

Fire resistance of Firecore TVC 30 Mini and TVC-40 Maxi doorsets incorporating various Kilargo products in accordance with AS 1530.4-2014 and AS 1905.1-2015

Assessment Report

Author: Keith Nicholls
Report number: FCO-3472
CO number: 5503
Date: 27/9/2022
Client: Firecore Pty Ltd

Commercial-in-confidence

Inquiries should be addressed to:

Fire Testing and Assessments	Author	The Client
NATA Registered Laboratory	Infrastructure Technologies	Firecore Pty Limited
14 Julius Avenue	14 Julius Avenue	291 Warringah Road
North Ryde, NSW 2113	North Ryde, NSW 2113	Beacon Hill NSW
Telephone +61 2 9490 5444	Telephone +61 2 9490 5500	Telephone +61 2 9401 9176

Report Details:

Report CSIRO Reference number: FCO3472/CO5503

Report Status and Revision History:

VERSION	STATUS	DATE	DISTRIBUTION	ISSUE NUMBER
Initial Issue	Final	27/9/2022	CSIRO/Client	FCO -3472

Report Authorization:

AUTHOR	REVIEWED BY	AUTHORISED BY
Keith Nicholls	Jing Xu	Brett Roddy



27/9/2022

27/9/2022

27/9/2022

Copyright and disclaimer

© 2022 CSIRO To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means except with the written permission of CSIRO.

Important disclaimer

CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must, therefore, be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CSIRO (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

Contents

1	Introduction	4
2	Supporting Data	4
3	Proposed Variations	6
4	Referenced Standards	12
5	Conclusion	13
6	Direct Field of Application of Results	16
7	Requirements	17
8	Term of Validity	17
9	Limitations	17
Appendix A	Supporting Test Data	18
Appendix B	Analysis of Variations	26

PROPERTY OF FIRECORE PTY LTD.
This CSIRO report can only be used as a Technical Reference for Firecore Fire Resistant Doorsets manufactured under License.
Must not be copied or distributed without written approval from Firecore Pty Ltd.
This report does not support any doors manufactured by Stylewise Doors and Complete Fire Door that are not a Firecore Pty Ltd Licensee

1 Introduction

This report is an assessment of fire resistance of Firecore TVC 30 Mini and TVC 40 Maxi doorsets incorporating various Kilargo products in accordance with AS 1530.4-2014 and AS 1905.1-2015.

This report is prepared for the purpose of meeting the evidence of suitability requirements of NCC 2019 Volume 1 Schedule 5 clauses 2b) and 2 c) or NCC 2022 Volume 1 Clauses S1C2 (b) and (c) as appropriate for FRL.

This report reviews and confirms the extent to which the reference fire resistance tests listed in Section 2 meet the requirements of the standard fire test standards listed in Section 4 of the report. The proposed variations to the tested construction presented in Section 3 are subject to an analysis in Appendix B and the conclusions are presented in Section 5 of this report.

The field of applicability of the results of this assessment report is presented in Section 6 and is subject to the requirements, validity and limitations of Sections 7, 8 and 9.

2 Supporting Data

This assessment report refers to various full scale test reports to support the performance of the target doorsets and they are listed below in Table 1;

Table 1 – Field of application of Firecore doorsets

Report Referenced	Test Standard	Description
FCO-3428 Shortform	AS 1530.4-2014 and AS 1905.1-2015	An assessment of fire resistance of Firecore single and double leaf doorsets in accordance with AS 1530.4-2014 and AS 1905.1-2015.

The report listed in Table 1 was prepared by CSIRO, North Ryde and sponsored by Firecore Pty Ltd.

To support the use of alternate hardware to that covered by the report listed in Table 1, reference is made to various additional full scale and pilot scale test reports to support the performance of various Kilargo branded hardware when fitted to the target doorsets listed in Table 1. These reports are listed in Table 2 below.

