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Spray Elastomers

Era Polymers





- They are sprayable protective coatings.
- These coatings are not hard and brittle but flexible and rubbery in nature.

POLYURETHANE



POLYUREA

HYBRIDS

- Not all coated surfaces are static and benign.
- Some substrates and structures are prone to movement – thermal expansion/contraction of metal and cracking and movement of concrete.
- Flexible coatings are required to manage the substrate movement by stretching (elongating).
- Hard rigid coatings crack in these situations leading to failure and loss of substrate protection.

To the applicator, it means high throughput and fewer callbacks. Key attributes being:

- are 100% solids hence solvent free**
- set at virtually any temperature - winter and summer**
- are non flammable**
- can be applied in a single or multi-pass coats to any dry film thickness**
- set in minutes**
- can be put into service within hours**
- are easily touched up if damaged**
- are non-dangerous goods for transportation**
- require no post curing**

Accompanying these handling advantages are a number of important performance advantages. These include:

- superior adhesion with suitable primer
- resistance to chemical attack
- resistance to gouging and abrasion
- flexibility and resilience
- inertness, freedom from embrittlement
- impermeable
- resistance to disbondment forces
- a totally monolithic, seamless polymer sheet virtually fused to the substrate.

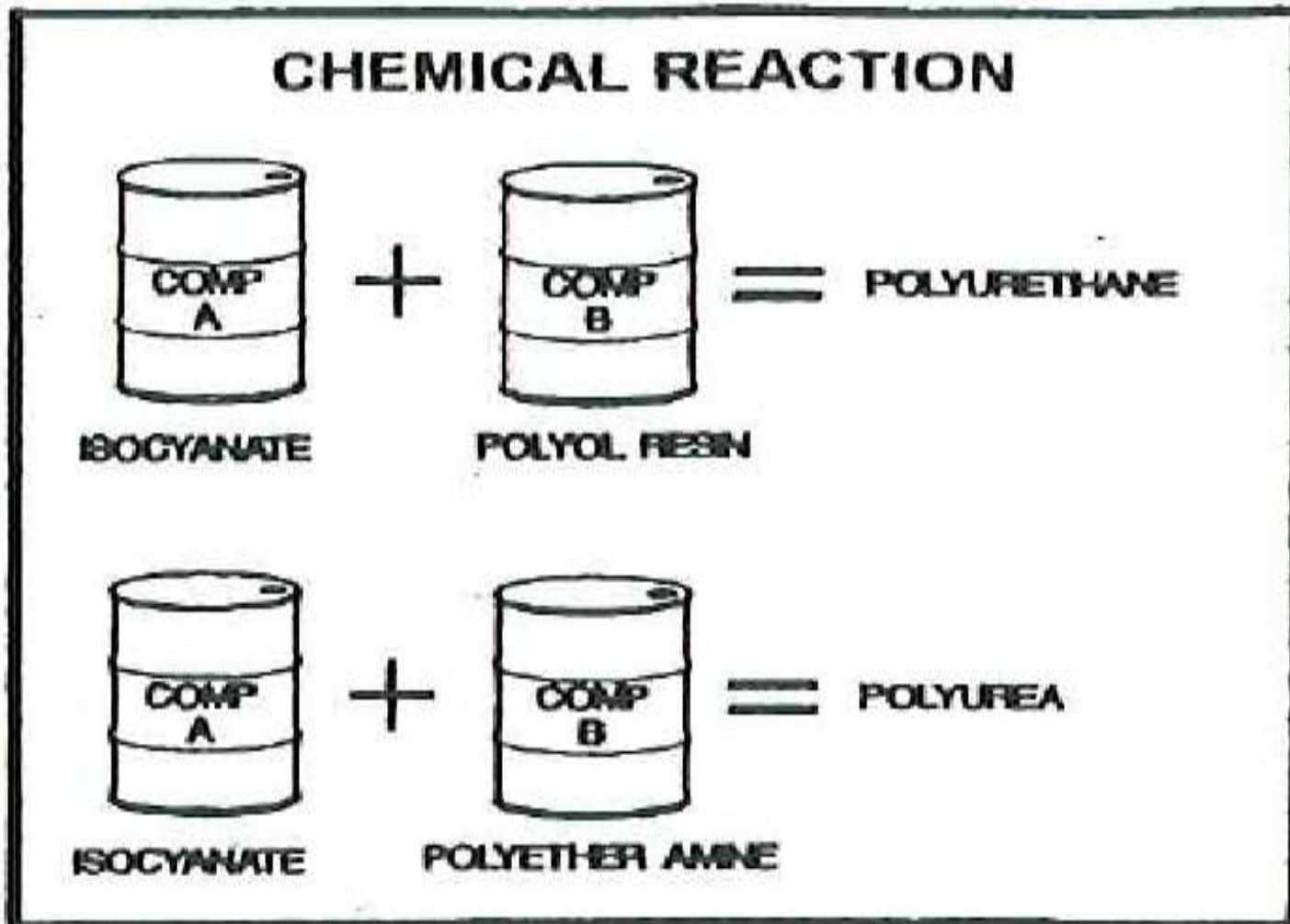
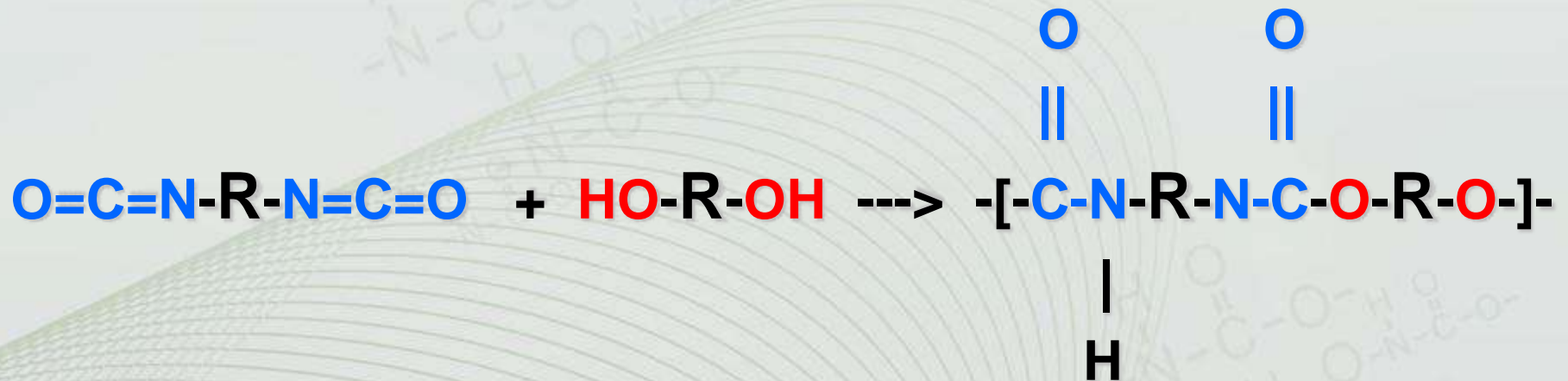


