Northstar Polymers (Div. of Tandem Products, Inc.)
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MPP-F04C

4.2 Pound-Per-Cubic-Foot Density
General Purpose Hand-Pourable Flexible Foam

This formulation is designed to make molded flexible foam parts/sheets/dies/blocks by a hand-mixing method with basic manual tools. The components are low-viscosity stable liquid at room temperature. The pot life is approximately 30 seconds, which is relatively long for this class foam formulation. These properties are ideal in small-scale productions for custom foam applications such as custom seating, padding, cushioning, many others.

Comparing to our 7-pound-per-cubic-foot density foam, MPP-F07A, flexible foam made of MPP-F04C exhibits a more gradual compression deflection pattern to provide a softer feel. The component mixing ratio may also be adjusted to yield softer foam.

The free-rise density of the foam is 4.15 pounds per cubic foot. The cell structure is open-cell with partial closed-cell. The molded foam may need to be physically crushed after the foam is demolded to ensure a fully open-celled structure.

This formulation is an MDI base water-blown polyether system, and it does not use ozone-depleting auxiliary blowing agents.

Examples for Applications:

- Molded Upholstery Parts
- Custom Seating, Padding, and Cushioning Parts
- Custom Packaging of Impact/Vibration-Sensitive Items
- Acoustic Foam Pads
- Prototyping

Physical Properties of the Cured Foam

Property	Typical Value
Foam Density (Free Rise)	4.2 LBS/Cuft
Typical Compression Density	4.6 LBS/Cuft
Surface Hardness (Open Top)	Shore OO 30

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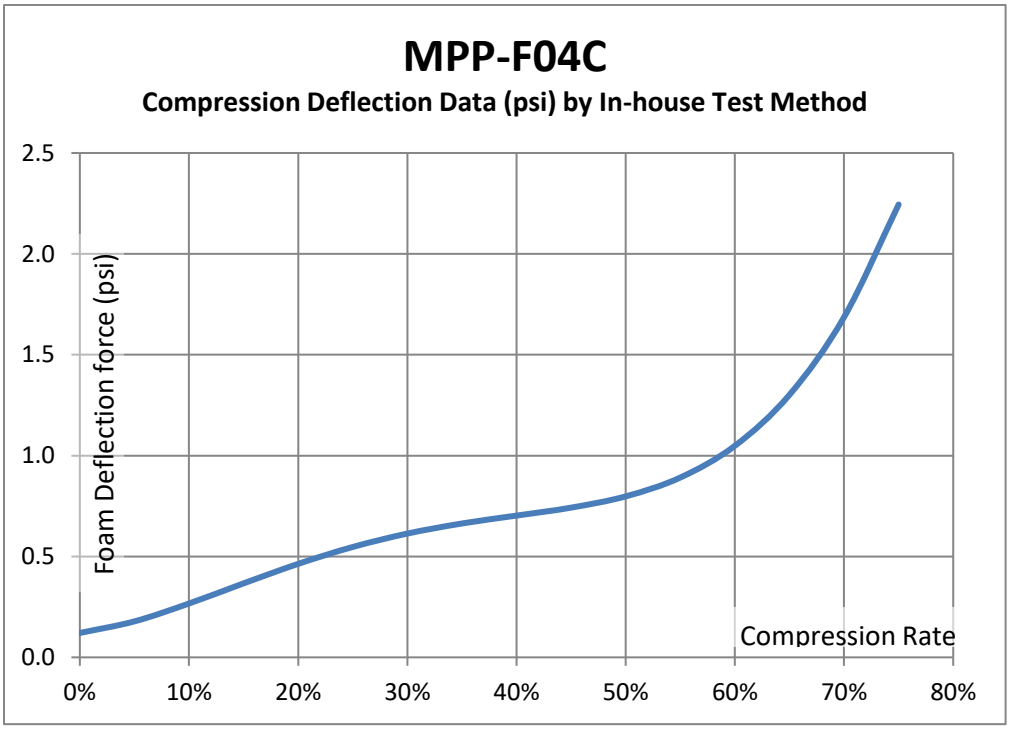
Surface Hardness (Cut Surface)	Shore OO 10
Cell Structure	Mostly Open Cell
Foam Color	Off white*

*Note: The foam color is expected to turn to dark yellow from light, heat, and oxidation after exposure to ambient condition for a while. Pigment dispersions in polyether polyols can be added to part-B side to colorize the foam.



Component Properties (Typical Values)

	Prepolymer (Part-A)	Curing Agent (Part-B)
Code Number:	MPC-022	PPF-023
Specific Gravity:	1.141	1.044
Equivalent Weight:	221	227
%NCO	19.0 %	n/a
Viscosity (@72 ˚F)	900 cps	900 cps
Storage Temperature	72 ˚F – 86 ˚F	72 ˚F – 86 ˚F

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Note: The prepolymer, MPC-022, is sensitive to cold temperature. Although the materials are tested for the stability at 35 ˚F in 3 days, shipping in a truck without temperature control during the cold seasons can increase the chance of permanent damage to the material. Immediate heating of the material to 140 ˚F after the receipt of the shipment may be required to avoid permanent damage. The component materials are also moisture sensitive, and the headspace in the container must be purged with dry nitrogen gas or argon gas to avoid moisture contamination.

