

Blast Mitigation Testing and Hazard Criteria

LLumar® Anti-Shatter Films have been successfully air-blast tested for their anti-blast properties in an explosion with the performances shown below. Attachment systems were used on all four sides except as otherwise indicated. Testing was in accordance with ASTM F 1642 and / or GSA-TS01-2003 (these tests are essentially identical). Often, specifications to ISO 16933 require the samples meet at least level 3b performance with 4 psi peak blast pressure and 28 psi-me blast impulse.

Many of the tests we have done (see tables below) achieved Level 3 performance or better, but with positive peak pressure and positive impulse higher than 4psi / 28 psi-ms. These test results demonstrate LLumar® SCL SR PS8 Anti-Shatter Film’s superior performance.

Since ISO 16933 and the USA test methods are effectively identical*, and since explosion testing is extraordinarily expensive, it is impractical to repeatedly blast test products where performance is already known, hence Solutia Performance Films uses all these tests as equivalents.

* Apart from the number of test samples; ISO 16933 demands 3 test samples but the USA tests demand only 1. Solutia Performance Films has tested more than the 3 panels demanded by ISO 16933.

The data below are all for film applied to single glazed 6 mm annealed glass. Additional details can be found in the test reports.

SCL SR PS8 Blast Mitigation

| Positive peak pressure | Positive impulse | Hazard Reduction |
|--|------------------|--------------------------|
| Peak pressures and impulses at or slightly above 4 psi blast pressure / 28 psi-ms blast impulse | | |
| 4.69 psi | 30.58 psi-ms | Minimal hazard, level 3b |
| 4.43 psi | 30.34 psi-ms | Minimal hazard, level 3b |
| 4.28 psi | 28.03 psi-ms | Minimal hazard, level 3b |
| 4.28 psi | 28.03 psi-ms | Minimal hazard, level 3b |
| Peak pressures and impulses significantly above 4 psi blast pressure / 28 psi-ms blast impulse | | |
| 6.64 psi | 39.75 psi-ms | Minimal hazard, level 3b |
| 6.64 psi | 39.75 psi-ms | Minimal hazard, level 3b |
| 6.57 psi | 39.13 psi-ms | Minimal hazard, level 3b |
| 6.57 psi | 39.58 psi-ms | Minimal hazard, level 3b |
| 6.57 psi | 39.58 psi-ms | Minimal hazard, level 3b |

Compliance with ISO 16933 at 4 psi / 28 psi-ms, level 3b: Yes, at pressures and impulses > specified minimum

SSI20 SR PS8 and V28 SR PS8 Blast Mitigation

We also offer combined solar control / energy savings blast mitigation films. SSI20 SR PS8 and V28 SR PS8 are identical apart from the nanometre thick metal layer, which has no effect on blast mitigation performance, hence these are effectively the same film. Information:

| Positive peak pressure | Positive impulse | Hazard Reduction |
|--|------------------|--------------------------|
| In addition to tests for SCL SR PS8 | | |
| 4.28 psi | 28.03 psi-ms | Minimal hazard, level 3b |
| 4.69 psi | 30.58 psi-ms | Minimal hazard, level 3b |
| 4.43 psi | 30.34 psi-ms | Minimal hazard, level 2 |
| 6.57 psi | 39.58 psi-ms | Minimal hazard, level 3b |

Compliance with ISO 16933 at 4 psi / 28 psi-ms, level 3b: Yes, at pressures and impulses similar to or > specified minimum