



Methods for fire tests on building materials, components and structures

Part 4: Fire-resistance tests for elements of construction



This Australian Standard® was prepared by Committee FP-018, Fire Safety. It was approved on behalf of the Council of Standards Australia on 6 October 2014.
This Standard was published on 10 December 2014.

The following are represented on Committee FP-018:

- Australasian Fire and Emergency Service Authorities Council
- Australian Building Codes Board
- Australian Industry Group
- Australian Institute of Building
- AWTA Product Testing
- Building Research Association of New Zealand
- Bureau of Steel Manufacturers of Australia
- CSIRO Manufacturing and Infrastructure Technology
- Engineers Australia
- Fire Protection Association Australia
- Fire Protection Association New Zealand
- Forest and Wood Products Australia
- Insulated Panel Council Australasia
- Insulation Australasia
- Insurance Council of Australia
- Plastics and Chemicals Industries Association
- Society of Fire Protection Engineers Australasian Chapter

Additional Interests:

- Testing Interests (Australia)
-

This Standard was issued in draft form for comment as DR AS 1530.4.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that 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Standards may also be withdrawn.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 a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting www.standards.org.au

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard[®]

**Methods for fire tests on building
materials, components and structures**

**Part 4: Fire-resistance tests for
elements of construction**

First published as part of AS A30—1935.
Second edition 1958.
Revised and redesignated in part as AS 1530.4—1975.
Sixth edition 2014.

COPYRIGHT

© Standards Australia Limited

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.

ISBN 978 1 74342 918 1

PREFACE

General

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee FP-018, Fire Tests on Building Components, Materials and Structures, to supersede AS 1530.4—2005.

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

Development and International Standards

This Standard aligns with the general principles and procedures set out in the ISO 834 series, *Fire-resistance tests—Elements of building construction*, of Standards and other related ISO documents. This Standard also includes references to relevant European Standards, as appropriate.

This Standard references normative and informative documents. Normative referenced documents are listed in Clause 1.5, and informative referenced documents are listed in the Bibliography.

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 the Standard, whereas an ‘informative’ appendix is only for information and guidance.

The use of Notes in this Standard is of an advisory nature only. They provide explanations and guidance on recommended design consideration or technical procedures, as well as an informative cross-reference to other documents or publications.

This Standard incorporates a Commentary on some clauses. The Commentary directly follows the relevant clause, is designated by ‘C’ preceding the clause number and is printed in italics in a panel. The Commentary is for information only and does not need to be followed for compliance with the Standard.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	7
1.2 OBJECTIVE	7
1.3 PRINCIPLE	8
1.4 APPLICATION	8
1.5 NORMATIVE REFERENCES	8
1.6 DEFINITIONS.....	9
1.7 LINEAR DIMENSIONS.....	13
1.8 UNCERTAINTY OF MEASUREMENT OF FIRE RESISTANCE.....	13
1.9 SAFETY PRECAUTIONS	14
SECTION 2 GENERAL REQUIREMENTS	
2.1 FURNACE LININGS	15
2.2 MEASUREMENT OF TEMPERATURE	15
2.3 MEASUREMENT OF PRESSURE	19
2.4 MEASUREMENT OF TIME.....	20
2.5 MEASUREMENT OF DEFLECTION	20
2.6 MEASUREMENT OF RECEIVED TOTAL HEAT FLUX	21
2.7 MEASUREMENT OF INTEGRITY.....	22
2.8 ACCURACY OF MEASURING EQUIPMENT	24
2.9 TEST SPECIMEN	25
2.10 LOADING AND RESTRAINT	26
2.11 TEST PROCEDURE	27
2.12 MEASUREMENTS, OBSERVATIONS AND RECORDS	31
2.13 CRITERIA OF FAILURE	32
2.14 TEST RESULTS.....	34
2.15 FIRE RESISTANCE LEVEL (FRL).....	34
2.16 REPORTING RESULTS	34
SECTION 3 WALLS—VERTICAL SEPARATING ELEMENTS	
3.1 GENERAL.....	38
3.2 TEST SPECIMEN	38
3.3 INSTRUMENTATION.....	42
3.4 LOADING	61
3.5 SPECIMEN ORIENTATION	61
3.6 MEASUREMENTS AND OBSERVATIONS	61
3.7 CRITERIA OF FAILURE	61
3.8 DETERMINATION OF FIRE RESISTANCE.....	61
3.9 PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN	62

