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**Metal Technology
Limited System 4-20 and
System 5-20 aluminium
windows tested to the
requirements of
BS 7950:1997**

Prepared for:
Metal Technology
Steeple Road Industrial Estate
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2 December 2008

Test report number 239807



0578

Protecting People, Property and the Planet



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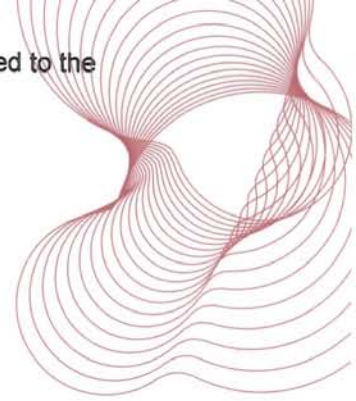
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1 Introduction

This report details the results of tests performed in accordance with the test methods of BS 7950:1997 Incorporating Amendments Nos.1, 2 and 3 - *Specification for enhanced security performance of windows for domestic applications*¹, on Metal Technology Limited System 4-20 and System 5-20 aluminium windows manufactured by Metal Technology Ltd, Steeple Road Industrial Estate, Steeple Road, Antrim BT41 1AB.

2 Origin of test request

The initial test programme was performed at the request of Mr Philip Osbourne of Metal Technology. BRE issued quotation Q2800a dated 13 December 2007 which was accepted by Mr Philip Osbourne on 18 December 2008.

Due to non-conformities found during the initial test programme BRE issued an additional test quotation on 12 June 2008 by email which was accepted by Philip Osbourne on 17 June 2008. This covered retesting System 4-20 and System 5-20 windows in accordance with the mechanical loading test (Clause A.6).

The initial test programme was carried out on 11 and 12 March 2008 and the retest programme was carried out on 17 June 2008, both against project number 239807 and under the BRE Terms and Conditions for Testing (PN145/5).

Tests were conducted at BRE by Mr C Dunton and Mr R Scott. The initial test programme was witnessed by Mr Tim Cummins of Metal Technology Limited and the retest programme was witnessed by Philip Osbourne of Metal Technology Limited.



3 Details of test specimens

Four window specimens were originally received on 10 March 2008 for testing. Two additional specimens were received for retesting on 12 June 2008. Each specimen was allocated a unique BRE reference number.

A summary of the design and component details of the windows tested is as follows. This is based on the information provided by Metal Technology Limited as detailed in Annex A.

3.1 Specimens 239807/1 and 239807/2

Type: System 4-20 aluminium window incorporating an internally beaded 850 mm wide x 1800 mm high side hung light next to an externally beaded 300 mm wide x 1800 mm fixed light (Figure 1). The side hung light was fitted with a key lockable handle. Location of the hardware is detailed in Figure 2.

Frames: Aluminium extruded profiles mitre cut at 45°. Corners are reinforced with extruded aluminium crimping cleats and the joints are formed by pneumatically crimping. Transom and mullions are square cut and fixed to the frame by stainless steel screws and fixing cleats.

Table 1 Frame and crimping details

Component	Part No./Code
Short leg outer frame profile	101-201
Inside glaze heavy duty profile	125-225
Deep mullion/transom profile	113-213
Crimping cleats	514, 516 and 524

Hardware: **Table 2** Hardware details

Hardware	Manufacturer and Description	Part No./Code	Fixings
Espagnolette locking system	Roto TSL standard euro espag with 8 cams and 1200 mm faceplate	842	CSK M5 x 20 mm self drilling screws
Keeps	Roto TSL compression keeps	835	CSK No 7 x 25 mm self drilling screws



Table 2 Hardware details (continued)

Hardware	Manufacturer and Description	Part No./Code	Fixings
Hinges	Securistyle 'Storm' heavy duty friction stay hinge	CA31A	CSK M10 X 19 mm self drilling screws
Security claws	Roto	702	Into sash CSK 4.8 x 25 mm self drilling screws Into frame CSK 4.8 X 25 mm self drilling screws
Handle	Laird 'Maxim 3' cranked espagnolette handle	825	Fixings come in handle set

Glazing: The side hung sash was internally glazed and the fixed light sash was externally glazed. Both lights were glazed with a 28 mm thick sealed glazing unit comprising 6 mm toughened glass, 16 mm air gap and 6 mm toughened glass. The sealed glazing units were held into place by clip in beads.

