

**POLYUREA  
COATINGS**



# ***Specifications and Polyurea Elastomeric Coating / Lining Systems***



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# *Specification: Coating / Lining*

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- Instructional document on how to proceed with a coating / lining installation
- Typically prepared by an architect or engineer specializing in that type work
- Often prepared by the polyurea coating / lining system supplier
- Basically a cookbook / recipe for successful polyurea coating / lining installation!

# *Specification Purposes*

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- A specific / desired polyurea coating / lining project
- Assures quality / proper polyurea materials and workmanship
- Assure timely completion of work; avoid delays / disputes
- Insure minimal or reasonable costs for the work
- Inhibit costly change orders or claims
- Assures for all safety, environmental and legal requirements
- To assure that the polyurea coating / lining system is applied to the correct areas of the project

# *Parts of a Specification*

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- Part 1 - **General**
- Part 2 - **Products**
- Part 3 - **Execution**

# ***Specification: General Section***

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- **Scope of work**
  - what is it that you are going to be doing
- **References and Standards**
  - ASTM, NACE, SSPC, ICRI
- **Definitions**
  - Polyurea - PDA, other terms
- **Submittals**
  - test samples, mock-ups

# *Specification: General Section*

Well planned  
mock-up area  
Off-site



# ***Specification: General Section***

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- **Quality Assurance**

- monitor material, method of application
- applies to both material production / supply as well as applicators / contractors



# ***Specification: General Section***

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- **Delivery, Storage and Handling of Materials**
  - drums, “outside”, weather, material agitation
- **Project Conditions / Scheduling**
  - safety issues, fall protection, confined space, other trades / work in the area

# *Specification: General Section*

Overlap of trade  
work in area



# *Specification: General Section*

Area / location  
of work



# ***Specification: Products***

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- **May include actual named products**
  - sometimes list “or equal”
- **May give a generic class**
  - use caution here
- **Will also note other accessory products**
  - primers, bughole fillers, soluble salt removal, topcoating systems, aggregates, geotextile fabric

# ***Specification: Products***

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- Not all **Polyurea's** are the same!
  - Light stable, high flexibility, high modulus, thin film applied, ANSI/NSF-61 certified, high chemical resistance, etc.

# Specification: Products

<i>PHYSICAL PROPERTIES</i>	<i>TEST METHOD</i>	<i>VALUE</i>
Tensile Strength (psi)	D-638	5180
Elongation (%)	D-638	240
Tear Strength (pli)	D-624	1395
Shore Hardness ("D" scale)	D-2240	62
Moisture Vapor Transmission	E-96	(perm. In.) 0.019
Abrasion Resistance (wt. Loss-mg.)		
H-18, 1000g, 1000 rev.	D-6040	58
CS-17, 1000g, 1000 rev.	D-6040	< 3
Flash Point, components (°F)		>200
Coefficient of Thermal Expansion (in/in/°C)		approx. $4 \times 10^{-5}$
Gel Time / Tack Free		6 sec. / 30 sec.
Flame Spread	E-108	Class A (Comparable to UL 790)
Flexibility Test		
Gardner impact, in.-lbs. (on 1/32" steel panels) Direct and Indirect	D-2794	>160
Mandrel Bend:		
Conical Bend (on 1/32" steel) 1/4" Mandrel, 25°C (free film, 35-50 mils)	D-522	pass
1/4" Mandrel, -20°C (free film, 35-50 mils)	D-1737	pass
1/4" Mandrel, -20°C (free film, 35-50 mils)	D-1737	pass

<i>PHYSICAL PROPERTIES</i>	<i>TEST METHOD</i>	<i>VALUE</i>
Elongation	D-638	425%
Tensile Strength	D-638	3,000 psi
Shore Hardness	D-2240	D-51
Tear Strength (pli)	D-624	495 pli
Moisture Vapor Transmission	E-96	0.02 perm
Abrasion Resistance (wt. loss mg.)		
1000 g., 1000 rev. H-18	D-4060	230 mg.
1000 g., 1000 rev. CS 17	D-4060	6 mg.
100% Modulus (psi)	D-638	1,280 psi
300% Modulus (psi)	D-638	2,100 psi
Coefficient of Thermal Expansion	C-531	$4 \times 10^{-5}$ (in/in/°C)
Flame Spread	E-108	Class A (Comparable to UL 790)
Tunnel Test	E-84	Class I
Gel Time / Tack Free		15 / 45 seconds
Flexibility Testing:		
Gardner Impact, in.-lbs. (on 1/32" steel panels) Direct and Indirect	D-2794	>160 in.-lbs.
Flexibility / Crack Bridging @ -26°C (-15°F)	C-836	>1/8", Pass
Mandrel Bend:		
Conical Bend (on 1/32" steel panels) 1/4" Mandrel, 25°C (free film, 35 - 50 mils)	D-522	Pass
1/4" Mandrel, -20°C (free film, 35 - 50 mils)	D-1737	Pass
1/4" Mandrel, -20°C (free film, 35 - 50 mils)	D-1737	Pass

# *Specified Properties v Tested*

<u>Physical Property Value</u>	<u>Specified / Reported</u>
Tensile strength, psi	3288
Elongation, %	752
Tear Strength, pli	494
Shore D Hardness	50

\* from a DOE gondola car lining project, nuclear waste



# *Specified Properties v Tested*

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<u>Physical Property Value</u>	<u>Specified / Reported</u>	<u>Field Tested</u>
Tensile strength, psi	3288	1625
Elongation, %	752	295
Tear Strength, pli	494	215
Shore D Hardness	50	37

\* from a DOE gondola car lining project, nuclear waste

# *Specification: Products*

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Incompatible primer  
system



# *Specification: Products*

Treatment not  
completely  
removed



# ***Specification: Execution***

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- **Surface preparation**
  - concrete, steel, wood, plastic, etc
- **Application of polyurea system**
  - how applied, specified film thickness, texture, aggregate, topcoating
- **Field Quality Control**
  - film thickness, holiday testing, adhesion testing

# *Specification: Execution*

Power-washing v  
abrasive blasting



# *Specification: Execution*

Surface prep involved  
sweeping!



# *Specification: Execution*

Pinholes & bugholes



# ***Specification: Execution***

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- **Application of polyurea system**
  - how applied, specified film thickness, texture, aggregate

# ***Specification: Execution***

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- **Field Quality Control**
  - film thickness, holiday testing, adhesion testing

# ***Specified, Bid & Applied Thickness***

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**Polyurea, mils**

**Specified**

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Base Coat

80

Top Coat

15 - 20

# ***Specified, Bid & Applied Thickness***

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<b>Polyurea, mils</b>	<b>Specified</b>	<b>Bid</b>
Base Coat	80	50
Top Coat	15 - 20	4 - 10

# ***Specified, Bid & Applied Thickness***

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<u>Polyurea, mils</u>	<u>Specified</u>	<u>Bid</u>	<u>Applied</u>
Base Coat	80	50	<b>80 - 140*</b>
Top Coat	15 - 20	4 - 10	<b>5 - 20</b>

**\* some areas actually > 250 mils!**

film thickness measured using a POSITECTOR 100 Ultrasonic gauge, ASTM D 6132

# *Specification: Execution*

Holiday testing

- at the wrong time



# *Specification: Execution*

Result:



# *Specification: Execution*

- **Field Quality Control**
  - adhesion testing
- **Insure adhesion testing is applicable to the environment!**



# Conclusion

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- Specification is *your* roadmap / recipe for a successful coating / lining project
- Incomplete / poorly written will result in confusion, miss-application, problems, delays
- Not following will result in failures!
- Keep the integrity of this technology!