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# Door hardware assessment

Report sponsor: E Plus Building Products Pty Ltd and Southern Design Group Pty Ltd

Products: Leverset, escutcheon and pull handles

Report number: FAS210275

Revision: DHAR1.0

# Contents

# 1. Introduction

This report documents the findings of the assessment to determine the expected fire resistance level (FRL) of proposed Southern Design leversets, escutcheon and pull handles in accordance with AS 1530.4:2014[1] and AS 1905.1:2015[2].

Warringtonfire performed this assessment at the request of the report sponsors listed in Table 1.

**Table 1 Report sponsor details**

| Report sponsor | Address |
|---|---|
| E Plus Building Products Pty Ltd | 12-13 Dansu Court<br>Hallam VIC 3803<br>Australia |
| Southern Design Group Pty Ltd | 4-16 Stepney Street<br>Stepney SA 5069<br>Australia |

# 2. Variations considered in this report

The variations considered in this report are fitting various door levers, escutcheon plates and pull handles as listed in Table 8 to Table 10 as an addition or an alternative item of hardware in the referenced doorsets listed in Table 2. Table 3 provides additional supporting information about the proposed hardware.

**Table 2 Referenced test reports**

| Test reference | Doorset description | Test standard |
|---|---|---|
| FSV 0608 | Single leaf plywood faced E-core mini doorset, nominally 35 mm thick | AS 1530.4:1997 |
| FSV 0609 | Single leaf plywood faced E-core doorset, nominally 45 mm thick | AS 1530.4:1997 |
| SI 2271 | Two leaf plywood faced E-core doorset, nominally 45 mm thick | AS 1530.4:1985 |

**Table 3 Additional supporting information**

| Test report | Test date | Doorset description | Test duration | Test standard |
|---|---|---|---|---|
| FRT210437 R1.0 | 7 March 2022 | Single leaf plywood faced E-core doorset, nominally 35 mm thick | 121 minutes | AS 1530.4:2014 |
| FRT210438 R1.0 | 8 March 2022 | Single leaf plywood faced E-core doorset, nominally 35 mm thick | 121 minutes | AS 1530.4:2014 |

# 3. Description of the tested door hardware

Table 4 and Table 6 describes the tested door hardware specimen. This information was provided by the test sponsor and surveyed by Warringtonfire. Table 5 and Table 7 describes the pre-test functionality test done on the door system.

Photographs of the test specimen are included in Figure 1 to Figure 6.

All measurements were done by Warringtonfire – unless indicated otherwise.

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

**Table 4 Specimen description – FRT210437 R1.0**

| Item | Description |
|---|---|
| Door hardware product name | Berlin leverset with round rose and Sans Arc Super Moon Pull handle |
| **Door system properties** | |
| Door leaf thickness (measured) | 38 mm |
| Backset | 60 mm |
| Lockset type | Tubular latchset |

**Table 5 Specimen functionality test – FRT210437 R1.0**

| Item | Description | |
|---|---|---|
| Opening and closing cycles | The doors were subjected to a series of 50 opening and closing cycles of at least 75° for side-hung doorsets in accordance with clause 7.2.5 of AS 1530.4:2014. | |
| Opening force | 1.6 N | |
| Closing force | 1.7 N | |
| Latching force | 34.3 N | |
| Average clearance measurement (door leaf to frame) | Top edge | 2.5 mm |
| | Latch edge | 1.28 mm |
| | Hinge edge | 2.3 mm |

**Figure 1 Unexposed view of the tested hardware**

**Figure 2 Exposed view of the tested hardware**

**Figure 3 Latch edge view of the tested hardware**

**Table 6 Specimen description – FRT210438 R1.0**

| Item | Description |
|---|---|
| Door hardware product name | Tradco 6213 Tubular latch, Tradco Brunswick levers and Tradco Chamfered Long plate furniture |
| **Door system properties** | |
| Door leaf thickness (measured) | 38 mm |
| Backset | 60 mm |
| Lockset type | Tubular latch |

**Table 7 Specimen functionality test – FRT210438 R1.0**

| Item | Description | |
|---|---|---|
| Opening and closing cycles | The doors were subjected to a series of 50 opening and closing cycles of at least 75° for side-hung doorsets in accordance with clause 7.2.5 of AS 1530.4:2014. | |
| Opening force | 1.5 N | |
| Closing force | 2.0 N | |
| Latching force | 78.5 N | |
| Average clearance measurement (door leaf to frame) | Top edge | 2.7 mm |
| | Latch edge | 1.4 mm |
| | Hinge edge | 2.0 mm |

