MPP-R04B

4 Pound-per-cubic-foot Rigid Foam

This foam polyurethane formulation is designed yield structural foam by either hand-mixing or machine casting method. The pot-life of this material is long enough to allow manual handling for cast-in-place application. It can also be used in molding short-run parts, mold-backing, and many other custom applications.

The components are liquid at room temperature. The free-rise density of the foam is approximately 3.5 to 4.5 pounds-per-cubic-foot, the cell structure is more than 95% closed-cell.

Component Properties

	Prepolymer (A)	Curing Agent (B)
Code Number:	MNB-013	PPF-012
Specific Gravity:	1.235	1.060
Equivalent Weight:	134	119
%NCO	31.3 %	n/a
Viscosity	200 cps at 77 ˚F	1250 cps at 77 ˚F

Mixing Ratio	(A)	(B)
Volume Ratio:	1.000	1.000
Weight Ratio:	1.000	0.858
Stoichiometry NCO/OH:	1.000	0.970
NCO Index	1.031	1.000

Processing Temperature:

Part-A	Ambient
Part-B	Ambient
Mold/Substrate	Ambient

* The ideal temperature for the mold and substrate is 100 - 110 ºF. However, if you are using plastic mold, this may not be necessary. For all metal molds, the temperature needs to be between 100 to 110 ºF. If a cold substrate must be used, you may yield a better result if the material is poured when the exothermic heat raised the temperature to above 90 °F.

Cure Pattern:

Pot life (pour within)	40 – 50 seconds
Tack-Free	20 – 30 minutes
Demolding time	30 – 60 minutes (thicker parts demold faster)
Complete Cure Cycle:	1 day at room temperature

Foam Density:

Free Rise Density:	3.5 – 4.5 pounds per cubic foot
Compressed density:	4.5 – 5.5 pounds per cubic foot (recommended)

Recommended Processing (for the manual mixing method):

We recommend testing this material small amounts to see how the material behaves, then develop your casting method accordingly. When you do test batch, please be sure to operate in a well-ventilated area or large open area, wear rubber gloves, long sleeves, and protective eyeglasses to avoid skin/eye contact. Read the enclosed Material Safety Data Sheet for details on the safety and handling.

- The part-B component (PPF-012) needs to be agitated before dispensing to ensure the homogeneous mix of the ingredients in the container. Stir the material with a bung mixer for 15 to 20 minutes for 55-gallon-drum packaged material. Use a long spatula or paint mixer to stir for a few minutes for 5-gal-pail packaged material.

- Pre-heat the mold and substrate to between 100 and 110 ºF if needed.

- Apply mold release into the mold when needed. Do not use mold release with a high concentration of silicone as it destroys the foam surface.

- Calculate the total inside volume of the mold (or the finished part volume) in cubic feet. Divide it by the density (4 in this case). This will give you the weight of the component mixture at the free-rise density. Use this total weight to calculate the weight ratio of the two components.

- Take the correct ratio of part-A and part-B into a mixing cup. Mix well with a steel or plastic stir stick for at least 20 - 30 seconds. Agitate vigorously and thoroughly. Scrape the material off the side and bottom of the cup as you mix. This material has a long pot-life for ease of use.

- Cast the mixture into the mold. The mold should be between 100 and 110 ºF if using a metal mold. The material may not cure properly if mold is too cold.

- Cure in the mold for 30 to 60 minutes before demolding. Please check the strength of the foam surface before demolding. Thicker parts demold faster.

- The foam cures at room temperature gradually in about a day to yield the final physical properties that are OK to be used in a lord-bearing application.

Compression Molding

Polyurethane foam needs to fill the mold space by the expansion pressure of the foam sending the foaming material to fill the mold. The mold, therefore, needs to be a close-mold, and it has to have a capacity to retain the expansion pressure. The simplest mold will be just an open-top box with a hard lid. The lid then needs to be clamped hold the pressure.

