3M™ VHB™ Structural Glazing Tapes – 3rd Party Structural Performance Tests

Test Sequence	Test Method	3M™ VHB™ Structural Glazing Tape 4972 Laminated Glass	One-Part Structural Silicone IGU	3M™ VHB™ Structural Glazing Tape G23F IGU *Subject to 2X cycling tests*	One-Part Structural Silicone 8 mm Tempered	3M™ VHB™ Structural Glazing Tape G23F 8 mm Tempered
Air Infiltration	ASTM E283 at 0.3 kPa (6.3 psf)	No air leakage from panel	No air leakage from panel	No air leakage from panel	No air leakage from panel	No air leakage from panel
Water Penetration	ASTM E331 at 0.7 kPa (15 psf)	No water leakage	No water leakage	No water leakage	No water leakage	No water leakage
Temperature Cycling	20 cycles -25˚C to 70˚C (-13˚F to 158˚F)	For each cycle, temperature is maintained at -25˚C (-13˚F) for 15 minutes and 70˚C (158˚F) for 15 minutes		Subjected to 40 cycles	For each cycle, temperature is maintained at -25˚C (-13˚F) for 15 minutes and 70˚C (158˚F) for 15 minutes	
Air Infiltration	ASTM E283 at 0.3 kPa (6.3 psf)	No air leakage from panel	No air leakage from panel	No air leakage from panel	No air leakage from panel	No air leakage from panel
Water Penetration	ASTM E331 at 0.7 kPa (15 psf)	No water leakage	No water leakage	No water leakage	No water leakage	No water leakage
Windload Structural	ASTM E330 -25˚C, 32˚C, 70˚C (-13˚F,90˚C, 158˚F) hold for 1 minute	+/- 2.9 kPa (60 psf) 250 kph (155 mph)	+/- 2.9 kPa (60 psf) 250 kph (155 mph)	+/- 2.9 kPa (60 psf) 250 kph (155 mph)	+/- 2.9 kPa (60 psf) 250 kph (155 mph)	+/- 2.9 kPa (60 psf) 250 kph (155 mph)
Air Infiltration	ASTM E283 at 0.3 kPa (6.3 psf)	No air leakage from panel	No air leakage from panel	No air leakage from panel	No air leakage from panel	No air leakage from panel
Windload Structural Maximum	ASTM E330 32˚C (90˚F) hold for 10 sec.	+/- 6 kPa (125 psf) 362 kph (225 mph)	+/- 6 kPa (125 psf) 362 kph (225 mph)	+/- 8 kPa (167 psf) 418 kph (260 mph)	+/- 8 kPa (167 psf) 418 kph (260 mph)	+/- 8 kPa (167 psf) 418 kph (260 mph)
Windload Structural Destructive	Maximum Pressure +/- 32˚C (90˚F)	Glass burst at -8.4 kPa (-175 psf) 426 kph (265 mph)	> -8.4 kPa (-175 psf) 426 kph (265 mph)	> 10 kPa (210 psf) 465 kph (290 mph)	> 10 kPa (210 psf) 465 kph (290 mph)	> 10 kPa (210 psf) 465 kph (290 mph)

Note: The limit of the test chamber was 10 kPa (210 psf). Panels were designed for a 2.9 kPa (60 psf) design pressure. Testing beyond this design pressure demonstrates a conservative safety factor used for 3M™ VHB™ Structural Glazing Tapes. Similar testing has also been conducted for architectural metal panel bonding and stiffener bonding. A technical bulletin is available summarizing these results.

Structural Performance Tests

3M™ VHB™ Structural Glazing Tapes have been used worldwide in thousands of glazing applications in the construction industry. To further support consideration for structural glazing applications, performance tests were conducted at an independent, accredited 3rd party test facility (Winwall Technology Pte Ltd – Singapore) to evaluate 3M™ VHB™ Structural Glazing Tapes under stresses and environmental conditions that glass panels would typically experience in a glazed curtain wall system. The glazed panels installed with 3M™ VHB™ Structural Glazing Tapes provided excellent performance overall compared to control panels glazed with structural silicone sealant. The first test sequence consisted of a PVB laminated glass panel bonded with 3M™ VHB™ Structural Glazing Tape 4972, an insulated glazed unit (IGU) bonded with 3M™ VHB™ Structural Glazing Tape G23F and an IGU bonded with a one-part structural silicone sealant. No failure was observed with either the 3M™ VHB™ Tape glazed panels or the structural silicone sealant glazed panel in any of the tests including ASTM E 330 wind load structural tests at cold, ambient, and hot temperatures -25ºC, 32ºC and 70ºC (-13ºF, 90ºF and158ºF) up to 2.9 kPa (60 psf), corresponding to a wind speed of 250 kph (155 mph). After this, pressures were gradually increased up to 8.4 kPa (175 psf) at ambient temperature conditions. At this point the laminated glass failed and blew out of the chamber. However, glass was still attached and bonded to the 3M™ VHB™ Structural Glazing Tape 4972 around the perimeter of the frame demonstrating the high strength of the tape.

A second test sequence patterned after the first test sequence was run consisting of two single pane tempered glass lites. One was bonded with 3M™ VHB™ Structural Glazing Tape G23F and the other with a one-part structural silicone sealant. The IGU panel bonded with 3M™ VHB™ Structural Glazing Tape G23F was also subjected to this second test sequence after surviving the first test sequence. No failure was observed with either the 3M™ VHB™ Structural Glazing Tape glazed panels or the structural silicone sealant glazed panel in any of the tests including ASTM E 330 wind load structural tests up to 10 kPa (210 psf), which corresponds to a sustained wind speed of 467 kph (290 mph). This testing protocol also demonstrated that no air or water leakage can be observed with proper assembly methods.