Figure 4 Unexposed view of the tested hardware

Figure 5 Exposed view of the tested hardware

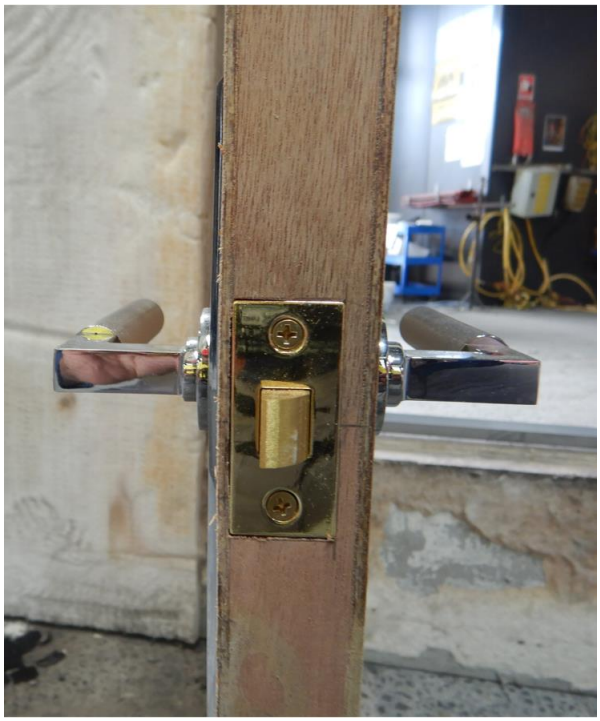

Figure 6 Latch edge view of the tested hardware

# 4. Assessment

## 4.1 Tested hardware in FRT210437 R1.0

Section 4 of AS 1905.1:2015 requires some variations from tested prototypes to be subjected to a pilot scale test for assignment of FRL. As such, in addition to the full-scale tests listed in Table 2, pilot scale tests listed in Table 3 form the basis of this assessment.

A pilot scale fire resistance test – in accordance with section 2, Appendix B11 of AS 1530.4:2014 – was done on a pilot scale doorset under FRT210437 R1.0. It included a Tradco Berlin leverset with a round rose and a Tradco Sans Arc Super Moon Satin brass pull handle fitted onto the door leaf.

AS 1530.4:2014 states that either sustained flaming on the surface of the unexposed face for 10 seconds or longer, ignition of a cotton pad, gap gauge failure, or the latching mechanism being disengaged at the end of the test, constitute integrity failure. During the test – FRT210437 R1.0 – the Tradco Berlin leverset with round rose and Tradco Sans Arc Super Moon Satin brass pull handle did not initiate failure of the doorset for the duration of the test.

As the proposed hardware did not cause failure in FRT210437 R1.0, adding the proposed Tradco Sans Arc Super Moon Satin brass pull handle and substituting the Tradco Berlin leverset with round rose for the hardware tested in the referenced doorsets is not expected to affect their performance.

## 4.2 Tested hardware in FRT210438 R1.0

A pilot scale fire resistance test – in accordance with section 2, Appendix B11 of AS 1530.4:2014 – was done on a pilot scale doorset under FRT210438 R1.0. It included a Tradco 6213 tubular latch, Tradco Brunswick levers and Tradco Chamfered Long plate furniture fitted onto the door leaf.

AS 1530.4:2014 states that either sustained flaming on the surface of the unexposed face for 10 seconds or longer, ignition of a cotton pad, gap gauge failure, or the latching mechanism being disengaged at the end of the test, constitute integrity failure. During the test – FRT210438 R1.0 – Tradco 6213 tubular latch, Tradco Brunswick levers, and Tradco Chamfered Long plate furniture did not initiate failure of the doorset for the duration of the test.

As the proposed hardware did not cause failure in FRT210438 R1.0, substituting the proposed Tradco 6213 tubular latch, Tradco Brunswick levers and Tradco Chamfered Long plate furniture to the referenced doorsets for the hardware tested in the referenced doorsets is not expected to affect their performance.

## 4.3 Proposed pull handles

The door pull handle type tested in FRT210437 R1.0 was the Tradco Sans Arc Super Moon Satin brass pull handle. The tested pull handle has the highest weight when compared to the other proposed door handles and hence is the most likely to fall off upon degradation of the door leaf. Therefore, it was identified as the most onerous item of hardware. The proposed door pull handles were surveyed and the weight of each hardware was recorded as shown in Table 8.