Table 3 Glazing details

Component	Supplier	Part No./Code
Glazing bead	-	328
Sealed glazing unit	Vista Therm	-

Seals: Co-extruded gaskets are fitted into gasket grooves in the frame upstand.

Table 4 Seal details

Component	Supplier	Part No./Code
Weatherseal	Fabprene	060
Grey wedge gasket	Fabprene	066
Red gasket	HL Plastics	CA25

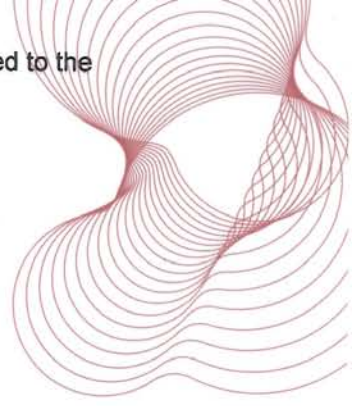


Figure 1 239807/1 (external view)



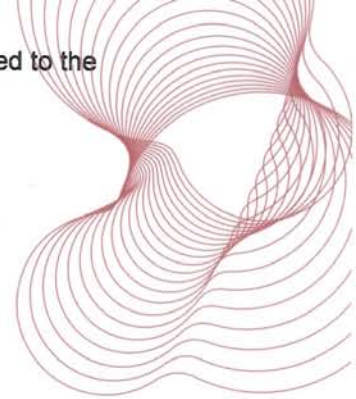
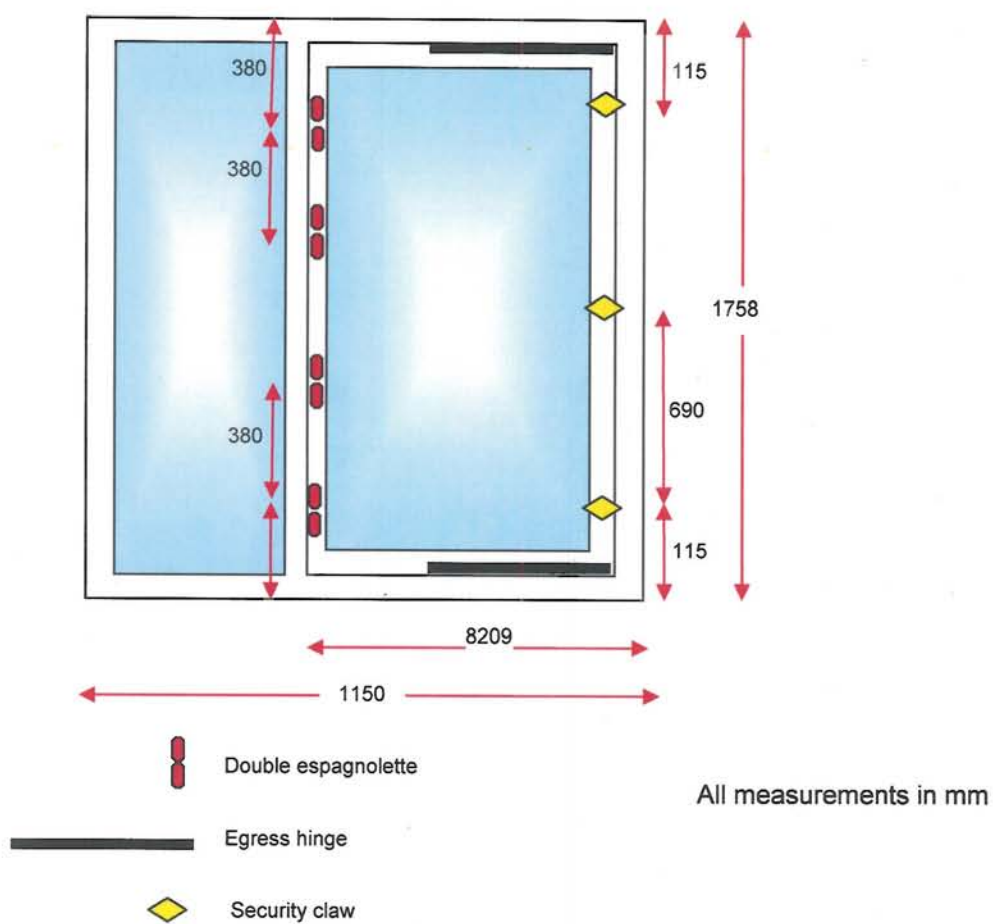
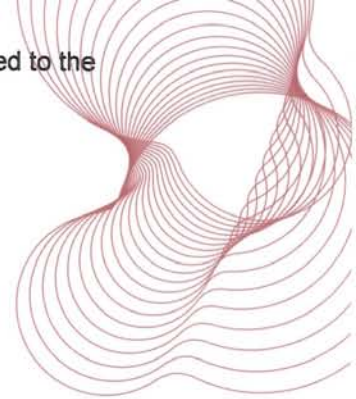