Table 2– Reports referenced to support additional hardware

Report reference	Test Standard	Brief hardware description		
		Product Type	Product code	Description
FSP 1142	AS 1530.4- 1997	Door Perimeter Seals	IS7025si	Surface mounted perimeter seal
FSP 1142	AS 1530.4- 1997		IS7190si	Surface mounted perimeter seal
FSP 1425	AS 1530.4- 2005		IS7095si	Surface mounted perimeter seal
FSP 1460	AS 1530.4- 2005		IS1046si	Silicone compression perimeter seal
FSP 1142	AS 1530.4- 1997	Automatic Door Bottom Seals	IS8090si	Surface mounted automatic door bottom seal
FSP 1143	AS 1530.4- 1997		IS8010si	Fully mortised automatic door bottom seal

Report reference	Test Standard	Brief hardware description		
		Product Type	Product code	Description
FSP 1425	AS 1530.4- 2005	Automatic Door Bottom Seals	IS8036si	Surface mounted automatic door bottom seal
FSP 1448	AS 1530.4- 2005		IS8020si	Fully mortised automatic door bottom seal
FSP 1142	AS 1530.4- 1997	Threshold Plates	IS4075	Heavy duty threshold ramp
FSP 1143	AS 1530.4- 1997		IS4025	Heavy duty threshold plate
FSP 1143	AS 1530.4- 1997	Smoke Seals	IS1515	Rebate smoke and acoustic seal
FSP 1143	AS 1530.4- 1997	Combined Fire / Smoke Seals	KG1612BW	Graphite intumescent combined fire, smoke and acoustic seal
FSP 1424	AS 1530.4- 2005		KG2512BW	Graphite intumescent combined fire, smoke and acoustic seal
FSP 1192	AS 1530.4- 1997		KG4002	Intumescent upgrade door perimeter gap seal (8mm gap)
FSV 1354	AS 1530.4- 2005		KG4002	Intumescent upgrade door perimeter gap seal
FSP 1192	AS 1530.4- 1997		KG4002TF	Intumescent upgrade door perimeter gap seal (8mm gap)
FSV 1437	AS 1530.4- 2005		KG5102	Intumescent upgrade door perimeter seal
FSP 1192	AS 1530.4- 1997		FDBU20	Door bottom upgrade seal
FSP 1192	AS 1530.4- 1997		FDBU60	Door bottom upgrade seal
FSP 1424	AS 1530.4- 2005		KP3504TF	Intumescent combined fire and smoke door bottom seal
FSV 1194	AS 1530.4- 2005		KP2004AS	Intumescent combined fire and smoke seal
FSV 1350				
FSV 1354	AS 1530.4- 2005		KP3004AS	Intumescent combined fire and smoke seal
FSV 1354	AS 1530.4- 2005	Meeting stile	FDMS-BB	Bullnose Aluminium meeting stiles with Intumescent seal (KP3004AS)
FSV 1391	AS 1530.4- 2005		FDMS-TP	T-Bar Aluminium meeting stiles

The referenced tests were carried out by CSIRO, North Ryde and sponsored by Firecore Pty Ltd.

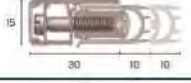
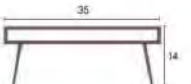
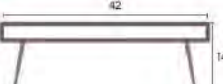
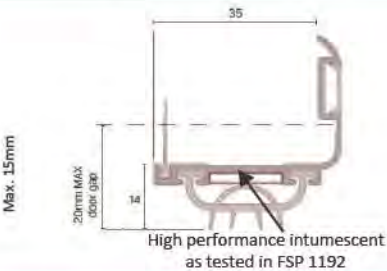
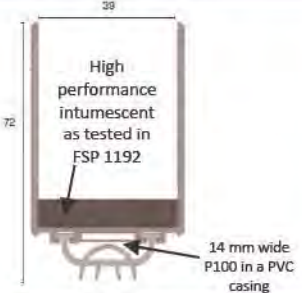
3 Proposed Variations