**Table 8 Proposed door pull handles**

| Item No. | Escutcheon Plate Type | Mass(g) |
|---|---|---|
| 1. | Sarlat Backplate Polished Brass | 1150 |
| 2. | Sarlat Polished Nickel | 1980 |
| 3. | Berlin Polished Brass | 2010 |
| 4. | Brunswick Knurled Antique Copper | 2010 |
| 5. | Baltimore Polished Brass | 2780 |
| 6. | Helsinki Chrome plated | 3550 |
| 7. | Pull handle Sans Arc Associati Satin Brass, L400 or L600 | 2110 |
| 8. | Tradco Sans Arc Super Moon Satin brass (tested) | 3620 |

As the heaviest pull handle did not initiate any integrity failure it is expected that, the proposed pull handles listed in Table 8 will also maintain integrity performance at least for the tested period. Based on the above, the proposed pull handles can be positively assessed.

## 4.4 Proposed door levers

It is proposed that the tested levers will be substituted by the lever models listed in Table 9.

**Table 9 List of proposed levers and doorknobs**

| item | Door hardware | Mass (g) | Turning moment (Nm) |
|---|---|---|---|
| 1. | Baltimore | 269.0 | 0.09 |
| 2. | Siena | 271.0 | 0.11 |
| 3. | Annecy | 235.0 | 0.09 |
| 4. | Bronte | 279.5 | 0.08 |
| 5. | Como | 237.0 | 0.05 |
| 6. | Verona | 234.0 | 0.10 |
| 7. | Berlin (tested) | 310.0 | 0.13 |
| 8. | Brunswick (tested) | 310.5 | 0.13 |
| 9. | Baltimore Return Pair | 346.0 | 0.1560 |
| 10. | Futurismo | 501.0 | 0.0814 |
| 11. | Oxford | 267.0 | 0.07 |
| 12. | Sarlat | 230.5 | 0.09 |
| 13. | Tradco Return Lever | 229.5 | 0.093 |
| 14. | Copenhagen Pair Rumbled Nickel | 271.0 | 0.1233 |
| 15. | Stirling Pair Chrome Plated | 261.5 | 0.0561 |
| 16. | Helsinki Pair Chrome | 356.5 | 0.1212 |
| 17. | Osaka Pair statin | 281.0 | 0.0872 |
| 18. | Gepetto chrome | 414.0 | 0.1086 |
| 19. | Doorknob Cambridge Round Rose Concealed Fix | 298.3 | n/a |
| 20. | Doorknob Paddington Round Rose Concealed Fix | 301.5 | n/a |
| 21. | Doorknob Guildford Round Rose Concealed Fix | 314.5 | n/a |
| 22. | Doorknob Zzzigurat D69 mm | 362.0 | n/a |

The proposed lever modules summarised in Table 9 are generally similar to the tested leversets and have a similar method of construction. The main variations from the tested hardware are the shape of the levers, their masses, and the moments they induce on the spindle. The proposed variations have near identical roses and escutcheons taking up the same or less area on the door leaf and operate the latchset via a similar mechanism.

AS 1530.4:2014, clause 7.9.7 (l) states: *'Where locksets or latchsets are operated by a steel shaft, their surface-mounted furniture may be varied provided—*

*(i) the melting point of any part is not reduced;*

*(ii) any replacement handle or knob is not so massive or asymmetrical as to introduce a turning moment about the operating shaft which exceeds 0.07 N.m.*

*(iii) any replacement lever handle is not so massive or asymmetrical as to increase the turning moment about the operating shaft by more than 10%.'*

The proposed levers have all been surveyed by Warringtonfire. It was noted that the levers have equal or higher melting points than the tested levers. In addition, the mass and turning moments of

each lever were also recorded, which are listed in Table 9. From the above, it is noted that the proposed levers did not exceed the turning moment about the operating shaft by more than 10%, with the exception of the Baltimore Return Pair. In addition, the calculated turning moment for the Futurismo lever is identified as inaccurate considering its overall mass. This is due to the unique shape of the Futurismo lever, which makes it difficult to mount in the instrument for turning moment calculation. However, from the overall mass of the lever, the turning moment is estimated to be significantly higher than the tested turning moments of Brunswick and Berlin levers. The Futurismo lever in conjunction with the proposed lock has been tested in a similar core door leaf and has demonstrated its ability to maintain latching for up to 120 minutes in a separate test. The Baltimore Return Pair has a lower mass than the Futurismo lever and hence is also expected to maintain latching for 120 minutes. Based on the above, the proposed levers listed in Table 9 are positively assessed.

## 4.5 Proposed escutcheon plates

It is proposed that the tested escutcheon plates will be substituted by the proposed escutcheon plates listed in Table 10. The tested escutcheon plates had the largest area and the highest weight when compared to the other proposed escutcheon plates. Therefore, they were considered to be the most onerous specimens. A survey of the proposed escutcheon plates was undertaken. The dimensions measured are shown in Table 10.

