PRODUCT INFORMATION

PROVISIONAL TECHNICAL DATASHEET
11/11/2020

Introduction

DIPRANE™ LC 1025 FC Series
Four Component Elastomer System

DIPRANE™ LC 1025 FC Polyol is a polyester based urethane which can be used to produce a range of polyurethane elastomers from 55 Shore A to 55 Shore D hardness. The system has been specially developed for applications requiring a dynamic performance coupled with good physical properties and abrasion resistance.

DIPRANE™ LC 1025 FC system is in compliance with the EU Commission Regulation 10/2011 for plastics in contact with food and its amendments for repeated use applications. The material is intended for short contact with all kinds of food at ambient temperature. For further information please reach out to your Dow contact.

Component Properties

These are typical values and should not be construed as specifications.

Polyol Component

Product Reference	DIPRANE™ LC 1025 FC Polyol
Appearance	Whitish, waxy solid at 20°C
Viscosity	1000 – 2000 mPa.s at 50°C ASTM D445
Specific Gravity	1.15 – 1.18 at 50°C

Isocyanate Component

Product Reference	DIPRANE™ 530 FC Prepolymer
Appearance	Pale, amber liquid
Isocyanate Component	16.4 – 16.5%
Viscosity	400 – 800 mPa.s @ 50°C ASTM D445
Specific Gravity	1.16 – 1.20 at 50°C

Chain Extender Component

Product Reference	DIPRANE™ C
Appearance	Whitish, crystalline solid below 20°C
Appearance	Colorless, clear liquid above 20°C
Viscosity	65 – 75 cSt at 25°C ASTM D4878
Specific Gravity	1.01 – 1.02 at 25°C

Catalyst Component

Product Reference	DIPRANE™ LC 1025 FC CATALYST
Appearance	Pale amber liquid
Viscosity	40 – 80 mPa.s at 25°C ASTM D445
Specific Gravity	1.03 – 1.08 at 25°C

Mixing Ratios

DIPRANE™ LC 1025 FC Polyol can be blended in the following proportions to give a range of hardness of 55°A to 55°D.

Hardness (Shore A)	55	60	65	70	75	80	85	90	95	55D
DIPRANE™ LC 1025 FC Polyol	191.2	168.5	148.7	128.8	113.0	99.4	79.50	59.65	36.19	20
DIPRANE™ C	8.55	9.61	10.54	11.48	12.55	12.86	13.79	14.41	15.51	16.3
DIPRANE™ 530 or 531 Prepolymer	100	100	100	100	100	100	100	100	100	100

For consistent hardness values for 45°A it is recommended to adjust the mix ratio for this grade based on the Hydroxyl Content of the Polyol and Prepolymer. A spreadsheet is available for this purpose, please contact your TSR

Catalysts Loadings

DIPRANE™ LC 1025 FC Polyol catalyst loadings should be determined experimentally by the end user, suggested levels should be in the range, shown below (% wt of total mix):

Hardness Grade	From	To	Gel Time Range	Demould Time
55	1.5%	2.3%	3 – 6'00"	10 – 15'00"
65	1.4%	2.1%	3 – 5'00"	8 – 15'00"
75	0.6%	1.5%	3 – 4'30"	8 – 15'00"
85	0.4%	0.8%	2 – 3'30"	8 – 12'00"
90	0.25%	0.5%	1'30" – 3'00"	7 – 12'00"
95	0.2%	0.5%	1'20" – 2'45"	7 – 12'00"

These are typical values and should not be construed as specifications.

Cured System – Typical Properties (90°C Mold)

Hardness (Shore A)	Method	55	60	65	70	75	80	85	90	95	55D
Tensile Strength (MPa)	ISO 527 - Type 5	26	28	34	34	34	42	40	40.5	36	29
100% Modulus (MPa)	ISO 527 - Type 5	1.5	2.0	2.4	3.1	3.8	4.6	5.9	8.2	12.2	16.8
300% Modulus (MPa)	ISO 527 - Type 5	2.35	4.1	4.9	6.2	7.6	9.3	11.7	15.4	19.5	22.8
Elongation at Break (%)	ISO 527 - Type 5	635	580	575	540	535	590	580	570	570	485
Angle Tear Strength (N/mm)	ISO 34 – Pt B, Proc A	44	53	61	66	80	84	96	113	132	103
Rebound Resilience (%)	ISO 4662	51 - 55	48 - 53	45 - 50	41- 45	40- 44	39 -42	36 - 38	34 - 38	33 -36	33-34
DIN Abrasion (mm^3loss)	ISO 4649	25	25	25	25	25	30	30	30	40	40

These are typical values and should not be construed as specifications. Ref: EE_IM_1491

Processing Details

The following information is given as a guide to processing this product. It is recommended that optimum conditions for a specific application are determined experimentally. Our Technical Service Department can offer more detailed advice. **Please note that it is essential the polyol component be thoroughly rolled / mixed before use.**

Recommended Processing Temperatures

Polyol Component	50 – 55°C
Isocyanate Component	45 – 55°C
Chain Extender Component	25 – 50°C
Catalyst Component	20 – 30°C
Mold Temperature	85 – 120°C
Gel Time	Dependent on catalyst loading
Typical Demold Time	Dependent on catalyst loading

These are typical values and should not be construed as specifications.