The proposed construction is defined as the doorsets described in Table 1 when varied to include the alternative hardware tested in Table 2 and subject to the variations below:

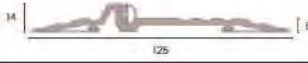
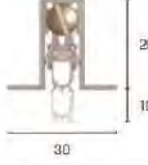
- Inclusion of the hardware as listed in Table 3.
- Where the hardware listed in Table 3 is added to the target doorset these seals are in addition to the hardware and seals required in FCO 3428.
- Inclusion of the hardware as listed in Table 4.
- Where the hardware listed in Table 4 is added to the target doorset this hardware is essential hardware and may only be installed as specified in FCO 3428.

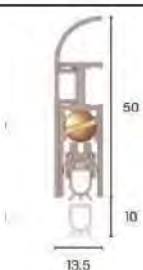
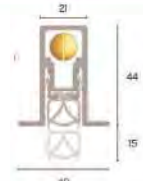
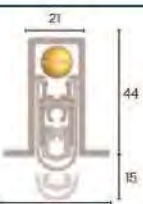
Table 3 – Proposed additional optional Kilargo Hardware

Hardware type	Product	Application	Location/Image
Door rebate perimeter smoke seals	IS1046si	In steel door frame rebate	
	IS1010		
	IS1212		
	IS1515		
	IS0511	Rebated into the head of the door leaf	
Frame-mounted perimeter seals	IS7010si	Mounted onto steel door frame door stop	
	IS7020si		
	IS7025si		
	IS7070si		
	IS7071si		
	IS7100si		
	IS7110si		
	IS7120si		

Hardware type	Product	Application	Location/Image
Frame-mounted perimeter seals	IS7080si	Mounted onto steel door frame door stop	
	IS7085si		
	IS7087si		
	IS7090si		
	IS7095si		
	IS7190si		
	IS7195si		
Intumescent Fire and Smoke Seals (graphite based)	KG1612BW	In steel door frame rebate	
	KG2512BW		
Fire door bottom upgrade seals (Sodium silicate)	KP3504TF (P100)	Stick on at the bottom of the door leaf	
	KP4204TF (P100)	Stick on at the bottom of the door leaf	
	FDBU20	Up to 20mm clearance between the bottom of door leaf and non-combustible threshold	
	FDBU60-35	Up to 60mm clearance between the bottom of door leaf and non-combustible threshold	

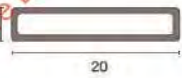
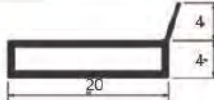
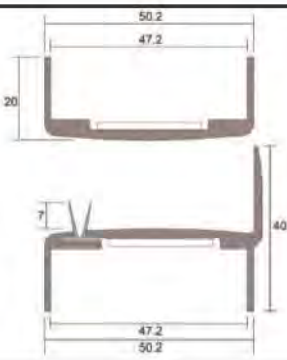
Hardware type	Product	Application	Location/Image
Intumescent Fire and Smoke Seals (Graphite and Sodium silicate)	FDBU60-45	Up to 60mm clearance between the bottom of door leaf and non-combustible threshold	
Aluminium Threshold plate	IS4010	At the door leaf threshold	
	IS4015		
	IS4020		
	IS4025		
	IS4030		
	IS4035		
	IS4040		
	IS4045		
Steel Threshold plate	IS4050S	At the door leaf threshold	
	IS4055S		
	IS4060S		
	IS4065S		
Aluminium Threshold plate	IS4070	At the door leaf threshold	
	IS4075		
	IS4077		
	IS4078si		
	IS4080		
	IS4100		
	IS4110		
	IS4120		
	IS4130		
	IS4135		