Illustration A

They are polymeric materials produced when a liquid Isocyanate reacts with a liquid polyol.

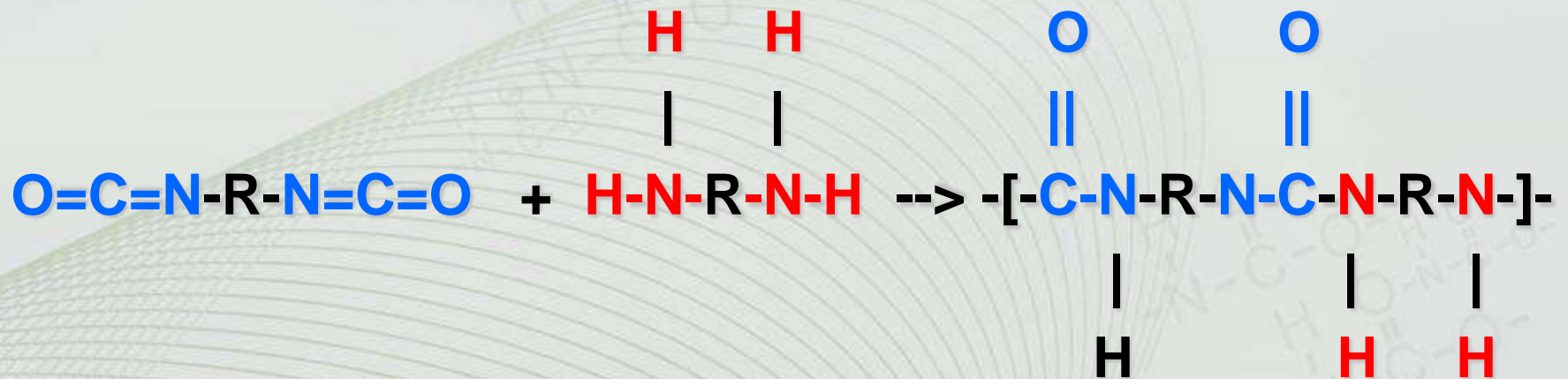


Diisocyanate

Polyol

Polyurethane

Polyureas are formed when an Isocyanate reacts with an amine in a rapid, exothermic reaction.