Figure 2 Specimen 239807/1 (external view)





3.2 Specimens 239807/3 and 239807/4

Type: System 5-20 1000 mm wide x 2000 mm high internally beaded tilt/turn aluminium window fitted with a key lockable handle (Figure 3). Location of hardware is detailed in Figure 4.

Frames: Aluminium extruded profiles mitre cut at 45°. Corners are reinforced with extruded aluminium crimping cleats and the joints are formed by pneumatically crimping.

Table 5 Frame and crimping details

Component	Part No./Code
Short leg outer frame profile	101-201
Eurogroove sash profile	132-236
Crimping cleats	509, 516 and 597

Hardware: **Table 6** Hardware details

Hardware	Manufacturer and Description	Part No./Code	Fixings
Tilt/turn gearing	Roto NT tilt before turn concealed gearing.	862	CSK No 7 x 25 mm self drilling screws
Security claws	Roto	-	-
Handle	Roto standard tilt/turn handle	870	Fixings come in handle set

Glazing: The sash was internally glazed with a 28 mm thick sealed glazing unit comprising 6 mm toughened glass, 16 mm air gap and 6 mm toughened glass. The sealed glazing unit was held into place by clip in beads.

Table 7 Glazing details

Component	Supplier	Part No./Code
Glazing bead	-	328
Sealed glazing unit	Vista Therm	-

Seals: Co-extruded gaskets are fitted into gasket grooves in the frame upstand.

Table 8 Seal details

Component	Supplier	Part No./Code
Weatherseal	Fabprene	060
Tilt/turn internal flipper gasket	Fabprene	061
Grey wedge gasket	Fabprene	066
Red gasket	HL Plastics	CA25
Flipper seal	HL Plastics	PCD82

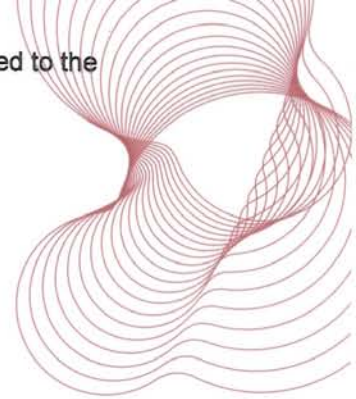


Figure 3 239807/3 (external view)



