

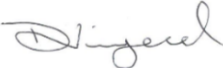
Test Report 3480028.
Smart Systems Limited
Incorporating Smart Extrusions

Introduction.

This report has been prepared by Jack Nicholls and relates to the activity detailed below:

Job/Registration Details	Client Details
Job number: 3480028 Job type: Testing Samples Submitted Start Date: 07/03/2022 Test type: Direct Sample ID: 10198106 Registration: NA Protocol: NA Quality system: NA Registration: NA Protocol: NA Quality system: NA	Smart Systems Limited Incorporating Smart Extrusions Arnolds Way Yatton BS49 4QN United Kingdom

The report has been approved for issue by David Vinyard – Senior Test Engineer

Approved For Issue	
	Issue Date: 6 May 2022

Objectives.

Direct Test

Product Scope.

Visofold 6000 Aluminium Bi-Fold Door

Report Summary.

The sample was received on 05 March 2022 and the testing was started on 15 March 2022.

The sample submitted complied with the requirements of the test work conducted.

PAS 24:2016 Direct Test.

1 off three leaf open out fully glazed in bi-fold door assembly with a fully rebated threshold

(Sample ID No 10198106)

Date sample received: 05 March 2022

Test Results.

- | | | |
|----|-------------------------------------|---|
| 1. | Manipulation | The test sample met the requirements of the Specification in respect of B.4.3 |
| 2. | Infill Removal | The test sample met the requirements of the Specification in respect of B.4.4 |
| 3. | Mechanical Loading | The test sample met the requirements of the Specification in respect of B.4.5 |
| 4. | Manual Check Test | The test sample met the requirements of the Specification in respect of B.4.6 |
| 5. | Soft Body Impact | The test sample met the requirements of the Specification in respect of B.4.8 |
| 6. | Hard Body Impact | The test sample met the requirements of the Specification in respect of B.4.9.2.2 |
| 7. | Security Hardware and Cylinder Test | The test sample met the requirements of the Specification in respect of Annex A |

B.2 Sample Selection.

The sample submitted for tests was selected using the criteria in B.2 of the Specification. The sample was submitted for test mounted in a 75mm x 100mm timber subframe in accordance with the manufacturer's installation requirements. The test sample was manufactured by the client.

B.3 Requirements for Test Apparatus.

The test apparatus for the manual and mechanical tests is shown in figures B.2 to B.5.

B.4 Test Methods.

The method of testing the sample followed the sequence detailed in B.4 of the Specification.

Description of Sample.

Sample Type -	Three leaf open out fully glazed in bi-fold door assembly with a fully rebated threshold		
Material -	Aluminium		
Construction -	Cleated		
Fittings -	Active leaf A five-point locking (two hook bolts, two cams, one dead bolt and two shoot bolts) FUHR espagnolette system, key lockable handle, 3* cylinder and four pin hinges Two passive leaves Two rollers, two shoot bolts and eight pin hinges		
Classification -	D		
Glass -	Double glazed 4-20-4mm toughened glass sealed units		
Panel -	Not applicable		
Glass Retention System -	Internal beads and gaskets		
Sample dimensions -	Overall -	Length: 3133mm	Height: 2293mm
	Active Leaf -	Length: 1000mm	Height: 2200mm
	Passive Leaves -	Length: 1000mm	Height: 2200mm
Date of test -	15 March 2022		

Visofold 6000, Open Out, 3 Panel Layout. Fully Rebated. Pas 24 Security Test.