SECTION 4 FLOORS, ROOFS AND CEILINGS HORIZONTAL SEPARATING ELEMENTS

4.1	GENERAL.....	63
4.2	TYPES OF HORIZONTAL SEPARATING ELEMENTS.....	64
4.3	TEST SPECIMEN	65
4.4	INSTRUMENTATION.....	69
4.5	LOADING	74
4.6	RESTRAINT	74
4.7	SPECIMEN ORIENTATION	74
4.8	MEASUREMENTS AND OBSERVATIONS	74
4.9	CRITERIA OF FAILURE	75
4.10	DETERMINATION OF FIRE RESISTANCE.....	75
4.11	TEST RESULTS.....	75
4.12	PERMISSIBLE VARIATION TO THE TESTED SPECIMEN	75
4.13	TEST REPORT.....	76

SECTION 5 COLUMNS

5.1	GENERAL.....	77
5.2	TEST SPECIMEN SIZE.....	77
5.3	INSTRUMENTATION.....	77
5.4	LOADING AND RESTRAINT	78
5.5	TEST PROCEDURE	78
5.6	OBSERVATIONS	78
5.7	CRITERIA OF FAILURE	78
5.8	FIRE RESISTANCE.....	78
5.9	TEST REPORT.....	78
5.10	PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN.....	79

SECTION 6 BEAMS, GIRDERS AND TRUSSES

6.1	GENERAL.....	80
6.2	TEST SPECIMEN	80
6.3	INSTRUMENTATION.....	80
6.4	LOADING AND RESTRAINT	82
6.5	TEST PROCEDURE	82
6.6	OBSERVATIONS	83
6.7	CRITERIA OF FAILURE—STRUCTURAL ADEQUACY.....	83
6.8	FIRE RESISTANCE.....	83
6.9	TEST REPORT.....	83
6.10	PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN.....	83

SECTION 7 DOORSETS AND SHUTTER ASSEMBLIES

7.1	GENERAL.....	84
7.2	TEST SPECIMEN	84
7.3	INSTRUMENTATION.....	86
7.4	TEST PROCEDURE	88
7.5	OBSERVATIONS	88
7.6	CRITERIA OF FAILURE	89
7.7	DETERMINATION OF FIRE RESISTANCE.....	90
7.8	TEST REPORT.....	90
7.9	PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN.....	91

SECTION 8 UNINSULATED GLAZING

8.1	GENERAL.....	95
8.2	TEST SPECIMEN	95
8.3	INSTRUMENTATION.....	96
8.4	TEST PROCEDURE	96
8.5	CRITERIA OF FAILURE	97
8.6	DETERMINATION OF FIRE RESISTANCE.....	97
8.7	TEST REPORT.....	97
8.8	PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN	97

SECTION 9 AIR DUCTS

9.1	GENERAL.....	98
9.2	TEST SPECIMEN	98
9.3	POSITION OF THERMOCOUPLES.....	99
9.4	PROCEDURE.....	100
9.5	OBSERVATIONS	100
9.6	CRITERIA OF FAILURE	100
9.7	DETERMINATION OF FIRE RESISTANCE.....	101
9.8	TEST REPORT.....	101
9.9	PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN	101

