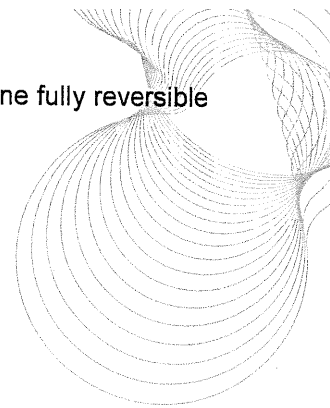


**BS 6375: Part 2: 1987  
Operation and strength  
tests on a Smart  
Systems Visoline fully  
reversible opening light**

Prepared for: Mr. M. Walford  
Smart Systems Ltd

06 May 2007

Test report number 236 464



**Tested on behalf of BRE by**

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Name Malcolm Pound  
Position Senior Consultant and Laboratory Manager, Actions, Centre for Materials and Engineering  
Date 30 April 2007  
Signature *M.C. Pound*

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**Prepared on behalf of BRE by**

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Name Malcolm Pound  
Position Senior Consultant and Laboratory Manager  
Date 06 May 2007  
Signature *M.C. Pound*

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**Approved on behalf of BRE**

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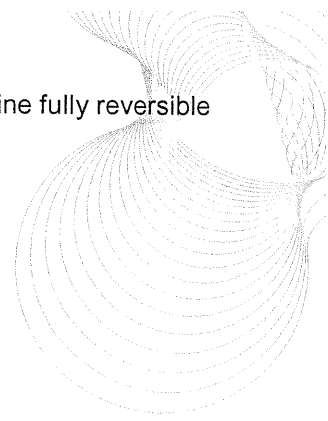
Name Dr. P. A. Blackmore  
Position Associate Director, Actions, Centre for Materials and Engineering  
Date 7/5/07  
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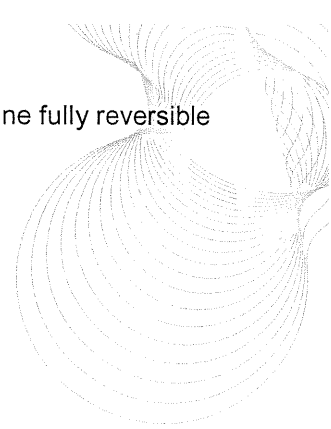


## 1 Introduction

At the request of Mr. M. Walford of Smart Systems Ltd, Arnolds Way, Yatton, North Somerset, BS49 4UN, BRE issued proposal number 119922 on 13 April 2007. It was accepted on 17 April 2007 and BRE tested a specimen window on 30 April 2007.

The tests assess the operation and strength characteristics of the specimen window against the performance requirements specified in BS 6375: Part 2: 1987<sup>1</sup>.

The tests on the specimen window were carried out under the BRE Standard Terms and Conditions of Business as part of BRE project number CV1750, Job Number 236 464.



## 2 Details of tests carried out

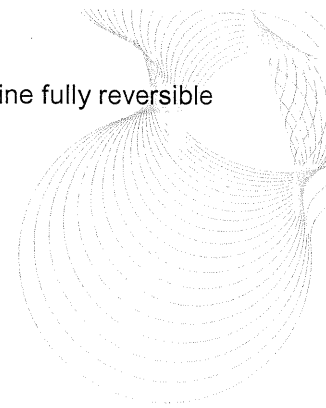
The operation and strength tests were carried out to the requirements of BS 6375: Part 2: 1987 for those tests appropriate for a window with a fully reversible, projecting, top hung opening light.

BS 6375: Part 2 specifies performance requirements for windows as manufactured and in glazed and fully furnished condition including hardware. It is applicable to most types of opening windows in external walls. Before testing, the specimen window was opened and closed at least 20 times. Tests commenced after at least one week had elapsed since the manufacture of the window to allow weather strips to bed in and any sealants to fully cure.

