



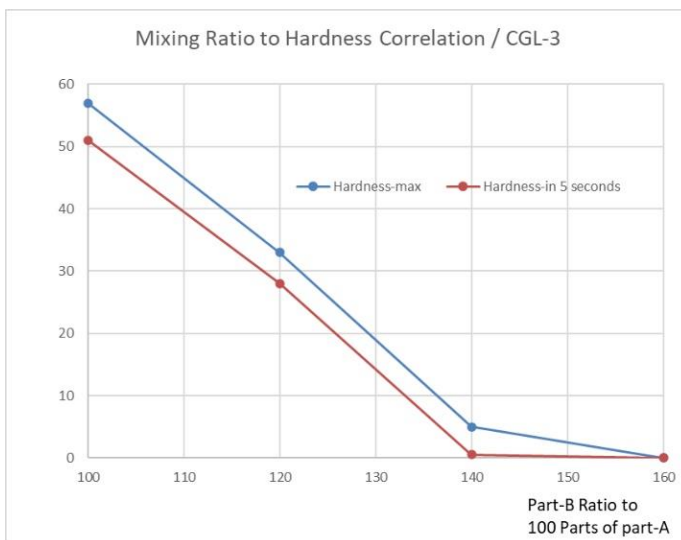
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CGL-3

Castor Oil Based Polyurethane Gel Elastomer

CGL-3 is specifically formulated to be used to make polyurethane “gel pads” encapsulated inflexible film or fabric casing using castor oil as its curing agent. Castor oil is commonly available, inexpensive, and renewable raw material. The users of this formulation have advantages from a low-cost common raw material to make price-competitive products.

The formulation is made in such a way the user can change the mixing ratio to change the firmness/softness of the material. The hardness range covers most of the common gel-pad application such as shoe insoles, keyboard/mouse wrist rests, bicycle saddle covers, and surgical bed liners.



The material can be manually processed at room temperature without use of an inline meter-dispensing machine. Thus, it does not require a large initial investment specifically to handle this formulation. A variety of polyurethane catalysts can be used for the optimum curing pattern for the application.

The raw material component does not use a plasticizer and the blended resin is compatible with many polymer film materials for encapsulation.

The component materials are relatively stable in a wide temperature range and easier to transport compared to other MDI-based products.

The natural color of the cured material is opaque dark yellow, which can be pigmented with typical pigment dispersion paste colorants for various colors.

Designations

System Name: CGL-3
Part-A Component: MPF-042 (Prepolymer)
Part-B Component: Dry-Grade Castor Oil*

Note*: Dry grade castor oil with the moisture content below 0.03% is recommended.

Mixing Ratios:

CGL-3 is formulated in such a way the users can adjust the hardness by changing the mixing ratio between the components at the batch process. A higher part-B (castor oil) ratio makes a softer and more viscoelastic product. The cured material is viscoelastic, and the Durometer reading changes while testing the hardness with the Durometer gage. The chart below shows the data on the hardness reading just after the probe is pressed on the specimen and the reading after 5 seconds.

Weight Ratio (MPF-042: Castor Oil)	Hardness - Shore OO (Initial Reading)	Hardness - Shore OO (Reading in 5 Seconds)
100: 100	57	51
100: 120	33	28
100: 140	5	<1
100: 160	<1	<1

*The above hardness data is typical values based on our lab test and may vary depending on the various conditions.

Curing Pattern**

Pot-life: 10 -15 minutes at ambient temperature
Demolding Time: 2 to 6 hours

Curing/hardening completes in 3 to 4 days at room temperature. Curing patterns vary depending on the mixing ratio.

Note**: Catalyst(s) must be added to part-B (castor oil) for this material to properly cure. The curing pattern described herein is based on 1.75% by weight of Dabco 33LV*** or an equivalent catalyst in part-B (castor oil). A wide range of common polyurethane catalysts can be used to yield the optimum curing pattern for your application. The catalyst must be added to part-B (castor oil) and homogeneously blended before the batch with part-A.

Note***: Dabco 33LV is 33% triethylenediamine (TEDA) dissolved in 67% dipropyleneglycol (DPG). The equivalent catalysts include TEDA-33 by Tosoh, TEGOAMIN® 33 by Evonik, JEFFCAT® TD-33A, Niax™ Catalyst A-33 by Momentive, and KAOLIZER NO.31 by Kao Global Chemicals.

Processing Temperatures:

Part-A 72 to 86 °F (22 to 30 °C)
Part-B 72 to 86 °F (22 to 30 °C)
Mold 72 to 86 °F (22 to 30 °C)

Component Material Data:

Part-A Component

Product Code:	MPF-042
Description:	Isocyanate terminated prepolymer extended with polyether polyol
%NCO:	10.0 % +, - 0.3%
Amine Equivalent	420
Specific Gravity:	1.096
Physical State at 22 °C (72 °F):	Viscous Liquid, Opaque Dark Yellow to Amber Color
Viscosity at 22 °C (72 °F):	14,000 cps
Storage:	Store in airtight containers in dry indoor storage with the temperature between 72 °F and 86 °F. The material is highly sensitive to moisture. The headspace in the container must be purged with dry nitrogen gas or argon gas all time.

