



**Intertek Testing Services**  
ETL SEMKO

**REPORT OF**

**PRODUCT SAFETY EVALUATION**

**CONDUCTED ON**

**FIBERGLASS & IMPACT RESISTANT ACRYLIC SKYLIGHT DOMES**

**FOR**

**BRISTOLITE SKYLIGHTS**  
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**ATTENTION: MR. CARL SCHMIDT**

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Revised Date: August 30, 2002

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### REVISION TABLE

Revision Date	Revision Page	Revision
August 30, 2002	Throughout entire report	Addition of description of the materials tested - Impact Resistant Acrylic

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## PREFACE

All services undertaken are subject to the following general policy:

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3. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product or service is or has ever been under an ITS certification program.

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## INTRODUCTION

At the request of Carl Schmidt of Bristolite Skylights, product safety tests were conducted on one fiberglass and two impact resistant acrylic skylight domes. The testing was to be conducted in accordance with the United States Occupational Safety and Health Administration Department of Labour (OSHA) regulations for Fall Protection Systems Criteria and Practices (1926.502).

In order to evaluate the skylight domes against this standard, the following testing methods were employed:

1. ASTM E661-88 (1997) – Standard Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads.
2. ASTM E72 – Standard Test Method of Conducting Strength Tests of Panels for Building Construction.

## PRODUCT DESCRIPTION

The external dimensions of the skylight domes are shown in Table 1 below.

ITS Identification	Manufacturer Designation	Width	Length	Target Dome Thickness
Skylight 1 Impact Resistant Acrylic	4896-HRS-CM	4'	8'	1/4"
Skylight 2 Fiberglass	6072-ES-CMG	5'	6'	1/8"
Skylight 3 Impact Resistant Acrylic	6072-HRS-CM	5'	6'	1/4"

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### TEST PROCEDURE

To carry out the uniformly distributed load testing, a double-height box frame was constructed from 2" x 6" standard planed lumber for each of the skylight domes. The frames were designed so that the skylight domes would fit tightly over the outer face of the frames, simulating actual construction use. The dimensions of the box frames are shown in Table 2 below. An inlet and outlet hole was cut on the outer face of each frame to allow a negative pressure to be drawn from the dome and frame assembly. The inlet valve was controlled by means of a 2" gate valve. To produce a uniformly distributed load, the skylight dome and frame chamber were sealed so that a negative pressure could be drawn using a vacuum pump. Each skylight dome was subjected to a proof load of 40 psf for five minutes. The equipment used for the measurement of pressure included:

- 36" 'Dwyer' manometer – ITS identification 52613
- 150" 'Dwyer' magnehelic – ITS identification 9-0345

<b>Table 2. Box Frame External Dimensions</b>		
<b>ITS Identification</b>	<b>Width</b>	<b>Length</b>
Skylight 1 Impact Resistant Acrylic	4' 3.5"	8' 3.5"
Skylight 2 Fiberglass	5' 3.5"	6' 3.5"
Skylight 3 Impact Resistant Acrylic	5' 3.5"	6' 3.5"

To perform the concentrated load testing, a wooden lever device was constructed to manually apply a proof load of 200 lb. and a 400 lb. load applied as a two times safety factor as outlined in the OSHA Standards 1926.502(i) (3). A load cell and a 3" diameter plate were fitted in series to the end of the lever to enable the correct loading to be applied. The equipment used for the measurement of weight included:

- 500 lb. 'Artech' load cell – ITS identification 52646
- 'Data Shuttle' interface – ITS identification 9-0429
- Work Bench software program.

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**TEST RESULTS**

The uniformly distributed and concentrated load test results are summarised in Table 3 below. A more detailed description of the test results and photographs of the tests in progress are shown in Appendices A and B respectively.

<b>Table 3. Uniformly Distributed and Concentrated Load Test Results</b>			
<b>ITS Identification</b>	<b>Uniformly Distributed load of 40 psf (pass/fail)</b>	<b>Concentrated Load of 200 lb. (pass/fail)</b>	<b>Concentrated Load of 400 lb. (pass/fail)</b>
Skylight 1 Impact Resistant Acrylic	Pass	Pass	Pass
Skylight 2 Fiberglass	Pass	Pass	Pass
Skylight 3 Impact Resistant Acrylic	Pass	Pass	Pass

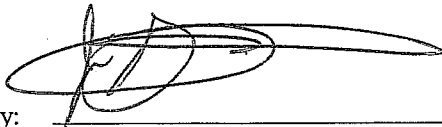
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**CONCLUSIONS**

All three of the skylight domes tested met the requirements of the United States OSHA standard 1926.502.