**Table 10 List of proposed escutcheon plates**

| Item No. | Escutcheon Plate Type | Dimensions H × W (mm × mm) | Area ($m^2$) | Mass(g) |
|---|---|---|---|---|
| 23. | Shouldered | 250 × 48 | 0.120 | 245.0 |
| 24. | Rectangular | 240 × 37 | 0.009 | 225.5 |
| 25. | Oval | 240 × 40 | 0.010 | 218.5 |
| 26. | Stepped | 237 × 50 | 0.012 | 315.5 |
| 27. | Chamfered Long (Tested) | 240 × 50 | 0.012 | 478.0 |
| 28. | Chamfered Square | 60 × 60 | 0.004 | 93.0 |
| 29. | Round Rose | D52 | 0.002 | 99.0 |
| 30. | Round Rose (Tested) | D58 | 0.003 | 68.5 |
| 31. | Square Rose | 52 × 52 | 0.002 | 71.0 |

AS 1530.4:2014, clause 7.9.7 (l) states: *'Where locksets or latchsets are operated by a steel shaft, their surface-mounted furniture may be varied provided—*

*(iv) any replacement escutcheon plate adequately covers any hole in the door leaf formed to accommodate the lockset or latchset, but does not increase the area of the face of the door leaf covered by the escutcheon by more than 20%*

The proposed escutcheon plates listed in Table 10 satisfy clause 7.9.7 (l) (iv). Based on the above, the proposed escutcheon plates are positively assessed.

# 5. Conclusion

It is the opinion of Warringtonfire's accredited fire testing laboratory in Australia that the proposed doorsets are expected to achieve the FRLs shown in Table 11 if fitted with the hardware listed in Table 8 to Table 10.

This assessment report has been prepared in accordance with section 4.5 of AS 1905.1:2015 and is conditional on the operational characteristics and materials of the doorset complying with section 2 of AS 1905.1:2015. The field of application for the Leverset, escutcheon and pull handles is the same as the field of application for the doorset that the Leverset, escutcheon and pull handles is installed on.

**Table 11 Conclusion**

| Test reference | Description | Assessed hardware | FRL |
|---|---|---|---|
| FSV 0608 | Single leaf plywood faced E-core mini doorset, nominally 35 mm thick. | As listed in Table 8 to Table 10 | **-/120/30** |
| FSV 0609 | Single leaf plywood faced E-core doorset, nominally 45 mm thick. | | **-/120/30** |
| SI 2271 | Two leaf plywood faced E-core doorset, nominally 45 mm thick. | | **-/120/30** |

# Conditions and validity

- The conclusions of this assessment may be used to directly assess the fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all 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 of the result. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.
- The 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 preparing this report. The published procedures for the conduct of tests and the assessment of the test results are the subject of constant review and improvement and it is recommended that this report be reviewed by Warringtonfire before the end of the validity date.
- The information in this report must 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.
- The data, methodologies, calculations and results documented in this report specifically relate to the tested specimen/s and must not be used for any other purpose. This report may only be reproduced in full. Extracts or abridgements must not be published without permission from Warringtonfire.
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# Quality management

<table>
<tr><th>Revision</th><th>Issue date</th><th>Expiry date</th><th colspan="4">Information about the report</th></tr>
<tr><td rowspan="4">DHAR1.0</td><td rowspan="4">23/05/2022</td><td rowspan="4">31/05/2027</td><td>Description</td><td colspan="3">Initial issue</td></tr>
<tr><td></td><td>Prepared by</td><td>Reviewed by</td><td>Authorised by</td></tr>
<tr><td>Name</td><td>Alim Rasel</td><td>Mahmoud Akl</td><td>Omar Saad</td></tr>
<tr><td>Signature</td><td>  </td><td>  </td><td>  </td></tr>
</table>

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# Global locations



**Warringtonfire Australia Pty Ltd**
**ABN 81 050 241 524**

**Perth**

Suite 4.01, 256 Adelaide Terrace
Perth WA 6000
Australia
T: +61 8 9382 3844

**Canberra**

Unit 10, 71 Leichhardt Street
Kingston ACT 2604
Australia
T: +61 2 6260 8488

**Melbourne**

Level 4, 152 Elizabeth Street
Melbourne VIC 3000
Australia
T: +61 3 9767 1000

**Sydney**

Suite 802, Level 8, 383 Kent Street
Sydney NSW 2000
Australia
T: +61 2 9211 4333

**Brisbane**

Suite B, Level 6, 133 Mary Street
Brisbane QLD 4000
Australia
T: +61 7 3238 1700

**Melbourne – NATA accredited laboratory**

409-411 Hammond Road
Dandenong VIC 3175
Australia
T: +61 3 9767 1000