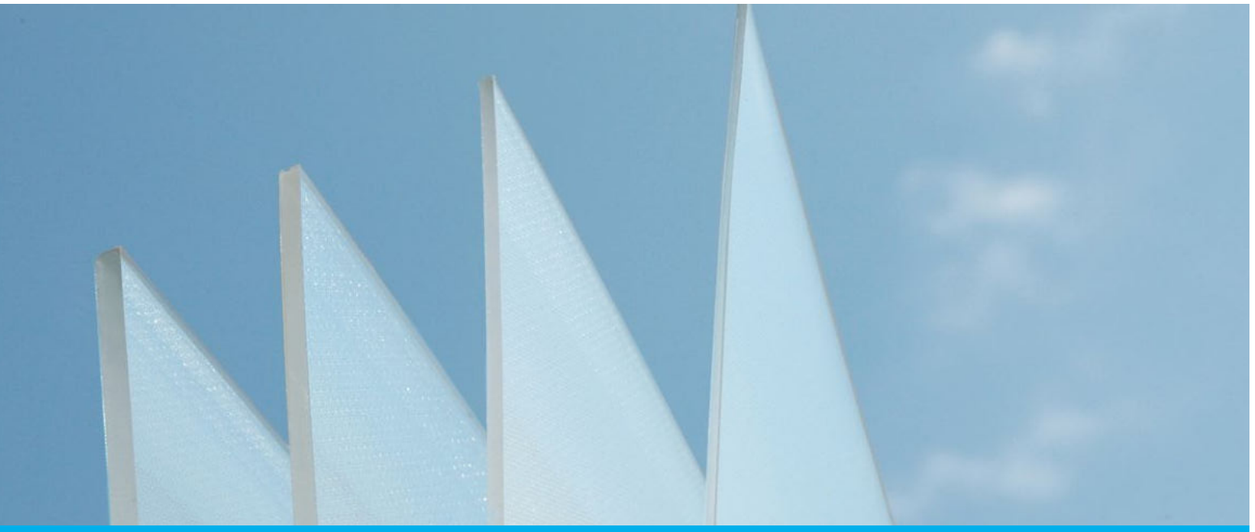


SentryGlas®

IONOPLAST INTERLAYER

SPECIFYING AND TECHNICAL DATA

The following information is presented to help you evaluate or order SentryGlas® ionoplast interlayers.
SentryGlas® interlayer is available on roll or as sheet and has a Yellowness-Index (YID) of < 2.5.

SHEET DIMENSIONS

Caliper mm (mil)	Width cm (in) Ordered, -0 +10 mm (-0 +0.4 in)	Length m (ft)
0,89 (35)	**61-216** (24-85)	**up to 600** (up to 236)
1,52 (60)	**61-216** (24-85)	**up to 600** (up to 236)
2,28 (90)	**61-216** (24-85)	**up to 600** (up to 236)
2,53 (100)	**61-183** (24-72)	**up to 600** (up to 236)
3,04 (120)	**61-183** (24-72)	**up to 600** (up to 236)

In addition to the standard stock sizes above, SentryGlas® can be ordered as 'cut-to-size', 'cut-to-fit' or 'cut-to-form' sheet, which means that none of the material is wasted. In all cases, sheet thickness is 0.89 mm (35 mil), 1.52 mm (60 mil) or 2.28 mm (90 mil). As these custom sizes require special handling/cutting, lead times are longer.

For details about the 'cut-to-size', 'cut-to-fit' or 'cut-to-form' sheet offering feel free to contact us.