Diisocyanate

Amine

Polyurea

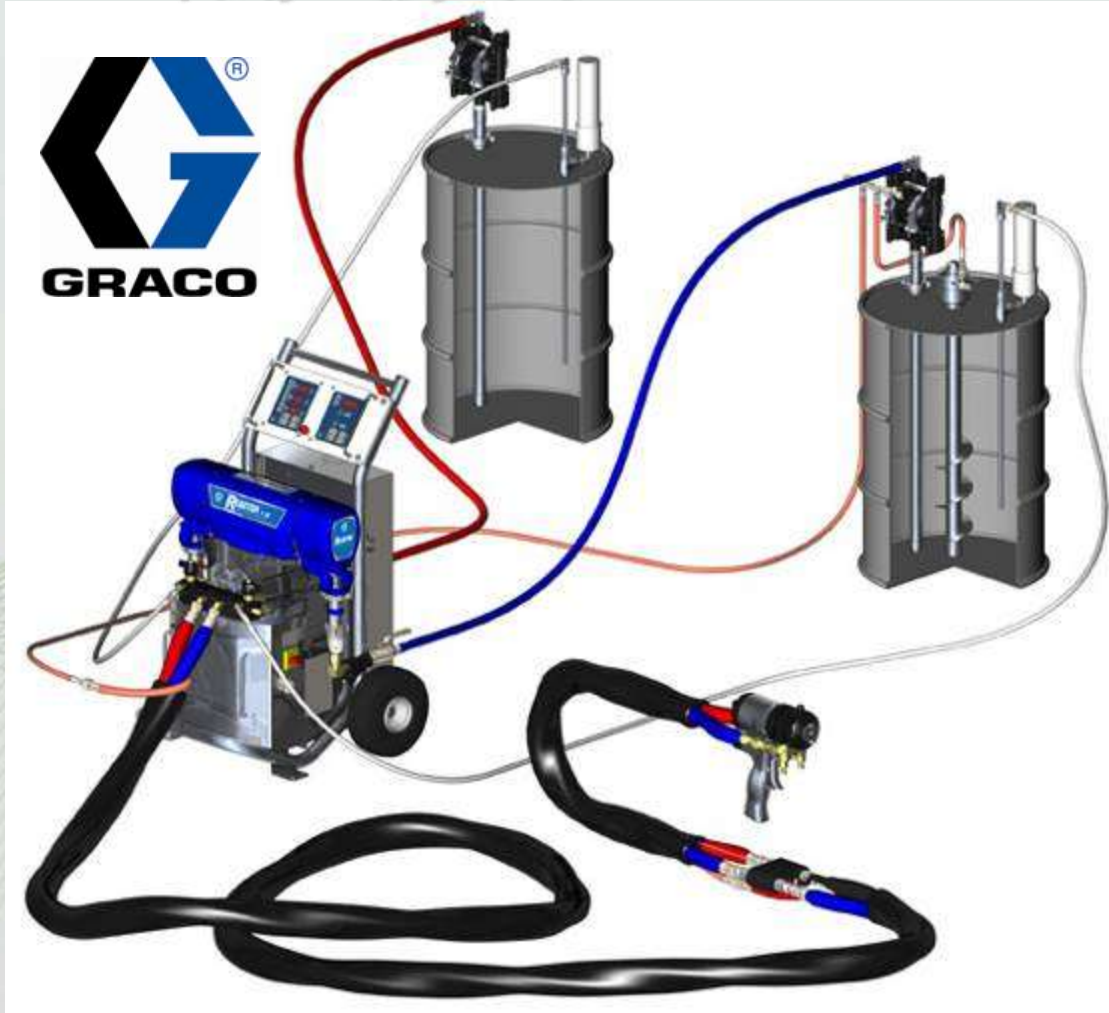
Below is a table illustrating some of the main differences between Polyurethanes and Polyureas.

	<u>Polyurethane</u>	<u>Polyurea</u>
Tensile Strength	++	++
Elongation	++	+
Impact Resistance	++	++
Abrasion Resistance	++	+
Chemical Resistance	++	+
High Temp Resistance	+	++
Humidity/Moisture Tolerant	-/+	++
Low Temp Application	+	++
Surface Smoothness	++	-
Adhesion to primers	+	-
Ability for topcoat adhesion	+	-
Price	+	-
UV resistance/Weatherability	-	--

++ Outstanding + Good - Fair -- Poor



To spray Polyurethane Elastomers you need the following



- Plural Component Proportioner
- Heated Hoses
- Heated Whip Hoses
- Fusion Spray Gun
- Supply Pumps
- Agitators

Below are the specifications of the Graco H-XP3 pictured

Max Pressure	3500psi
Max Hose Length	125m
Output	10 L/min
Heater Wattage	20,400 Watts
Weight	271 kg