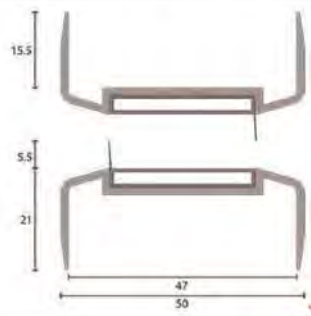
Hardware type	Product	Application	Location/Image
Aluminium Threshold plate	IS4140	At the door leaf threshold	
	IS4220si		
Automatic door bottom seals	IS8005si	Fully mortised	
	IS8010si	Fully mortised	
	IS8010si-KG	Fully mortised	
	IS8011si	Surface mounted or semi mortised	
	IS8011si-KG	Surface mounted or semi mortised	
	IS8020si	Surface mounted, semi mortised or fully mortised	
	IS8035si	Surface mounted or semi mortised	

Hardware type	Product	Application	Location/Image
Automatic door bottom seals	IS8036si	Surface mounted	
	IS8090si	Surface mounted or semi mortised	
	IS8091si	Surface mounted	
	IS8100si	Fully mortised	
	IS8520si	Surface mounted, semi mortised or fully mortised	
Silicone rubber wiping blade seal	IS8530si	Fully mortised	
	IS3080si	Surface mounted at bottom of the door leaf	
	IS5111si		

Hardware type	Product	Application	Location/Image
Silicone rubber wiping blade seal	IS5116si		
	IS5121si	Surface mounted door bottom seal	

Table 4 – Proposed essential Kilargo Hardware

Hardware type	Product code	Relevant doorset type in FCO 3428 Shortform	Application in FCO 3428	Image
Intumescent Fire and Smoke Seals (Sodium silicate)	KP2004	Single or double leave hinged doorsets	Rebated into the timber frame	
	KP2004AS			
	KP2004TS			
	KP3004AS	Double action doorsets	Rebated into the head of the door leaf or used in FDMS-BB meeting stiles	
Intumescent Fire and Smoke Seals (graphite based)	KG4002		Retrofitted on the steel door frame	
T-Bar Aluminium meeting stiles (Sodium silicate)	FDMS-TP	Double leaf double action or double leaf Push&Pull doorsets	Meeting stiles on double leaf double action or Push&Pull doorsets	

Hardware type	Product code	Relevant doorset type in FCO 3428 Shortform	Application in FCO 3428	Image
Bullnose Aluminium meeting stiles with Intumescent seal	FDMS-BB	Double leaf hinged doorsets	Meeting stiles on double leaf hinged doorsets	

4 Referenced Standards

Standards:

- | | |
|----------------|---|
| AS 1530.4-2014 | Methods for fire tests on building materials, components and structures Part 4: Fire resistance tests of elements of building construction. |
| AS 1905.1-2015 | Components for the protection of openings in fire-resistant walls Part 1: Fire-resistant doorsets. |

PROPERTY OF FIRECORE PTY LTD.
This CSIRO report can only be used as a Technical Reference for Firecore Fire Resistant Doorsets manufactured under License.
Must not be copied or distributed without written approval from Firecore Pty Ltd.
This report does not support any doors manufactured by Stylewise Doors and Complete Fire Door that are not a Firecore Pty Ltd Licensee

5 Conclusion

On the basis of the analysis presented in this report, it is the opinion of this Accredited Testing Laboratory that the tested prototypes described in Section 2 when varied as described in Section 3 will achieve the Fire Resistance stated below when submitted to a standard fire test in accordance with the test methods referenced in Section 4 and subject to the requirements of Section 7, the validity of Section 8 and limitation of Section 9.

