PAS 24:2012
Annex C

Test of: Side Hung Window Next to Direct Glazed
Enhanced security performance requirements for windows

A Report To:
Archibald Kenrick & Sons
Kenrick Way, West Bromwich, West Midlands, B70 6DB

Document Reference:
WIL 367869

Date: 26/07/2016
Copy: 1
Issue No.: 1
Page 1
TEST CONCLUSIONS

Samples of:
Manufacturer: Garrard Windows Ltd
Product: Window
Model: Side hung next to direct glazed

have been tested in accordance with: PAS24:2012 Annex C.
By Exova Willenhall, a UKAS accredited Testing Laboratory (No. 0621)

At Key Industrial Park, Fernside Rd, Willenhall, West Midlands, WV13 3YA.
Results and comments as detailed below:

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<th>Clause No.</th>
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<tr>
<td>4</td>
<td>Enhanced security performance requirements</td>
<td>No</td>
</tr>
<tr>
<td>4.1.1</td>
<td>Classification of use</td>
<td>No</td>
</tr>
<tr>
<td>4.2</td>
<td>Infill medium</td>
<td>N/A</td>
</tr>
<tr>
<td>4.3</td>
<td>Letterplates</td>
<td>N/A</td>
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<tr>
<td>4.4</td>
<td>Classification</td>
<td>WK</td>
</tr>
<tr>
<td>5</td>
<td>Marking</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>Design and general requirements</td>
<td>No</td>
</tr>
<tr>
<td>Annex C</td>
<td>Enhanced security performance for windows</td>
<td>Yes</td>
</tr>
<tr>
<td>C.4.3</td>
<td>Manipulation test</td>
<td>Yes</td>
</tr>
<tr>
<td>C.4.4.2</td>
<td>Infill manual test</td>
<td>Yes</td>
</tr>
<tr>
<td>C.4.4.3</td>
<td>Infill mechanical test</td>
<td>Yes</td>
</tr>
<tr>
<td>C.4.5</td>
<td>Mechanical loading test</td>
<td>Yes</td>
</tr>
<tr>
<td>C.4.6</td>
<td>Manual check test</td>
<td>Yes</td>
</tr>
<tr>
<td>C.4.7</td>
<td>Additional mechanical loading test</td>
<td>Yes</td>
</tr>
</tbody>
</table>

No inferences can be made regarding performance against other requirements of this standard

Tests marked N/A are not applicable to the sample under test.
Tests marked N/T were not applied to the sample under test.
AUTHORISATION

Tests performed by: Chris Bryan, Test Engineer

Report issued by: Mark Garfield, Door & Window Deputy Laboratory Manager

Signed

Date 26th July 2016

For and on behalf of Exova

Report authorised by: Mark West, Door & Window Laboratory Manager

Signed

Date 26th July 2016

For and on behalf of Exova

Report issued: 26 July 2016

NOTE.
Tests marked “Not UKAS Accredited” are not covered by the Laboratory UKAS accreditation schedule.

The laboratory has tested the product supplied by the client as sampled in accordance with their own requirements

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</table>
TEST DETAILS

CLIENT DETAILS
Company name: Archibald Kenrick & Sons
Address: Kenrick Way, West Bromwich, West Midlands, B70 6DB
Contact: Craig Barnett

ORDER DETAILS
Order number: 6268
Dated:

SAMPLE DETAILS
Outer frame: 1200mm x 1250mm
Opening casements: 570mm x 1198mm
Material: Aluminium
Details of Hardware:
Hinges: Kenrick
Hinge protection: Kenrick
Lock: Kenrick
Handles: Fab n Fix
Seals: Smarts

TEST DETAILS
Test specification: PAS 24:2012
Full test: Yes
Test to clauses: Annex C
Sample received: 08/07/16
Test started: 15/07/16
Test completed: 15/07/16

Special Test requirements
Other reports to be used in conjunction with this report
## TEST PROCEDURE

### Introduction
This test report should be read in conjunction with the Standard PAS 24:2012 Enhanced security performance requirements for doorsets and windows in the UK.