GX-7



Fusion Gun

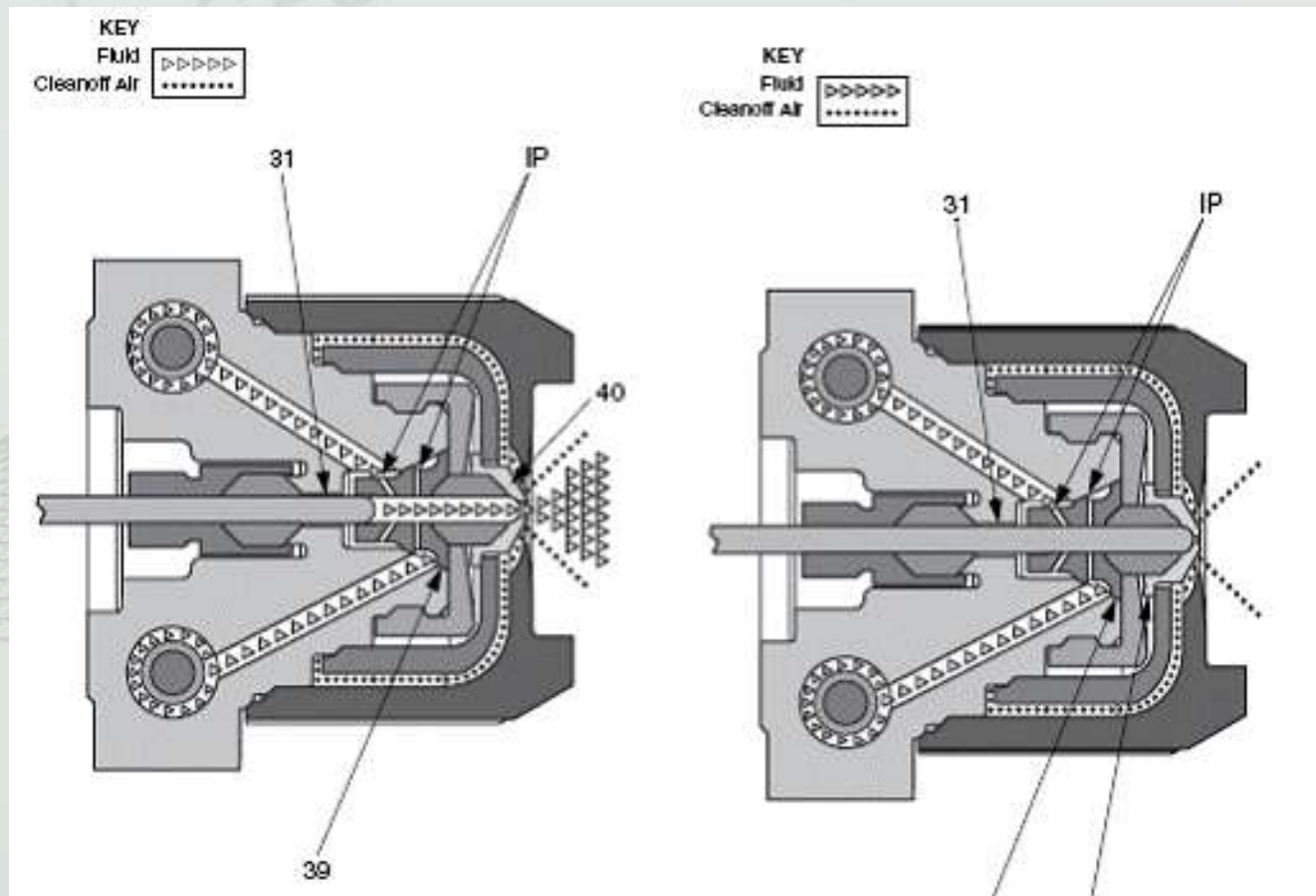


D-Gun



GAP Pro





SPRAYABLE PRODUCTS

Product	Hardness	Chemical Backbone	Type	Parts	Mix Ratio (by Volume)	Gel Time	Abrasion Loss (mm ³)	Application
Eraspray ESM700	70 Shore A	MDI / PPG	Polyurethane	2	1 : 1	< 30 secs	180	Soft flexible liner
Eraspray ESM800	80 Shore A	MDI / PPG	Polyurethane	2	1 : 1	< 30 sec	170	Soft flexible liner
Eraspray ESM900	90 Shore A	MDI / PPG	Polyurethane	2	1 : 1	< 30 sec	120	Flexible liner / good abrasion
Eraspray ES900PW	90 Shore A	MDI / PPG	Polyurethane	2	1 : 1	< 30 sec	120	Potable water grade
Eraspray ESP850	85 Shore A	MDI / PTMEG	Polyurethane	2	1 : 1	< 30 secs	70 -100	Flexible high performance
Eraspray ESP950	95 Shore A	MDI / PTMEG	Polyurethane	2	1 : 1	< 30 secs	90 - 100	High performance liner
Eraspray ESP600D	60 Shore D	MDI/ PTMEG	Polyurethane	2	1 : 1	< 30 secs	100	High hardness structural
Eraspray ES81A-HB	80 Shore A	TDI / PTMEG	Polyurethane	3	100/60/1 (w)	60 mins	70	Long potlife / excellent abrasion resistant
Eraspray ES321	80 Shore A	TDI / PTMEG	Polyurethane	2	3 : 1	< 30 sec	65	Flexible / abrasion resistant liner
Eraspray ESU630D	63 Shore D	MDI / amine	Polyurea	2	1 : 1	< 20 sec	135	High wear / impact resistant
Eraspray ESU950	95 Shore A	MDI / amine	Polyurea	2	1 : 1	< 20 sec	145	High performance liner
Eraspray ESU500D FR	50 Shore D	MDI / amine	Polyurea	2	1 : 1	< 10 secs	240	Polyurea fire retardant
Eraspray AL550D	55 Shore D	Aliphatic - PTMEG	Polyurethane	2	1 : 1	< 30 sec	125	UV resistant / high abrasion resistant

