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Silquest* A-Link* 600 Aminosilane

MARKETING BULLETIN

SILANES - ADHESIVES & SEALANTS ADDITIVES

Silquest A-Link 600 silane is a non-yellowing adhesion promoter that can provide sealant, adhesives and coatings with good flexibility and excellent adhesion compared to other functional silanes. Silquest A-Link 600 silane may be considered for use with SPUR+* technology-based, silicone, urethane, epoxy, silylated polyether and polyurethane adhesives, sealants and coatings.

Formulators using Silquest A-Link 600 silane in SPUR+ prepolymer-based systems typically experience higher elongation and lower modulus than conventional aminosilanes provide. Silquest A-Link 600 silane can provide the greatest benefit in systems requiring low color formation and improved flexibility.

Silquest A-Link 600 silane helps formulators develop low yellowing sealant formulations with improved flexibility and high elastic recovery while maintaining the excellent adhesion common to conventional aminosilanes.

Key Features and Typical Benefits

- Low yellowing under UV and thermal exposure
- Helps to optimize sealant modulus and elongation
- Improved joint movement desirable in construction sealants
- Excellent adhesion to a variety of substrates for performance across numerous organic and inorganic surfaces

Potential Applications

Silquest A-Link 600 silane is a good candidate to consider for use in silicone, epoxy, urethane, silylated polyurethane and polyether adhesives, sealants and coatings:

- Moisture curable, specialty construction sealants
- SPUR+ prepolymer hybrid sealants and adhesives
- Polyurethane sealants
- Silicone RTV applications
- Clearcoats and paints for architectural, automotive, industrial and marine coatings

Typical Physical Properties

Property	Value
Actives Content, %wt	100
Specific Gravity at 25 / 25 °C	0.9762
Amine Equivalent Weight (m/kg)	4.5
Flash Point °C (°F)	97 (207)

Typical properties are average data and are not to be used as or to develop specifications.

Color Stability

To determine the color stability performance, Silquest A-Link 600 silane and three other silanes were evaluated after four weeks of QUV B exposure. Results showed that Silquest A-Link 600 silane maintained a color close to that of the water sample. When formulated appropriately, it can offer significantly lower yellowing compared to other aminosilanes.

Water | Silquest A-2120 Sllane | Silquest A-1110 Silane | Competitive Benchmark: Oligomeric Aminosilane | Silquest A-Link 600 Silane

Note: Test results. Actual results may vary.

Color Stability in SPUR+* Prepolymer-based Clear Sealant Formulations

To understand how Silquest A-Link 600 silane would perform in a sealant formulation, it was exposed to QUV A for 7 days. Each of the other three silanes used above were also tested using the same amount in the same formulation. After the test was complete, Silquest A-Link 600 silane proved to be more stable than the conventional amino functional silanes when placed under prolonged UV exposure.

Ingredients	(Wt. %)
SPUR+ 1050MM Prepolymer	51.0
Benzoate Plasticizer	32.9
Antioxidant	1.3
Fumed Silica	11.3
Silquest A-171* Silane	1.7
Aminosilane	**1.5**
Formrez† SUL-4 Catalyst	0.3

No Aminosilane | Silquest A-2120 Silane | Silquest A-1110 Silane | Competitive Benchmark: Oligomeric Aminosilane | Silquest A-Link 600 Silane

Note: Test results. Actual results may vary.

Product formulations are included as illustrative examples only. Momentive makes no representation or warranty of any kind with regard to any such formulations, including, without limitation, concerning the efficacy or safety of any product manufactured using such formulations.

Color Stability in Polyurethane Formulations

Measured by a Minolta Colorimeter, the color stability of Silquest A-Link 600 silane was compared to Silquest A-1120 silane, Silquest A-1110 silane and Silquest A-Link 15 silane. The results showed the color change (Δb) of a traditional moisture-cure aromatic polyurethane sealant formulation to be far less when using Silquest A-Link 600 silane compared to the three other amino functional silanes.

