

# HYPERLAST™ and DIPRANE™ Elastomers



Mining and Quarrying



## INTRODUCTION

Dow Formulated Systems, a global business unit of The Dow Chemical Company (Dow), is an industry leader in the development and formulation of fully-formulated polyurethane and epoxy systems, focused on providing its customers worldwide with innovative, tailor-made solutions through a global network of systems houses.

With more than 40 years experience in the development of polyurethane elastomers our products are used internationally for wear and tear protection in mining and mineral extraction processes.

Acting as interpreter between chemist and engineer, we adapt and use the versatility of chemistry to provide practical solutions to industrial applications. By working with Dow Formulated Systems, you'll have access to reliable service, creative polymer design, and the vast resources of one of the world's largest and most respected chemical companies.

## POLYURETHANE SYSTEMS

HYPERLAST™ and DIPRANE™ prepolymer and quasi prepolymer systems have been developed to offer improved processing characteristics and help maximize the performance of the resulting elastomer. The prepolymers and systems have been developed from a variety of polyol backbones and isocyanates.

HYPERLAST™ prepolymers and systems are predominantly based on polyether chemistry. They yield elastomers with excellent dynamic performance and toughness, through to polyether polyols which offer very good all round performance - especially in cold and wet environments.

DIPRANE™ prepolymers and systems are based on polyester or polycaprolactone chemistry to yield elastomers that are suitable in ore and mineral extraction processes where a high degree of wear and tear resistance is required. They can also be tailored to provide elastomers with fire retardance or anti-static properties.



# INNOVATION

## MINING AND QUARRYING

HYPERLAST™ polyether and DIPRANE™ polyester based materials offer excellent wear and tear properties, this together with good impact and abrasion resistance makes them an ideal choice for:

- Transportation of abrasive slurries
- Separation and sizing of aggregate
- Movement of solid materials from face to processing area
- Cleaning of conveyor belts
- Chemical resistance benefitting the ore extraction and concentration process

Elastomers are suitable for both manufacturing components and providing wear protection. In mining applications the DIPRANE™ and HYPERLAST™ polyurethane systems have been proven to extend the life of metal components by providing a durable, protective coating. Using a polyurethane coating has the added benefit of reducing noise in the working environment.

Safety in mineral extraction, whether above or below ground, is paramount and polyurethanes ability to be customized in terms of fire and anti-static resistance make them important materials for consideration.

### Typical Applications

Application	Function	Features	Product
Pipe lining	Transportation of abrasive materials	Wear, cut & tear resistance. Chemical resistance	HYPERLAST™ 151 or HYPERLAST M440/85
Pump impellers and linings	Movement of abrasive materials	Wear, cut & tear resistance. Chemical resistance.	HYPERLAST™ 101, 151 or HYPERLAST M440/85
Aggregate screens	Separation and de-watering of materials by size	Impact, wear, cut & tear resistance. Flex fatigue resistance.	DIPRANE™ 530
Conveyor rollers	Support of conveyor belt, providing efficient movement of materials	Fire retardance and anti-static as required. Load bearing and dynamic performance	DIPRANE™ 530 or DIPRANE 640
Belt scrapers	Cleaning conveyor belts	Wear, cut & tear resistance	DIPRANE™ 530
Chute linings and impact mats	Movement of abrasive materials	Impact, wear, cut & tear resistance	DIPRANE™ 530 or HYPERLAST™ T140/80-95
Aerators for floatation cells	Separation and concentration of minerals	Wear and chemical resistance	HYPERLAST™ 101, 151 or HYPERLAST M440/85
Floatation tank linings	Separation and concentration of minerals	Wear and chemical resistance	DIPRANE™ SMP 85A
Hydrocyclones	Separation and purification of materials	Rigidity to provide support, wear and impact resistance	HYPERLAST™ LU 1049 or HYPERLAST 151
Spiral conveyors	Movement of abrasive materials	Impact, wear, cut & tear resistance	HYPERLAST™ TMH 85 or HYPERLAST EMH 85
Excavator bucket linings	Movement of abrasive materials	Impact, wear, cut & tear resistance	HYPERLAST™ TMH 85 or HYPERLAST EMH 85

## FULL PREPOLYMERS

### HYPERLAST™ prepolymers

HYPERLAST T and HYPERLAST M prepolymers are derived from the reaction of polyether polyols with TDI or MDI.

