POLYMER GROUP LTD

SOLUTIONS FOR EXTREME ENVIRONMENTS

Product Data Sheet

ENDURATHANE 3325M

INJECTION FOAM SYSTEM

DESCRIPTION:

ENDURATHANE 3325M is a low density, highly energy efficient, general purpose insulation and buoyancy medium suitable for application by machine injection.

ENDURATHANE 3325M is formulated with HFC as the blowing agent which has zero ozone depleting potential.

ENDURATHANE 3325M is a fire retarded grade with good self-extinguishing properties, coupled with low thermal conductivity and permeability, good mechanical strength, chemical resistance and dimensional stability.

PHYSICAL PROPERTIES:

Component A (isocyanate)	
Viscosity (20°C)	200 cps
Flashpoint (ASTM D92)	230°C
Specific Gravity	1.25
Component B (polyol)	
Viscosity (20°C)	380cps
Specific Gravity	1.11

Reaction Profile:

Cream Time (20°C)	20-25 secs
Rise Time	120-150 secs
Tack Free Time	165-195 secs

Mix Ratio: 100A:100B parts by volume

TYPICAL CURED PROPERTIES

Density	32-35 kg/m³
Thermal Conductivity	0.023 W/mK aged
Compressive Strength	150 kPa
Closed cells	90 – 95%
Dimensional Stability	
24 hrs @ 100°C	1 to 5%
24 hrs @ -40°C	0%
24 hrs @ 70°C/100% RH	0 to 5%
Water Absorption (23°Ckgs/m²)	0.49
Water Vapour Permeability (Perm-in ASTM C-355 @ 23°C)	1.8
Flammability DIN 4102	B3 rating
ASTM D-1692	self-extinguishing

Theoretical Usage 1 kg of expanded foam occupies 0.03 m³. Make adequate allowance for losses.

RECOMMENDED USES:

Applications include:-

- Wall and door cavity insulation
- Pipe insulation
- Buoyancy chambers
- Insulated building panels
- Refrigerated transport trailers
- Refrigerated containers
- Commercial display cabinets
- Walk-in coolers/freezers
- Fish holds & freezers
- Laminated composites for:-
  - light weight spandrels
  - low cost insulation boards
  - roofing panels
  - partition panel systems

HEALTH AND SAFETY ADVICE

Refer to Polymer Group Safety Data Sheets for individual products. Also refer to technical Information PU193-IE *"MDI-Based Compositions: Hazards and Safe handling Procedures".*

Component A [isocyanate] contains methylene bisphenyl di-isocyanate [MDI]. It is moderately toxic. **Avoid contact with skin or eyes, avoid breathing vapour** and use only in well ventilated areas.

Component B [polyol] contains HFC volatile blowing agent. It is a mild irritant. In confined spaces it may displace sufficient air to be hazardous. Provide ventilation or use only in well ventilated situations.

PACKAGING

Nett 220 kg per 200 litre drum.

APPLICATION DATA

ENDURATHANE 3325M can be hand mixed (see separate application bulletin) or machine-applied through 2-component polyurethane application equipment such as ***Graco Reactor*** with ***Probler P2*** or similar.

Please consult your representative for advice regarding any equipment application questions you may have.

Equipment: ***Graco Reactor Probler***

Pre-heat:	Part A [isocyanate]	35-45°C
	Part B [polyol]	35-45°C
Hose Temperature:		40-50°C

Optimum temperatures will vary with equipment, substrate temperature and ambient conditions generally.
Check and maintain correct output ratio to ± 2%.
Ensure metering is accurate by regular ratio checks and monitoring of line pressures to gun. Operator must have adequate product knowledge to recognise faulty foam so remedial action can be taken.

Substrates:
Endurathane 3325M may be applied to most surfaces. Substrates must be clean and dry.
Ambient and surface temperatures should be above 15°C. **Low temperatures will decrease yield markedly.**

Theoretical Coverage:

Always check yield and application rates at start of job and then regularly to ensure product usage is as expected. Pay special attention when applying on to a profiled substrate to determine the "flat" area. This can often be as much as 25% greater than the measured area. Similarly adequate allowance must be made for overpacking, especially when cavities are narrow or foam has a long flow path.