Part-B Component

Product Code:	Castor Oil (Dry Grade)
Description:	Curing agent based on a blend of polyether polyols and additives
Equivalent Weight:	342
Specific Gravity:	0.959
Physical State at 22 °C (72 °F):	Viscous Liquid with Yellow Tint
Viscosity at 22 °C (72 °F)	650 cps
Storage:	Store in an airtight container in a dry indoor storage at room temperature. The material is hygroscopic. For long term storage, inject dry nitrogen gas, argon gas, or -40° dew-point dry air into the container to blanket the material.

Standard Packages:

- 55-gallon steel drums loaded with 450 pounds each of material
- 5-gallon plastic pails loaded with 40 pounds each of material

Storage/Handling Information for Urethane Component Materials

Our polyurethane raw material component products are industrial grade chemicals. For the safety of your workers and successful operation, you must follow the proper handling and storage procedure. The following information is the general conditions of storage and handling for part-A (isocyanate prepolymer) and part-B (curative) we produce. The supervisors and operators need to be familiar with this information in order for the operation safety as well as the successful production.

Please Note that polyurethane raw material components are sensitive to the environment. Without a good control when handling and storing, you cannot produce good products. Without proper storage and handling of the material your damage claim or reject of the product may not be accepted.

Storage of Part-A Component: (Isocyanate Prepolymer)

Part-A component (prepolymer) contains isocyanate, which is highly sensitive to moisture. If it is left in ambient air, part-A will react with atmospheric moisture and will be ruined. This reaction is non-reversible.

Soon after the container is opened to dispense the content, dry nitrogen or argon gas needs to be injected to the container to blanket the material. The pressured nitrogen gas can be injected for 15 to 20 seconds for 5-gallon pail size containers, and 60 to 120 seconds for 55-gallon size containers depending on the top space.

For gravity-feeding from a 55-gallon drum on a drum cradle, silica gel or calcium chloride desiccant filter(s) should be installed to the vent-hole of the drum. A shut-off valve to inject dry nitrogen gas can be installed instead.

Store the containers in a dry indoor storage within the temperature range between 72 and 96 °F (22 - 30 °C). Avoid direct sunlight.

Note: If large amount of water mixes with a large amount of isocyanate materials, including our part-A components or isocyanate prepolymer, the exothermic heat can raise the temperature very high. Keep the storage area free of water. The decomposition of this material by extremely high temperature or fire can create toxic gasses. Please read the SDS for the detailed information.

During the cold season, isocyanate prepolymer may freeze while it is shipped. You may need to thaw the material if it arrives frozen. If freezing of the material is suspected, put the container in an industrial oven between 160 - 190 °F (70 - 88 °C) until the material temperature is about 140 °F (60 °C). You may use drum heater at 160 - 190 °F heat (70 - 88 °C). You may agitate the content as you thaw. Keep squirting a small flow of dry nitrogen gas from the vent hole as you agitate with the caps of the drums removed. Do not overheat the drum above 180 °F as it can induce decomposition reaction. Do not heat excessive length of time after it is thawed. Prolonged heating may increase the viscosity of the material and change the quality of the material to cause malfunctioning. Keep the material at room temperature after it is thawed. Our plastic pails are rated for 190 °F max. Do not apply heat higher than 190 °F.

Thawing must take place immediately after the material is received. Otherwise, the material may be ruined. We disclaim the damages caused by exposure to low temperatures.

The shelf-life for it is 6 months for the materials in the unopened original container under the correct storage conditions.

Storage of Part-B Component: (Curative/Castor Oil)

Part-B component (castor oil) is hygroscopic. It means that if the material is exposed to ambient air, it absorbs moisture quickly. Part-B

component contaminated by moisture may cause issues. Avoid exposure of the material to moisture in air.

Purging the headspace in the container with nitrogen or argon gas or negative-40-degree-dew-point dry air is also recommended to prevent moisture contamination of part-B as well. It is specially recommended when the humidity of the storage or working space is above 60% relative humidity at room temperature.

Store it in a dry indoor storage at a room temperature between 72 and 86 °F (22 - 30 °C) Avoid direct sunlight.

The shelf-life for part-B material in the unopened original containers is 6 months under the correct storage conditions.

Handling the Component Materials:

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 (SDS) for the detail information on safety and handling of each component 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, we recommend, in addition to the above, installation of a proper dynamic ventilation system and/or using a proper type of respirator 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 procedures of the Standard Industrial Hygiene Practices. Please refer to the MSDS for each component for more information.

High humidity work site may cause humidity/water contamination of the material. If you see excessive bubbles in the cured urethane parts, this may be an indication of moisture contamination. If the humidity goes above 60% in you workspace, we recommend use of dehumidifier to bring the humidity below 60%.

When the workspace is hot and humid, the material, molds, and tools can have water condensation. If storage place for material, molds, and tools are cooler, this can happen more readily. We recommend materials, molds, and other tools to stay at the same temperature as the workplace in the humid days to avoid water problem from the condensation.

Note: Our product warranty is limited to the chemical qualities to be within our specifications as well as our workmanship to produce, package, and ship the products. We do not guarantee the fitness of our products in any end-product. The materials need to be tested for each application by the user(s), processor(s), and/or marketer(s) of the end products. It is the responsibility of the maker/seller of the final product(s) to be compliant with all health, environmental, and other regulations related to the end products and their applications.

For any questions, please contact Northstar Polymers.

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