ROLL DIMENSIONS

Caliper mm (mil)	Width cm (in) Ordered, -0 +10 mm (-0 +0.4 in)	Length m (ft)
0,76 (30)	**122** (48)	**200** (656)
0,76 (30)	**153** (60)	**200** (656)
0,76 (30)	**183** (72)	**200** (656)
0,76 (30)	**153** (60)	**50** (164)
0,89 (35)	**122** (48)	**200** (656)
0,89 (35)	**153** (60)	**200** (656)
0,89 (35)	**183** (72)	**200** (656)
0,89 (35)	**153** (60)	**50** (164)
0,89 (35)	**225** (88)	**50** (164)
0,89 (35)	**225** (88)	**200** (656)
0,89 (35)	**240** (96)	**50** (164)
0,89 (35)	**240** (96)	**200** (656)

SentryGlas® Elastic Properties (SG5000)

In general, 0,76 mm (30 mil) is specified for easy processing when double stacking and not intended to be used as a single ply. Single ply use has not been tested to determine performance against any safety glazing codes or standards. 0,89 mm (35 mil) interlayers typically require high quality tempered glass for flatness. 1.52 mm (60 mil) interlayers are specified as the standard thickness for minimally supported applications. 2.28 mm (90 mil) thickness interlayers are normally specified for anti-intrusion, hurricane and other types of security applications. Glass producers and laminators require interlayers to be supplied either in sheet form or on rolls. SentryGlas® Ionoplast interlayers are available in both formats. For faster deliveries, SentryGlas® ionoplast interlayer is stocked in standard thicknesses (calipers) of 0.89 mm (35 mil), 1.52 mm (60 mil) and 2.28 mm (90 mil) sheets. SentryGlas® ionoplast interlayer on roll is available in 0,76 mm (30 mil) and 0.89 mm (35 mil) thickness.

TABLE 1 — LAMINATE PROPERTIES

Property	Units Metric (English)	Value	Test
Haze	%	< 2	ASTM D1003
Impact test 0,23 kg (0.5 lb)	**m** (ft)	> 9.14 (> 30)	ANSI Z26.1
Boil test 2 hr	-	No defects	ANSI Z26.1
Bake test 2 hr/100 °C	-	No defects	ANSI Z26.1

TABLE 2 — INTERLAYER TYPICAL PROPERTIES

Property	Units Metric (English)	Value	ASTM Test
Young's Modulus	**Mpa** (kpsi)	**300** (43.5)	D5026
Tear Strength	**MJ/m3** (ft lb/in3)	**50** (604)	D638
Tensile Strength	**Mpa** (kpsi)	**34.5** (5.0)	D638
Elongation	**%** (%)	**400** (400)	D638
Density	**g/cm3** (lb/in3)	**0.95** (0.0343)	D792
Flex Modulus **23 °C** (73 °F)	**Mpa** (kpsi)	**345** (50)	D790
Heat Deflection Temperature (HDT) @ 0.46 MPa	**°C** (°F)	**43** (110)	D648
Melting Point	**°C** (°F)	**94** (201)	(DSC)
Coeff. of Thermal Expansion (-20 °C to 32 °C)	**10-3 cm/cm °C** (mils/in °C)	**10 - 15** (0.10 - 0.15)	D696
Thermal Conductivity	**W/M-K** (BTU-in/hr-ft2 °F)	**0.246** (1.71)	

SentryGlas® Elastic Properties (SG5000)

YOUNG`S MODULUS: SENTRYGLAS®

Young's Modulus E MPa (psi)		Load Duration						
		1 s	3 s	1 min	1 h	1 day	1 mo	10 yrs
Temperature	10 °C (50 °F)	692. (1.00 E+05)	681. (98745)	651. (94395)	597. (86565)	553. (80185)	499. (72355)	448. (64960)
	20 °C (68 °F)	628. (91060)	612. (88740)	567. (82215)	493. (71485)	428. (62060)	330. (47850)	256. (37120)
	24 °C (75 °F)	581. (84245)	561. (81345)	505. (73225)	416. (60320)	327. (47415)	217. (31465)	129. (18705)
	30 °C (86 °F)	442. (64090)	413. (59885)	324. (46980)	178. (25810)	148. (21460)	34.7 (5032)	15.9 (2306)
	40 °C (104 °F)	228. (33060)	187. (27115)	91.6 (13282)	27.8 (4031)	13.6 (1972)	9.86 (1430)	8.84 (1282)
	50 °C (122 °F)	108. (15660)	78.8 (11426)	33.8 (4901)	12.6 (1827)	8.45 (1225)	6.54 (948.3)	6.00 (870)
	60 °C (140 °F)	35.3 (5119)	24.5 (3553)	10.9 (1581)	5.10 (739.5)	3.87 (561.2)	3.24 (469.8)	2.91 (422)
	70 °C (158 °F)	11.3 (1639)	8.78 (1273)	5.64 (817.8)	2.52 (365.4)	1.77 (256.7)	1.44 (208.8)	1.35 (195.8)
	80 °C (176 °F)	4.65 (674.3)	3.96 (574.2)	2.49 (361.1)	0.96 (139.2)	0.75 (108.8)	0.63 (91.4)	0.54 (78.3)