1 kg of foam occupies 0.030 m³ [0.605 m² @ 50mm] applied under ideal conditions [1 m² = 1.65kg @ 50mm].

STORAGE AND HANDLING PRECAUTIONS

ALL CHEMICALS MUST BE USED BY TRAINED PERSONNEL.

Component B contains HFC which has a boiling point of 15°C. Storage at elevated temperatures will result in build up within the drums, and for this reason the product should be stored away from direct sunlight.

When opening a container, care must be taken to release any internal pressure slowly.

To prevent loss of HFC by evaporation, and to prevent ingress of moisture, drums must be kept tightly sealed when not in use.

Always wear **eye protection** and suitable **protective clothing.**

Flush splashes to the skin or eyes with copious quantities of water.

Clean up:
Owing to the chemical resistance of polyurethane products it is important to clean up any overspray as quickly as possible. Methyl Proxitol is suitable for general cleaning and methylene chloride can be used as a line flush.
Wear suitable protective clothing, goggles and gloves at all times when cleaning.
Greasing components beforehand assists with contamination removal.

Storage Stability
Recommended storage temperature is 10-25°C in tightly closed containers to prevent moisture and other contamination. Under these conditions this product has a storage stability of at least 6 months.

Store out of direct sunlight and sources of heat. If exposed to moisture Component A will crystallise resulting in line blockages.

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PROPERTIES AND SUSTAINABILITY OF POLYURETHANE FOAM

Polyurethane rigid foams have a closed cell structure and high cross-linking density give them the characteristics of good heat stability, high compressive strength and excellent insulation properties.

PU insulation has a very low thermal conductivity, starting from as low as 0.017 W/m.K, making it one of the most effective insulants available today for a wide range of applications.

All types of insulation can also play a role in improving the energy efficiency of buildings and reducing CO_2 emissions.

The environmental impact Polyurethane offers is as follows:

- Excellent thermal efficiency – leading to optimum energy savings and reduced CO_2 emissions.
- Relatively low environmental impact at the building level – the product saves more than 100 times the energy than is used in its manufacture.
- Durability – leading to long term performance and reducing the need for replacement, therefore saving energy.

The economic impact from polyurethane is:

- Increased energy efficiency – leading to immediate savings for the end user.

Ref: PU Europe Sustainability and polyurethane insulation.

λ INFORMATION ON THERMAL CONDUCTIVITY (K-FACTORY OR λ) TESTING

To test the insulation properties of foam we test the thermal conductivity or K-factor, which is a measure of a materials ability to transfer heat through conduction and therefore is the principle property of an insulation material.

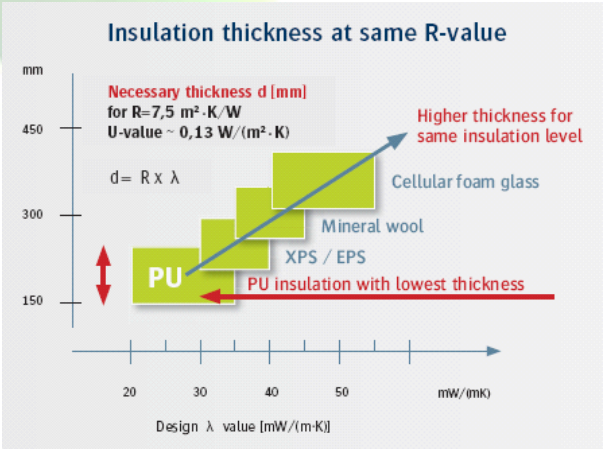
Typical values of insulating materials are:

Material	Density (kg/m³)	k-factor (W/mK)
Polyurethane foam closed cell	32	0.017 initial 0.023 aged
Polyurethane foam open cell	10-12	0.035
Polystyrene foam	16	0.035
Rockwool	100	0.037
Glasswool	65-160	0.041
Timber – white pine	350-500	0.112

Insulation materials are then normally reported in terms of their R-value, which is a measure of the thermal resistance.

ENDURATHANE 3325M with the above k-factor result would give an estimated R-value of 2.17 m^2 K/W @50mm thickness.

The following graph shows the thickness of insulation materials needed to get an R-value of 7.5 m² K/W with standard PU foam. As seen, PU offers the best insulation at lowest thickness.



Reference: Insulation for sustainability: A guide, XCO2 Conisbee 2002