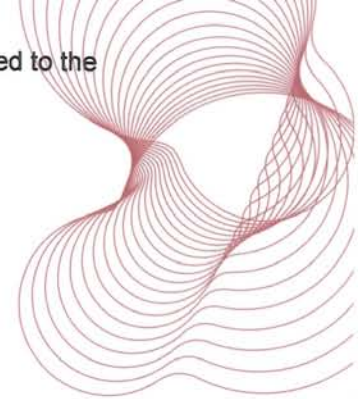
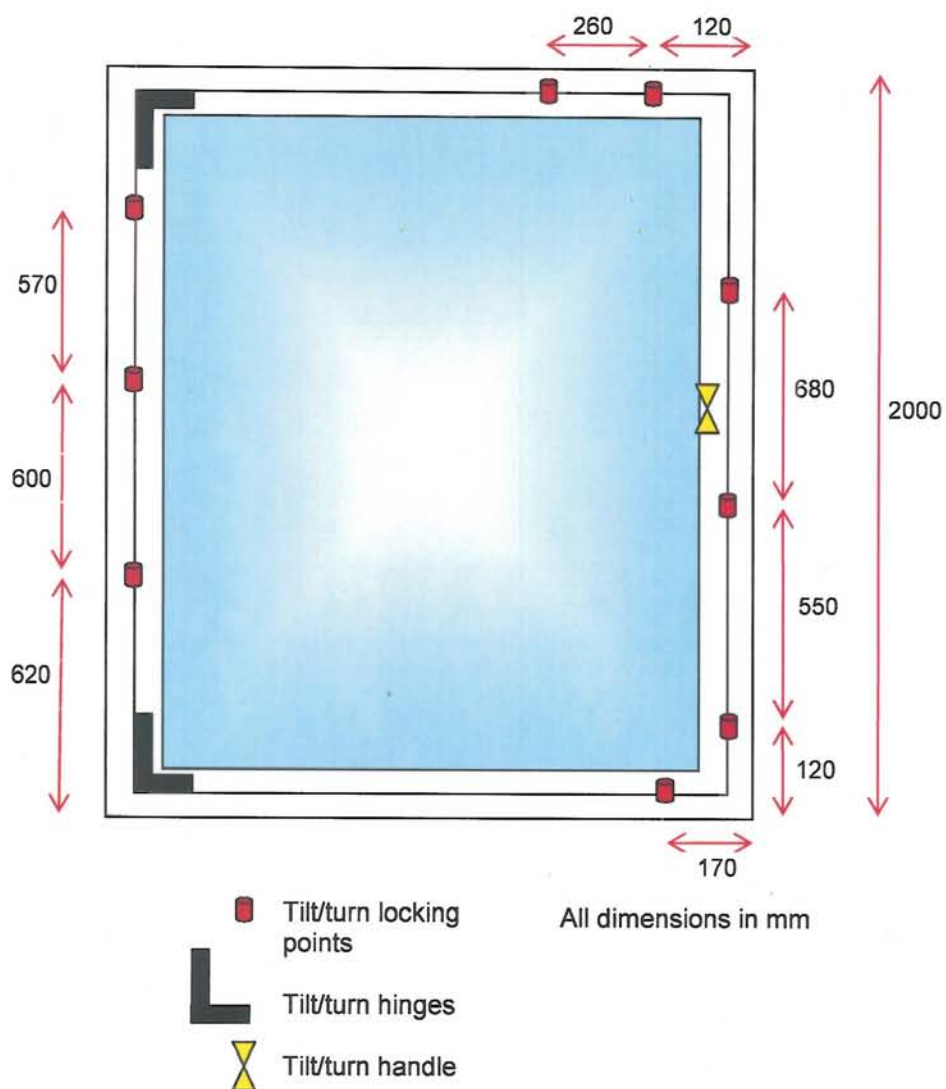
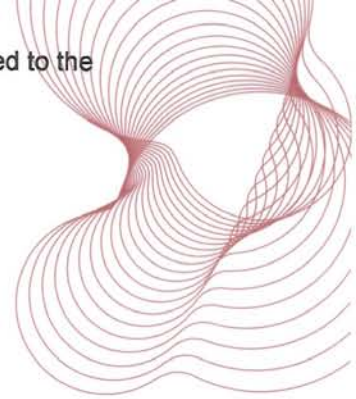


Figure 4 Specimen 239807/3 (external view)





3.3 Specimen 239807/5

Specimen 239807/5 was submitted for test A.6 (mechanical loading) due to the non conformity found during the initial test. The sample was identical to specimens 239807/1 and 239807/2 in size and construction, the only difference was the fitting of a keep strengthening plate, Part No 835. This plate was fitted to the top and bottom corner keeps.

3.4 Specimen 239807/6

Specimen 239807/6 was submitted for test A.6 (Mechanical Loading) due to the non conformity found during the initial test. The sample was identical to specimens 239807/3 and 239807/4 in size and construction, the only difference was the fitting of modified Roto security keeps (system Part No TTGEAR 992).

4 Test programme

The test methods were carried out in accordance with the procedures described in:

1. Clause 5.1 and Annex A of BS 7950:1997¹.
2. The BRE specific procedures Series F².

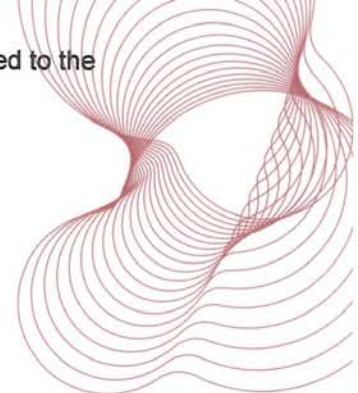
The following specimens were tested on 11 and 12 March 2008:

- 239807/1, 239807/2, 239897/3 and 239807/4

The following specimens were tested on 17 June 2008:

- 239807/5 and 239807/6.