The prepolymers that are based on polyoxytetramethylene glycol (PTMEG) polyols take full advantage of its strength in:

- **Dynamic performance**
- **Resilience**
- **Hydrolysis resistance**
- **Low temperature performance**

This class of prepolymers is particularly suitable for high speed/ high load bearing applications, and in environments where elastomers are exposed to moisture or low temperature, or a combination of both.

The prepolymers that are based on polypropylene glycol (PPG) offer a cost effective option with good performance, especially in cold and wet environments.

### DIPRANE™ prepolymers

DIPRANE T and DIPRANE M prepolymers are derived from the reaction of polyester or polycaprolactone with TDI or MDI.

These tough and durable elastomers are designed to maximize resistance to:

- **Wear**
- **Tear**
- **Flex fatigue**
- **Organic chemicals**

This excellent dynamic performance makes them suitable for a range of applications such as wheels, rollers and mining equipment – typically screens, scrapers and conveyors.

# PROTECTION

## PERFORMANCE TDI and MDI SYSTEMS

HYPERLAST™ polyether and DIPRANE™ polyester based prepolymer systems are specifically formulated to offer excellent dynamic and mechanical performance with the advantages of tolerance to processing conditions and ratio.

### HYPERLAST™ T and DIPRANE™ T Features Guide

	HYPERLAST T830 series	HYPERLAST T840 series	HYPERLAST T140 series	HYPERLAST T170	HYPERLAST T890	DIPRANE T950 series	DIPRANE T240 series	DIPRANE T940	DIPRANE T250
Typical hardness (shore)	75-95 A	85-95 A	72A-75D	80 A	85 A	80-95 A	57-90 A	90A	60A
Hand process	★ ★ ★	★ ★ ★	★ ★	★ ★	★ ★ ★	★ ★	★	★	★ ★
Machine process	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★
Dynamic performance	★	★ ★	★ ★ ★	★ ★ ★	★ ★	★ ★ ★	★ ★	★ ★	★ ★ ★
Solvent resistance	⊙	⊙	⊙	⊙	⊙	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★
Fire retardant	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Anti-static	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Low temperature flex	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★	★ ★	★ ★	★ ★	★ ★
Abrasion resistance	★	★	★ ★	★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★
Tear resistance	★	★ ★	★ ★	★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★

### HYPERLAST™ M and DIPRANE™ M Features Guide

	HYPERLAST M440	DIPRANE M540	DIPRANE M550
Typical hardness (shore)	85A, 90A	85A, 95A	55-95A
Hand process	★	★	★
Machine process	★ ★ ★	★ ★ ★	★ ★ ★
Dynamic performance	★ ★ ★	★ ★	★ ★ ★
Solvent resistance	⊙	★ ★	★ ★
Fire retardant	⊙	⊙	⊙
Anti-static	⊙	⊙	⊙
Low temperature flex	⊙	⊙	★ ★
Abrasion resistance	★ ★ ★	★ ★ ★	★ ★ ★

Key    Unsuitable    Good    Very Good    Excellent  
          ⊙           ★           ★★           ★★★





## QUASI PREPOLYMERS

Dow offers an extensive range of quasi prepolymer systems.

These polyurethane systems are based on MDI prepolymer technology, using polyether polyols for the HYPERLAST™ ranges and polyester polyols for the DIPRANE™ ranges.

