

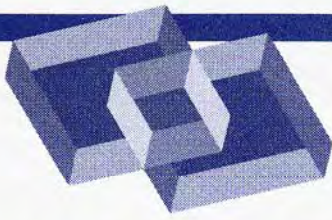
## Notice

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The company name in the following report could not be retroactively changed from Bekaert to Solar Gard. The integrity of the product represented in the test has not changed and the results for this product are still valid. As the test is update the new report will reflect the Solar Gard name.

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**Report No:** 805/07

**Client:** Bekaert Specialty Films

**Project:** Impact Testing for Organic Coated Glass to AS / NZ 2208.96

**Date:** July 6, 2007

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**Objective:**

To determine the performance of the organic coated glass to impact requirements of AS/NZ 2208.96 to Grade ‘A’ status.

**Samples:**

Bekaert Specialty Films supplied us with the samples. There were 45 pieces of organic coated glass that were 3 mm and 6 mm thick annealed glass. The organic film was placed on one side of the panels.

The organic films were of 3 different thickness- 100 micron, 175 micron and 200 micron thick and were manufactured by Bekaert Specialty Films LLC in San Diego in the USA.

The panels were of the size 1900mm X 860 mm.

**Sample Preparation:**

The samples were conditioned for 24 hours at  $23 \pm 5^{\circ}$  C.

- 8 off – 1900 mm X 860 mm X 6 mm thick annealed glass with 175 micron (7 mil) Clear safety film
- 8 off – 1900 mm X 860 mm X 6 mm thick annealed glass with 100 micron (4 mil) Clear safety film
- 8 off – 1900 mm X 860 mm X 6 mm thick annealed glass with 200 micron (8 mil) Clear safety film
- 8 off – 1900 mm X 860 mm X 3 mm thick annealed glass with 100 micron (4 mil) Clear safety film

- 8 off – 1900 mm X 860 mm X 3 mm thick annealed glass with 175 micron (7 mil) Clear safety film

### **Apparatus Used:**

The glass samples were supported in the standard AS/NZ 2208: 96 impact test frame and impacted with the specified 46 Kgs lead shot bag. The drop heights were progressively increased until fracture occurred.

The apparatus used was a steel frame that held the glass samples in the vertical plane. This frame was securely bolted down to the floor. The glass panel was held in the vertical position in the frame using edge clamps. (See AS/NZ 2208:96 for details).

The impactor was a reinforced leather bag filled with No. 7<sup>1/2</sup> chilled lead shorts, providing a total mass of 46 kgs. The bag is made up of a 1.6 mm thick pliable leather with canvas laminated to the inside surface making a wall thickness of 2.4 mm. A rubber bladder of 0.6 mm wall thickness is contained inside the leather bag. The lead shots are then filled into this leather bag with the rubber bladder.

### **Test Method:**

The annealed glass samples were placed in a vertical position.

The impactor bag was supported from an overhead support so located that the bag when at rest would be 12 mm from the surface of the glass panel at the center of the test piece.

The lead shot bag is then raised in an arc to a height of 300 mm and then stabilised before it is released to impact the glass panel in the frame.

The sample once impacted was checked for any breakages or tearing in the glass film composite and the observation are recorded.

The samples are inspected after for the following:

- If the sample had broken or the film had torn
- If any breaks or tear is observed, check if it has numerous fissures and no tear or opening is large enough to which a 76 mm diameter can freely pass through.

**Test Results:**

The results obtained from the tests conducted on the 45 samples are provided in the table below.

**6 mm Thick annealed glass with 100 micron clear safety film**

<b>Sample No:</b>	<b>Drop Height</b>	<b>Impact Surface</b>	<b>Comments</b>	<b>Results</b>
1	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
2	300 mm	Impact on Film Side	Glass did not crack, no tear in the film	Pass
	450 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
3	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
4	300 mm	Impact on Film Side	Glass did not crack, no tear in the film	Pass
	400 mm	Impact on Film Side	Glass did not crack, no tear in the film	Pass
	600 mm	Impact on Film Side	Glass did not crack, no tear in the film	Pass
	750 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
5	300 mm	Impact on Film Side	Glass cracked and a tear was observed. The opening was 140 mm long X 26 mm wide.	Even though a tear was observed, it is deemed to have passed.
6	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 180 mm long X 30 mm wide.	Even though a tear was observed, it is deemed to have passed
7	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 35 mm long X 10 mm wide.	Even though a tear was observed, it is deemed to have passed
8	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 70 mm long X 10 mm wide.	Even though a tear was observed, it is deemed to have passed
9	300 mm	Impact on Non	Glass cracked and a tear	Even though a