In order to carry out the tests the windows were fitted into the BRE security test rig. The temperature and humidity of the laboratory was measured and found to be within the limits specified in Annex A.1 of BS 7950:1997¹.



5 Test results summary

A summary of each test result is given in Tables 9 and 10.

Further details of the results for each test are given in Annexes B and C.

Table 9 Summary of results for System 4-20 side hung/fixed light windows

Test	Test Method	Annex	Result	Observations/Comments
Specimen 239807/1				
1	Manipulation test	A.4	Pass	No entry gained.
2	Manual glazing removal test	A.5.1	Pass	No entry gained.
3	Manual check test	A.7	Pass	No entry gained.
Specimen 239807/2				
4	Mechanical glazing removal	A.5.2	Pass	No entry gained.
5	Mechanical loading test	A.6	Fail	Entry gained.
Specimen 239807/5 – retested due to failure of 239807/2.				
6	Mechanical loading test	A.6	Pass	No entry gained.

Table 10 Summary of results for System 5-20 tilt/turn windows

Test	Test Method	Annex	Result	Observations/Comments
Specimen 239807/3				
1	Manipulation test	A.4	Pass	No entry gained.
2	Manual glazing removal test	A.5.1	Pass	No entry gained.
3	Manual check test	A.7	Pass	No entry gained.
Specimen 239807/4				
4	Mechanical glazing removal	A.5.2	Pass	No entry gained.
5	Mechanical loading test	A.6	Fail	Entry gained.
Specimen 239807/6 – retested due to failure of 239807/4.				
6	Mechanical loading test	A.6	Pass	No entry gained.



6 Conclusions

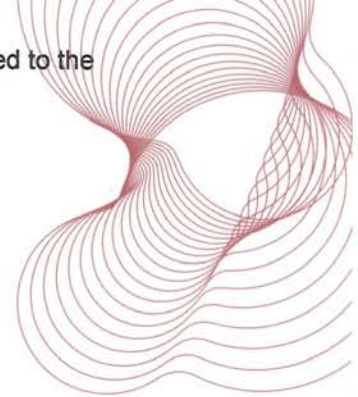
The Metal Technology Ltd System 4-20 side hung/fixed light windows with key locking handle as detailed in Section 3.1 and fitted with the reinforced espagnolette keeps detailed in Section 3.3 met the enhanced security performance requirements of Clause 7 of BS 7950:1997¹.

The Metal Technology Ltd System 5-20 tilt/turn windows with key locking handle as detailed in Section 3.2 and fitted with the espagnolette keeps detailed in Section 3.4 met the enhanced security performance requirements of Clause 7 of BS 7950:1997¹.

The results detailed in this report relate only to the type, size and construction of windows tested, and cannot be adopted for a similar range of windows without further assessment or testing.

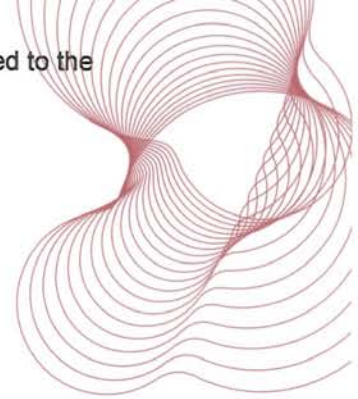
7 References

1. BS 7950:1997 Incorporating Amendments Nos. 1, 2 and 3, *Specification for enhanced security performance of windows for domestic applications*. British Standards Institution.
2. BRE Specific procedures Series F.



Annex A – Documentation supplied by Metal Technology Limited

Document Reference	Title	Date
F415.8d	LPCB Questionnaire	30/08/07
-	System 4-20 Casement Window Specification	15/02/07
-	System 5-20 Tilt & Turn Window Specification	15/02/07
Job 007-2	Assembly List System Metal Tec 5-20	18/06/08
Job 007-01	Assembly List System Metal Tec 4-20	18/06/08
SHEET 420/7/195 Rev 5 SL	Ancillary Hinge Security Device	29/09/08
Rev 0	BS 7950 Security test requirements	04/06/07
SHEET BS 7950 4-20	BS 7950 Security test requirements 4-20 Standard Euro Espag – Side Hung	20/06/08
SHEET BS 7950 5-20	BS 7950 Security test requirements 5-20 Tilt & Turn Eurogroove	20/06/08
SHEET 520/?/?	Roto Tilt Before Turn Security Fittings	Rec'd 2/12/08