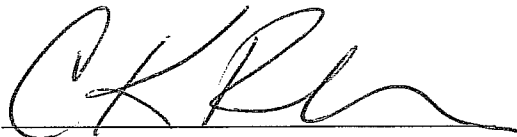
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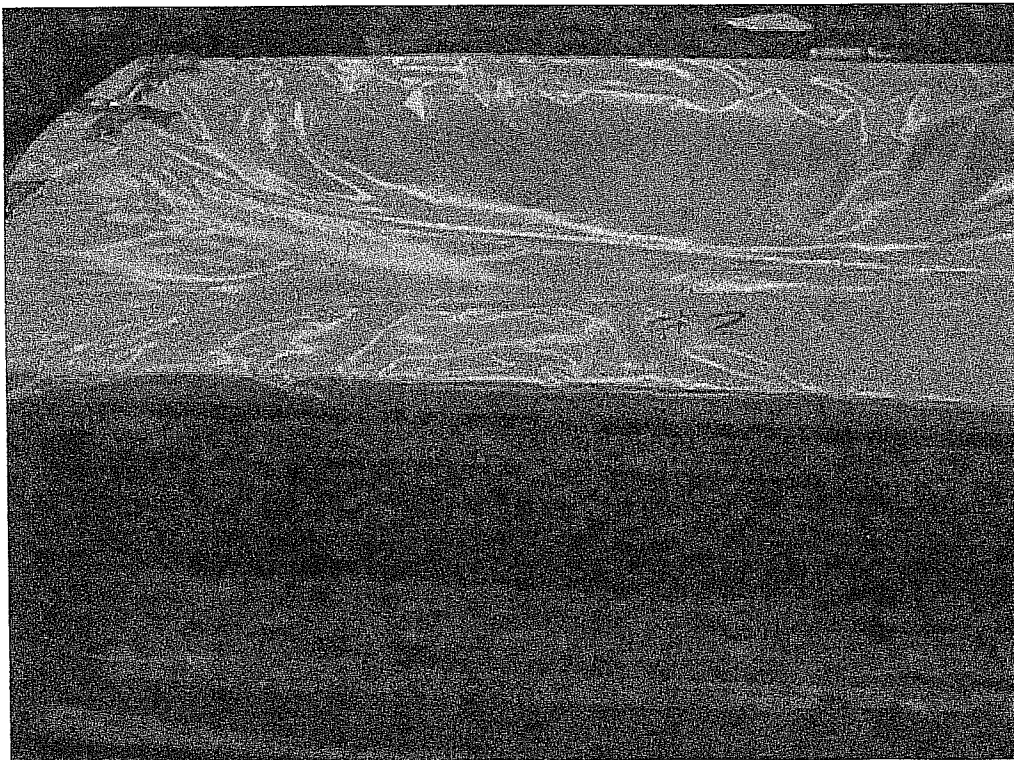
**APPENDIX A**  
**PHOTOGRAPHS**

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**A uniformly distributed proof load test in progress – specimen shown is holding uniform load  
(Skylight #2 - 6072-ES-CMG – Fiberglass)**



**Inverted skylight in frame after inverting due to a combination of uniform and concentrated loading  
(Test #2 – Skylight #1 - 4896-HRS-CM – impact modified acrylic)**



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**APPENDIX B**  
**DATA SHEETS**



# Uniform and Point loading

**Date:** August 8, 2002  
**Client:** Bristolite  
**Project:** 3028364  
**Product:** Skylights  
**Standard:** ASTM E661-88(1997) and ASTM E72  
**Equipment:** Dwyer 36" manometer 1230-36, S 21N, ID# 52613  
 5.5 HP 110 Volt Vacuum System  
 Artech 500 lb. load cell Serial # 200613, ID# 9-0489  
 Workbench software program  
 Data Shuttle Model # DS-1-8-TC-40 S/N 1171R403, ID# 9-0429

**Bristolite Skylights** Number 1, 4896-HRS-CM

Displacement	Uniform Loading in psf			
	10	20	30	40
At start, no loading	0	0	0	1/16
At start, with loading	2/16	3/16	3/16	4/16
After 5 min. of loading	2/16	3/16	4/16	4/16
At initial load release	0	0	1/16	1/16
	0	0	1/16	1/16

**Observations**

Point Load of 200 lbs./5 min.  
With no loading  
 The load depressed the skylight locally but there was no sign of collapse or failure

Point Load of 200 lbs./5 min.  
with uniform load of 40 psf  
 Point load depressed the skylight uniformly until it inverted. At that point it held in the inverted position for the remaining time. There was no signs of cracking.