Outer Frame width	3133mm	Outer Frame Material	Aluminium
Outer Frame height	2293mm	Outer Frame Gasket	
Outer Frame Part Numbers		Gasket Type	Edpm
Top	DV614	Manufacturer	Reddiplex.
Bottom	DV614	Product Name	Sealing Gasket.
Lock Side	DV614	Product Code	ACDV244, ACDV272
Hinge Side	DV614	Threshold Gasket	
Outer Frame section dimensions		Manufacturer	Reddiplex.
Width	76mm	Product name	Outer Frame Gasket
Depth	55mm	Product Code	ACDV 582
Cill		Materials	Edpm.
Manufacturer	Smart Systems	Outer Frame Joint Method	
Product Name	150mm Projecting Cill	Head	Cleat and Glue.
Product code	ETC457	Foot	Cleat and Glue.
Material	Aluminium		

Leaf		Leaf Material:	Aluminium
Leaf Width:	1000mm	Leaf Gasket	
Leaf Height:	2200mm	Gasket type:	Edpm
Leaf Part Numbers:		Manufacturer:	Reddiplex.
Top:	DV624	Product Name:	Sealing Gasket
Bottom:	DV624	Product Code	ACDV272
Lock side:	DV624	Head and Jamb Insert	
Hinge Side	DV624	Manufacturer:	Smart Systems
Leaf section size		Product name:	Head and Jamb Insert
Width:	74.5mm	Product code:	DV545N
Depth:	41.5mm	Material:	Aluminium
Rebate Adaptor.		Leaf joint method	
Manufacturer:	Smart Systems.	Head:	Cleat and Glue.
Product Name:	Rebate Adaptor.	Foot:	Cleat and Glue.
Product Code:	DV662		
Material:	Aluminium		
Bead			
Manufacturer:	Smart Systems		
Product Name:	Glazing Bead.		
Product Code:	ETC272		
Material:	Aluminium		
Bead Size:	20.5mm x 15.5mm		

Visofold 6000, Open Out, 3 Panel Layout.
Fully Rebated. Pas 24 Security Test.

Glazing Unit		Glazing Gasket	
Manufacturer:	Cornwall Glass	Gasket Type:	Edpm
Inner Thickness:	4mm	Manufacturer:	Reddiplex.
Spacer Material:	Aluminium	Product Name:	E Gasket Wedge.
Outer Thickness:	4mm	Product Code	ACET842 ACET840
Unit Sizes:	941mm x 2141mm	Glazing Clip NA.	
Glazing Tape Details NA		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			Fixings	Quantity
Hinges:	ACDV331	Intermediate Hinges.	M5 Machine Screws. Fixing Plate No 10 Self Tapping Screw.	15.
Hinge Protectors:	NA.			
Lock: And Keep Set.	ACDV576.	Fuhr Lock And Keep.	ACET 060	1.
Cylinder:	ACCY5050S3	UAP 3 Star Cylinder.	M5 Machine Screw.	1.
Handle:	ACDV251	Fab and Fix. Lever / Lever.	M5 Machine Screw.	1 Pair.
Top Guide	ACDV567	Banks.	M4 Machine Screws.	1
Bottom Roller	ACDV566	Banks.	M4 Machine Screws.	1
Shoot bolt Kit	ACDV663	Banks. Top and Bottom Shoot Bolt Kit.	M4 Machine Screws. Fixing Plate.	1
Shoot Bolt Guide Fixings.	ACET190	SFS Polyamide Screws		2
Shoot Bolt Handle.	ACDV625	Locking Pop up Handle	M5 Machine Screw.	1
Anti Lift Blocks	ACDV081	Atc China Anti Lift	ACET 064	4
Corner Gaskets	ACDV275 ACDV375			6. 4
Hinge D Handle	ACDV234	Banks. D Handle.	M5 Machine Screws. Fixing Plate	1
Threshold Keep	ACDV667	Banks. Bottom Shoot Bolt Keep.	M4 Machine Screws.	1
Cill End Caps	ACET157	ATC China. Cill End Caps.		
Sealing Glue Cleat Glue. Rubber Sealant	ACSIL04 ACSIL013 ACSIL05.			
Stainless Steel Track.	VG53.			2
Bridge Packers	ACDV571	Setting Blocks.	Self Adhesive.	24.

Test Results.

