

## Introduction

A specified weight shall be released in a controlled fall under gravity towards the test sample, sample at critical points as described herein, to check if the test sample has an adequate resistance to withstand the impact from weight.

The tests assess the fragility of the specimen rooflight assemblies when subjected to impacts by a heavy soft body as in ACR(M) 001:2005

The test was carried out by the competent persons Mr S. Johnston and Mr A Patterson of NaturaLight Systems, witnessed by Mr G Woodman of NaturaLight Systems.

## Details of the tests carried out

The tests were performed on a specimen of roof light assembly known as 25mm fastlock. The scope of this edition of the standard describes it as applicable to any product that will form a roof or part of a roof assembly. The roof light was tested to simulate accidental impacts that can occur when humans stumble and fall onto the top surface of roof light products.

The tests use a 45kg cylindrical shaped impactor canvas bag filled with compacted sand. The test rig, impactor, drop height, number of drops and time of retention after impact are according to ACR (M) 001: 2005.



The impactor bag described above was dropped vertically onto the outdoor surface of the specimen roof light assemblies. A second identical impact was performed at the same position on the same test specimen. When all impacts are completed at one position (including repeated tests) then the next position is tested. The height of 1.2m above the specimen, specified in the ACR standard, from which the impactor was released, gave theoretical impact energies of 530J (Joules).

Impacts are performed at three positions to match those specified in the ACR standard and at other positions to attempt to establish the 'worst' position to impact the specimen in this manner. The specified positions are:

- I. Within 150 mm of the centre of the last sample
- II. Within 30 mm of a support point, at least 150mm away from the support
- III. Within 150mm of the edge of the sheet, adjacent to the underlap with the other sheet, at a position chosen by the 'competent' person.

## Definition of Test

ACR (M) 001 :2005 Test for fragility of roofing assemblies (2<sup>nd</sup> edition)

First impact at a point. On impact, if the impactor falls through the test assembly and hits the ground, the test assembly is classified as fragile.

If the impactor is retained on the test assemble the assembly must retain the load for at least 5 minutes. The time period may be shortened or extended if justified by the 'component' person.

If the test assemble retains the load for the 5 minutes after the impact then it will be classified Class C . Non-fragile assembly.

Second impact to same point as the first. The impactor is removed and a second impact similar to the first is made to the same point. If the impactor is retained on the test assembly after the second impact it must be retained for 5 minutes. If the impactor is not retained after the second impact the test assembly will be Classified C. Non-fragile assembly. If, however, the test assembly retains the impactor after the second impact it will be classified Class B. Non-fragile assembly.

To attain a higher grade than Class B a person competent to do so closely examines the roofing assembly. If this examination shows no sign of damage to sheet or assembly likely to affect the long term strength and weathertightness then the test assembly shall be upgraded to Class A Non-fragile assembly.

## Roof light test specimen

NaturaLight Systems Ltd assembled and fixed the test specimens a test rig constructed from 80x80x3 SHS steel to replicate degree of pitch and size of rooflight with intermediate support to suit site conditions.

Type: A polycarbonate roof light with aluminium glazing and end bars(interlocking). Reference : NaturaLight Systems Ltd 25mm Fastlock system roof light.



Roof light: The 'glazing' is 25 mm (overall thickness) Bayer Makrolon Multi UV clear polycarbonate with vertical internal walls between upper and lower skins of approx 0.9mm thick.

The Fastlock system consists of the polycarbonate glazing fitted into primary and secondary glazing bars with closure bars at the top and bottom of the roof light sheets. Secondary bars interlock into the primary bars. The overall sizes of the glazing bars id : Primary bars 80 mm wide x 43 mm high, Secondary bars 51 mm wide x 33 mm high. The glazing engagement into the bars was 25 mm.

Fixings: The roof light was fixed to the purlins with self-drilling and tapping screws, 35mm long x 5 mm diameter through the glazing bars, at each corner of the starter panel and two corners of interlocking panels (corners furthest away from the interlock), they were then fixed at equidistant centres down each primary and secondary bar.