LEGEND



Medium Performance MDI



High Performance MDI



High Performance TDI



Polyurea



Aliphatic Coating

Eraspray ESM Range

- These grades are suitable for applications where Abrasion resistance is not imperative. Waterproofing being the main industrial use.

– ESM700 70 Shore A

– ESM800 80 Shore A

– ESM900 90 Shore A

– ES900PW 90 Shore A (Potable Water Approval*)

*AS/NZS 4020:2005

Eraspray ESP Range

- These grades are used where Abrasion resistance is of utmost importance. Applications include industrial lining in the Mining Industry, Coal Wagons, Truck Beds, etc
 - ESP850 85 Shore A
 - ESP950 95 Shore A
 - ESP600D 60 Shore D

ESU Range

- Polyureas are used in similar applications to high performance Polyurethanes. They have faster gel times so tend to have better adhesion to substrates when moisture is present.

– ESU950	95 Shore A
– ESU630D	60 Shore D
– ESU500D FR	50 Shore D

- These grades are suitable for specific applications
 - AL550D 55 Shore D
 - Aliphatic, UV Stable, High Performance
 - ES321 88 Shore A
 - Premium abrasion resistance product for mining applications
 - ES81A HB 75 Shore A
 - Solvent based slow set grade, applied through airless spray equipment.

- Futura 5041
 - Manufactured in Australia under license
 - 100% Solids Polyurea with high tolerance for damp, cold substrates.
 - Features excellent resistance to Hydrogen Sulphide for waste water and sewer applications.

5041 IMMERSION DATA

<i>Chemical</i>	<i>3 day % weight gain</i>	<i>30 day % weight gain</i>	<i>60 day % weight gain</i>
Methanol	56%	55%	35% *
Gasoline	47%	53%	37% *
Diesel Fuel	5%	12.5%	16.5%
Toluene	88%	96%	51%*
MTBE	47%	51%	36% *
5% MTBE in Gasoline	38%	41%	32% *
Motor Oil	NO CHANGE	NO CHANGE	3%
Hydraulic Fluid	NO CHANGE	NO CHANGE	3%
2-Methylbutane	10.7%	15.6%	7.3% *
Water	NO CHANGE	NO CHANGE	2.1
10% Salt Water	NO CHANGE	NO CHANGE	<1%
10% Sugar Water	NO CHANGE	NO CHANGE	<1%
5% Sulfuric Acid	NO CHANGE	NO CHANGE	<1%
10% Sulfuric Acid	NO CHANGE	NO CHANGE	<1%
5% Hydrochloric Acid	NO CHANGE	NO CHANGE	<1%
10% Hydrochloric Acid	NO CHANGE	NO CHANGE	<1%
10% Phosphoric Acid	NO CHANGE	NO CHANGE	<1%
10% Acetic Acid	NO CHANGE	8%	13%
10% Ammonium Hydroxide	NO CHANGE	13%	12%
20% Ammonium Hydroxide	NO CHANGE	13%	14%
10% Sodium Hydroxide	NO CHANGE	NO CHANGE	<1%
50% Sodium Hydroxide	NO CHANGE	NO CHANGE	<1%
10% Potassium Hydroxide	NO CHANGE	NO CHANGE	<1%
20% Potassium Hydroxide	NO CHANGE	NO CHANGE	<1%

The break point for immersion is a 4% weight gain. Anything under a 4% weight gain should be suitable for immersion. Values over 4% are unsuitable for immersion. NO CHANGE = no change from the control.