Table 5 - FRL of additional door hardware

Additional hardware type	Product code	Location on doorset	Goal FRL	
			Mini TVC 30 single leaf hinged doorsets in FCO-3428	Maxi TVC 40 single or double leaf hinged doorsets in FCO-3428
Door rebate perimeter smoke seals	IS1046si	In steel door frame rebate	Up to -/120/30	Up to -/240/30
	IS1010		Up to -/120/30	Up to -/240/30
	IS1212		Up to -/120/30	Up to -/240/30
	IS1515		Up to -/120/30	Up to -/240/30
	IS0511	Rebated into the head of the door leaf	Up to -/120/30	Up to -/240/30
Frame-mounted perimeter seals	IS7010si	Mounted onto steel door frame door stop	Up to -/120/30	Up to -/240/30
	IS7020si		Up to -/120/30	Up to -/240/30
	IS7025si		Up to -/120/30	Up to -/240/30
	IS7070si		Up to -/120/30	Up to -/240/30
	IS7071si		Up to -/120/30	Up to -/240/30
	IS7100si		Up to -/120/30	Up to -/240/30
	IS7110si		Up to -/120/30	Up to -/240/30
	IS7120si		Up to -/120/30	Up to -/240/30
	IS7080si		Up to -/120/30	Up to -/240/30
	IS7085si		Up to -/120/30	Up to -/240/30
Frame-mounted perimeter seals	IS7087si	Mounted onto steel door frame door stop	Up to -/120/30	Up to -/240/30
	IS7090si		Up to -/120/30	Up to -/240/30
	IS7095si		Up to -/120/30	Up to -/240/30
	IS7190si		Up to -/120/30	Up to -/240/30
	IS7195si		Up to -/120/30	Up to -/240/30

Additional hardware type	Product code	Location on doorset	Goal FRL	
			Mini TVC 30 single leaf hinged doorsets in FCO-3428	Maxi TVC 40 single or double leaf hinged doorsets in FCO-3428
Door Rebate Intumescent Fire and Smoke Seals (graphite based)	KG1612BW	In steel door frame rebate	Up to -/120/30	Up to -/240/30 Single leaf only
	KG2512BW		Up to -/120/30	Up to -/240/30 Single leaf only
Intumescent Fire and Smoke Seals (Sodium silicate)	KP3504TF	Stick on at the bottom of the door leaf	Up to -/120/30	Up to -/240/30
	KP4204TF		Up to -/120/30	Up to -/240/30
Door bottom upgrade seals (Sodium silicate)	FDBU20	Up to 20mm clearance between the bottom of door leaf and non-combustible threshold	Up to -/120/30	Up to -/120/30
Door bottom upgrade seals (Graphite and Sodium silicate)	FDBU60-35	Up to 60mm clearance between the bottom of door leaf and non-combustible threshold	Up to -/120/30	Up to -/120/30
	FDBU60-45		Up to -/120/30	Up to -/120/30
Aluminium Threshold plate	IS4010	At the door leaf threshold	Up to -/120/30	Up to -/240/30
	IS4015		Up to -/120/30	Up to -/240/30
	IS4020		Up to -/120/30	Up to -/240/30
	IS4025		Up to -/120/30	Up to -/240/30
	IS4030		Up to -/120/30	Up to -/240/30
	IS4035		Up to -/120/30	Up to -/240/30
	IS4040		Up to -/120/30	Up to -/240/30
	IS4045		Up to -/120/30	Up to -/240/30
Steel Threshold plate	IS4050S		Up to -/120/30	Up to -/240/30
	IS4055S		Up to -/120/30	Up to -/240/30
Steel Threshold plate	IS4060S		Up to -/120/30	Up to -/240/30
	IS4065S		Up to -/120/30	Up to -/240/30