A quasi prepolymer system can provide certain advantages over the more conventional full prepolymers for example:

- Lower viscosity prepolymers and curatives
- Lower material temperature for processing
- Closer mix ratios
- Multi hardness elastomers from the same prepolymers

These systems are non mercury catalysed and are compliant with the REACH Regulation (Regulation (EC) No 1907/2006) and RoHS Directive (Directive 2002/95/EC). They can be tailored to address specific solutions for a variety of mining and quarrying applications.

# PERFORMANCE

## HYPERLAST™ POLYURETHANE SYSTEMS

HYPERLAST™ quasi polyurethane systems based on polyether polyols can produce elastomers that offer the majority of benefits of full prepolymer versions with the processing advantages that quasi systems exhibit.

Products made from this type of elastomer have very good moisture tolerance and cold flexibility making them suitable for the handling of abrasive slurries in transportation, separation and purification applications (e.g. pipe and pump lining, hydrocyclones).

The following table offers an overview of the products.

HYPERLAST™	101	151	LU1049	201
Typical hardness (Shore)	60-95A	60A-55D	83A	35-95A
Recommended processing temp °C	40-50	40-50	40-50	20-30
Hand process	★ ★	★ ★	★ ★	★ ★ ★
Machine process	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★
3 component available	Yes	Yes	No	No
Solvent resistance	⊙	⊙	⊙	⊙
Fire retardant	⊙	⊙	⊙	⊙
Anti-static	⊙	⊙	⊙	⊙
Low temperature flex	★ ★	★ ★	★ ★ ★	★ ★
Abrasion resistance	★ ★	★ ★ ★	★ ★ ★	★
Tear resistance	★ ★	★ ★	★ ★ ★	★
Dynamic/resilient	★ ★ ★	★ ★ ★	★ ★ ★	★ ★
Hydrolysis resistant	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★
Key	Unsuitable ⊙	Good ★	Very Good ★ ★	Excellent ★ ★ ★

The above table is not extensive but gives an indication of the various series available. Dow Formulated Systems sales and technical teams will work with you to select and adapt the materials to address your specific requirements.



## QUASI PREPOLYMERS – DIPRANE™ POLYURETHANE SYSTEMS

DIPRANE™ polyurethane systems based on polyester polyols produce elastomers that are mechanically tough, durable and have a good degree of chemical resistance. This makes them suitable for a variety of material and mineral handling applications such as pipeline pigs, aggregate screens, rollers, scrapers and impact mats.

DIPRANE™	300	310	530	57	58	640
Typical hardness (Shore)	55A-95A	55A-90A	45A-95A	45A-95A	45A-90A	70A-90A
Recommended processing temp (°C)	60-65	60-65	50-55	40-50	40-50	40-50
Hand process	★	★	★	★★	★	⊙
Machine process	★★★	★★★	★★★	★★★★	★★★	★★★★
3 component available	★	★	★★★	★★★★	★★★	⊙
Solvent resistance	★★★	★★	★	★	★	★
Fire retardant	⊙	⊙	⊙	⊙	⊙	★★★
Anti-static	⊙	⊙	⊙	⊙	⊙	★★★★
Low temperature flex	★	★	★	★	★	★
Abrasion resistance	★	★★	★★★	★★★★	★★★	★★★
Tear resistance	★	★★	★★	★★	★★★	★★★
Key	Unsuitable ⊙	Good ★	Very Good ★★	Excellent ★★★★		

The above table is not extensive but gives an indication of the various series available. Dow Formulated Systems sales and technical teams will work with you to select and adapt the materials to address your specific requirements.

# VERSATILITY



## HIGH PERFORMANCE SPRAYABLE COATINGS

The HYPERLAST™ and DIPRANE™ range of sprayable polyurethane systems offer a range of rapid cure and fast drying coatings suitable for various mining & quarrying applications. They have been developed to help protect and extend the design life of a variety of substrates. These products are formulated without the use of solvents.

