS-011-01, Combustible Dusts, to supersede AS/NZS 4745:2004.

This Standard incorporates Amendment No. 1 (June 2013). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

This Standard is intended to assist those industries which may have risks associated with the presence of combustible dusts as part of their process, in minimizing the risk of injury, death or loss of property to fire and/or explosion. It sets out good design and management principles and practices for the construction, operation and maintenance of manufacturing and processing plants and associated transportation and storage systems.

The objective of this revision is to update the referenced documents and bring the Standard into line with current editorial practices. This revision also modifies the classification for levels of protection in Section 7 to align with the classifications used in referenced Standards.

The technical content of this Standard is based on but not equivalent to EN 1127-1, *Explosive Atmospheres—Explosion-prevention and Protection Part 1: Basic Concepts and Methodology*.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	5
1.2 APPLICATION	5
1.3 REFERENCED DOCUMENTS.....	6
1.4 DEFINITIONS.....	6
SECTION 2 OHS AND RISK MANAGEMENT	
2.1 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM.....	7
2.2 RISK MANAGEMENT STANDARDS.....	8
2.3 TRAINING.....	8
2.4 RECORDS.....	9
SECTION 3 HAZARD ASSESSMENT	
3.1 DUST CHARACTERIZATION	10
3.2 SAFETY CHARACTERISTICS OF DUSTS.....	11
3.3 COMBUSTION BEHAVIOUR.....	12
3.4 DETERMINATION OF DUST CHARACTERISTICS.....	13
3.5 SAMPLING OF DUSTS FOR TESTING.....	20
3.6 HAZARDOUS PROCESSES	21
3.7 RISK ASSESSMENT	23
SECTION 4 SAFETY REQUIREMENTS	
4.1 GENERAL.....	28
4.2 TRAINING/AWARENESS	28
4.3 PERSONNEL PROTECTIVE EQUIPMENT (PPE).....	28
4.4 SITE ENTRY CONDITIONS	29
4.5 WORK PERMITS.....	29
4.6 SAFETY OPERATING PROCEDURES.....	29
4.7 MAINTENANCE AND HOUSEKEEPING	30
SECTION 5 DETERMINING THE PRESENCE OF EFFECTIVE IGNITION SOURCES	
5.1 GENERAL.....	31
5.2 HOT SURFACES	31
5.3 FLAMES, HOT GASES AND HOT PARTICLES	32
5.4 MECHANICALLY GENERATED SPARKS.....	32
5.5 ELECTRICAL APPARATUS	33
5.6 STRAY ELECTRIC CURRENTS, INDUCED VOLTAGES AND CATHODIC CORROSION PROTECTION	33
5.7 STATIC ELECTRICITY	33
5.8 LIGHTNING	34
5.9 RADIOFREQUENCY (RF) ELECTROMAGNETIC WAVES FROM $10^4\text{Hz} \times 21\text{Hz}$ TO $3 \times 10^{12}\text{Hz}$	34
5.10 ELECTROMAGNETIC WAVES FROM $3 \times 10^{11}\text{ Hz}$ TO $3 \times 10^{15}\text{ Hz}$ (Infra-red, visible and ultraviolet light).....	34
5.11 IONIZING RADIATION.....	35
5.12 ULTRASONIC RADIATION.....	35
5.13 ADIABATIC COMPRESSION AND SHOCK WAVES	35
5.14 EXOTHERMIC REACTIONS, INCLUDING SELF-IGNITION OF DUSTS	35

SECTION 6	PLANT DESIGN	
6.1	SITE AND PLANT LAYOUT	38
6.2	BUILDING DESIGN	38
6.3	EQUIPMENT—DUST CONTAINMENT	39
6.4	REDUCE DUST CLOUD FORMATION	39
6.5	EXPLOSION-PREVENTION AND PROTECTION	40
SECTION 7	DETAILED DESIGN AND OPERATIONAL ISSUES	
7.1	CLASSIFICATION OF HAZARDOUS AREAS	43
7.2	DESIGN AND CONSTRUCTION OF EQUIPMENT, PROTECTIVE SYSTEMS AND COMPONENTS BASED ON THE AVOIDANCE OF IGNITION SOURCES	43
7.3	DESIGN AND CONSTRUCTION OF EQUIPMENT, PROTECTIVE SYSTEMS AND COMPONENTS TO REDUCE THE EXPLOSION EFFECTS	52
7.4	PROVISIONS FOR EMERGENCY MEASURES	68
7.5	PROVISIONS FOR PLANT START-UP	68
7.6	PRINCIPLES OF MEASURING AND CONTROL SYSTEMS FOR EXPLOSION- PREVENTION AND PROTECTION	69
7.7	FIREFIGHTING	69
SECTION 8	EMERGENCY MANAGEMENT	
8.1	PURPOSE	71
8.2	EMERGENCY PLANNING	71
APPENDICES		
A	TOOLS FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES	73
B	BIBLIOGRAPHY	74
GLOSSARY	75

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Code of practice for handling combustibile dusts

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Code of Practice is intended to apply whenever combustibile dusts are encountered in quantities sufficient to give rise to a fire and/or explosion. This would normally include, but is not limited to, manufacturing plants and processes (where dusts may be generated or used as part of the process) and bulk storage and handling installations.

It provides a means by which relevant parties can firstly determine whether or not risks exist within an existing or a proposed system or facility, secondly ascertain the nature of such risks, and thirdly determine the means by which the criteria for safe design, construction, operation and maintenance can be met.

The Code is not intended to apply to parts of pulverized fuel combustion systems, or other systems where burning is intended. Where other applicable Standards and Codes exist for the design, construction, operation and maintenance of those systems, they may be adopted.

1.2 APPLICATION

The people who should use this Standard will specifically include those listed below, but this list is not meant to be exhaustive and the Standard may well be relevant to others not listed. Anyone in doubt should make their own enquiries as to the relevance of the Standard to their industry or specific circumstance.

Interested and affected groups include —

- (a) designers;
- (b) equipment manufacturers and suppliers;
- (c) installers of plants;
- (d) plant owners and operators;
- (e) employees;
- (f) storage and transport operators;
- (g) inspectors;
- (h) insurance companies; and
- (i) training providers.