Performance Requirements

Assessment

B.4.3 Manipulation Test A

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the given objective of this Annex using the procedure detailed in B.4.3.1 and the tools described in Group A and Group B where applicable.

The sample was closed and locked and the key removed. Although there is a 15 minute overall time limit no one technique was used for more than three minutes.

No tools effective.

No entry gained by any technique within three minutes.

Pass

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

B.4.4 Cutting and Infill Medium Removal Test

B.4.4.2 Infill Manual Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the requirements of this Annex using the tools described in Group A and Group B where applicable.

A craft knife was used to cut the gasket

No entry gained within three minutes.

Pass

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

Test Results (Continued).

Performance Requirements (Continued).

Assessment

B.4.4.3 Infill Mechanical Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out with a perpendicular-to-plane load of 2.0kN applied to each corner of the glazing.

No evidence of bead failure. No entry gained.

Pass

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

B.4.4.4 Manual Cutting Test

Not applicable.

Test Results (Continued).

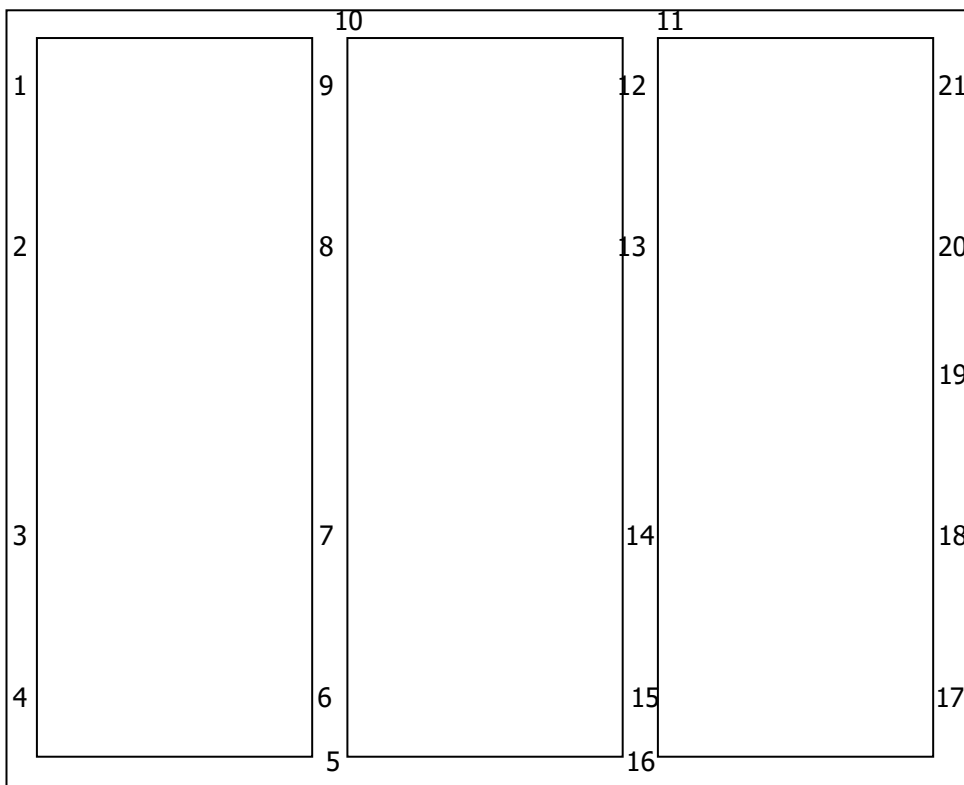
Performance Requirements (Continued).

B.4.5 Mechanical Loading Test

The sample was mounted, vertically and square, in the test rig.

The test was carried out in accordance with the procedures detailed in B.4.5, using loading cases B.1 to B.6 and Figures B.12 for loading sequence, and using the test apparatus detailed in Figures B.6 to B.6.

Diagram of load points



Test Results (Continued).