Weatherseals: The edges of the glazing in the bars has a silicone sealant seal.

The heavy, soft body impactor was suspended vertically above the roof light assembly test specimen at 1.2 m drop height.

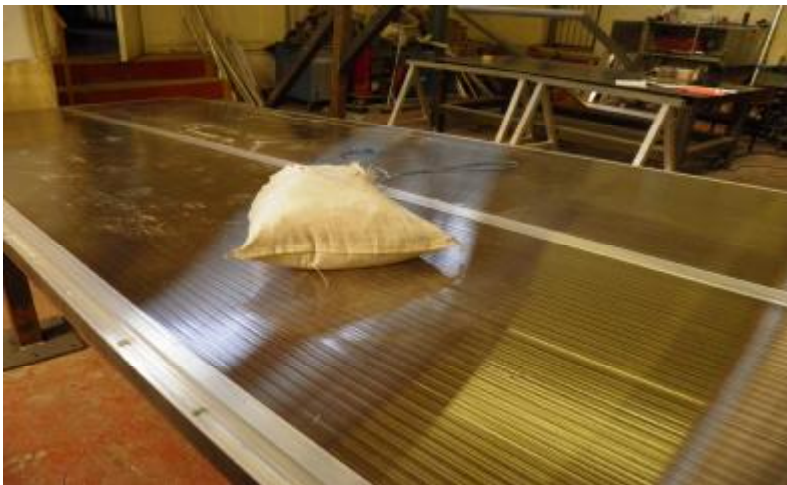


## Results for the test

The weight of the impactor was checked prior to the day's testing and confirmed to be within the prescribed limits at 45.45 kg. The length of the drop height gauge was also checked and confirmed to be 1.2 m.

Impact Position	Drop No	Notes
Centre of starter panel	1	Slight indent to poly impactor retained For 5 mins no problem
Centre of starter panel	2	Further indent to poly impactor retained For 5 mins no problem
Centre of end panel	1	Slight indent to poly impactor retained For 5 mins no problem
Centre of end panel	2	Impactor bounced over to C/L of glazing bar, bar had slight separation but held for 5 mins no problem

Table 1. Test results on specimens of 25mm thick Fastlock roof light when impacted at the centre of panels.





Impact Position	Drop No	Notes
Corner of starter panel	1	Slight indent to poly impacter retained for 5 mins no problem
Corner of starter panel	2	Slight disengagement of poly from profile approx 20mm, impacter retained for 5 mins no problem. Gap did not increase
Corner of end panel	1	Slight indent to poly impacter retained for 5 mins no problem
Corner of end panel	2	Further denting to poly, slight buckling of profile although glazing remained engaged and held impacter for 5 mins no problem