Annex B – Initial test programme

Specimens 239807/1 and 239807/2 – System 4-20 side/fixed light windows

Test Method A.4 - Manipulation test (Specimen 239807/1)

Location	Overall Time (secs)	Observations
Bottom hinge	180	Attacked bottom hinge area using a paint scraper and small screwdriver. The hinge was exposed by levering back the aluminium frame. No entry gained.
Espagnolette	180	Attacked bottom espagnolette area using a paint scraper and small screwdriver. The espagnolettes were exposed by levering back the aluminium frame. No entry gained.
Security claws	180	Attacked security claw area using a paint scraper. No entry gained.
Test stopped	It was evident that entry would not be possible through the window using this test method with the tools available. No further locations were tested. No entry was achieved.	

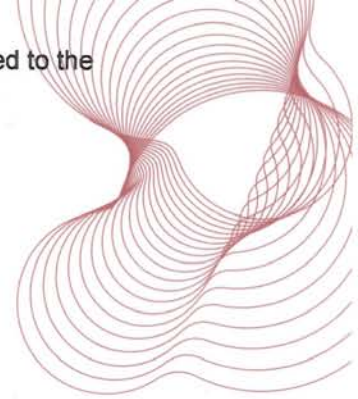
Test Method A.5.1 – Manual glazing removal test (Specimen 239807/1)

Location	Overall Time (secs)	Observations
Fixed light sash (externally glazed)	180	Beading from the top and sides was removed with a 25 mm chisel, 6 mm chisel and brick bolster. The sealed glazing unit could not be removed. No entry gained.
Side hung sash (internally glazed)	180	Attempted to remove the sealed glazing unit with 6 mm and 25 mm chisels. The sealed glazing unit could not be removed. No entry gained.

Test Method A.7 - Manual check test (Specimen 239807/1)

Location	Overall Time (secs)	Observations
Bottom edge beside hinge	180	Attempted to lever open the sash using two nail bars. No entry gained.
Between espagnolettes.	180	Attempted to lever open the sash using two nail bars. No entry gained.
Between security claws	180	Attempted to lever open the sash using two nail bars. No entry gained.
Test stopped	It was evident that entry would not be possible through the window at any other allowable locations using this test method and the tools available. No further locations were tested. No entry was achieved.	

No additional loading tests required.



Test Method A.5.2 – Mechanical glazing removal tests (Specimen 239807/2)

Location	Load (kN)	Observations
Side hung sash		
Top left corner	2	No damage. No entry gained.
Top right corner	2	No damage. No entry gained.
Bottom right corner	2	No damage. No entry gained.
Bottom left corner	2	No damage. No entry gained.
Fixed light sash		
Top left corner	2	No damage. No entry gained.
Top right corner	2	No damage. No entry gained.
Bottom right corner	2	No damage. No entry gained.
Bottom left corner	2	No damage. No entry gained.

Test Method A.6 - Mechanical loading test (Specimen 239807/2)

Location	Case (From Table B1 in BS 7950:1997 ¹)	Parallel To Plane Load	Perpendicular To Plane Load	Observations
Top right corner/ security claw	1/5	At right angles to the edge (1 kN), then along the edge towards the opposite edge (1 kN).	3 kN	Load held. 15 mm permanent deflection
Top left corner	3	In the direction to disengage the nearest locking point (1 kN)	3 kN	Load not achieved. Keep failed and >150 mm deflection achieved. A further 1 kN was applied and load held.
		At right angles towards the opposite edge (1 kN)	3 kN	Load not achieved. Second keep failed (see Figures 5 and 6). Test halted.
Test stopped	It was evident that placing loads at the other load points would result in further locking points failing and entry being achieved.			