The specimens were judged on their ability to comply with the performance criteria as required in PAS24:2012 Annex C.

### Instruction To Test
Initial requirement was for a classification of WK for key locking windows only.

### Test Specimen Construction
A description of the test construction is given in the Schedule of Components. The description is based on a detailed survey of the specimens and information supplied by the sponsor of the test.

### Installation
The window was supplied mounted within a timber sub-frame of nominal section 75mm x 100mm fitted flush with the exterior face, in accordance with the clients fitting instructions.

### Sampling
The samples were not independently witnessed or selected and were provided direct from the test sponsor.

### Test Climate
The sample was conditioned in the laboratory in the range 10-30 °C and 25-75% humidity.
INITIAL OBSERVATIONS

The external face of the sample

The internal face of the sample
Sample handle

Sample hinge/
hinge protection
Sample keeper

Sample locking cams
TEST SPECIMEN

Figure 1 - General Elevation of Test Specimen (External Face)

Do not scale. All dimensions are in mm
Figure 2 – Profile section

Do not scale. All dimensions are in mm
SCHEDULE OF COMPONENTS
(Refer to Figures 1 to 3)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

Variants
None

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
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</table>
| 1. Window frame head | Supplier: Smarts  
Profile code: ETC 317  
Material: Aluminium  
Density: kg/m$^3$ (stated)  
Overall section size: 1200mm  
Rebate: 49 x 15  
Fixing jamb to head joints:  
i. type: Cleat  
ii. size: 5.5mm x 19.6mm  
iii. quantity: 1  
Reinforcement:  
i. position: N/A  
ii. profile code: N/A  
iii. material: N/A  
iv. density: kg/m$^3$ (stated)  
v. length: N/A |
| 2. Window frame jamb | Supplier: Smarts  
Profile code: ETC 317  
Material: Aluminium  
Density: kg/m$^3$ (stated)  
Overall section size: 1250mm  
Rebate: 49 x 15  
Fixing jamb to sill joints:  
i. type: Cleat  
ii. material: Aluminium  
iii. size: 5.5mm x 19.6mm  
iv. quantity: 1  
Reinforcement:  
i. position: N/A  
ii. profile code: N/A  
iii. material: N/A  
iv. density: kg/m$^3$ (stated)  
v. length: N/A |
| 3. Window frame mullion | Supplier: Smarts  
Profile code: ETC 333 |
<table>
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<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Material</strong>: Aluminium</td>
</tr>
<tr>
<td></td>
<td><strong>Density</strong>: kg/m³ (stated)</td>
</tr>
<tr>
<td></td>
<td><strong>Overall section size</strong>: 1186mm</td>
</tr>
<tr>
<td></td>
<td><strong>Rebate</strong>: 49 x 15</td>
</tr>
<tr>
<td></td>
<td><strong>Fixing mullion to head &amp; sill joints</strong></td>
</tr>
<tr>
<td></td>
<td>i. <strong>type</strong>: S/S self-tap pan head</td>
</tr>
<tr>
<td></td>
<td>ii. <strong>size</strong>: 10 x 50</td>
</tr>
<tr>
<td></td>
<td>iii. <strong>quantity</strong>: x 4</td>
</tr>
<tr>
<td></td>
<td><strong>Reinforcement</strong>: N/A</td>
</tr>
</tbody>
</table>

4. **Window frame sill**
- **Supplier**: Smarts
- **Profile code**: ETC 317
- **Material**: Aluminium  |
- **Density**: kg/m³ (stated)  |
- **Overall section size**: 1200mm  |
- **Rebate**: N/A  |
- **Reinforcement**: N/A  |

5. **Window frame weather seals**
- **Supplier**: Smarts
- **Reference**: ACVL032
- **Material**: Rubber  |
- **Fixing method**: Inserted  |

6. **Hinges**
- **Supplier**: Kenrick
- **Description**: 12” side hung 13mm stack height  |
- **Reference**: KS12
- **Material**: Ferritic S/S  |
- **Quantity**: 1 pair per sash  |
- **Fixing hinge to casement**
  i. **type**: Pan head screws  |
  ii. **size**: 3.8 x 25  |
  iii. **quantity**: x 3  |
- **Fixing hinge to frame**
  i. **type**: Pan head screws  |
  ii. **size**: 3.8 x 25  |
  iii. **quantity**: x 3  |