Run up pressure to failure  
 No sign of cracking at 90.13 psf although the skylight is inverted and the metal frame is distorted At that point the skylight passes the 200 lbs. point load. The skylight held at 86.84 psf with a maximum point load of 405 lbs. There was no sign of cracking in the inverted skylight.

Tested By: \_\_\_\_\_  
 Jim Barzilay  
 Technician, Construction Products



# Uniform and Point loading

**Date:** August 8, 2002  
**Client:** Bristolite  
**Project:** 3028364  
**Product:** Skylights  
**Standard:** ASTM E661-88(1997) and ASTM E72  
**Equipment:** Dwyer 36" manometer 1230-36, S 21N, ID# 52613  
 5.5 HP 110 Volt Vacuum System  
 Artech 500 pound load cell Serial # 200613, ID# 9-0489  
 Workbench software program  
 Data Shuttle Model # DS-1-8-TC-40 S/N 1171R403, ID# 9-0429

**Bristolite Skylights** Number 2, 6072-ES-CMG  
 Uniform Loading in psf

	10	20	30	40
<b>Displacement</b>				
At start, no loading	0	0	0	0
At start, with loading	1/16	3/16	5/16	6/16
After 5 min. of loading	4/16	4/16	5/16	7/16
At initial load release	0	0	0	0
At 5 min. load released	0	0	0	0

**Observations**

Point Load of 200 lbs./5 min.  
(no uniform loading)

There was some deflection as the weight increased to 200 lbs. and then the point load stabilized and deflection ceased. After 5 minutes the load was increased to 275 lbs. At that time the deflection became greater than the stroke of the apparatus and loading was halted. There was no sign of cracks or punctures at the 275 lb. mark.

Point Load of 200 lbs./5 min.  
with uni-load of 7.6 in. H2O

The skylight accepted the 200 lb. load for the indicated 5 minute time frame. The deflection crept gradually and steadily for the time period. A maximum load of 462.8 lbs. was obtained without signs of cracks or puncture.

Run up pressure to failure

The skylight started to fail at 69.47 psf and finally inverted completely at 81.58 psf. It held at 89.47 psf. A load of 418 lbs. did not cause any more cracking than what appeared in the inversion process. The frame is quite distorted on the outside edge.

Tested By:

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 Jim Barzilay  
 Technician, Construction Products



# Uniform and Point loading

**Date:** August 8, 2002  
**Client:** Bristolite  
**Project:** 3028364  
**Product:** Skylights  
**Standard:** ASTM E661-88(1997) and ASTM E72  
**Equipment:** Dwyer 36" manometer 1230-36, S 21N, ID# 52613  
 5.5 HP 110 Volt Vacuum System  
 Artech 500 lb. load cell Serial # 200613, ID# 9-0489  
 Workbench software program  
 Data Shuttle Model # DS-1-8-TC-40 S/N 1171R403, ID# 9-0429

**Bristolite Skylights** Number 3, 6072-HRS-CM

Uniform Loading in psf		10	20	30	40
<b>Displacement</b>	At start, no loading	0	0	0	0
	At start, with loading	2/16	2/16	3/16	3/16
	After 5 min. of loading	2/16	2/16	3/16	4/16
	At initial load release	0	0	0	1/16
	At 5 min. load released	0	0	0	1/16

**Observations**

Point Load of 200 lbs./5 min.  
(no uniform loading)

Loading causes deflection in skylight but does not cause inversion. At 200 lbs. the point load stops deflecting. I loaded to 310 lbs. where the apparatus failed. The skylight continued to deflect past 200 lbs.

Point Load of 200 lbs./5 min.  
with uni-load of 40 psf

The point load did not cause more deflection with uniform loading.

Run up pressure to failure

The skylight started to yield at 81.58 psf and after being fully inverted it held the 200 lb. point load for 5 min. at 91.05 psf. The point load was then increased to a maximum of 427.5 lbs., and there was no cracking or failure of the fully inverted skylight.

Tested By:

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