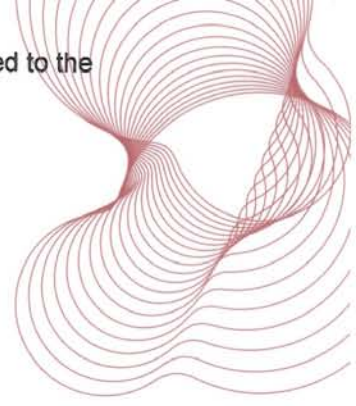


Figure 5 239807/2 – Keep before failure

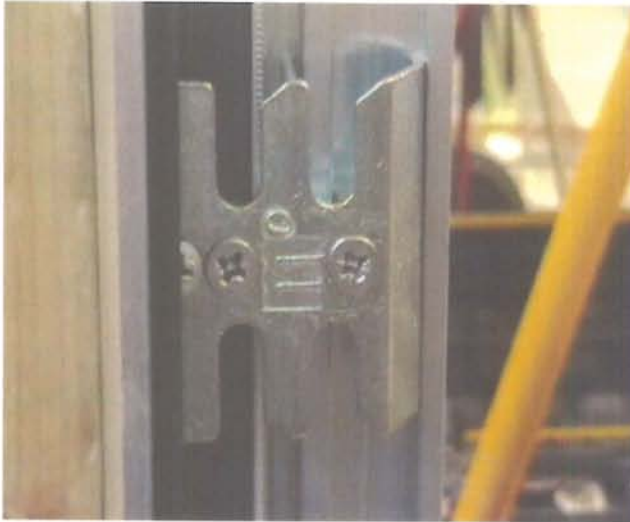
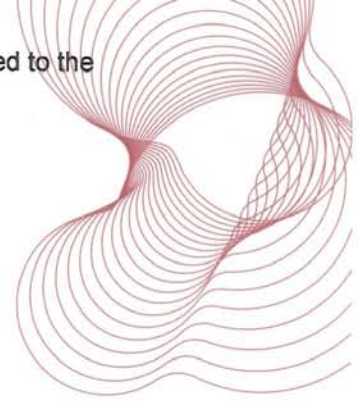


Figure 6 239807/2 – Keep after failure





Specimens 239807/3 and 239807/4 – System 5-20 tilt/turn windows

Test Method A.4 - Manipulation test (Specimen 239807/3)

Location	Overall Time (secs)	Observations
Tilt/turn hinge	180	Attacked tilt/turn hinge area using a paint scraper and small screwdriver. Access to the hinge fixings was achieved by levering back the aluminium frame. It was not possible to loosen the fixings in the allowed time. No entry gained.
Tilt/turn locking cams	180	Attacked bottom espagnolette area using a paint scraper and small screwdriver. No entry gained.
Test stopped	It was evident that entry would not be possible through the window using this test method with the tools available. No further locations were tested. No entry was achieved.	

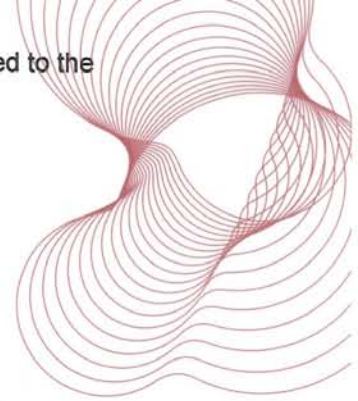
Test Method A.5.1 – Manual glazing removal test (Specimen 239807/3)

Location	Overall Time (secs)	Observations
Tilt/turn sash (internally glazed)	180	Attempted to split corners with 6 mm and 25 mm chisels. It was not possible to remove the sealed glazing unit with the available time and tools. No entry gained.

Test Method A.7 - Manual check test (Specimen 239807/3)

Location	Overall Time (secs)	Observations
Side edge between tilt/turn locking cams	180	Attempted to lever open the sash using two nail bars. No entry gained.
Top edge between corner and tilt/turn locking cam	180	Attempted to lever open the sash using two nail bars. No entry gained.
Test stopped	It was evident that entry would not be possible through the window at any other allowable locations using this test method and the tools available. No further locations were tested. No entry was achieved.	

No additional loading tests required.



Test Method A.5.2 – Mechanical glazing removal tests (Specimen 239807/4)

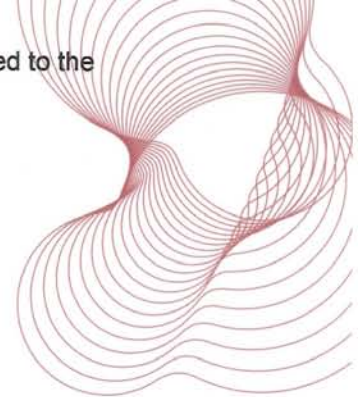
Location	Load (kN)	Observations
Top left corner	2	No damage. No entry gained.
Top right corner	2	No damage. No entry gained.
Bottom right corner	2	No damage. No entry gained.
Bottom left corner	2	No damage. No entry gained.