7. **Hinge protectors**
- **Supplier**: Kenrick
- **Description**: 13mm stack  |
- **Reference**: KSHS13
- **Material**: Zinc die-cast  |
- **Quantity**: 4 x per sash  |
- **Position**: Within 100 mm of hinge  |
- **Fixing device to casement**
  i. **type**: Countersunk screws  |
  ii. **size**: 3.8 x 25  |
  iii. **quantity**: 2 x per hinge protector
### Item | Description
--- | ---
**Fixing device to frame**

i. **type** : Countersunk screws  
ii. **size** : 3.8 x 25  
iii. **quantity** : 2 x per hinge protector

**8. Lock**

Supplier : Kenrick  
Description : Nemesis Twin Cam  
Reference : NEM1150205LH  
Material : Stainless steel  
Fixings  

i. **type** : Countersunk screws  
ii. **size** : 3.8 x 19  
iii. **quantity** : x 10

**9. Lock Keeps**

Supplier : Kenrick  
Description : Nemesis  
Reference : RLCO8136F  
Material : Die-cast  
Quantity : 1 x per sash  
Fixing keeps to frame  

i. **type** : Countersunk screws  
ii. **size** : 3.8 x 19  
iii. **quantity** : 3 x per keep

**10. Lever handles**

Supplier : Fab & Fix  
Description : Left hand white  
Reference : HCOSLH40WH-ALU  
Material : Aluminium  
Fixings  

i. **type** : Machine screws  
ii. **size** : M5 x 16mm  
iii. **quantity** : 2 x per handle

**11. Window casement(s)**

**Overall Size**

i. **top hung sash** : N/A  
ii. **side hung sash** : 570mm x 1198mm  
iii. **fixed sash** : N/A  
Supplier : Smarts  
Profile codes  

i. **stile profile code** : ETC 321  
ii. **rail profile code** : ETC 321  
iii. **mid rail profile code** : N/A  
Material : PVC  
Density : kg/m³ (stated)  
Sash framing section sizes

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Author: M Garfield  
Issue Date: 26/07/2016  
Client: Archibald Kenrick & Sons  
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<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>iv. rail</td>
<td>N/A</td>
</tr>
<tr>
<td>v. stile</td>
<td>N/A</td>
</tr>
<tr>
<td>Corner fixing method</td>
<td>Cleat</td>
</tr>
<tr>
<td>i. type</td>
<td>ACET321 &amp; ACET327</td>
</tr>
<tr>
<td>ii. size</td>
<td>(321) 5.5mm x 18.6mm &amp; (327) 5.5mm x 9.3mm</td>
</tr>
<tr>
<td>iii. quantity</td>
<td>1 x Each</td>
</tr>
<tr>
<td>Reinforcement</td>
<td></td>
</tr>
<tr>
<td>i. position</td>
<td>N/A</td>
</tr>
<tr>
<td>ii. profile code</td>
<td>N/A</td>
</tr>
<tr>
<td>iii. material</td>
<td>N/A</td>
</tr>
<tr>
<td>iv. density</td>
<td>kg/m$^3$ (stated)</td>
</tr>
<tr>
<td>v. length</td>
<td>N/A</td>
</tr>
</tbody>
</table>

12. Window casement glass
Supplier : JCL Glass
Thickness : 4:20:4
Overall size
i. top hung sash : N/A
ii. side hung sash : 498 x 1125
iii. fixed sash : N/A
iv. direct glazing : 552 x 1178
Nominal edge clearance : 4mm