		Film Surface	was observed. The opening was 80 mm long X 16 mm wide.	tear was observed, it is deemed to have passed
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*6 mm Thick annealed glass with 175 micron clear safety film*

<b>Sample No:</b>	<b>Drop Height</b>	<b>Impact Surface</b>	<b>Comments</b>	<b>Results</b>
1	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
2	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
3	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
4	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
5	300 mm	Impact on Film Side	Glass cracked and a tear was observed. The opening was 67 mm long X 16 mm wide.	Even though a tear was observed, it is deemed to have passed.
6	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 108 mm long X 30 mm wide.	Even though a tear was observed, it is deemed to have passed
7	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 70 mm long X 6 mm wide.	Even though a tear was observed, it is deemed to have passed
8	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 120 mm long X 19 mm wide.	Even though a tear was observed, it is deemed to have passed
9	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 150 mm long X 16 mm wide.	Even though a tear was observed, it is deemed to have passed

6 mm Thick annealed glass with 200 micron clear safety film

<b>Sample No:</b>	<b>Drop Height</b>	<b>Impact Surface</b>	<b>Comments</b>	<b>Results</b>
1	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
2	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
3	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
	450 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
4	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
5	300 mm	Impact on Film Side	Glass cracked and a tear was observed. The opening was 145 mm long X 26 mm wide.	Even though a tear was observed, it is deemed to have passed.
6	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 180 mm long X 30 mm wide.	Even though a tear was observed, it is deemed to have passed
7	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 80 mm long X 10 mm wide.	Even though a tear was observed, it is deemed to have passed
8	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 150 mm long X 12 mm wide.	Even though a tear was observed, it is deemed to have passed
9	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 40 mm long X 20 mm wide.	Even though a tear was observed, it is deemed to have passed

3 mm Thick annealed glass with 100 micron clear safety film

<b>Sample No:</b>	<b>Drop Height</b>	<b>Impact Surface</b>	<b>Comments</b>	<b>Results</b>
1	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
2	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
3	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
4	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
5	300 mm	Impact on Film Side	Glass cracked and a tear was observed. The opening was 110 mm long X 16 mm wide.	Even though a tear was observed, it is deemed to have passed.
6	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 100 mm long X 30 mm wide.	Even though a tear was observed, it is deemed to have passed
7	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 40 mm long X 10 mm wide.	Even though a tear was observed, it is deemed to have passed
8	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 76 mm long X 15 mm wide.	Even though a tear was observed, it is deemed to have passed
9	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 160 mm long X 26 mm wide.	Even though a tear was observed, it is deemed to have passed

3 mm Thick annealed glass with 175 micron clear safety film

Sample No:	Drop Height	Impact Surface	Comments	Results
1	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
2	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
3	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
4	300 mm	Impact on Film Side	Glass cracked, no tear in the film	Pass
5	300 mm	Impact on Film Side	Glass cracked and a tear was observed. The opening was 110 mm long X 26 mm wide.	Even though a tear was observed, it is deemed to have passed.
6	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 100 mm long X 30 mm wide.	Even though a tear was observed, it is deemed to have passed
7	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 70 mm long X 10 mm wide.	Even though a tear was observed, it is deemed to have passed
8	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 170 mm long X 10 mm wide.	Even though a tear was observed, it is deemed to have passed
9	300 mm	Impact on Non Film Surface	Glass cracked and a tear was observed. The opening was 130 mm long X 16 mm wide.	Even though a tear was observed, it is deemed to have passed

***Note: Even though in some of the samples tearing was observed, it was deemed to have passed is because the tear was not large enough to allow a 75 mm dia sphere to pass through freely***

**Conclusion:**

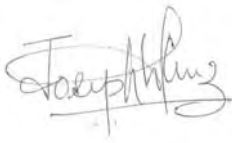


The results obtained from the series conducted on the glass/ film composite shows that they have passed the requirements of the AS / NZ 2208:96 for Grade A Safety glass and glazing materials.

It must be noted that these results are only valid for the above mentioned products namely:

- 100 micron (4mil) Clear Safety Film
- 175 micron (7mil) Clear Safety Film
- 200 micron (8mil) Clear Security Film

Manufacturer by Bekaert Specialty Films LLC.

A handwritten signature in black ink, appearing to read "Joseph H. King". The signature is written in a cursive style with a horizontal line underneath the name.

Laboratory Manger.