B.4.5.2 Loading Procedure

First Sequence

1. Hinge (upper left jamb)
Standard loading case used: 1

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds
2. Hinge (upper left jamb)
Standard loading case used: 1

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds
3. Hinge (lower left jamb)
Standard loading case used: 1

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds
4. Hinge (lower left jamb)
Standard loading case used: 1

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds
5. Shoot Bolt (threshold of passive leaf)
Standard loading case used: 5

Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
Load applied perpendicular to plane: 4.5kN applied for ten seconds
6. Hinge (lower passive to passive leaves)
Standard loading case used: 2

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
1.5kN to oppose the above load
Load applied perpendicular to plane: 4.5kN applied for 10 seconds

Test Results (Continued).

B.4.5.2 Loading Procedure (continued)

First Sequence (continued)

7. Hinge (lower passive to passive leaves)

Standard loading case used: 2

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
1.5kN to oppose the above load

Load applied perpendicular to plane: 4.5kN applied for 10 seconds

8. Hinge (upper passive to passive leaves)

Standard loading case used: 2

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
1.5kN to oppose the above load

Load applied perpendicular to plane: 4.5kN applied for 10 seconds

9. Hinge (upper passive to passive leaves)

Standard loading case used: 2

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
1.5kN to oppose the above load

Load applied perpendicular to plane: 4.5kN applied for 10 seconds

10. Shoot Bolt (head of passive leaf)

Standard loading case used: 5

Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt

Load applied perpendicular to plane: 4.5kN applied for ten seconds

11. Roller (head of passive leaf)

Standard loading case used: 11

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge

Load applied perpendicular to plane: 4.5kN applied for ten seconds

Test Results (Continued).

B.4.5.2 Loading Procedure (continued)

First Sequence (continued)

12. Hinge (upper passive to passive leaves)

Standard loading case used: 2

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
1.5kN to oppose the above load

Load applied perpendicular to plane: 4.5kN applied for 10 seconds

13. Hinge (upper passive to passive leaves)

Standard loading case used: 2

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
1.5kN to oppose the above load

Load applied perpendicular to plane: 4.5kN applied for 10 seconds

14. Hinge (lower passive to passive leaves)

Standard loading case used: 2

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
1.5kN to oppose the above load

Load applied perpendicular to plane: 4.5kN applied for 10 seconds

15. Hinge (lower passive to passive leaves)

Standard loading case used: 2

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
1.5kN to oppose the above load

Load applied perpendicular to plane: 4.5kN applied for 10 seconds

16. Roller (threshold of passive leaf)

Standard loading case used: 11

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge

Load applied perpendicular to plane: 4.5kN applied for ten seconds

Test Results (Continued).

B.4.5.2 Loading Procedure (continued)

First Sequence (continued)

17. Cam (lower active leaf)

Standard loading case used: 7

Load applied in plane: 1.5kN along the edge in the direction to disengage the cam
Load applied perpendicular to plane: 4.5kN applied for ten seconds

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds

18. Hook Bolt (lower active leaf)

Standard loading case used: 7

Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
Load applied perpendicular to plane: 4.5kN applied for ten seconds

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds

19. Dead Bolt (centre active leaf)

Standard loading case used: 5

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds

20. Hook Bolt (upper active leaf)

Standard loading case used: 7

Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
Load applied perpendicular to plane: 4.5kN applied for ten seconds

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds

Test Results (Continued).

Performance Requirements (Continued).

Assessment

B.4.5.2 Loading Procedure (continued)

First Sequence (continued)

21. Cam (upper active leaf)

Standard loading case used: 7

Load applied in plane: 1.5kN along the edge in the direction to disengage the cam
Load applied perpendicular to plane: 4.5kN applied for ten seconds

Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
Load applied perpendicular to plane: 4.5kN applied for ten seconds

No entry gained

Pass

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

B.4.3 Manipulation Test B

No fixings were exposed during mechanical loading.

Pass

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

Test Results (Continued).