13. Glazing setting blocks
Supplier : Glazparts
Material : Plastic
Thickness : Various
Overall size : 100mm

14. Glazing tape
Supplier : N/A
Reference : N/A
Material : N/A
Thickness : N/A
Overall size : N/A
Fixing method : N/A

15. Glazing gasket
Supplier : Smarts
Reference : ACET 835 (Bead) & ACET 840 (Wedge)
Fixing method : Insert and Wedge

16. Glazing beads
Glazing method : Externally beaded
Supplier : Smarts
Profile code : ETC 375
Material : Aluminium
Density : kg/m$^3$ (stated)
Overall size : 15mm
Fixing method : Shuffle
## PERFORMANCE CRITERIA & TEST RESULTS

<table>
<thead>
<tr>
<th>Clause</th>
<th>Result</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.1 Classification of use</td>
<td>Windows shall be classified according to their intended use for all relevant characteristics in accordance with BS 6375:2009 and the relevant material specific standard.</td>
<td>No evidence supplied by client.</td>
</tr>
<tr>
<td>4.1.3 Windows</td>
<td>Windows must meet the requirements of Annex C of PAS24:2012 or RC2N of BS EN 1627</td>
<td>Window meets the requirements of Annex C of PAS24.</td>
</tr>
<tr>
<td>4.2 Infill medium requirements</td>
<td>Where non-key locking hardware is fitted each glazed area shall include at least one pane of laminated glass meeting the requirements of BS EN 356 Class P1A.</td>
<td>Window is fitted with key locking hardware, not applicable.</td>
</tr>
<tr>
<td>4.3 Letterplates</td>
<td>Window not fitted with a letterplate, not applicable.</td>
<td>N/A</td>
</tr>
<tr>
<td>4.4 Classification</td>
<td>Following testing to Annex C with an entry definition defined in 3.1 &amp; 3.2, the final classification shall be determined as:</td>
<td>Window classified as WK for removable key locking hardware only</td>
</tr>
<tr>
<td>5 Marking</td>
<td>The window assembly shall be permanently marked, in a position that is visible and accessible when the window is open, with the following information:</td>
<td></td>
</tr>
<tr>
<td>Clause</td>
<td>Result</td>
<td>Compliance</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>------------</td>
</tr>
<tr>
<td>Window assembly shall be permanently marked, in a position that is visible and accessible when the window is open, with the following information:</td>
<td>Pre-certification prototype only. No labels supplied as yet. Customer advised of labelling requirements for production windows.</td>
<td><strong>NO</strong></td>
</tr>
</tbody>
</table>

- The number and date of the specification, i.e. PAS24:2012
- The date of manufacture (at least year and quarter)
- The name or trade mark or other means of identifying the manufacturer
- The classification to 4.4

| 6.2 Installation instructions | The manufacturer shall supply full instructions for assembly, installation and maintenance | Pre-certification prototype only. No installation instructions supplied as yet. Customer advised of installation instruction requirements for production windows. | **NO** |
### Annex C: Enhanced security performance requirements for windows

<table>
<thead>
<tr>
<th>Clause</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C.4.3 Manipulation test</strong></td>
<td><strong>PASS</strong>&lt;br&gt;WK / WKT</td>
</tr>
<tr>
<td>Attacks were made with a Stanley knife to try to cut the locking points out for 3 minutes, but entry was not achieved.</td>
<td><strong>PASS</strong>&lt;br&gt;WK / WKT</td>
</tr>
<tr>
<td>Attacks were made with a paint scraper to try to disengage the locking point for 1 minute 34 seconds, but entry was not achieved.</td>
<td><strong>PASS</strong>&lt;br&gt;WK / WKT</td>
</tr>
<tr>
<td>Attacks were made with a small screwdriver to try to gauge the hinge out for 3 minutes, but entry was not achieved.</td>
<td><strong>PASS</strong>&lt;br&gt;WK / WKT</td>
</tr>
</tbody>
</table>

| **C.4.4.2 Manual test on infill** | **PASS**<br>WK / WKT |
| Side hung | **PASS**<br>WK / WKT |
| Attacks were made with a small chisel and large chisel to try to remove the profile around the glazing for 3 minutes, but entry was not achieved. | **PASS**<br>WK / WKT |
| Direct glazed | **PASS**<br>WK / WKT |
| Attacks were made with a small chisel and large chisel to try to remove the profile around the glazing for 3 minutes, but entry was not achieved. | **PASS**<br>WK / WKT |

