

Geolite* Modifier 210

Description

Geolite Modifier 210 is a stabilizing additive whose technology can offer ways to fully eliminate or dramatically reduce the use of auxiliary blowing agents (ABAs) in many grades of conventional slabstock foam.

Like our earlier Geolite products, this technology is based on the principle of lowering the hardness of foam by reducing isocyanate index. This permits the use of higher water and lower blowing agent levels to achieve desired foam hardness.

The use of Geolite Modifier 210 can facilitate the production of numerous foam grades at very low indices (down to about 85), while maintaining acceptable physical properties and processing latitude. The addition of Geolite Modifier 210, or its sister product Geolite Modifier 205, is necessary for the production of such low-index foams.

Relative to Geolite Modifier 205, foams made using Geolite Modifier 210 should reduce more ABA, be softer, possess improved “hand”, and exhibit compression set improvements over other additives and technologies used to reduce consumption of ABAs. Geolite Modifier 210 also allows the manufacture of foams possessing greater airflow. Therefore, it may offer greater processing latitude, depending on foaming equipment. A consequence of this may be the need for slightly higher concentrations of tin catalyst.

Key Features and Benefits

- Requires no major capital investment
- Uses existing urethane raw materials
- Provides stability for use at isocyanate index as low as 85
- Yields softer foam over previous Geolite products, giving improved processing
- Often eliminates all ABAs
- Good properties in most grades, comparable to conventional foam
- Best processability of all currently available soft foam technologies
- Useful with varied processing technologies, including mechanical cooling
- Plant operational in one to two days
- Reduces amine and tin catalyst levels

Typical Physical Properties

Physical Form	Liquid
Specific Gravity at 25°C	1.115
Weight per Gallon at 25°C (77°F), lb (kg)	9.27 (4.20)
Viscosity at 25°C (77°F), cSt	78
Freezing Point, °C (°F)	< -35 (-31)
Vapor Pressure at 20°C (68°F), mm Hg	> 1
Coefficient of Expansion at 55°C (130°F), per °C	0.00071
Flash Point °C (°F)	47 (116)
Boiling Point, °C (°F)	> 100 (212)
Solubility in Water at 20°C (68°F)	Complete
Water Content, % by wt	22.4
TDI/Geolite Modifier 210 Ratio	2.84/1
Hydroxyl Number (with water), mg KOH/g	1835

Processing Recommendations

Foam Properties

Using this technology with low-index, high-water formulations yields foam with improved physical properties – near those obtained in conventional, lower water, ABA-based systems. In certain cases, with mechanical cooling processes, for example, this technology leads to foams with vastly improved physical properties, including compression sets. More over, this technology allows the production of soft, ABA-free foams of many densities. Soft foams with densities ranging from less than 1.05 pcf (17 kg/m³) to greater than 2.5 pcf (40 kg/m³) have been produced using Geolite modifier 210.

Formulation examples of several representative formulations using this Geolite Modifier 210 technology are shown in the following table.

Table 1: Performance in Slabstock Foams

Density, pcf	1	1	1.25	1.25	1.25	1.25	1.5	1.5	1.5	1.5	1.8	1.8	1.8	1.8
IFD, 25%	15	20	15	20	25	30	15	20	25	30	15	20	25	30
GM-210, pphp	3.5	3.6	2.4	2.5	2.6	2.7	1.7	1.9	2.0	2.1	1.1	1.3	1.5	1.6
Index 105.0	85.0	93.0	85.0	93.0	99.0	105.0	85.0	93.0	99.0	105.0	85.0	93.0	99.0	
MeCl ₂ , pphp	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water, total, pphp	6.65	6.30	5.12	4.92	4.76	4.63	4.17	4.03	3.92	3.83	3.41	3.31	3.24	3.18
% ABA Reduction	100	100	100	100	100	100	100	100	100	100	100	100	100	100

The base case is a MeCl₂-blown foam (Momentive Performance Materials formulas).

All formulations calculated on same basis: do not include effect of amine, tin, surfactant and other additives.

Processing Considerations

The formulated grades of foam using Geolite technology will exhibit higher reaction exotherms than conventional formulations since higher water concentrations are required. This concern must be addressed prior to the adoption of this technology. Lower index formulations serve to reduce this high exotherm, but higher than normal exotherms should be expected.

Geolite modifier 210 utilizes an environmentally friendly technology. The additive eliminates the emission of ABAs, and, when used with low-index formulations, TDI emissions into the plant environment may be greatly reduced.

Geolite modifier 210 contains 22.4 percent water. This must be taken into account when calculating a foam formulation. It is recommended that Geolite modifier 210 be kept in polyethylene or stainless steel tanks, kept above 50°F and pumped through heat-traced lines when possible.

Formulations

The following are some typical formulations utilizing Geolite modifier 210:

Foam Grade (pcf/25% IFD, lb)	1.0/15	1.2/20	1.6/22
European Grade (kg/m³/25% IFD, N/323 cm²)	16.0/67	19.2/89	25.6/98
Polyol, 3000 Molecular Weight	100	100	100
Water, total	6.6	5.14	3.7
Stannous Octoate, T-9	0.24	0.23	0.26
Niix Catalyst A-133	0.06	0.1	0.17
Niix Silicone L-620	1.2	1.2	1.2
Geolite Modifier 210	3.5	2.7	1.7
Index	85	93	95

Patent Status

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