MOMENTIVE™

Marketing Bulletin

NIAX* Silicone L-5614 and NIAX Catalyst LC-5615

URETHANE ADDITIVES - SPECIALTIES

Frothed foam technology utilizes high-shear mechanical mixers to incorporate dispersed air into a urethane system prior to its application to a substrate. This technology allows preparation of medium density (290 to 320 kg/m^3, 18 to 20 pcf) urethane foams without the use of environmentally harmful CFCs or organic blowing agents. Small amounts of water in the system can reduce the density even further (190 to 225 kg/m^3, 12 to 14 pcf). Potential applications for this type of foam include: carpet backing, head and door liners in automobiles, specialized fabrics (leather substitutes, upholstery), gaskets, sealants and two-faced tapes.

With this technology, reacting components are mechanically frothed (machines are available from Oakes Machine Company and SKG Industries), the froth is directly applied to the substrate of choice and the resultant composite is thermally cured. The keys to the success of this process are the silicone and catalyst that are used to control cell stability and cure chemistry.

Potential Applications

Niax silicone L-5614 and Niax catalyst LC-5615 have exhibited significant utility in a wide variety of applications. A typical filled froth foam formulation that might be used in several of these applications is given below as a reference system. Note that both Niax silicone L-5614 and Niax catalyst LC-5615 may be used in froth systems utilizing polymeric MDI as the preferred isocyanate.

Typical Physical Properties

Property	Niax Silicone L-5614	Niax Catalyst LC-5615
Appearance	Slightly hazy liquid	Clear liquid
Viscosity at 25°C, cSt	14,000	2000
Specific Gravity at 25°C	0.92	1.047
Weight per Gallon at 25°C, lb	7.67	8.70
Flash Point, Pensky-Martens Closed Cup(1), °C (°F)	113 (235)	100 (212)

(1) ASTM Method D93

*Niax is a trademark of Momentive Performance Materials Inc.

Niax Silicone L-5614

Niax silicone L-5614 is a highly stabilizing silicone for use in mechanically frothed foam. Its unique structure promotes cell stabilization even in the highly filled formulations often used in this technology. Cell stabilization is critical to this process for several reasons:

- it controls the ultimate density of the frothed foam.
- It is the key to generating a froth with sufficient stability to withstand the high shear zones in the mixer, delivery system and applicator, and the high temperature of the curing oven without significant collapse.
- good cell stability allows excellent gauge control upon application to a substrate.

In addition, the product controls both cell size and cell size distribution in the froth. Control here leads to an air dispersion with a viscosity high enough to minimize strikethrough with certain types of fabric substrates and yet low enough to allow good flow characteristics.

Typically, 2 to 4 parts of Niax silicone L-5614 per hundred parts of polyol are sufficient to achieve proper control. In this use level range, it has no effect on the physical properties of the foam, and foam densities ranging from 190 kg/m^3 (12 pcf) to about 320 kg/m^3 (20 pcf) can be obtained.

Niax Catalyst LC-5615

Urethane froth foam technology often requires a delayed-action catalyst. Mixing/frothing, delivery and lay-down on the substrate demand critical control of reaction sequencing. No reaction should occur in this phase of the process. Conversely, reaction leading to final cure of the froth must be rapid once it is applied to the substrate to maximize production throughput.

Niax catalyst LC-5615 is unique in its delayed-action capability. It is a thermally activated catalyst that is relatively inert at ambient temperature but becomes effective at temperatures above 70°C. At the nominal use level of 2 to 4 parts per hundred parts of polyol, it will cure a typical froth system in about four minutes at 135 to 150°C. Although used for froth foam technology, Niax catalyst LC-5615 may find utility in other applications requiring similar catalytic performance.

Typical Froth Foam Formulation

Component	phr
Polyol(1)	100.00
Niax Silicone L-5614	2.0
Niax Catalyst LC-5615	2.0
Alumina Trihydrate	117.0
Polymeric MDI Isocyanate	110 index
Frothed Foam Properties	
Density, kg/m^3 (pcf)	304 (19)
Tensile Strength, kPa (psi)	689 (100)
Tear Strength, N/m (pli)	2627 (15)
Elongation, %	150

(1) Polyols suitable for use in froth foam technology include: “Pluracol” TPE-4542, 581, and PE-2712S (BASF); “Arcol” 11-34, 1255, and E-351 (Arco); “Voranol” 232-034 (Dow); and “Multranol” 3900 and E-9151 (Miles).

Patent Status

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