Test Method A.6 - Mechanical loading test (Specimen 239807/4)

Location	Case (From Table B1 in BS 7950:1997 ¹)	Parallel To Plane Load	Perpendicular To Plane Load	Observations
Top right corner/ security claw	3	In the direction to disengage the nearest locking point (1 kN)	3 kN	Load not achieved. Keep failed and >150 mm deflection achieved. A further 1 kN was applied and four keeps failed under load (see Figures 7 and 8). Entry gained.

Figure 7 Keep before failure



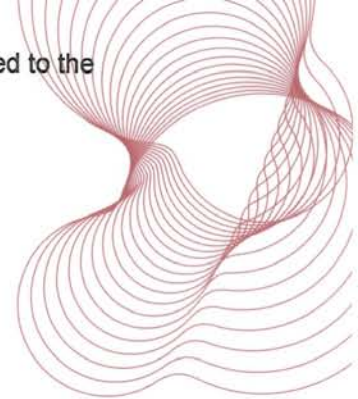


Annex C – Retest programme

System 4-20 side/fixed light windows

Test Method A.6 - Mechanical loading test (Specimen 239807/5)

Location	Case (From Table B1 in BS 7950:1997 ¹)	Parallel To Plane Load	Perpendicular To Plane Load	Observations
Top right corner/ security claw	1/5	At right angles to the edge (1 kN), then along the edge towards the opposite edge (1 kN).	3 kN	Load held.
Top left corner	3	In the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Espagnolette	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Espagnolette	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Espagnolette	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Espagnolette	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.

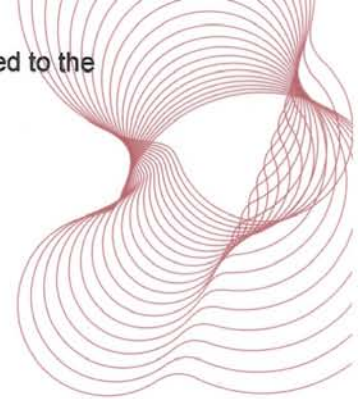


Location	Case (From Table B1 in BS 7950:1997 ¹)	Parallel To Plane Load	Perpendicular To Plane Load	Observations
Bottom left corner	3	In the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Top left corner/ security claw	1/5	At right angles to the edge (1 kN), then along the edge towards the opposite edge (1 kN).	3 kN	Load held.
Security claw	5	At right angles to the edge (1 kN), then along the edge towards the opposite edge (1 kN).	3 kN	Load held.

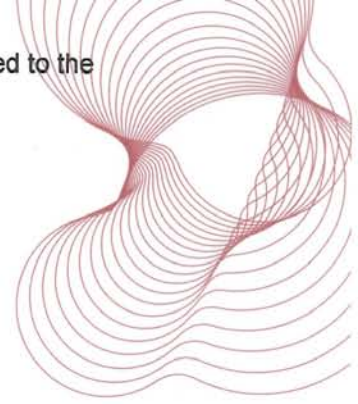
System 5-20 tilt/turn windows

Test Method A.6 - Mechanical loading test (Specimen 239807/6)

Location	Case (From Table B1 in BS 7950:1997 ¹)	Parallel To Plane Load	Perpendicular To Plane Load	Observations
Top right corner	3	In the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Tilt/turn cam	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Top left corner/tilt/turn cam	3/4	In the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.



Location	Case (From Table B1 in BS 7950:1997 ¹)	Parallel To Plane Load	Perpendicular To Plane Load	Observations
Tilt/turn cam	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Tilt/turn cam	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Bottom left corner/tilt/turn cam	3/4	In the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Tilt/turn cam	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Bottom right corner/tilt/turn cam	3/4	In the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Tilt/turn cam	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.
Tilt/turn cam	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.



Location	Case (From Table B1 in BS 7950:1997 ¹)	Parallel To Plane Load	Perpendicular To Plane Load	Observations
Tilt/turn cam	4	Along the edge in the direction to disengage the nearest locking point (1 kN), then at right angles to the edge towards the opposite edge (1 kN).	3 kN	Load held.

=====REPORT ENDS=====