A Paper presentation on Pure Polyurea vs. Hybrid polyurea / Polyurethanes & Epoxies

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By:

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Milestones

1983

VIP Founda

Germany

Trading company for

Adhesives for the automotive aftermarket

1990 – 1999

Expansion into industrial applications of innovative adhesive technologies

2000

Specialization and in-house R&D of 2K adhesives, sealants & coatings

MADE IN GERMANY PRODUCT

2004

Polyurea Coating Sytems

Market Launch Intl. Expansion

2009

VIP Middle East LLC local Manufacturing of Polyurea Systems in Dubai

2010

VIP India

Sales team, distribution & Applicator network

2011

VIP SE Asia

Sales team, distribution & Applicator network

What is POLYUREA?

- A high reactive performance coating
- 2 liquid components (Part A + B)
- Mixing Ratio 1:1 (volume)
- Part A - Isocyanate Pre-Polymer
- Part B - Amine terminated resin blend
- Rapid cure from liquid to plastic coating
- Flexible
- Waterproof
- Has outstanding properties
- Designed to protect various surfaces

POLYUREA beats traditional coatings…

What is POLYUREA?

- **Definition of Polyurea by the Polyurea Development Association (PDA), 2000**

A pure polyurea coating/ elastomer is derived from the reaction product of an isocyanate component and a resin blend component such as amine-terminated polymer resins, and/or amine-terminated chain extenders. The isocyanate can be aromatic or aliphatic in nature. It can be a monomer, a polymer, or any variant reaction of isocyanates, a quasi-prepolymer or a prepolymer. The prepolymer, or a quasi-pre polymer, can be made of an amine-terminated polymer resin.

What is POLYUREA?

- **Definition of Polyurea by the Polyurea Development Association (PDA), 2000**

The resin blend must be made up of amine-terminated polymer resins, and/or amine terminated chain extenders. The amine-terminated polymer resins will not have any intentional hydroxyl groups. Any hydroxyls are the result of incomplete conversion to the amine-terminated polymer resins. The resin blend may also contain additives or nonprimary components. These additives may contain hydroxyls, such as pre-dispersed pigments in a polyol carrier. Normally, the resin blend will not contain a catalyst.

Polyurea components

Polyurea is an elastomer made from two reactive components

A-component

■ Isocyanate prepolymers (MDI based for aromatic systems,
HDI- or IPDI-based for aliphatic systems)

B-component

■ Amines (polyether amines)
■ Amine chain extenders
■ Additives (e.g. pigments, defoamers, flame retardants, etc.)

In case of pure polyurea B component is made up of amine-terminated polymer resins, and/or amine terminated chain extenders as more than 80% of the total content of component B.

Functions of components

Amine chain extenders

- **Faster film property development With high strength.**
- **Excellent UV and color stability of the film Easy to formulate with various amine systems.**
- **Slows down gel time allowing for better adhesion.**
- **Flow and leveling maintains better film stability at elevated temperatures.**

Functions of components

Polyetheramines

- **Used as curing agents.**
- **Films hardening agents.**
- **If very high hardness is desired the trifunctional Polyether amine is required for a stronger cross linking.**
- **Polytetra hydrofura amine leads to reduced moisture uptake and swelling as well as to improved abrasion resistance.**

Functions of components

Additives

- **Pigments for coloration**
- **Flame retardants**
- **Defoaming or deaerating agents**
- **Other processing auxiliaries**

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POLYUREA

Properties

Properties	Polyurethane	Epoxy	Pure Polyurea VIP QuickSpray
Working times	Fast	Slow	Extremly fast (5 seconds to 15 seconds)
Atmospheric Moisture sensitivity	Yes	Yes	No, moisture insensitve
Elongation	1000%	Tend to get brittle	Upto 1000% (Flexibile with high tensile strenght so does no crack)
Colour stability	Average, yellowing	Average, yellowing	Aromatics: average Aliphatics: 100% UV resistant and colour stable
Abrasion resistance	>15 mg , 500g/1000 cycles (ASTM D-4060)	< 6mg, 500g/1000 cycles (ASTM D-4060)	< 6mg, 500g/1000 cycles (ASTM D-4060)
Superior tensile strength	About 8-10 N/MM2	15-20 N/MM2	More than 20N/MM2
Chemical resistance	Good	Very Good	Excellent (Can resist upto 20% H_2SO_4 also)
VOC free	No	No	Yes (Ecofriendly)
Temperature resistance	From -30°C to +120°C	From -20°C to +110°C	From -50°C to +150°C
Seamless	No	No	Yes, unlimited mil thickness with one layer
Coverage	Different	Different	Average 1L = $1m^2$ = 1mm
Duratbility	Good	Average	Excellent
Solid Content	50-100%	50-100%	100%