SHEAR MODULUS: SENTRYGLAS®

Shear Modulus G MPa (psi)		Load Duration						
		1 s	3 s	1 min	1 h	1 day	1 mo	10 yrs
Temperature	10 °C (50 °F)	240. (34800)	236. (34220)	225. (32625)	206. (29870)	190. (27550)	171. (24795)	153. (22185)
	20 °C (68 °F)	217. (31465)	211. (30595)	195. (28275)	169. (24505)	146. (21170)	112. (16240)	86.6 (12557)
	24 °C (75 °F)	200. (29000)	193. (27985)	173. (25085)	142. (20590)	111. (16095)	73.2 (10614)	43.3 (6279)
	30 °C (86 °F)	151. (21895)	141. (20445)	110. (15950)	59.9 (8686)	49.7 (7207)	11.6 (1682)	5.31 (770)
	40 °C (104 °F)	77.0 (11165)	63.0 (9135)	30.7 (4452)	9.28 (1346)	4.54 (658.3)	3.29 (477.1)	2.95 (427.8)
	50 °C (122 °F)	36.2 (5249)	26.4 (3828)	11.3 (1639)	4.20 (609)	2.82 (408.9)	2.18 (316.1)	2.00 (290)
	60 °C (140 °F)	11.8 (1711)	8.18 (1186)	3.64 (527.6)	1.70 (246.5)	1.29 (187.1)	1.08 (156.6)	0.97 (140.7)
	70 °C (158 °F)	3.77 (546.7)	2.93 (424.9)	1.88 (272.6)	0.84 (121.8)	0.59 (85.6)	0.48 (69.6)	0.45 (69.6)
	80 °C (176 °F)	1.55 (224.8)	1.32 (191.4)	0.83 (120.4)	0.32 (46.4)	0.25 (36.3)	0.21 (30.5)	0.18 (26.1)

SentryGlas® Elastic Properties (SG5000)

POISSON RATIO: SENTRYGLAS®

Poisson Ratio, ν		Load Duration						
		1 s	3 s	1 min	1 h	1 day	1 mo	10 yrs
Temperature	10 °C (50 °F)	0.442	0.443	0.446	0.450	0.454	0.458	0.463
	20 °C (68 °F)	0.448	0.449	0.446	0.459	0.464	0.473	0.479
	24 °C (75.2 °F)	0.452	0.453	0.458	0.465	0.473	0.482	0.489
	30 °C (86 °F)	0.463	0.466	0.473	0.485	0.488	0.497	0.499
	40 °C (104 °F)	0.481	0.484	0.492	0.498	0.499	0.499	0.499
	50 °C (122 °F)	0.491	0.493	0.497	0.499	0.499	0.500	0.500
	60 °C (140 °F)	0.497	0.498	0.499	0.500	0.500	0.500	0.500
	70 °C (158 °F)	0.499	0.499	0.500	0.500	0.500	0.500	0.500
	80 °C (176 °F)	0.500	0.500	0.500	0.500	0.500	0.500	0.500

POLYMER INTERLAYER BEHAVIOR

All interlayers are viscoelastic

- Stiffness (modulus) and Poisson ratio vary as a function of temperature and load duration (creep)
- Evaluate properties over a range of test temperature and time using dynamic mechanical analysis and creep tests (ASTM D 4065)
- 'Small' strain values (< 20% engineering strain)

Young's Modulus, E, shear modulus, G & Poisson ratio, U.

- Extract E, G and U for specified temperature and load duration
- Choose appropriate elastic property values for design case and assign to an effective elastic interlayer
- Important to assess the likelihood of achieving full design load at the design temperature and load duration

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