Material Preparation

Both DIPRANE™ LC 1025 FC Polyol component and DIPRANE 530 FC Prepolymer component are viscous liquids, and, depending on the storage temperature, may freeze or crystallise.

Polyol component

The polyol component forms a waxy solid at the recommended storage temperature of 0 – 30°C. Heat is required to liquefy the polyol and / or to condition the polyol to the processing temperature. It is recommended that the polyol be warmed slowly either:

- in an air circulating oven (preferred) or a hot box,
- with a drum blanket,
- with band heaters.

Temperatures up to 60°C are recommended.

CAUTION: Exposure to temperatures above 60°C should be avoided as this will lead to degradation of the product.

It is recommended that the warming/melting process should be carefully controlled, taking care to avoid overheating or heating for extended periods of time. Hot spots can cause degradation and should, therefore, be avoided. In general, warming for a longer time period at a lower temperature (50°C) is preferred compared to a short time period at a higher temperature (60°C).

Typically, at 45 – 50°C:

- a 25kg drum (pail) of polyol requires 16 hours to melt;
- a 200kg drum requires 24 – 48 hours,

although this will depend on the initial temperature of the material and the heat distribution efficiency of the heating method. **It is recommended that the optimum conditions for a particular application are determined experimentally by the user.**

It is recommended that the polyol component is NOT stored:

- at 40 – 50°C for greater than 1 week;
- at 50 – 55°C for greater than 5 days;
- at 55 – 60°C for greater than 3 days.

In each case this assumes unopened, tightly sealed containers.

Please Note: It is essential that the polyol component is thoroughly rolled / mixed before use.
Strong turbulence and mixing with air should be kept to a minimum by adopting a careful mixing technique (e.g. drum/keg rolling) or using low air introducing mixers. It is recommended that any air introduced during mixing is subsequently removed through degassing by either machine or vacuum chamber. It is the responsibility of the customer to ensure that the product is mixed and degassed sufficiently for use. Please consult the Dow Technical Service Department if you are unsure of the recommended methods for degassing material.

Isocyanate component
DIPRANE™ 530 FC Prepolymer is a pale, low viscosity, stable liquid at the recommended storage temperature of 15 – 30°C, however below this temperature range it can crystallise and solidify. The crystalline portion of the solidified product is 4,4'- diphenylmethane diisocyanate and, in this solid form, it exhibits the same dimerization characteristics as pure diphenylmethane diisocyanate. Unless proper action is taken to reform the original solution, subsequent dimerization will proceed quickly and deteriorate the clarity and assay of the product.

The recommended technique for melting crystallised material is by drum rolling (5 - 10 RPM) in atmospheric steam. This method helps to provide for efficient heat transfer while the solid block of frozen diphenylmethane diisocyanate cools the liquefied portion, so that the product temperature should not reach a high enough level (>60°C) as to cause excessive dimerization.

CAUTION: Exposure to temperatures above 60°C should be avoided as this will lead to degradation of the product.

A second, but slower technique for melting crystallised material, involves warming in a hot air-circulating fan oven at up to 60°C, ideally including slow drum rolling (5 – 10 RPM) inside such an oven. Static melting in hot air ovens (i.e. with no air circulation) is not recommended because this can lead to hot spots.

Another method for melting crystallised material is static melting in a steam chest.

As can be seen, agitation and subsequent but even heating is the key to help maintain DIPRANE™ 530 FC Prepolymer quality during melting, and this should be for as short a time period as possible in order to achieve it's typical appearance.

Further information can be found in Dow's information sheet 'Safe Handling – Pure, Modified and Polymeric MDI' Form No. 109-01224X-1009P&M.

In the case of isocyanate that is already a pale amber, transparent liquid with no solid particles (i.e. already melted), further heating may be necessary to condition the material to the recommended processing temperature.

The recommended technique should be to warm the isocyanate slowly either:

- in an air circulating oven (preferred) or a hot box,
- with a drum blanket,
- with band heaters.

Temperatures up to 60°C are recommended.
CAUTION: Exposure to temperatures above 60°C should be avoided because this will lead to degradation of the product.

It is recommended that the warming/melting process should be carefully controlled, taking care to avoid overheating or heating for extended periods of time. In general, warming for a longer time period at a lower temperature (40 – 50°C) is preferred compared to a short time period at a higher temperature, although the exact time/temperature combination will depend on the initial temperature of the material and the heat distribution efficiency of the heating method. **It is recommended that the optimum conditions for a particular application are determined experimentally by the user.**

It is recommended that the isocyanate component is NOT stored:

- at 40 – 50°C for greater than 2 weeks;
- at 50 – 55°C for greater than 7 days;
- at 55 – 60°C for greater than 3 days.