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Pure POLYUREA vs. Hybrid

Properties	Hydrid polyurea	Pure Polyurea VIP QuickSpray
Working times	Fast	Adjustable (5 seconds to 8 mins)
Moisture sensitivity	Sensitive to atmospheric moisture	Atmospheric moisture insensitve
Film quality	May have pinholes	Free from pin holes
Abrasion resistance	Average	Very good < 6mg (C17,500gms/1000 cycles)
Superior tensile strength	Good	Excellent (23 N/mm sq)
Chemical resistance	Good	Very Good
Temperature resistance of flim	From -30°C to +120°C	From -50°C to +150°C
Temp resistance during application	From 5°C to +45°C	From -10°C to +70°C
Shel life Duration	6-9 months	12 months
Film life	Approx 4-5 years	Can go from 10 to 20 years easily
Solid Content	80-100%	100%

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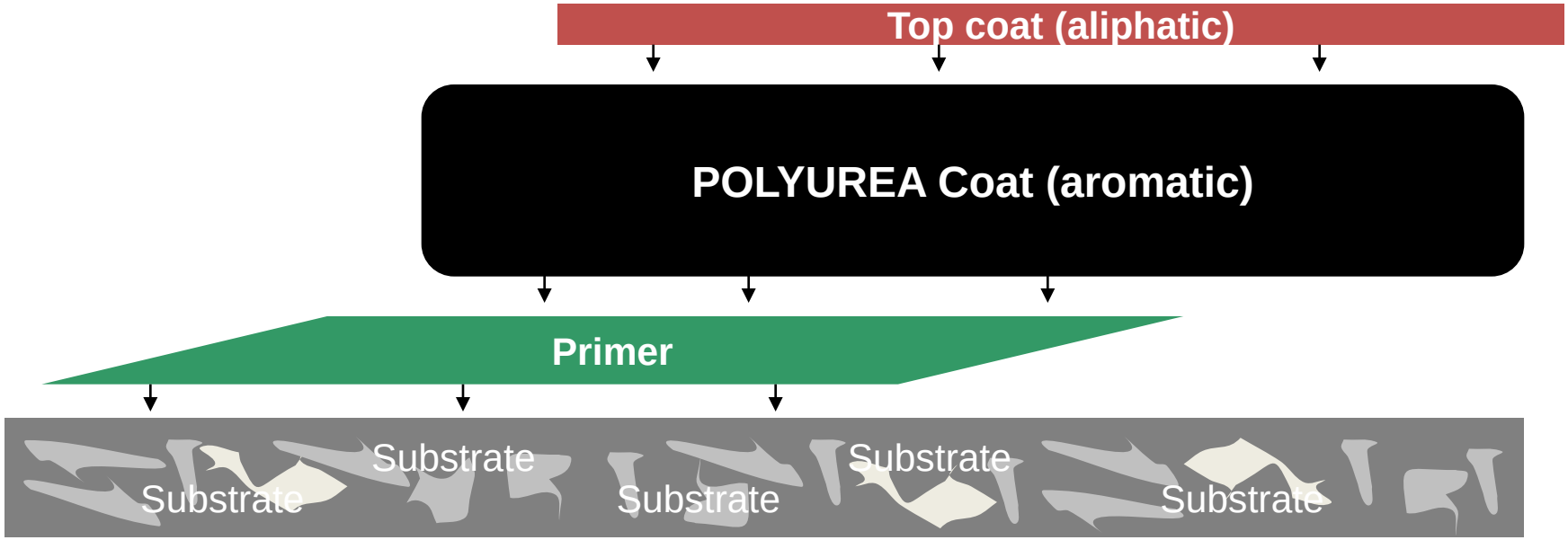
POLYUREA