The operation and strength tests on the specimen window comprised of five parts:

- Test 1           Ease of fastener operation. Test forces applied at the fastener position in the direction for conventional operation of the fastener and sash.
- Test 2           Ease of movement of the opening sashes. With the fastener released test forces applied at the fastener position in the direction for conventional operation of the sash.
- Test 4           Release of jammed sash. With the fastener released and a corner of the sash clamped, test force applied at the conventional position and in the direction for opening the sashes. Remove the test force and repeat Test 1.
- Test 5           Release of jammed hinge. With the window open immobilise one hinge and then attempt to close the window by applying a force of 300 N for 5 seconds at the point of operation. Remove the force and repeat tests 1 and 2.
- Test 6           Strength of restricted opening devices. With the device engaged, test force applied at the fastener position in the direction that tests the device. Remove the test force and check condition and operation.

Of the seven tests in BS 6375: Part 2, Tests 3 and 7, Resistance to excessive operating force and Resistance to accidental loading respectively are not applicable to this sort of opening light.



### 3 Test specimen

The general details about the test specimen supplied by Smart Systems Ltd for these tests are given below and in drawings in the Annex of this report

**Type:** Aluminium frame members with one top hung, reversible opening light and one fixed light. Reference: Smart Systems Ltd 1200 mm x 1800 mm Visoline reversible window with fixed light.

**Glazing:** The two lights are glazed with insulating glass units with 6 mm thick glass and a 16 mm air gap. The opening light is glazed from indoors and the fixed light from outdoors. Aluminium beads retain the glazing seals and the glazing.

**Seals:** On the opening light frame there is a blade/flipper type seal with mitred bonded corner joints. On the corresponding parts of the window frame there is a compression type seal, continuous at two corners and butt jointed at the other two. The glazing seals are neoprene with bonded corner joints.

EPDM Sealant is applied to corner joints of the seals and other sealant is applied to the joints between glazing beads.

**Hardware:** A single lockable handle operates three espagnolette bolts at the bottom of opening light. The Pieder Nielson hinges allow full reversal of the light; the left hand hinge has a restricted opening device incorporated into it.

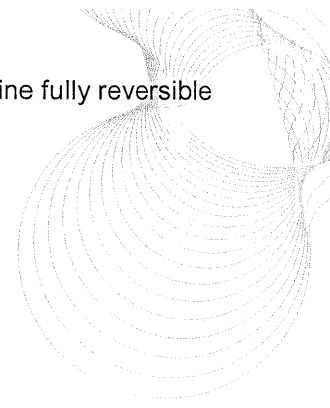
**Fixings:** For these tests the specimen was fixed and sealed into a wood surround frame with screws at the top, bottom and sides.

**Detail:** The bottom rail of the opening light has four drainage holes. The sill frame member below has four below the opening light and two more below the fixed light area. All drain out onto the sub-sill.

**Dimensions:** 1205 mm high x 1805 mm wide (overall). Area: 2.18 m<sup>2</sup>  
Length of opening joint = 4.38 m

### 4 Test rig

The window was mounted in the BRE test rig that consists of rigid steel channels and columns adjusted to fit the test window. The window is held in the rig by clamps around its outside edge.



## 5 Test results

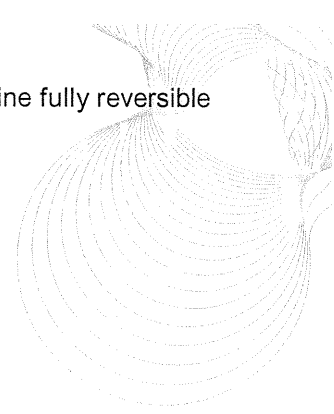
The test results for the fully reversible opening light are shown in Table 1 below.

BS 6375: Part 2 tests	BS 6375: Part 2 requirements	Fully reversible opening light performance	
		Test results	Comparison with requirements
1. Ease of fastener operation	Fasteners shall engage as designed with sash closing force of <65 N. Maximum permitted force to release sash: Turn handles 10 Nm	Yes 5.2 Nm	Passed
2. Ease of movement of sash	Maximum permitted force to initiate movement, 80 N. Maximum permitted force to sustain movement, 65 N.	Opening 10.0 N Closing 1.0 N* Opening 14.0 N Closing 1.0 N	Passed
4. Release of jammed sash	No visible damage. Fasteners shall fully engage as designed with a closing force on the sash of <65 N. Maximum permitted force to release sash: Turn handles 10 Nm	No damage Yes 5.2 Nm	Passed
5. Release of jammed hinge Class A	No visible damage. Fasteners shall fully engage as designed with a closing force on the sash of <65 N. Maximum permitted force to release sash: Turn handles 10 Nm Maximum permitted force to initiate movement, 80 N. Maximum permitted force to sustain movement, 65 N.	No damage Yes 5.3 Nm Opening 11.0 N Closing 1.5 N Opening 15.0 N Closing 1.5 N	Passed
6. Strength of restricted opening device	Capable of withstanding the test forces and remain operable.	Yes**	Passed