Additional hardware type	Product code	Location on doorset	Goal FRL	
			Mini TVC 30 single leaf hinged doorsets in FCO-3428	Maxi TVC 40 single or double leaf hinged doorsets in FCO-3428
Aluminium Threshold plate	IS4070	At the door leaf threshold	Up to -/120/30	Up to -/240/30
	IS4075		Up to -/120/30	Up to -/240/30
	IS4077		Up to -/120/30	Up to -/240/30
	IS4078si		Up to -/120/30	Up to -/240/30
	IS4080		Up to -/120/30	Up to -/240/30
	IS4100		Up to -/120/30	Up to -/240/30
	IS4110		Up to -/120/30	Up to -/240/30
	IS4120		Up to -/120/30	Up to -/240/30
	IS4130		Up to -/120/30	Up to -/240/30
	IS4135		Up to -/120/30	Up to -/240/30
	IS4140		Up to -/120/30	Up to -/240/30
	IS4220si		Up to -/120/30	Up to -/240/30
Automatic door bottom seals	IS8005si	Fully mortised	Up to -/120/30	Up to -/240/30
	IS8010si	Fully mortised	Up to -/120/30	Up to -/240/30
	IS8010si-KG	Fully mortised	Up to -/120/30	Up to -/240/30
	IS8011si	Surface mounted or semi mortised	Up to -/120/30	Up to -/240/30
	IS8011si-KG	Surface mounted or semi mortised	Up to -/120/30	Up to -/240/30
	IS8020si	Surface mounted, semi mortised or fully mortised	Up to -/120/30	Up to -/240/30
	IS8035si	Surface mounted or semi mortised	Up to -/120/30	Up to -/240/30
	IS8036si	Surface mounted	Up to -/120/30	Up to -/240/30
	IS8090si	Surface mounted or semi mortised	Up to -/120/30	Up to -/240/30
	IS8091si	Surface mounted	Up to -/120/30	Up to -/240/30

Additional hardware type	Product code	Location on doorset	Goal FRL	
			Mini TVC 30 single leaf hinged doorsets in FCO-3428	Maxi TVC 40 single or double leaf hinged doorsets in FCO-3428
Automatic door bottom seals	IS8100si	Fully mortised	Up to -/120/30	Up to -/240/30
	IS8520si	Surface mounted, semi mortised or fully mortised	Up to -/120/30	Up to -/240/30
	IS8530si	Fully mortised	Up to -/120/30	Up to -/240/30
Silicone rubber wiping blade seal	IS3080si	Surface mounted at bottom of the door leaf	Up to -/120/30	Up to -/240/30
	IS5111si		Up to -/120/30	Up to -/240/30
	IS5116si		Up to -/120/30	Up to -/240/30
	IS5121si		Up to -/120/30	Up to -/240/30

Table 6 - FRL of essential door hardware

Hardware type	Product code	Doorset construction	Relevant doorset type	Application	FRL
Intumescent Fire and Smoke Seals	KP2004	FCO 3428 Shortform	Single or double leaf hinged doorsets	Rebated into the timber frame	Refer to FCO 3428 Shortform
	KP2004AS				
	KP2004TS				
	KP3004AS		Double action doorsets	Rebated into the head of the door leaf or used in FDMS-BB meeting stiles	
	KG4002			Retrofitted onto a steel door frame	
Bullnose Aluminium meeting stiles	FDMS-BB	FCO 3428 Shortform	Double leaf double action or double leaf Push&Pull doorsets	Meeting stiles on double leaf double action or Push&Pull doorsets	Refer to FCO 3428 Shortform
T-Bar Aluminium meeting stiles	FDMS-TP		Double leaf hinged doorsets	Meeting stiles on double leaf hinged doorsets	

6 Direct Field of Application of Results

The results of this assessment are applicable to door hardware fitted to single and double leaf doorset in wall constructions exposed to fire from either direction.

7 Requirements

It is required that the doorset including all hardware is designed, configured and installed to meet the requirements of AS 1905.1-2015 Section 2 and Section 5.

Any other variations with respect to size, constructional details, loads, stresses, edge or end conditions that are other than those identified in this report, may invalidate the conclusions drawn in this report.

8 Term of Validity

This assessment report will lapse on 31st August 2027. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

9 Limitations

The conclusions of this assessment report may be used to directly assess the fire resistance performance under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire conditions.

Because of the nature of fire resistance testing, and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

This assessment report does not provide an endorsement by CSIRO of the actual products supplied to the industry. The referenced assessment can therefore only relate to the actual prototype test specimens, testing conditions and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that this report is reviewed on or, before, the stated expiry date.

The information contained in this assessment report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.