2.3 LBS/ft^3 Density Structural Foam with Good Resiliency
Creates Less Dusts for Easier Die-Cutting

MPA-M02A

MPA-M02A is an open-cell light-duty structural foam casting system. This foam formulation is made to service applications where light density foam with some structural supporting and impact mitigation properties are needed. The cured foam has some load bearing capacity as well as some flexibility. This set of properties avoids cracking from impact forces. The foam flexes and then comes back to the original shape. Because of the flexibility, machining on this foam creates much less amount of fine dusts/particles.

The mixing ratio is 1: 1 by volume. The viscosity range is reasonably low at room temperature. This will allow use of low-cost fixed-ratio dispensing equipment for cast-in-place foam application. With these properties, MPA-M02A may be suitable for many custom applications such as:

- Light weight shock-absorbing parts
- Foam die for cutting out various parts
- Cast-in-place foam to fill large areas
- Packaging foam with specific weight bearing/ shock absorbing requirements
- Molding larger light-weight objects

This is an MDI base water-blown polyether-based polyurethane system; the foam is expected to be stable in wet conditions. The formula does not use auxiliary blowing agents such as volatile hydrocarbon and fluorocarbon blowing agents.

The pot life for this formulation is very short. For molding larger parts, meter mixing equipment and automated molding line setup is required.

Physical Properties of the Cured Foam

Property	Typical Value
Foam Density (Free Rise)	2.3 LBS/Cuft
Typical Compression Density	2.5 LBS/Cuft
Foam Consistency	Structural with Flexibility
Apparent Surface Hardness (Skinned open top of a free-risen foam)	25 – 35 A Shore Durometer
Foam Color	Creamy to dark yellow

*Note: The foam color is expected to turn to dark yellow from light, heat, and oxidation after exposure to ambient condition for a while.

Component Properties (Typical Values)

	Prepolymer (Part-A)	Curing Agent (Part-B)
Code Number:	MNB-013	PAE-010
Specific Gravity:	1.235	1.028
Equivalent Weight:	134	102
%NCO	31.3 %	n/a
Viscosity (@72F)	100 cps	1,100 cps

Mixing Ratio	(A)	(B)
Volume Ratio:	**100**	**100**
Weight Ratio:	100	84
Stoichiometry:	100	109
NCO Index	0.92	

Processing Temperature:

Part-A	Room Temperature (68 – 85 ˚F)
Part-B	Room Temperature (68 – 85 ˚F)
Mold/Substrate	Room Temperature (68 – 85 ˚F)

Cure Pattern:

Pot life (pour within)	15 seconds
Demolding time	15 minutes

Standard Packaging Sizes:

5-gallon pail (40 LBS per pail)
55-gallon drums (450 LBS per drum)

Hints for Foam Compression Molding

Foam needs to fill the mold space from 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 a capacity to retain the internal pressure. A simplest compression mold will be an open-top box with a lid. The lid needs to be clamped to hold the pressure.

The air trapped in the mold could make large voids if it is not vented. For this purpose, you need to have very small holes to let the trapped air escape from the mold. Determine the mold position so that 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.

The mold material can be metal, plastic, or elastomeric material. Mold surface needs to be slick as foam could stick to any porous surface. Metal molds tend to absorb heat. The heat created from 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 heat to 100 to 120 ºF 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 very important.

The “compression rate” describes the additional amount of material you would put into the closed mold to create the internal pressure so that the foam fills the entire inside space of the mold. Typically, about 5 to10 %

compression should give enough pressure to distribute the foam within the mold. Using higher rate makes the foam denser and stronger. However, it will increase the chance of closed-cell/shrinkage problem.

Polyurethane foam is cured at an elevated temperature. When it is just cured in a mold, the warm gas inside the cells is at expanded state, and the gas contracts its volume as it cools off. If the cells are not opened enough, the contracting gas shrinks and deforms the foam badly. You may need to reduce the compression rate. Some sharp edges in the mold may also create a high-density spots and may cause the closed-cell related deforming issues. If possible, redesign the mold to avoid sharp edges.

Other Information

Applications that requires 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 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 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 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 72 and 90 °F.

If a large amount of water mixes with a large amount of isocyanate base materials, the chemical reaction may produce a large amount of CO2 gas and heat to create a hazardous condition. Keep the storage area free of water.

Under a certain combination of heat, catalyst (basic chemicals), amounts of reactive materials, and some other favorable conditions for the reaction, the water (or alcohol/glycol) to isocyanate reaction can reach a dangerous state of accelerated reaction. The accelerated reaction may create a very high temperature condition. The thermal decomposition of isocyanate based material by extremely high temperature or fire can produce toxic gasses and smokes. Please be sure that the containers are stored in dry indoor storage, away from source of water, alcohol, glycol, and other reactive chemicals.

If a leak is found in a drum, please place the drum in such a position that the leaking part is at a higher part of drum so that the content no longer leaks out. Cover the leaking area with dry towel to prevent air from entering. If possible, transfer the material into new container(s) with nitrogen purge. If moisture enters into an isocyanate container from a small leakage, CO2 gas may be produced to gradually pressurize the container. If pressure built up is suspected, open the bung (or cap) very slowly to release the pressure before you change the drum position.

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. The storage temperature should be at a room temperature between 72 and 90 °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.

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 of 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 use 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. Please refer to the MSDS for each component for the detailed health information.

For any questions, please contact Northstar Polymers.

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