SECTION 10 SERVICE PENETRATIONS AND CONTROL JOINTS

10.1	GENERAL.....	102
10.2	TEST LIMITATIONS	102
10.3	PURPOSE OF TEST	102
10.4	TEST SPECIMEN	102
10.5	POSITIONING OF THERMOCOUPLES.....	105
10.6	INTEGRITY.....	108
10.7	INSULATION	108
10.8	TEST PROCEDURE	108
10.9	CRITERIA OF FAILURE	109
10.10	DETERMINATION OF FIRE RESISTANCE.....	109
10.11	TEST REPORT.....	109
10.12	PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN	110

SECTION 11 FIRE DAMPER AND AIR TRANSFER GRILLE ASSEMBLIES IN DUCTS

11.1	GENERAL.....	115
11.2	TEST METHOD.....	115
11.3	APPARATUS	115
11.4	TEST CONSTRUCTION.....	125
11.5	TESTS	126
11.6	CRITERIA OF FAILURE	128
11.7	DETERMINATION OF FIRE RESISTANCE.....	128
11.8	TEST REPORT.....	128
11.9	PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN	129

SECTION 12 CRITICAL SERVICES

12.1	GENERAL.....	131
12.2	TEST SPECIMEN	131
12.3	APPARATUS AND INSTRUMENTATION.....	133
12.4	PRINCIPLE	134
12.5	PROCEDURE.....	134
12.6	CRITERIA OF FAILURE	134
12.7	REPORTING OF RESULTS	134
12.8	PERMISSIBLE VARIATIONS TO THE TESTED SPECIMEN	135

APPENDICES

A RADIANT HEAT FLUX MEASUREMENTS 136

B ALTERNATIVE AND ADDITIONAL TEST PROCEDURES FOR ELEMENTS
OF CONSTRUCTION..... 140

C GUIDELINES FOR THE ATTACHMENT OF SPECIMEN
THERMOCOUPLES 152

D STANDARD CONFIGURATIONS FOR ELECTRICAL AND
TELECOMMUNICATION CABLES..... 155

E STANDARD CONFIGURATIONS FOR PENETRATIONS WITH METAL
PIPE..... 158

F FIRE-RESISTANT DOORSETS 159

BIBLIOGRAPHY..... 160

STANDARDS AUSTRALIA

Australian Standard

Methods for fire tests on building materials, components and structures

Part 4: Fire-resistance tests for elements of construction

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard provides methods for determining the fire resistance of various elements of construction when subjected to standard fire exposure conditions.

NOTES:

- 1 Radiant heat measurements are given in Appendix A.
- 2 Alternative heating and radiation exposure conditions, which may be used for evaluation of alternative solutions, voluntary upgrades and other applications where the standard heating regime may not be applicable, and recommended means for meeting special requirements are given in Appendix B.
- 3 Unless one of the alternative heating regimes is specifically required, the standard time temperature curve applies (see Figure 2.11.1).
- 4 AS 1720.4, AS 3600, AS 3700 and AS 4100 may also be used to determine the fire resistance of an element of construction.
- 5 The assessment of smoke production and smoke spread when testing specimens is outside the scope of this Standard. Significant smoke spread or smoke production can occur even though an element of construction may have achieved a high fire resistance level (FRL). Other test methods, such as AS 1530.7, may be considered when evaluating the potential for smoke spread.

1.2 OBJECTIVE

The objective of this Standard is to provide building designers, manufacturers, test laboratories and regulatory authorities with a set of uniform requirements for heating conditions, test procedures, and criteria for the determination of fire resistance of an element of building construction.

NOTE: Test reports include information that may assist building designers. Records of temperature at critical times may be used by a designer to assess the fire resistance of a variant of the tested prototype, where the procedure for such an assessment is defined in the appropriate design Standard or code. The test methods given herein provide means for the determination of—

- (a) resistance to the incipient spread of fire through ceiling systems;
- (b) safe distances for the spacing of combustible materials from elements that provide a separating function;
- (c) radiant heat flux from doorsets, shutter assemblies and glazing; and
- (d) the cross-sectional area of air ducts to provide functional operation while providing fire resistance.