The air trapped in the mold could make a large void if it is not released. For this purpose, you need to have very small vents to let the trapped air escape from the mold. You need to plan where in the mold the in-mold air is cornered by the expanding foam. Determine the position of the mold and casting point, and then drill small holes where you see the air traps.

The mold material can be metal, plastic, or elastomeric material. Mold surface needs to be smooth as foam could stick to any porous surface. Metal molds tend to absorb the heat. Heat created from the chemical reaction (or exothermic heat) is required for foam to cure. If mold is cold, this heat is absorbed and the foam does not cure properly. The mold needs to be heat to 100 to 110 ºF in case of metal molds if metal

mold. If your mold is plastic or elastomeric mold, typically heating is not necessary as those materials retain heat better.

Compression rate is the rate of how much more material you would put in to create the pressure. Typically, about 10 % compression should give enough pressure to distribute the foam within the mold. Using higher rate makes the foam denser and stronger.

As the foam cools, there will be some shrinkage. If the level of shrinkage is critical, you need to compensate the shrinkage with adjusting the mold dimensions. Higher compression rate may reduce the shrinkage rate.

If you have any questions, please feel free to call Northstar Polymers at 612-721-2911.

Applications with fire-retardant grade

This foam is not fire-retardant foam, and it is not recommended for applications, which require or should be using fire-retardant grade materials. The applications such as automotive interior, building material, and components for some electronic parts often require fire-retardant grade materials by law. It is the user's responsibility to conform to the applicable regulations. We also do not recommend this foam to be used to the applications in which the foam can be exposed to high temperature or being near an ignition source.

By adding fire retardant additives, this foam may be modified to a fire-retardant grade foam. The user must test the foam modified with the fire retardant additives for the fire-retardant property and the conformance to the applicable regulations.

Deflection Temperature

All urethanes soften as the temperature rises. If load bearing capacity is required at an elevated temperature, test the structural integrity of the foam parts at the expected entire operating temperature range for the application.

Handling Information for the Component Materials

Storage:

Part-A component (prepolymer) contains isocyanate component, which is very much sensitive to moisture. If it is left in air, part-A will react with atmospheric moisture and will be ruined. This reaction is non-reversible. Soon after opening a can and dispensing the content, nitrogen gas or argon gas needs to be injected to the can to blanket the material. Silica gel or calcium chloride desiccant filter should be installed to 55 gallon drum-vent for your drum feeding system. The storage temperature should be at a room temperature between 65 and 80 °F.

Part-B component is hygroscopic. If the material is exposed to ambient air, it may absorb moisture. Moisture contaminated part-B material may become source of degradation or excessive bubbles in the product. Avoid exposure of the material to air. Purging the empty space in the container with nitrogen gas or negative-40-degree-due-point dry air is also recommended to prevent moisture contamination of part-B as well; however most of the cases, keeping in an airtight container will be sufficient. Store it in a dry indoor storage at a room temperature between 65 and 80 °F.

Safety:

The component materials are industrial-grade chemicals. Please keep them in a secure place and prevent access from any unauthorized individual. The personnel who handle these materials need to read the Material Safety Data Sheet (MSDS) for detail information on safety and handling of the material. The MSDS for each component is sent with the shipment of the material.

When using this material, be sure to operate in a wide-open area with good air movement, or in a well-ventilated area. Wear rubber gloves, long sleeves, and protective eyeglasses to prevent skin/eye contact of the material. When your operation involves heating or spraying of the material, and if you expect the isocyanate content level in the work place atmosphere may become above the threshold regulated by OSHA or by other appropriate working place safety standard, we recommend, in addition to the above, installation of a proper hooded dynamic ventilation system and/or using an appropriate type of respirator (such as a full-face respirator equipped with OSHA approved HEPA filters for particulate and organic vapor) to prevent inhalation of the fume.

Direct contact of polyurethane raw materials to skin/eye, as well as ingestion may lead to health problems. No eating or smoking should be permitted at the working area. The operator should wash hands well with soap and water after handling the materials and follow the other procedures of the Standard Industrial Hygiene Practices. Please refer to the MSDS for each component for the detailed health information.

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