HYPERLAST™ sprayable polyurethane systems are predominantly based on polyether chemistry. They yield elastomers with remarkable dynamic performance and toughness through to polyether polyols which offer very good all round performance - especially in cold and wet environments.

DIPRANE™ sprayable polyurethane systems are based on polyester or polycaprolactone chemistry to yield elastomers that are suitable in applications requiring a high degree of wear and tear resistance. Typical examples include floatation tank linings.

They can also be tailored to provide elastomers for example with improved chemical resistance or fire retardant properties.

The HYPERLAST™ and DIPRANE™ range of tough, durable coatings offer:

- **Fast installation**
- **Non-slumping**
- **Fast return to service**
- **Non-solvented high build**
- **Corrosion protection**
- **Chemical resistance**
- **Reduced noise transmission**

### Properties Guide

BRAND Product Family	HYPERLAST™						DIPRANE		
	EME	TMP	TMP	EMH	TMH	EMU	SMP	SMP	SMP FR
Typical hardness shore A (D)	70-90A	85	82	85, 95 & 80D	85	60D	83E	85E	88
On-site process	⊙	⊙	⊙	★ ★ ★	⊙	★ ★	⊙	⊙	⊙
Ratio 1:1 by volume	⊙	⊙	✓	✓	✓	✓	⊙	✓	⊙
High pressure application	⊙	★ ★	★ ★	★ ★	★ ★	★ ★	⊙	★ ★ ★	⊙
Low pressure application	★ ★	★ ★	★	★ ★	★ ★	★ ★	★ ★	⊙	★ ★
Hydrolysis resistance	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★	★	★
Fire retardant	⊙	⊙	⊙	⊙	⊙	⊙			★ ★ ★
Low temperature flex	★ ★	★ ★	★ ★	★ ★ ★	★ ★		★	★	★
Abrasion resistant	★	★ ★ ★	★ ★ ★	★	★ ★	★	★ ★ ★	★ ★ ★	★ ★
Tear resistant	★	★ ★	★ ★	★	★ ★	★	★ ★	★ ★	★ ★
UV stable						★ ★ ★			
Key		Yes ✓	Unsuitable ⊙	Good ★	Very Good ★ ★	Excellent ★ ★ ★			

## SET YOUR BUSINESS APART WITH A SUPPLIER YOU CAN COUNT ON

Dow is committed to continually create today's and tomorrow's solutions for helping make the world safer, healthier, cleaner and more sustainable for all of us.

Offering a broad range of customized products and systems for many applications, Dow can help you stay competitive in today's fast-paced market environment.

### **In conclusion**

We have described briefly the ranges of prepolymer and quasi prepolymer systems that have been developed to help address your needs within the mining and quarrying industry.

As part of The Dow Chemical Company we have local Dow technical people ready to help you.



# COMMITMENT WORLD-WIDE

## Dow Formulated Systems Locations



PU Systems Hub Centers
Ahlen, Germany
Birch Vale, United Kingdom
Corseggio, Italy
Guangzhou, China
Marietta, Georgia, USA
Vladimir, Russia

PU Systems Production and Service Centers
Cairo, Egypt
Cardano al Campo, Italy
Dilovasi, Turkey
Erstein, France
Jundiai, Brazil
Map Ta Phut, Thailand
Mumbai, India
Rancho Cucamonga, California, USA
Ribaforsada, Spain
San Lorenzo, Argentina
Tlaxcala, Mexico
Wilmington, Illinois, USA

Epoxy Systems Production and Service Centers
Balbringer, Germany
Cleveland, Ohio, USA
Roberta, Georgia, USA
Wuhan, China

Sourcing Points for Epoxy Blends
Rheinmünster, Germany
Fresport, Texas, USA
Gumi, South Korea

Service Centers
Aarhus, Denmark
Kuala Lumpur – Selangor, Malaysia
Kiev, Ukraine
Shanghai, China
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