MOMENTIVE

Technical Data Sheet

Silquest* RC-1

Silquest© RC-1

Description

Silquest RC-1 silane, a proprietary organo silicone coupling agent, is especially designed for use in mineral- reinforced, peroxide-cured rubber wire and cable insulation formulations. It offers a balance of mechanical properties and stable wet electrical properties necessary to meet power cable specifications for EPM and/or EPDM rubber compounds containing clay, talc, ATH, silica and other minerals.

Key Features and Benefits

Improvements in modulus and tensile strength along with stable wet electrical properties are achieved with Silquest RC-1 silane in rubber compounds. This coupling agent does not contain and will not liberate EGME (ethylene glycol monomethyl ether) or other glycol ethers during its use. It is recommended as an alternate to Silquest A-172 silane [vinyl-tris(2-methoxyethoxy)silane] which does liberate EGME upon contact with moisture.

Typical Physical Properties

Physical Form	Liquid
Color, GVS	4
Vinyl Content, % by wt	9.1
Specific Gravity at 25/25°C	0.954
Flash Point, Pensky-Martens Closed Cup, ASTM D 93,°C (°F)	47 (116)

Potential Applications

Minerals may be pretreated with Silquest RC-1 silane, or it can be added with other ingredients at the time of compounding.

In many commercial formulations, Silquest RC-1 silane can be substituted for Silquest A-172 silane on a one-to-one basis with little or no change in properties. Loading adjustments may be required to achieve equal performance in some formulations. Tables 1 to 3 provide comparative performance data.

Table 1: Clay-Filled EPM[1]

		Silquest Silane, 1.0 PHF	
Performance Properties	Control,No Silane	Silquest A-172	Silquest RC-1
Rheometer at 340°F, tc 90, min	21.0	20.5	20.5
Physical Properties, Cured 25 min at 340°F			
100% Modulus, psi (MPa)	245 (1.69)	375 (2.58)	375 (2.58)
300% Modulus, psi (MPa)	375 (2.58)	1030 (7.10)	1015 (7.00)
Tensile Strength, psi (MPa)	855 (5.89)	1100 (7.58)	1090 (7.51)
Elongation, %	960	350	410
Electrical Properties			

Specific Inductive Capacitance at 1 KHz			
As cured	3.07	2.99	3.07
7 days in 75°C water	4.21	2.97	3.06

(1) 100 “Vistalon”404 (Exxon), 110 “Whitetex” Clay (Engelhard Minerals), peroxide-cured

Table 2: Clay-Filled, High-Ethylene, High-Diene EPDM(1)

		Silquest Silane, 0.85 PHF	
Performance Properties	Control,No Silane	Silquest A-172	Silquest RC-1
Rheometer at 340°F, tc 90, min	12.5	12.5	12.6
Physical Properties, Cured 15 min at 340°F			
100% Modulus, psi (MPa)	755 (5.20)	800 (5.52)	785 (5.41)
300% Modulus, psi (MPa)	1580 (10.9)	1915 (13.2)	1710 (11.8)
Tensile Strength, psi (MPa)	1855 (12.8)	1915 (13.2)	1840 (12.7)
Elongation, %	380	300	350
100% Modulus at 266°F, psi	200	220	210
Heat Aged, 7 days at 250°F			
Tensile Retained, %	96	93	92
Elongation Retained, %	103	110	103
Electrical PropertiesSpecific Inductive Capacitance at 60 Hz			
24 hr in RT water	2.54	2.66	2.66
1 day in 90°C water	2.55	2.55	2.63
7 days in 90°C water	2.59	2.60	2.64
14 days in 90°C water	2.55	2.59	2.64
Power Factor at 60 Hz, %			
24 hr in RT water	0.20	0.22	0.23
1 day in 90°C water	0.19	0.16	0.18
7 days in 90°C water	0.19	0.14	0.16
14 days in 90°C water	0.19	0.16	0.16

(1) 100 “Nordel” 2722 (DuPont), 60 “Translink” 37 (Engelhard), peroxide-cured

Patent Status

Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute a permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

Product Safety, Handling and Storage

Warning – Sporadic minor explosions and fires have been reported during RC-1 EPM/EPDM compounding in internal mixers. The following precautionary steps are recommended by Momentive Performance Materials in order to insure that a flammable atmosphere is not created.

1. Review all MSDS and product safety pterature with the appropriate operations personnel.

2. Conduct a complete and thorough safety review of each operation, paying particular attention to the potential of flammable mixtures inside all mixing and compounding units and vessels.

3. Ground all mixing, compounding and blending units or vessels and periodically test this equipment for electrical continuity.

4. Epminate all known sources of ignition within and in the immediate vicinity of the compounding/mixing/blending units.

5. Blanket all mixing, compounding and blending units/vessels with an inert gas such as nitrogen to reduce the oxygen concentration to a safe level prior to the addition of silane. Maintain the inert blanketing throughout the entire compounding and discharge cycles.

6. Epminate or control other sources of potentially explosive gases.

7. Keep the temperature of the second stage pass as low as possible, consistent with proper catalyst dispersion.

8. Provide the necessary personal protective equipment as specified in the MSDS. Include local exhaust ventilation as necessary.

Silquest RC-1 silane and other organofunctional silane products commonly mixed with fillers in rubber or thermoplastic resins, will liberate methanol, ethanol or other alcohols, during the intentional silane coupling process where inorganic fillers are bonded to a polymeric resin. With the presence of free alcohol as an inherent by-product of the hydrolysis part of the reaction, the potential exists for flammable mixtures to develop within or around mixing units unless the recommended precautions are taken to exclude oxygen and ignition sources.

Static can be generated in a number of mixing/compounding operations. Although all mechanical equipment should be properly grounded, static discharges might not be completely eliminated – especially in certain intensive mixing operations. Since the fuel source (alcohol) and an ignition source (static) might be unavoidable in some cases, the remaining control available to avoid ignition is the elimination of oxygen. The blanketing of mixing and compounding units with an inert gas such as nitrogen is one of the most effective options to removing the remaining (third) side of the fire triangle.

EPM and EPDM, are non-polar compounds, which are particularly prone to generate static sparks, especially when an internal mixer is undercharged, which is often standard procedure in second stage mix cycles. Wire and cable grade EPM/EPDM compounds are particularly prone to generating static sparks during compounding because they typically contain low levels of plasticizing oils and contain calcined (i.e., anhydrous) clays.

1. E. I. DuPont, “Safe Handling of Vinyl Silane A-172 in Nordel Insulating Compounds,” 1970.

2. H. F. Coward and G. W. Jones, “Limits of Flammability of Gases and Vapors,” Bulletin 503, U.S. Bureau of Mines, 1952.

Customers should review the latest Material Safety Data Sheet (MSDS) and label for product safety information, safe handling instructions, personal protective equipment if necessary, and any special storage conditions required for safety. MSDS are available at www.momentive.com or, upon request, from any Momentive Performance Materials (MPM) representative. **For product storage and handling procedures to maintain the product quality within our stated specifications, please review Certificates of Analysis, which are available in the Order Center**. Use of other materials in conjunction with MPM products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.

Limitations

Customers must evaluate Momentive Performance Materials products and make their own determination as to fitness of use in their particular applications.

Contact Information

For product prices, availability, or order placement, contact our customer service by visiting momentive.com/ContactSilicones.

For literature and technical assistance, visit our website at: www.momentive.com