Niax* silicone L-580

Description

Niax silicone L-580 is a non-hydrolyzable silicone, designed to provide excellent foam stability and fine regular cell structure in extremely low density foams using liquid carbon dioxide as the blowing agent. In stretched formulations with high TDI, high water, high CO_2, Niax silicone L-580 provides superior nucleating efficiency and dramatically reduces striations in the foam bun. It has full hydrolytic stability and can be used as a separate stream or in water/amine/ silicone preblends. Niax silicone L-580 offers enhanced stability while yielding foams with good breathability.

Key Features and Benefits

- Silicone with medium efficiency
- Excellent foam stability plus good breathability in low-density formulations blown with liquid carbon dioxide
- Complete hydrolytic stability in water/amine/silicone preblends
- Works well on all commercially available CO_2 equipment (Cardio/Beamech/Novaflex)

Typical Physical Properties

Form	Clear liquid
Viscosity at 25°C, cSt	600-1200
Specific Gravity, 20°C	1.02
Flash Point, Pensky-Martens Closed Cup(1), °C	97

(1) ASTM Test Method D 93

Formulation

The following formulation illustrates some typical foam results utilizing Niax silicone L-580 on Momentive Performance Materials CO_2 pilot scale machines.

General Screening Formulation

Component	php
Polyol (Varied)	100
CO_2	3.5
Water	4.8
Niax Silicone L-580	1.4
Niax Catalyst A-1	0.08
Stannous Octoate	0.20
TDI, 80/20	Varied with polyol
TDI Index	110

Discussion

Description of Momentive Performance Materials Pilot Scale Equipment

Beamech CO-2™

The Beamech CO-2 machine is about 1/7 scale. The machine has seven metered streams, including one for CO_2. A typical run results in the manufacture of a bun that is approximately 7.5m long, 0.6m high and slightly less than one meter in width. In principle, long pours can be made with the equipment but space limits us to less than two minutes of actual pour time.

Description of Momentive Performance Materials Pilot Scale Equipment (continued)

Hennecke NovaFlex®

The Hennecke-Krauss-Maffei Novaflex machine has 7 metered streams, including one for CO_2. The Novaflex head was specially designed for laboratory usage. A typical run results in the manufacture of a bun that is approxi mately 1.7m long, 0.45m wide and 0.4m high. The head pressure was maintained at about 15 bars during this evaluation.

Cannon CarDio®

The Cannon CarDio CO_2 head designed for lab scale evaluations is mounted on a Hennecke-Krauss-Maffei machine. The machine has 7 metered streams, including one for CO_2. A typical run results in the manufacture of a bun that is approximately 1.7m long, 0.45m wide and 0.4m high. The head pressure was maintained at about 13 bars during this evaluation.

Average Operating Parameters

Machine Parameter	CO-2	CarDio	NovaFlex
Polyol Temperature, °C	21	22	22
TDI Temperature, °C	20	22	22
Total Throughput, kg/min	15	15	15
Laydown Pressure, bar	17	13	15

There was, of course, some variability of operating parameters during sample production, but, in most cases, differences were quite small. The exception to this was that a significant throughput difference was required with the Beamech equipment, with the two different polyols. The higher viscosity of the 3500MW polyol required that we increase the surface area of the sinter (which controls pressure at the lay-down) because pressure was higher than desired. This pressure is the key operating parameter for froth and cell structure control at any given CO_2 concen tration. Since surface area can only be changed in discrete increments, the resulting pressure was too low at the same throughput used for the 3000MW polyol. Therefore, it was necessary to significantly increase total throughput to maintain pressure at the desired level. The throughput with 3000MW polyol averaged 11 kg/min, while it averaged almost 19 kg/min using the 3500MW material. For the Novaflex and Cardio equipments, throughput with 3000MW polyol was 14 kg/min and 16 kg/min for the 3500MW material.

Results

All foams poured using Niax silicone L-580 on above CO_2 pilot scale equipments were of good quality. A fine and uniform cell structure with good density distribution was achieved with CO_2 Cardio and Novaflex technologies. In figures 1 and 2, Niax silicone L-580 was compared with a competitive product in a low density foam grade on a Novaflex full scale equipment. The cell structure, in this stretched formulation, was finer and more uniform than that of the competitive product.

Figure 1: Niax Silicone L-580 in Low Density Foam (1.0 pcf)

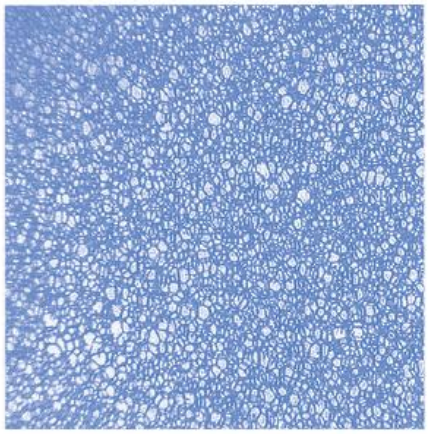
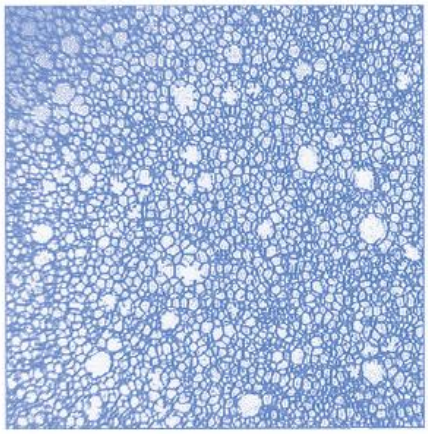


Figure 2: Competitive Product in Low Density Foam (1.0 pcf)



Patent Status

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