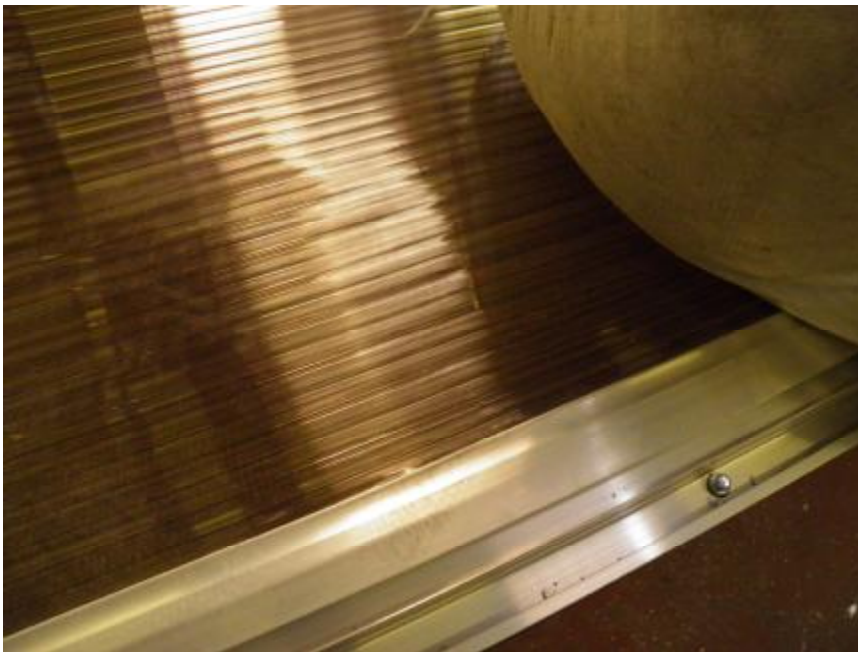
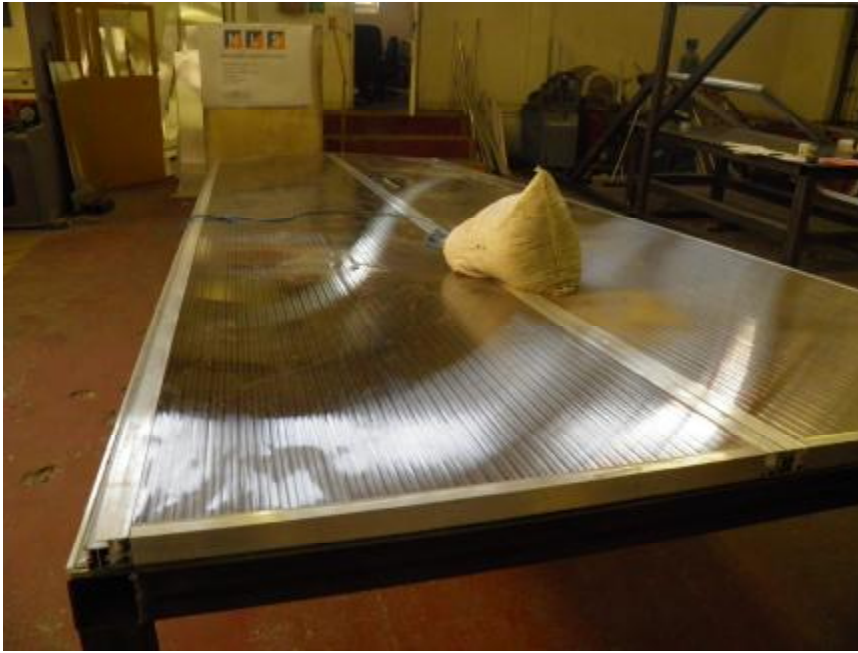
Table 2. Test results on specimens of 25mm thick Fastlock roof light when impacted at the corner of the panels.





Impact Position	Drop No	Notes
Mid way along glazing panel edge of starter panel	1	Very slight 5mm separation of interlocking glazing bars and slight indent to poly, impactor held for 5 mins no problem
Mid way along glazing panel edge of starter panel	2	Further separation of glazing profiles, approx 10mm, further indent to poly, glazing still engaged and retainer held for 5 mins no problem.
Mid way along glazing panel edge of end panel	3	Very slight 5mm separation of interlocking glazing bars and slight indent to poly, impactor held for 5 mins no problem
Mid way along glazing panel edge of end panel	4	Further separation of glazing profiles, approx 10mm, further indent to poly, glazing still engaged and retainer held for 5 mins no problem.

Table 3. test results on specimens of 25mm thick Fast lock roof light when impacted at a point midway along the long edge of a panel, close to a glazing bar.



### Classification of roof construction

The impact tests have been carried out to assess the fragility of specimens of NaturalLight Systems Ltd 25 mm thick Fastlock roof lights. The interim results apply only to the new roof lights as configured, mounted and fixed as described herein.

It is the findings of Naturalight Systems that the Fastlock 25mm system when installed as described herein is capable of meeting the requirements of ACR(M)001:2005