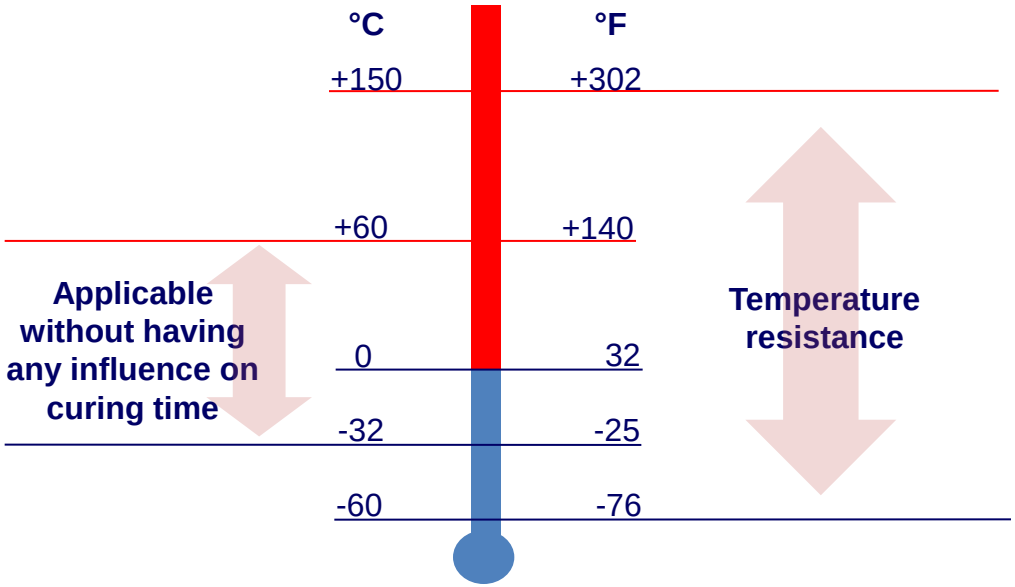
The System



Pure POLYUREA

Properties

Thermal resistance



Resits thermal shocks

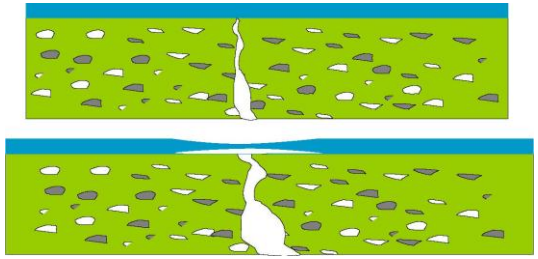
The coating is widely used over polyurethane foam for wall and roofing insulation systems in building, residential housing and temperature controlled containment tanks (wine, oil or chemicals).

Pure POLYUREA

Properties

Superior tensile & structural strength

- Excellent adhesion on steel, aluminium, GRP, plastics, concrete, wood, isolating foams
- High tensile strength (3000psi/ ≥ 20MPa) while still having excellent elongation



→ Deformation from moving substrate shifts will be reduced

→ Thick Polyurea adapts to sonic & vibratory attack for e.g. earthquakes

Polyureas will bridge hairline cracks in concrete it act as shock absorber as well because of high tensile strength along with flexibility & elongation.

Pure POLYUREA

Properties

Superfast reaction times

- Polyurea's fast reaction time (5-15 seconds) leaves polyurethane and epoxy materials in the proverbial dust.

→ Tremendous savings because of minimum downtime for facilities.

→ Especially important for traffic, manufacturing industry, energy and petrochemical market.

Pure POLYUREA

Properties

High abrasion resistance & flexibility

- High abrasion resistance (ASTM 4060-90)
- Superior elongation (upto 700%)
  soft, elastic and extremely flexible
- No cracking when exposed to constant pounding

→ Tremendous savings because of much longer maintenance intervalls. Epoxies crack and have to be repaired and re-coated. **Polyureas guarantee a lifetime of 10 years and more after proper application.**

Pure POLYUREA

Properties

Moisture insensitivity

- Pure Polyurea does not contain polyols or catalyst
- Pure Polyurea does not contain –OH groups
- The reaction of component A and component B (polyamines) is so fast that the moisture reaction cannot occur

→ Polyurea is unbeatable in climates or regions with high humidity and moisture

→ **No pinholes, less costs:** No further measures for deaeration and set-up of a closed-porositiy surface

→ NOTE: Surface preparation is always necessary!

Pure POLYUREA

Properties

High chemical resistance

- Polyurea is the choice of facility managers for storage of diluted acids, alkali, salt solution, organic solvents and oils
- Polyurea provides a strong barrier to spills from reaching the environment
- Ideal for petrochemistry, chemical processing facilities, (potable) water systems, reservoirs, sewage processing, manholes, holding tanks, secondary containment protection…

Pure POLYUREA

Properties

Environmentally-friendly

- No VOC´s (Volatile Organic Compounds)
- No solvents
- No fumes
- No styrenes

- 100% solids
- Less overspray
- Little to no odor
- certified for potable water

Water Regulations Advisory Scheme (UK)

United States Department of Agriculture (US)

⇒ Ideal for the food industries

⇒ corresponding to strikt styrene emission laws Europe-wide

Divisions & Markets

Coatings Systems

Water and Waste Water Industry
Power & Energy Markets
Petrochemical Industry
Roofing & Waterproofing
Industrial Flooring & Carparks
Airports & Heildecks
Ship building Industry
Infrasctructure, Tunnels & Bridges
Automotive, Trucks & Transport
Leasure & Theme Parks
Swimming Pools & Ponds
Furniture and foam Industry

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Thanks for your kind attention!!!