In each case this assumes unopened, tightly sealed containers.

Hot air circulating oven requirements

A recommended warming method for all components is in an air circulating fan oven, capable of rapid air circulation from top to bottom of the oven. The oven must be capable of achieving and maintaining the recommended material temperature. The oven type should be sufficient to ensure that the required temperature is reached quickly. An even temperature distribution throughout the oven is extremely important to help achieve product consistency. The material containers should be raised off the floor of the oven (for example, on pallets) to allow good air circulation under and around them.
One of the most effective warming methods to help ensure even temperature distribution throughout the material is by slow rolling (5 -10 RPM) inside such an air circulating oven.

Please Note: Depending on the heat distribution efficiency of the oven, the oven set point may not correspond to the internal air temperature or the material temperature. It is recommended that the optimum conditions for a particular application are determined experimentally by the user.

Our Technical Service Department can offer advice on oven design.

Degassing

It is recommended that all components are degassed before use, either by machine or in a vacuum chamber. Please consult the Dow Technical Service Department if you are unsure of the recommended methods for degassing material.

Moisture

Some of the components in the DIPRANE™ LC 1025 FC Series are hygroscopic. Care should be taken to avoid moisture contamination. If containers are vented during the warming period, a drying tube or dry nitrogen should be used. If the components are to be opened and then resealed, a blanket of dry nitrogen should always be used.
To help achieve the most satisfactory results – PROTECT FROM MOISTURE.

Mold Preparation

Aluminium, steel, alloy, brass GRP, polyurethane or silicone RTV molds can be used, of which metal molds are the recommended choice. Aluminium is considered to be the best material for large moldings because it offers good heat transfer characteristics and is lightweight.

Ensure the mould is cleaned thoroughly and is well sealed so as to prevent material from escaping. The mold should then be treated with a recommended mould release agent.

Pre-heat the mold to the recommended mold temperature before casting; this helps to ensure a uniform cure cycle, and is considered to be the most satisfactory operating procedure to allow the production of uniform castings. An even temperature distribution throughout the mold is extremely important to achieve product consistency.

Demould

DIPRANE™ EXP LC 1025 FC elastomers can be demolded hot. Removal from the mold should not be a problem, providing the correct release agent has been employed. Care should be taken when demolding large or complicated moldings to avoid causing damage or distortion whilst hot.

Recommended Cure Cycle

In order to achieve rapid attainment of mechanical properties of DIPRANE™ LC 1025 FC castings, a post-cure of 12 -16 hours at approximately 60-80 °C is recommended followed by a minimum of 48 hours at ambient. It is important that molds be heated to the recommended temperature in order to achieve satisfactory demould times and subsequent curing of the elastomer.

Additional Processing Details

Machine Mixing

Our Technical Service Department can advise on suitable two or three component polyurethane dispensing equipment for processing DIPRANE™ series elastomers.

Storage and Handling

		Shelf life
Polyol Component	Store in tightly sealed containers at a temperature of 10 - 30°C. Raise to the processing temperature and mix well before use. Avoid contact with moisture. Storage at low temperatures may result in freezing of the polyol component, should this occur it should be melted out by raising to the processing temperature and mixed thoroughly before use.	12 months
Isocyanate Component	Store in tightly sealed containers at a temperature of 15 – 30°C. Avoid contact with moisture. Storage below the recommended minimum temperature may result in freezing of the Isocyanate. If the Isocyanate does not fully melt out when raised to the processing temperature it may be necessary to re-melt at a temperature of 60 – 70°C following the procedures laid down in the information sheet 'Safe Handling – Pure, Modified and Polymeric MDI' Form No. 109-01224X-1009P&M.	6 months
Chain Extender Component	Store in tightly sealed containers at a temperature of 0 - 30°C. Raise to the processing temperature and mix well before use. Avoid contact with moisture.	12 months
Catalyst Component	Store in tightly sealed containers at a temperature of 10 - 30°C. Raise to the processing temperature and mix well before use. Avoid contact with moisture.	6 months

More detailed information on the storage and handling of polyurethane components can be obtained by contacting Dow Technical Service Department.

Product Stewardship

The Dow Chemical Company and its subsidiaries ("Dow") has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our Product Stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our Product Stewardship program rests with each and every individual involved with Dow products — from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Safety Considerations

Safety Data Sheets (SDS) are available from The Dow Chemical Company (Dow). SDS are provided to help customers satisfy their own handling, safety and disposal needs, and those that may be required by locally applicable health and safety regulations. SDS sheets are updated regularly. Therefore, please request and review the most current SDS before handling or using any product. Copies of the SDS are available on request through the nearest Dow Sales office.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to help ensure that Dow products are not used in ways for which they were not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products.

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