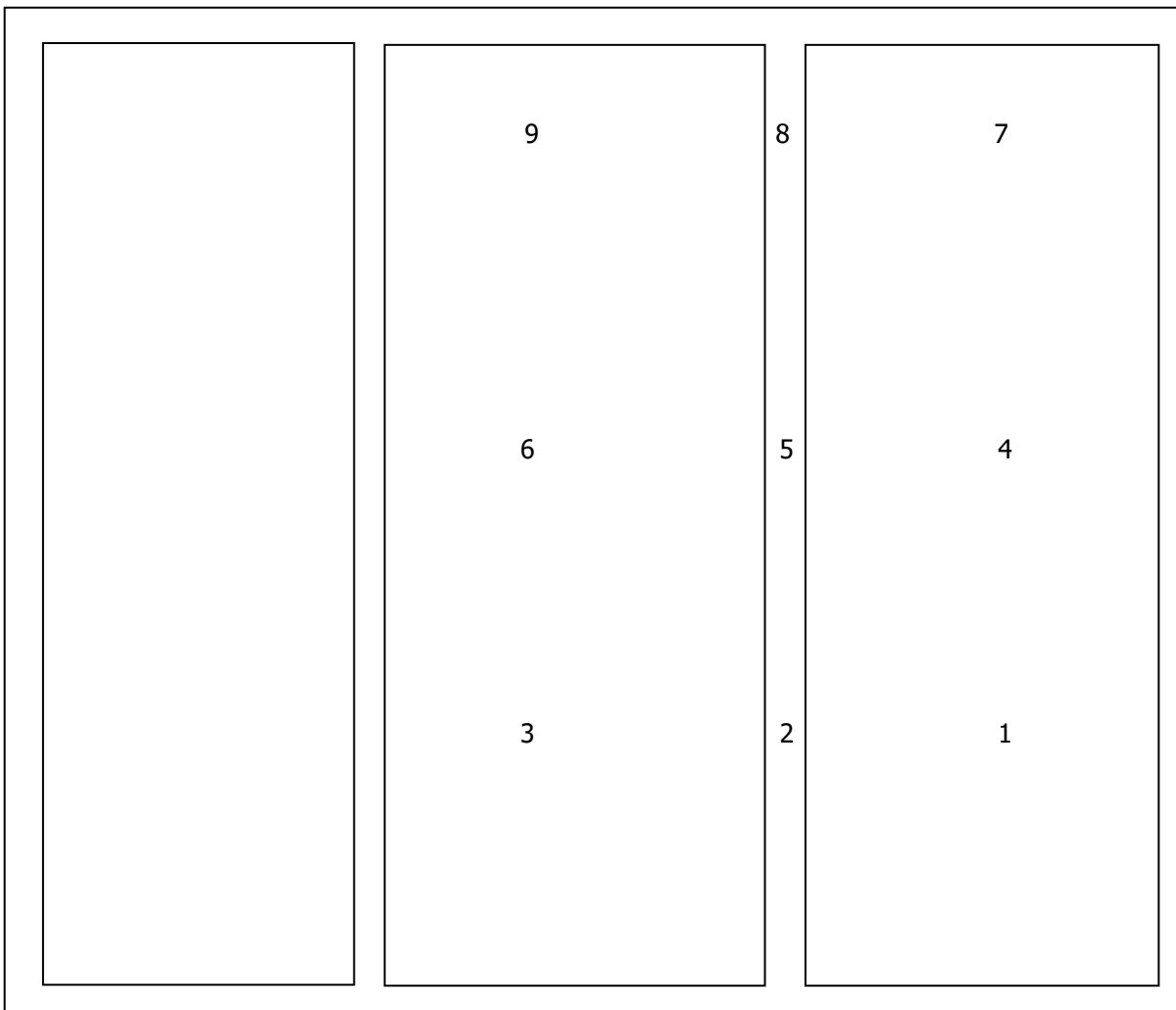
Performance Requirements (Continued).