	Initial			After 5-days at 80 °C			
Silanes	*L*	*a*	*b*	*L*	*a*	*b*	Δ***b***
Silquest A-1120	89.83	0.05	**6.52**	86.96	-1.55	**20.83**	14.31
Silquest A-1110	91.1	0.16	**4.8**	91.45	-1.52	**14.76**	9.96
Silquest A-Link 15	91.58	0.14	**4.6**	89.71	-0.1	**12.07**	4.47
Silquest A-Link 600	91.2	0.22	**4.52**	91.57	-0.25	**6.3**	1.78
	Aromatic polyurethane formulation with 2.5% silane addition level.						

Note: Test results. Actual results may vary.

Performance in 13 % SPUR+* Prepolymer-based Sealant Formulation

Silquest A-Link 600 silane was tested in a low-use level SPUR+ prepolymer-based sealant formulation and then compared to the results of two identical formulations utilizing either an oligomeric aminosilane or Silquest A-1120 silane. Results show that Silquest A-Link 600 silane provided a lower modulus and enhanced flexibility compared to the other silanes. In turn, it can be used to give more flexibility to a sealant or adhesive, while maintaining adhesion over a variety of tested substrates.

Ingredients	(Wt. %)
SPUR+ 1050MM Prepolymer	13.1
DINP Plasticizer	27.2
Titanium Dioxide	1.1
Fumed Silica	2.2
GCC / PCC Mix (Calcium Carbonate)	54.5
Silquest A-171* Silane	1.1
Aminosilane	**0.73**
Formrez† SUL-4 Catalyst	0.08

Silane Additive Used	Silquest A-1120 Silane	Commercial Benchmark: Oligomeric Aminosilane	Silquest A-Link 600 Silane
Mechanical Properties[a]			
Tensile Strength (Psi)	140	143	127
Elongation (%)	185	252	**287**
Modulus at 100 % E (Psi)	125	112	**83**
Hardness Shore A	33	32	28
Tear Resistance (lb/in)	29	24	25
Adhesion – Peel Strength (lb/in / % CF) After 7 Days Water Immersion[b]			
Glass	18 / 100%	18 / 100%	16 / 100%
Aluminum	19 / 100%	16 / 100%	19 / 100%
PVC	18 / 100%	12 / 100%	15 / 100%
Nylon	18 / 100%	3 / 10%	13 / 100%

Lab test formulation, did not include UV stabilizers. UV stabilizers may be included in actual formulations.

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Note: Test results. Actual results may vary.

Performance in 23 % SPUR+ Prepolymer-based Sealant Formulation

Silquest A-Link 600 silane was then tested in a high-use level SPUR+ prepolymer-based sealant formulation and compared to the results of two identical formulations utilizing Silquest A-1120 silane and Silquest A-1110 silane. When using Silquest A-Link 600 silane in a formulation with SPUR+ 1015LM prepolymer, a more flexible and elastic system can be obtained over conventional aminosilane adhesion promoters.

Ingredients	(Wt. %)
SPUR+ 1015LM Prepolymer	23.0
DINP Plasticizer	18.3
Titanium Dioxide	1.2
Fumed Silica	1.2
GCC / PCC Mix (Calcium Carbonate)	55.1
UV Stabilizer	0.5
Silquest A-171* Silane	0.3
Aminosilane	**0.57**
Formrez† SUL-4 Catalyst	0.03

Silane Additive Used	Silquest A-1120 Silane	Silquest A-1110 Silane	Silquest A-Link 600 Silane
Mechanical Properties[a]			
Tensile Strength (Psi)	161	176	182
Elongation (%)	651	626	**1073**
100 % Modulus (Psi)	60	57	**39**
Tear Resistance (lb/in)	46	40	45
Hardness Shore A	20	22	13
Adhesion – Peel Strength (lb/in / % CF) After 7 Days Water Immersion[b]			
Glass	21 / 100%	26 / 100%	19 / 100%
Aluminum	19 / 100%	18 / 100%	16 / 100%
ABS	22 / 100%	20 / 100%	19 / 100%
PVC	16 / 100%	17 / 100%	15 / 100%
Polystyrene	21 / 80%	23 / 100%	18 / 100%
Nylon	26 / 100%	24 / 10%	16 / 100%

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Note: Test results. Actual results may vary.

(a) ASTM D 412
(b) ASTM C 794

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