| **C.4.4.3 Mechanical test on infill** | **PASS**<br>WK / WKT |
| Side hung | **PASS**<br>WK / WKT |
| 2.0kN loads were applied to the top left, top right, bottom right and bottom left corners of the glazing. | **PASS**<br>WK / WKT |
| Direct glazed | **PASS**<br>WK / WKT |
| 2.0kN loads were applied to the top left, top right, bottom right and bottom left corners of the glazing. | **PASS**<br>WK / WKT |
| All loads were held and no entry was achieved. | **PASS**<br>WK / WKT |
C.4.5 Mechanical loading test

Attempts to apply Mechanical loads to all the hinge points and locking points were made with the following results obtained.

**Point 1: Top hinge/ hinge protector**
- 1kN parallel load (down) and 3kN perpendicular load held for 10s.
- 1kN parallel load (horizontal) and 3kN perpendicular load held for 10s.

**Point 2: Top locking cams/free corner of casement**
- 1kN parallel load (down) and 3kN perpendicular load held for 10s.
- 1kN parallel load (up) and 3kN perpendicular load held for 10s.
- 1kN parallel load (equal and opposite) and 3kN perpendicular load held for 10s.

**Point 3: Centre locking cams**
- 1kN parallel load (down) and 3kN perpendicular load held for 10s.
- 1kN parallel load (up) and 3kN perpendicular load held for 10s.
- 1kN parallel load (equal and opposite) and 3kN perpendicular load held for 10s.

**Point 4: Bottom locking cams/free corner of casement**
- 1kN parallel load (down) and 3kN perpendicular load held for 10s.
- 1kN parallel load (up) and 3kN perpendicular load held for 10s.
- 1kN parallel load (equal and opposite) and 3kN perpendicular load held for 10s.

**Point 5: Bottom hinge/ hinge protector**
- 1kN parallel load (up) and 3kN perpendicular load held for 10s.
- 1kN parallel load (horizontal) and 3kN perpendicular load held for 10s.

All loads were held and no entry was achieved.
<table>
<thead>
<tr>
<th>Clause</th>
<th>Result</th>
<th>Pass / Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C.4.6 Manual check test</strong></td>
<td>Attacks were made with a lever and screwdriver to try to lever the window open between the hinges for 3 minutes, but entry was not achieved. Attacks were made with a lever and screwdriver to try to lever the window open between the locking points for 3 minutes, but entry was not achieved. Attacks were made with 2 levers to try to lever the window open between the hinge and locking point for 3 minutes, but entry was not achieved.</td>
<td><strong>PASS</strong>  NO VULNERABILITY IDENTIFIED</td>
</tr>
<tr>
<td><strong>C.4.7 Additional mechanical loading test</strong></td>
<td>Testing was not required as no vulnerabilities were identified in the manual check test.</td>
<td><strong>NOT REQUIRED</strong></td>
</tr>
</tbody>
</table>
## CONCLUSIONS

**Evaluation against objective**
The windows as provided by the client were subjected to enhanced security testing in accordance with PAS24:2012 Annex C and achieved the requirements for a classification of WK for removable key locking only.

## LIMITATIONS

**Limitations**
The results relate only to the behaviour of the specimens of the element of construction under the particular conditions of test. They are not intended to be the sole criteria for assessing the potential performance of the element in use, nor do they reflect the actual behaviour in use.

**Range of assemblies covered by this report**
It is our opinion that the range of assemblies covered by this report are limited to the following:
- Assemblies with identical hardware fitted no further apart than in the tested assembly
- Assemblies of the same or smaller overall dimensions to the tested assembly

**Uncertainty of Measurement**
The uncertainties of measurements calculated for a confidence level of 95% throughout these tests are within the limits of these tolerances.

The standard specifies the following tolerances:
- Forces: ±2%
- Distances: ±1mm for tape measures ± 0.01mm for dial gauges
- Times: ±5s
**REVISION HISTORY**

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**END OF REPORT**