- Chemical resistance applies to dilute chemicals only.
- This chemical resistance applies at low temperature only. Dilute chemicals at high temperature still need to be avoided.
- For resistance to strong chemicals and higher temperature, consider more robust but more rigid coating systems like:
 - Phenolic (Novolak) Epoxy Products
 - Vinyl Ester Systems

You cannot spray onto any substrate

Some substrates to avoid:

- Silicone
- Polyethylene
- Polypropylene
- Phenolic Foam
- Waxed Polyester
- EPDM
- Teflon

- **Epoxy coatings are one of the main alternative used in opposition to Polyurethane coatings.**
- **Some advantages of Polyurethanes over Epoxies are:**
 - **Polyurethanes can be designed to be elastomeric or rigid, while epoxies are normally rigid or even brittle;**
 - **Polyurethanes could be cured within a hour at as low temperature as - 40°C, while epoxies cure slowly (weeks) or do not cure at all at such cold temperatures;**
 - **Polyurethanes generally have the best abrasion resistance among all industrial coatings systems;**
 - **Aliphatic Polyurethanes are well known for their excellent UV resistance and color stability, while epoxies and aromatic polyurethanes are normally not being used for exterior applications;**

There are many different properties that are important when talking about spray materials

- Abrasion Resistance
- Bond Strength
- Density
- Elongation
- Flexural Modulus
- Tear Strength
- Tensile Modulus
- Tensile Strength
- Thermal Coefficient of Expansion
- Water Absorption
- Water Vapour Transmission
- Flexural Strength
- Hardness
- Heat Distortion Resistance
- Izod Impact Resistance
- Shrinkage

- Surface preparation is CRITICAL in obtaining good adhesion to any substrate. Poor surface preparation = poor coating performance.
- The surface preparation will generally include
 - Abrasive blasting to achieve mechanical bond
 - Solvent washing to remove any contamination
 - Application of suitable primer
 - Application of coating

Adhesion is also a very important factor when bonding spray coatings to properly prepared substrates.

Please see separate handout for specific information

Which Primer to use

- Always contact your Era Technical Rep for advice.
- For 90% of applications there are a few common primers.
- Remaining 10% require special primers which are indent ordered.

Common Primers - CONCRETE

- **Futura Bond 415**
 - 2 component water reducible epoxy primer
 - Recommended for Concrete, Masonry, metal and wood substrates

- **Erabond Concrete**
 - Fast Dry (2 hours), solvent based single component polyurethane
 - Dries to hard film to resist outgassing from concrete
 - Can be mixed with sand to make filler for filling small holes and defects in the concrete slab

Common Primers - METAL

- **Futura-Bond 610**
 - Fast Dry, high solids primer
 - Recommended for Steel, Iron and Galvanized metal substrates
 - Contains Anti Corrosive additives

Primary & Secondary Containment

* Tank lining: oil factory, chemical factory, electric factory, etc.

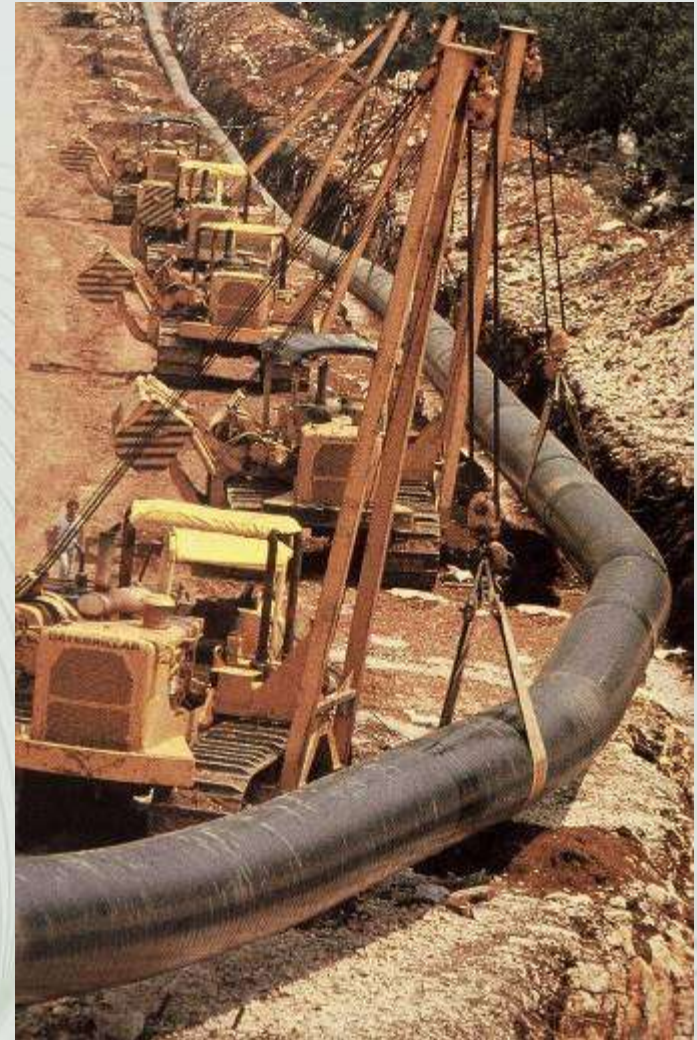


Corrosion resistant

* Pipe/pipeline lining: petroleum pipe, chemical pipes, water pipe, natural gas pipe, city heat addition,



Ductile Iron Pipe



Water & Waste Water Tanks







Case Study - Sewerage Industry

Digester Tank Insulation - Eraspray ESM900 & Futurabond 415 Primer

SA United Water Bolivar Digester Tanks

Era Polymers assisted in the refurbishment of this 40 year old digester tank. The refurbishment included repairs to the internal metal work, pumps etc as well as replacing the insulated roof. The digesters are maintained at 35°C for efficient anaerobic processing of sewage; to maintain this constant temperature sufficient insulation is required, Era Polymers products were specified.