Mixing Ratio	(Part-A)	(Part-B)
Volume Ratio:	75	100
Weight Ratio:	1.00	1.22

Note: You may adjust the mixing ratio to yield softer or firmer foam. In general, a higher part-B ratio makes softer foam. A higher part-B ratio will make the foam surface stickier. You must test varied ratios for your application. In general, you should be able to change +, - 10% of the above ratios. You may also exceed 10% variation based on your test results.

Processing Temperature:

Part-A	Room Temperature (72 – 86 ˚F)
Part-B	Room Temperature (72 – 86 ˚F)
Mold/Substrate	Room Temperature (72 – 86 ˚F)

* The substrate/mold can be at ambient temperature if it is made of plastic, resin, wood, paper, or other heat-insulating materials. When casting on metal or other heat-absorbing materials, the substrate may need to be heated to the 100 – 140 ˚F range.

Cure Pattern:

Pot life (Cream Time):	30 seconds
Rise Time:	3 minutes
Demolding Time:	30 – 35 minutes
Complete Cure Cycle:	24 hours at room temperature

NOTE: Cured foam contains some closed-cells. After the foam is demolded, you need to physically crush the cured foam to force the closed cell to open. Crushing can be done about 30 to 60 minutes after the resin component is poured into the mold. After the foam

cells are opened, the foam will feel softer. If foam contains a large portion of closed cells, the cured foam may shrink more noticeably.

Processing (manual hand-batch):

We recommend testing small amounts to see how the material behaves, then develop your processing method accordingly. Herein, the descriptions are for the manual hand-mixing processes. When you process/test, please be sure to operate in a well-ventilated area or large open area with a fan to move air; wear rubber gloves, long sleeves, and protective eyeglasses to avoid skin/eye contact. Read the Material Safety Data Sheet for the details on the safety and handling of each component.

The amount of foam that enters into the mold is important to mold your foam parts at the right density. The foam expands by approximately 14 to 15 times the liquid volume. You need to determine the optimum foam resin quantity to be poured into your mold by test-pouring several different amounts into the mold for the optimum result.

About 30 to 35 minutes after casting the mixed components, the foam should be solid enough to de-mold. At this point, foam is expected to have some closed cells. These closed cells shrink more significantly after the foam cools down. To avoid shrinkage from the closed cells, the foam should be crushed down physically to force the internal cell structure to be open cell. At first, the closed-cell regions of foam feel like balloons when you press it. You would hear popping sounds as you crush the foam. The foam will have softer, more uniform softness throughout after being crushed to open the cells.

Compression Molding

Foam needs to fill the in-mold space with its expansion pressure by putting a slightly larger amount of foam resin into the mold. The mold, therefore, needs to be a closed-mold and has to have the capacity to retain the internal pressure. The simplest compression mold will be an open-top box with a lid. The lid needs to be clamped to hold the pressure. The typical compression rate is about 10%, which means to pour 10% more liquid resin than what is required to fill the inner mold volume by the free-risen foam.

The air trapped in the mold could make large voids if it is not vented. For this purpose, you need to have small holes to let the trapped air escape from the mold. Determine the mold position so that the trap air is pushed toward a corner or sections where the vent holes are. Small amounts of the foam may squeeze out from the vent holes, which you can machine off after the part is cured.

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The mold material can be metal, plastic, or elastomeric material. The mold surface needs to be slick as foam could stick to any porous surface. Metal molds tend to absorb heat. The heat created from the urethane reaction is required for foam to cure properly. If mold is cold, this heat is absorbed and the foam does not cure properly. The mold needs to be heated to 100 to 120 ˚F range in case of using metal molds. If your mold is made of a plastic or elastomeric material, such as silicone rubber, epoxy, and urethane, this may not be necessary. Please test and determine the optimal temperature for your mold. Higher mold temperature increases the shrinkage rate. For tight shrinkage variation, controlling temperature parameters is critical.

NOTE: All data provided herein are based on our in-house test methods and are reference only.

Other Information

Applications that require fire-retardant property:

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 for applications in which the foam can be exposed to high temperatures or being near an ignition source.

By adding fire retardant additives, this foam may be modified to 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.

Storage:

Part-A component (prepolymer) contains an isocyanate component, which is very much sensitive to moisture. If it is left in the 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 into 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 72 and 100 °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 a source of degradation or excessive bubbles in the product. Avoid exposure of the material to air. Purging the headspace 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. The storage temperature should be at a room temperature between 65 and 90 °F.

Safety:

The component materials are industrial-grade chemicals.

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

Whenever using this material, please 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 with the material. When your operation involves heating or spraying of the material, we recommend, in addition to the above, installation of a proper ventilation system and using a half-face respirator recommended for the user 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 in the working area. The operator should wash hands well with soap and water after handling the materials. Please refer to the SDS for each component for detailed health information.

For any questions, please contact Northstar Polymers.

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