

Structural Laminate Analysis

SentryGlas® Interlayer — FEA-Based Load & Deflection Studies

Report Reference	IPH/KC/R4/2026
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Analysis Conducted by	Kuraray India Pvt. Ltd., New Delhi
Software	SJ Mepla 3.5.9 — Finite Element Analysis
Interlayer Product	Kuraray SentryGlas® (SGP)
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1. Overview

IPH Glasses commissions structural laminate analyses through Kuraray India Pvt. Ltd. for all demanding glass applications — including high wind-load façades, structural pool walls, and safety-critical panels. These analyses use SJ Mepla finite element software, which simulates actual glass and interlayer mechanical behaviour under realistic load, temperature, and time conditions. The SentryGlas® (SGP) interlayer by Kuraray provides significantly higher stiffness than standard PVB, enabling structurally efficient glass designs with enhanced post-breakage integrity.

This report covers two FEA studies commissioned by IPH Glasses: a high wind-load window analysis and a swimming pool wall analysis. Both demonstrate the structural capability of SentryGlas® laminate systems under demanding conditions.

2. Study A — High Wind Load Window Application

2.1 Project Parameters

Application	Window — Façade Glazing
Panel Dimensions	1100 mm (W) × 2400 mm (H)
Glass Build-up	7.7 mm Annealed + 4.56 mm SentryGlas® + 7.7 mm Annealed
Edge Type	Seamed Edges
Support Condition	Simply supported on all four edges
Interlayer E-Modulus @ 50°C / 3 sec	78 MPa
Interlayer E-Modulus @ 50°C / 1 hr	12.6 MPa
Design Standard	AS 1288 (Australian Standard)

2.2 Design Loads

Load Type	Pressure (kPa)	Load Duration
Ultimate Limit State (ULS) — Wind	9.6 kPa	3-second gust
Serviceability Limit State (SLS) — Wind	3.84 kPa	3-second gust

2.3 Design Specifications & Allowable Stress

Allowable Stress — Edge Locations (8mm Annealed)	27.46 MPa (AS 1288, 3-sec wind load)
Allowable Stress — Other Locations (8mm Annealed)	34.33 MPa (AS 1288)
Deflection Limit	Not specified; Span/90 recommended

2.4 FEA Results

Load Scenario	Design Load (kPa)	Max Principal Stress (MPa)	Allowable Stress (MPa)	Max Deflection (mm)	Status
ULS — Wind (3 sec gust @ 40°C)	9.6	24.07	27.46	7.81	✓ PASS
SLS — Wind (3 sec gust @ 40°C)	3.84	9.64	27.46	3.19	✓ PASS

The laminate satisfies allowable glass stress values per AS 1288. Maximum stress under ULS (24.07 MPa) remains within the 27.46 MPa limit. SentryGlas® laminates of this construction show low breakage probability for the specified loads and support conditions.

3. Study B — Swimming Pool Wall Application

3.1 Project Parameters

Application	Structural Swimming Pool Wall
Panel Dimensions	5100 mm (L, incl. 50 mm side insertion) × 1250 mm (H, incl. 150 mm base)
Glass Build-up	3 × 11.7 mm FT Glass + 2 × 1.52 mm SentryGlas®
Glass Type	Fully Tempered (FT) — all three plies
Edge Type	Seamed Edges
Support — Base	Rigidly supported, minimum 150 mm insertion in base
Support — Vertical Edges	Simply supported
Interlayer E @ 30°C / 10 Years	15 MPa
Design Standard	ASTM E1300

3.2 Design Load

Hydrostatic Load	1100 kg/m² (11.0 kPa) — caused by 1.1 m depth of water
Load Duration	10 Years
Load Temperature	30°C
Deflection Limit	Not specified by client

3.3 Allowable Stress

Max Allowable Stress — FT Glass (ASTM E1300, 10-yr load)	51.9 MPa
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3.4 FEA Results

Scenario	Max Principal Stress (MPa)	Allowable Stress (MPa)	Deflection (mm)	Status
All layers intact — hydrostatic 11.0 kPa	17.23	51.9	6.24	✓ PASS
Post-breakage — any one layer broken	28.05	51.9	10.67	✓ PASS

The triple-laminate construction demonstrates high structural redundancy. Even in the post-breakage scenario (one ply broken), maximum stress (28.05 MPa) remains well within the 51.9 MPa allowable for FT glass. The SentryGlas® interlayer provides substantial structural contribution, maintaining panel integrity and preventing sudden failure.

4. Technical Summary & Conclusion

Study	Application	Glass Build-up	Max Load	Max Stress (vs Allowable)	Conclusion
A	High Wind Window	7.7+SGP+7.7 Annealed	9.6 kPa (ULS)	24.07 MPa vs 27.46 MPa	✓ SAFE
B	Pool Wall (3-ply)	3×11.7 FT + 2×SGP	11.0 kPa Hydrostatic	17.23 MPa vs 51.9 MPa	✓ SAFE

5. About SentryGlas® Interlayer

SentryGlas® (SGP) by Kuraray is an ionoplast interlayer that is approximately 100× stiffer than standard PVB at typical service temperatures. This significantly increases the structural efficiency of laminated glass, enabling thinner or lighter glass constructions while meeting stringent safety and deflection criteria. SGP also provides superior post-breakage glass retention, making it the preferred interlayer for structural glass applications including pool walls, overhead glazing, point-fixed facades, and hurricane-rated windows. IPH Glasses is an authorised fabricator of SentryGlas® laminated glass.

6. Disclaimer

The structural analyses in this report were conducted by Kuraray India Pvt. Ltd. using SJ Mepla finite element software. Results are based on the mechanical properties of glass and polymer interlayer and are offered for assistance in application of Kuraray laminating interlayer products. These analyses do not constitute a warranty of merchantability or fitness for any particular purpose. Actual performance may vary in particular applications. Users are responsible for ensuring results are appropriate for their specific project conditions and comply with applicable building codes. IPH Glasses recommends independent structural verification for all safety-critical glass applications.