PROCESS:

1. Steel Surface Shot Blast to remove any contaminants
2. *Futura-Bond 415* metal primer was applied
3. Followed by a 50mm layer of *Stepanfoam RS3011* 48kg/m³ sprayfoam to provide insulation
4. Finally a 5mm coating of *Eraspray ESM900* elastomeric spray coating was applied to protect the insulation layer.



Priming with Futura-Bond 415



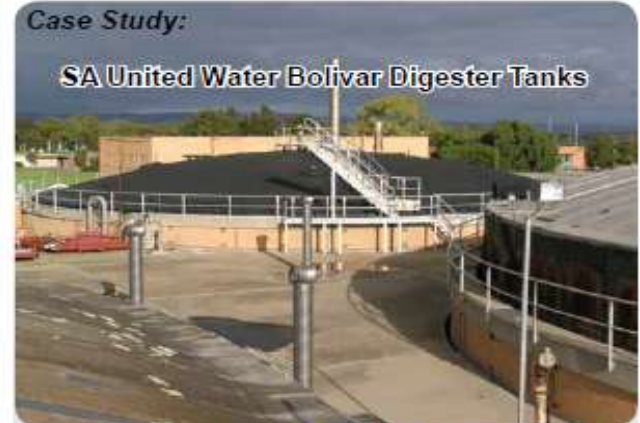
The refurbished digester is now set for another 20 years plus of operation!

For more information on Protective Linings please contact Era Polymers Sales Representative on (02)9666 3788.

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25-27 Green St, Banksmeadow, NSW 2010, AUSTRALIA
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Case Study:

SA United Water Bolivar Digester Tanks



Purpose: UV & Wear Protection of Insulation Foam

Size: 750m²

Materials: Futura 415 Primer, Stepanfoam RS3011, Eraspray ESM900

Equipment: HXP-3, Fusion Gun

Workers: 4

Dates: Start: November 2009
Completion: November 2009

Case Study - Secondary Containment

Secondary Containment - Erabond CM Primer & Eraspray ESU950

Quenos Polyolefin Tank Farm

Era Polymers were closely involved in the specifying and then application of the ESU950 Polyurea around chemical tanks at Quenos in Sydney. After months of accelerated immersion testing the ESU950 was specified and then applied by a Spray Application expert. The Polyolefines are used in the production of ethylene, low-density polyethylene (LDPE), linear low-density polyethylene (LLDPE) and high-density polyethylene (HDPE). The surrounds of the tanks were previously coated with Rigid Epoxy Paints that could not withstand any substrate movement and had subsequently cracked and were ineffectual. The Polyurea has proved successful and no cracks have been seen. There is currently another project underway at the same Tank Farm for secondary containment lining under dilute acid tanks.

PROCESS:

1. Abrasive Sander/Grinder was used to prepare surface and remove any contaminants.
2. *Erabond CM Primer* a two component solvented anti-corrosive primer was applied to the metal surface.
3. Followed by a 3-5mm layer of *Eraspray ESM900* a two component, spray-in-place, solvent free, 100% solids polyurea elastomer system.



Purpose: Secondary Containment
 Size: 2600m²
 Materials: Erabond CM Primer, Eraspray ESU950
 Equipment: H20/35, GX7 Gun
 Workers: 4
 Dates: Start: 28th October 2008
 Completion: 6th November 2008

For more information on Protective Linings please contact Era Polymers Sales Representative on (02)9666 3788.

Case Study - Sewerage Industry

Protective Linings - *Eraspray ESP950* & *Futurabond 415*

Eraspray ESP950 is an Australian made polyurethane/polyurea hybrid lining which has been manufactured and supplied by Era Polymers for many applications for over 20 years. The product's chemical backbone makes it an ideal protective lining, suitable for conditions ranging from complete outdoor exposure through to immersion in salt water. The product was applied by PTI who are one of the leading processors of high performance polyurethanes in Australia.