Clause B.4.8 Soft Body Impact Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1

The test was carried out in accordance with the requirements, objectives and procedures detailed in B.4.8.1 using the impact points and procedure described in B.4.8.2 and B.4.8.3 and Figure B.10.

Diagram of points of application of loads



Test Results (Continued).**Performance Requirements (Continued).****Assessment****Clause B.4.8 Soft Body Impact Test**

Impact point	Position from floor level	Effect
1	0.8m	None
2	0.8m	None
3	0.8m	None
4	1.25m	None
5	1.25m	None
6	1.25m	None
7	1.70m	None
8	1.70m	None
9	1.70m	None

No entry gained.

Pass

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

Test Results (Continued).

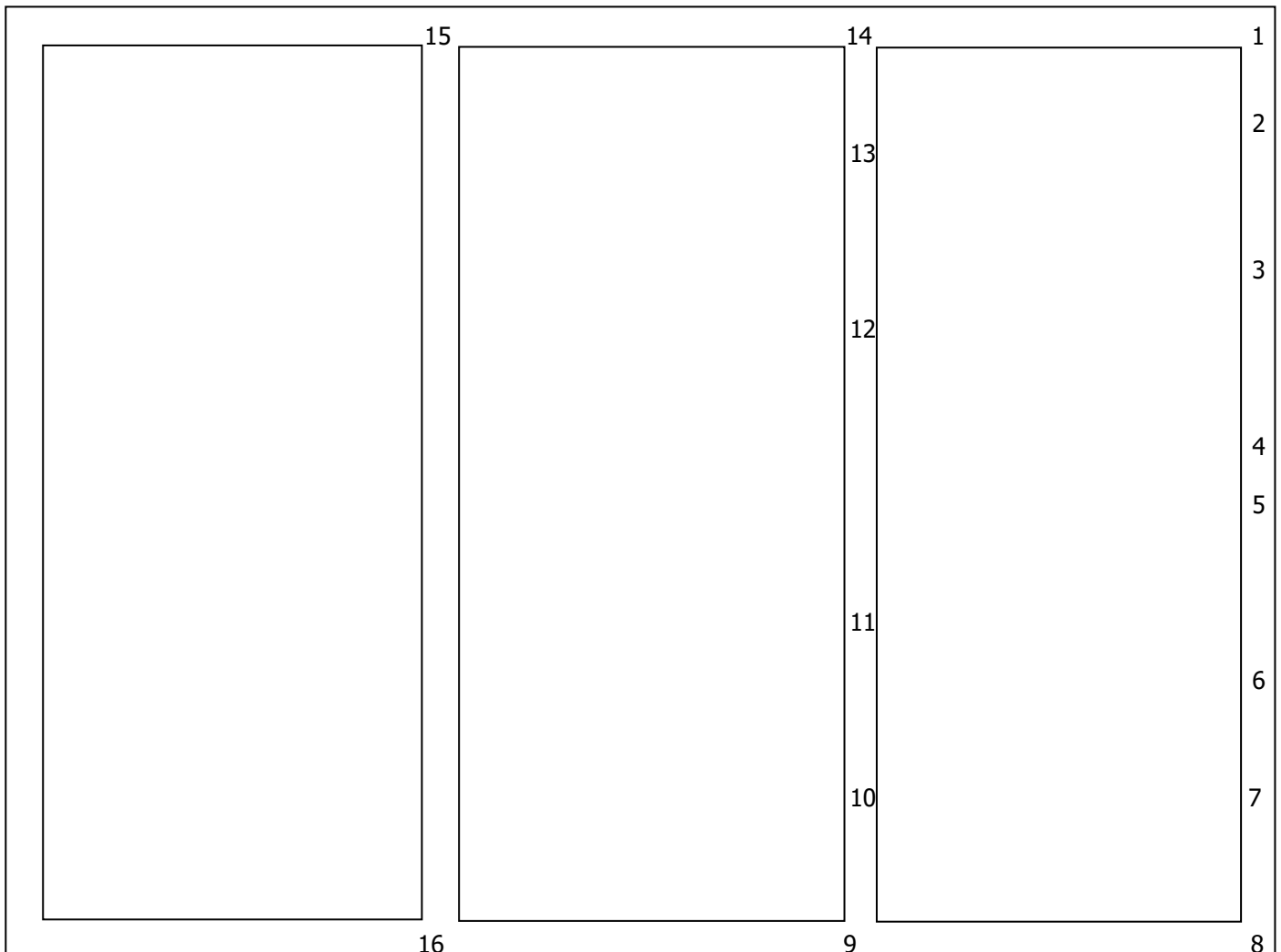
Performance Requirements (Continued).

