

AS 3584.2:2021



STANDARDS
Australia



Diesel engine systems for underground coal mines

Part 2: Explosion protected



This is a preview. [Click here to purchase the full publication.](#)

AS 3584.2:2021

This Australian Standard® was prepared by ME-018, Mining Equipment. It was approved on behalf of the Council of Standards Australia on 16 April 2021.

This Standard was published on 28 May 2021.

The following are represented on Committee ME-018:

- Australasian Institute of Mining & Metallurgy
- Australian Chamber of Commerce and Industry
- Australian Industry Group
- Chamber of Minerals and Energy of Western Australia
- Construction and Mining Equipment Industry Group
- Department of Mines, Industry Regulation and Safety, WA
- Department of Regional NSW
- Department of Resources, Qld
- Engineers Australia
- Minerals Council of Australia
- Mining Electrical and Mining Mechanical Engineering Society
- WorkSafe New Zealand

This Standard was issued in draft form for comment as DR AS 3584.2:2020.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

ISBN 978 1 76113 333 6

This is a preview. [Click here to purchase the full publication.](#)

Diesel engine systems for underground coal mines

Part 2: Explosion protected

Originated as AS 3584—1988.
Jointly revised and redesignated as AS/NZS 3584.2:2003.
Previous edition 2008.
Revised and redesignated as AS 3584.2:2021.

© Standards Australia Limited 2021

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 (Cth).

Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee ME-018, Mining Equipment, to supersede AS/NZS 3584.2:2008.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this document as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this document is to promote the safety of explosion-protected diesel engine systems that are used underground in coal mines.

A list of all parts in this series can be found in the Standards Australia online catalogue.

This document introduces the requirements for an ignition hazard assessment and functional safety assessment to be performed on the diesel engine system.

The major changes in this edition are as follows:

- (a) The maximum methane concentration for continuous operation has been increased to 1.25 %.
- (b) [Section 3](#) Design and construction now includes all performance requirements.
- (c) The test appendices now include all test requirements.
- (d) Exhaust gas temperature tests have been revised.
- (e) Rated torque speed has been replaced with intermediate speed.
- (f) References to product certification schemes have been removed.
- (g) Testing for replacement particulate filter elements have been added.

The terms “normative” and “informative” have been used in this Standard to define the application of the appendix to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

Contents

Preface	ii
Section 1 Scope and general	1
1.1 Scope	1
1.2 Normative references	1
1.3 Terms and definitions	2
1.4 New designs and innovations	5
Section 2 Hazard identification and control	6
2.1 Ignition hazard assessment	6
2.2 Fire hazard	6
2.3 Ignition control measures	7
2.3.1 General	7
2.3.2 Safety functions	7
2.3.3 Risk reduction required	7
2.3.4 Assessment and validation	
2.3.5 Safety components	8
Section 3 Design and construction	9
3.1 Engine types	9
3.2 Condition monitoring	9
3.3 Surface temperature	9
3.4 Materials	9
3.4.1 Non-metallic materials	9
3.4.2 Light metals	9
3.4.3 External thermal insulation	9
3.5 Flexible metallic pipes	9
3.6 Joints	10
3.6.1 Designation	10
3.6.2 Fixed connection	10
3.6.3 Open joints	10
3.7 Transmission belts	13
3.8 Engine breather	13
3.9 Starting aids	14
3.10 Fuel systems	14
3.11 Air inlet systems	14
3.11.1 General	14
3.11.2 Flame propagation	14
3.11.3 Structural integrity	14
3.12 Air compressors	15
3.13 Cooling systems	15
3.14 Ignition control measures	15
3.14.1 Emergency stop safety function	15
3.14.2 Methane shutdown safety function	16
3.14.3 Manual fuel shut-off valve	16
3.14.4 Engine start and restart	16
3.15 Exhaust systems	16
3.15.1 General	16
3.15.2 Flame propagation	17
3.15.3 Structural integrity	17
3.15.4 Required equipment	17
3.15.5 Exhaust flame arrester	17
3.15.6 Spark arrester	18
3.15.7 Exhaust cooling systems	18
3.15.8 Replaceable element-type particulate filter system	18
3.16 Electrical systems	19

Section 4	Marking	20
4.1	Compliance plate	
Section 5	Testing	21
5.1	Type testing	21
5.1.1	Air inlet system	21
5.1.2	Exhaust system	21
5.2	Installation tests	21
5.3	Routine commissioning tests	22
5.3.1	General	22
5.3.2	Test results — Shutdown, temperature and hydrostatic tests	22
5.4	Management system	
Section 6	Documentation	23
6.1	Documentation to be supplied	23
6.1.1	General	23
6.1.2	Documentation to be supplied to the testing authority or certifying authority	23
6.1.3	After assessment	23
6.1.4	Purchase documentation	23
6.2	General arrangement drawings	24
Appendix A	(normative) Test apparatus	26
Appendix B	(normative) Determining load-speed characteristics	28
Appendix C	(normative) Determining duration, temperature and fluid usage	31
Appendix D	(normative) Testing engine protection systems	34
Appendix E	(normative) Testing spark arrester components	37
Appendix F	(normative) Testing replaceable particulate filter components	39
Appendix G	(normative) Testing sub-assembly components	44
Appendix H	(normative) Hydrostatic testing of intake and exhaust systems	53
Bibliography		55

Australian Standard®

Diesel engine systems for underground coal mines

Part 2: Explosion protected

Section 1 Scope and general

1.1 Scope

This document sets out the explosion protection requirements for diesel engine systems designed for safe operation in underground coal mines, including use in explosion-risk zones. Conformance with this document implies sufficient protection for continuous operation in atmospheres containing up to 1.25 % methane, including—

- (a) the control of surface temperature, to avert ignition of coal dust that could settle on a hot surface or fluid fires; and
- (b) containment or elimination of flames and sparks that could ignite flammable gases and dust that may be present.

This document also addresses inadvertent short-term exposure to high methane levels and any consequent uncontrolled combustion.

NOTE Diesel engine systems that meet the requirements of this document (Part 2) are also fire protected.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 1019, *Internal combustion engines — Spark emission control devices*

AS 3584.4, *Diesel engine systems for underground coal mines, Part 4: Emissions*

AS 4024.1502, *Safety of machinery, Part 1502: Design of safety related parts of control systems — Validation*

AS 4024.1503, *Safety of machinery, Part 1503: Safety-related parts of control systems — General principles for design*

AS 4024.1601, *Safety of machinery, Part 1601: Design of controls, interlocks and guarding — Guards — General requirements for the design and construction of fixed and moveable guards*

AS 4024.1604, *Safeguarding of machinery, Part 1604: Design of controls, interlocks and guarding — Emergency stop — Principles for design (ISO 13850:2017 (ED.3.0), MOD)*

AS 61508.1, *Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 1: General Requirements*

AS/NZS 3584.3, *Diesel engine systems for underground coal mines, Part 3: Maintenance*

AS/NZS 4024.1204, *Safety of machinery — Electrical equipment of machines, Part 1204: General requirements (IEC 60204-1:2016 (ED. 6.0) MOD)*

AS/NZS 4871.1, *Electrical equipment for mines and quarries, Part 1: General requirements*

AS/NZS 4871.6, *Electrical equipment for mines and quarries, Part 6: Diesel powered machinery and ancillary equipment*