▲ Concrete Collar and Spray Equipment ▲



▲ Priming - *Futurabond 415*



▲ Spraying - *Eraspray ESP950*



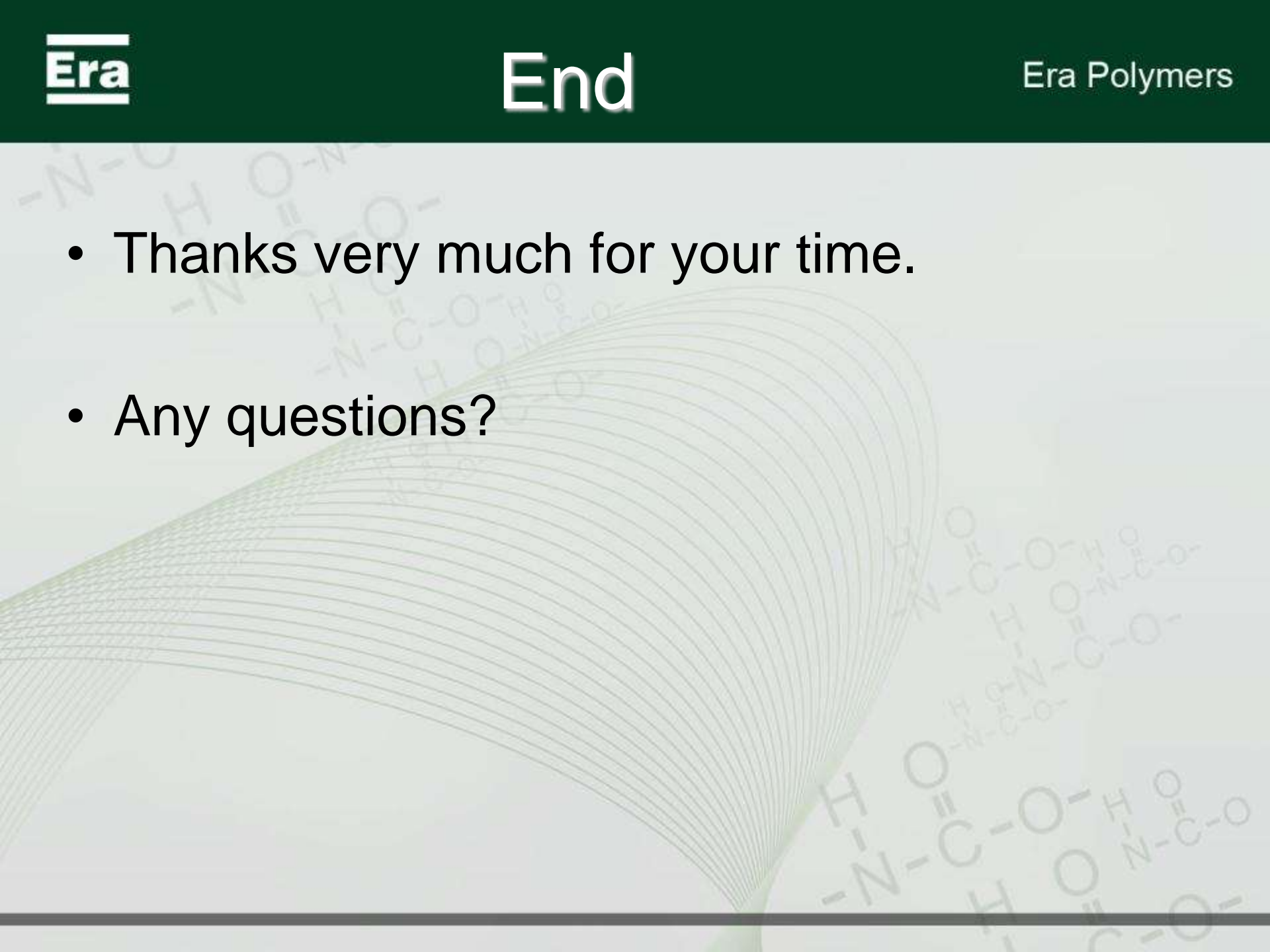
▲ Spraying Complete Collar ready for Installation

PROCESS:

- Concrete was grit blasted to remove contaminants and provide a rough surface
- *Futurabond 415* concrete primer was applied with a roller and allowed to dry
- *Eraspray ESP950* was sprayed onto the surface at an approximate 4mm thickness
- Collar was put into its final position later that same day

PRODUCTS: *Eraspray ESP950* & *Futurabond 415*
SUPPLIER: Era Polymers Pty Ltd
CONTRACTOR: Polymer Technologies International (PTI)
CLIENT: EcoCivil and Hunter Water Corporation

For more information on Protective Linings please contact Era Polymers Sales Representative on (02)9666 3788.

- Thanks very much for your time.
 - Any questions?
- 
- The background features a light green wavy pattern that resembles a polymer chain or a stylized wave. Overlaid on this are faint, semi-transparent chemical structures, including repeating units of a polyamide or polyimide, such as
- $-N-C(=O)-O-$
- and
- $-N-C(=O)-O-C(=O)-N-$
- .