\*self-closes under its own weight

\*\* The same restrictors re-engage when the light is fully reversed and the same test repeated

**Table 1. Fully reversible opening light - operation and strength test results**



## 6 Conclusion

The operation and strength of the specimen 1200 mm x 1800 mm Smart Systems Visoline window met the performance requirements specified in BS 6375: Part 2: 1987 for fully reversible, projecting, top hung opening lights.

## 7 References

1. BS 6375: Part 2: 1987: Performance of windows. Part 2. Specification for operation and strength characteristics. British Standards Institution, London

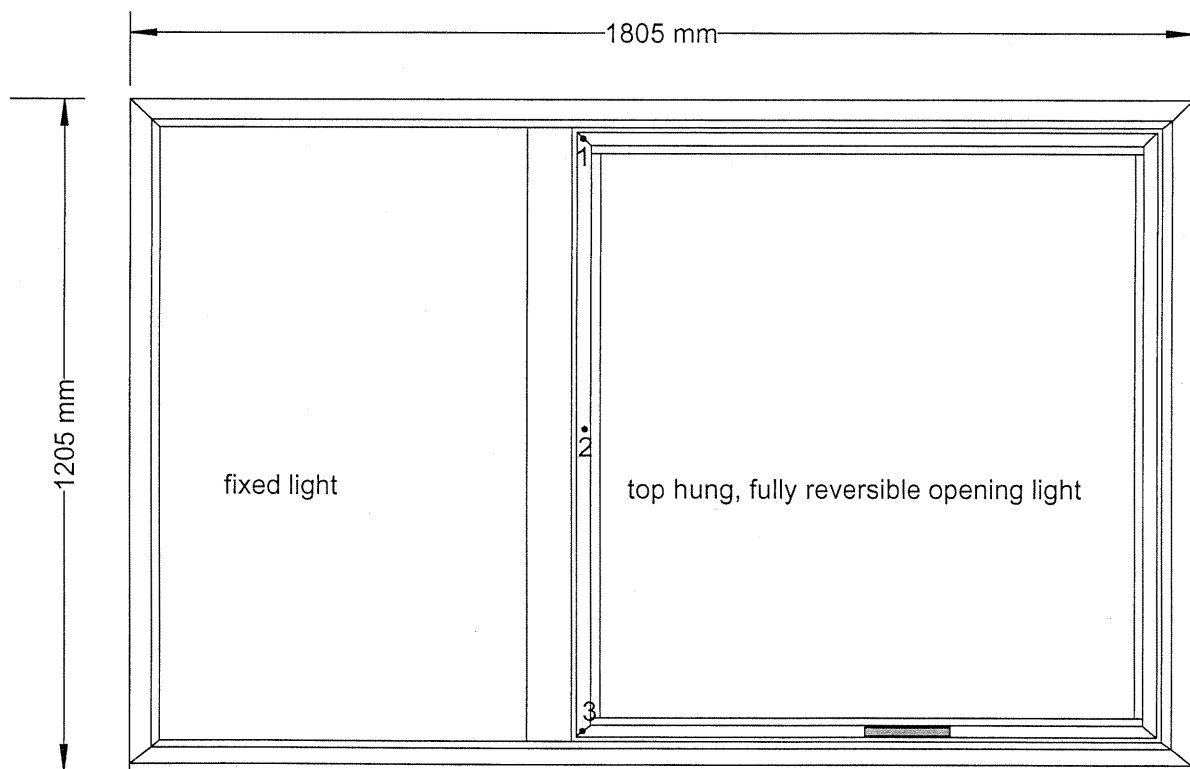


Figure 1. Outline sketch of the inside face of the window

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