Clause B.4.9 Hard Body Impact Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the requirements, objectives and procedures detailed in B.4.9.1, B.4.9.2.1, B.4.9.2.2 and B.4.9.2.3 using procedure B.4.9.3, using the test apparatus detailed in B.11 and using the impact sequence in figure B.14.

Diagram of points of application of loads



Test Results (Continued).

Clause B.4.9 Hard Body Impact Test (continued)

Assessment

Impact point	Position	Effect
1	Corner	None
2	Cam	None
3	Hook	None
4	Dead	None
5	Cylinder	None
6	Hook	None
7	Cam	None
8	Corner	None
9	Roller / Corner	None
10	Hinge	None
11	Hinge	None
12	Hinge	None
13	Hinge	None
14	Roller / Corner	None
15	Shoot	None
16	Shoot	None

No entry gained

Pass

Date of test – 15 March 2022
 Test engineer(s) – Errol Creary & Dave Vinyard
 Laboratory temperature – 22.8°C

Test Results (Continued).

Performance Requirements (Continued).

Clause B.4.6 Manual Check Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the given objectives of this clause using the procedure detailed in B.4.6.3 and the tools described in B.4.6.2.

No one technique was used for more than three minutes.

No alternative method of entry could be found.

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

Clause B.4.7 Additional Mechanical Loading Test

Not applicable – no alternative method of entry found during manual check testing.

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

Test Results (Continued).

Performance Requirements (Continued).

Assessment

Annex A Security Hardware and Cylinder Test

Annex A.3.2 (Part 1)

The sample was mounted, vertically and square, in the test rig as described in Clause 3.1.

The test was carried out in accordance with the given objectives of this Annex using the procedure detailed in Annex A.3.1 and the tools described in A.2.

Mole grips were used to remove the handle and snap the cylinder.

No entry gained within three minutes.

Pass

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

Annex A.3.2 (Part 2)

Unable to insert the traction screw

Pass

Date of test – 15 March 2022

Test engineer(s) – Errol Creary & Dave Vinyard

Laboratory temperature – 22.8°C

Photograph of sample.



Test Sample.

Sample Id	ER Number	Description
1	10198106	Aluminium Bi-Fold Door

Description of Test Sample.

Sample Description
1 off three leaf open in fully glazed in bi-folding door assembly and a fully rebated threshold

Test Requirements.

PAS24 Direct Test

Clause	Requirements
Results table	PAS24 Direct Test

Glossary of Terms.

PASS: Complies. Tested by BSI engineers at BSI laboratories.

PASS1: Complies. Witnessed by BSI engineers in manufacturers laboratory.

PASS2: Complies. Tests carried out by third party lab; results accepted by BSI.

PASS*: Report resulted in uncertainty and states that Compliance is more probable than non-compliance.

FAIL: Non compliance – Product does not meet the requirements of this clause.

FAIL*: Report resulted in uncertainty and states that Non-compliance is more probable than compliance.

N/A: Not applicable to design under consideration.

N/T: Not tested due to similarity to previously tested item; reference earlier test report.

Conditions of Issue.

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*** End of Report ***