HUNTSMAN

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Advanced Materials

Aradur® 2978-1 Hardener

Modified Cycloaliphatic Polyamine

General

Aradur® 2978-1 Hardener is a low viscosity, non-blushing epoxy curing agent with excellent handling and surface appearance properties. Aradur 2978-1 Hardener can be formulated with modified or unmodified bisphenol A and bisphenol F based liquid epoxy resins.

Key properties

- **Low viscosity**
- **Low color**
- **High gloss films with good humidity resistance**
- **Optimal combination of long pot life and fast cure time**
- **Outstanding non-yellowing properties and good gloss retention**
- **Rapid development of water spotting resistance**

Description

Aradur® 2978-1 Hardener is designed for two-component, ambient curing coating and flooring systems that require good aesthetic properties, good blush and early water spotting resistance. Its unique combination of long pot life and fast cure offers a distinct advantage over typical curing agents based on cycloaliphatic polyamines, such as isophorone diamine. The overall improvement of performance properties gained by use of Aradur® 2978-1 Hardener makes it an ideal curing agent for many applications.

Applications

Solvent-free and high solids coatings for general purpose and decorative coatings, and self-leveling and broadcast floorings.

Product data*

	Aradur® 2978-1 Hardener
Visual Appearance	Clear, no contamination
Color, APHA, max.	100
H^+ Active Equivalent Weight (g/eq.)	115
Use Level with Araldite GY 6010 (phr)	60
Amine Value (mg KOH/g)	255 - 295
Viscosity at 25°C (cP)	125 - 425
Density at 25°C (g/cm^3, lb/gal)	1.02, 8.5
Flash Point, Closed Cup (°C)	> 93

* Product data are based on Huntsman's test methods. Copies are available upon request.

Formulations

Clear Coating Starting Formulation (Parts by Weight)

Formulation No.	**1**
Araldite® GY 6010 Epoxy Resin[1]	100
Aradur® 2978-1 Hardener	60
Mixed Viscosity[2], 25°C (cP)	1570
Gel time[3], 100 g, 23°C (min)	69
Curing Properties[4] @ 23°C / 50% Relative Humidity	
Tack-free time (hr)	5.25
Cure-through time (hr)	7.5
Film Appearance	Glossy
Gloss (20° / 60°)[6] (%)	105 / 108
@ 5°C / 50% Relative Humidity	
Tack-free time (hr)	15.5
Cure-through time (hr)	>24
Film Appearance	Glossy, slight haze
Gloss (20° / 60°)[6] (%)	99 / 103
@ 33°C / 80% Relative Humidity	
Tack-free time (hr)	2.5
Cure-through time (hr)	4
Film Appearance	Glossy, slight haze
Gloss (20° / 60°)[6] (%)	99 / 103

[1] Standard bisphenol-A liquid epoxy resin (epoxy equivalent weight: 182 - 192)

[2] ASTM D4440 (ICI Cone & Plate)

[3] Tested by Gardco® Standard gelation timer, Model GT-S

[4] Tested by Gardner® Circular Drying Time Recorder on a 10 mil wet coating

[5] ASTM D523

Typical Cured Properties

Unless otherwise stated, the data were determined with typical production batches using standard testing methods. They are provided solely as technical information and do not constitute a product specification.

Formulation No.	**1**
Araldite® GY 6010 Epoxy Resin	100
Aradur® 2978-1 Hardener	60
Coating Properties 10-mil, 7 days @ 23°C / 50% Relative Humidity	
Pencil Hardness[6]	2H
Persoz Hardness[7] (s)	280
X-Cut Adhesion[8]	5A
Impact Resistance[9] (Direct/Rev.) (in-lb)	30 / 16
Mandrel Bend[10]	Fail 1/8"
Glass Transition Temp.[11], T_g, (°C)	50
Shore D Hardness[12], 1/8" thickness	
1 day	84
3 days	85
7 days	85
Time to Water Spot Resistance[13] (hr)	8.5
Taber Abrasion[14] (mg)	45.6
Pull-Off Adhesion[15], 5-mil wet film (psi)	
Sandblasted Concrete (failure mode)	> 450 (concrete)
Sandblasted Steel (failure mode)	> 800 (glue)

[6] ASTM D3363

[7] ANSI/ISO 1522

[8] ASTM D3359

[9] ASTM D2794

[10] ASTM D522

[11] Determined by Differential Scanning Calorimetry (DSC)

[12] ASTM D2240

[13] Place a droplet of deionized water on coating periodically beginning at the tack-free time and continually throughout the cure cycle. Record the time at which no visible defect is seen on the coating film after evaporation of the droplet.

[14] ASTM C1353

[15] ASTM D4541

Mechanical Properties 7 days @ 23°C / 50% Relative Humidity

Formulation No.	1
Flexural Strength[16] (kpsi)	13.1
Flexural Modulus, (kpsi)	475.2
Compressive Strength[17] (kpsi)	10.3
Compressive Modulus (kpsi)	657.7
Max. Compression Load (lb)	2254
Tensile Strength[18] (kpsi)	7.5
Tensile Modulus (kpsi)	407.5
Tensile Elongation (%)	2.9
Heat Deflect. Temp.[19], 66 psi (°C)	45.4
Heat Deflect. Temp., 264 psi (°C)	43.8

[16] ASTM D790

[17] ASTM D695

[18] ASTM D638

[19] ASTM D648

Yellowing Resistance (ASTM E-313)

Cure: Araldite® GY 6010 epoxy resin; 7 days at 23°C / 50% Relative Humidity

Coating: 3-mil film on Laneta contrast panels

Exposure Conditions: QUV-A (340 nm) bulbs, 50°C

Formulation 1

QUV Exposure Time	Initial	3 days	7 days
- Yellow Index	-4.6	4.0	17.0
- Gloss (20°/60°), %	97 / 102	96 / 99	94 / 97

Isophorone Diamine-based Curing Agent

QUV Exposure Time	Initial	3 days	7 days
- Yellow Index	-4.6	10.8	32.3
- Gloss (20°/60°), %	89 / 93	Matte	42 / 43

Chemical Resistance, Immersion (ASTM D-543)

Specimen Dimensions: 1" x 3" x 1/8"

Cure: 7 days @ 25°C / 50% Relative Humidity

Evaluated by weight change (%) / Shore D hardness

Formulation No. 1

Exposure Time	3 days	7 days	28 days
Unexposed control (blank)	- / 84	- / 85	- / 86
Acetic Acid, 10%	2.2 / 80	3.2 / 79	5.5 / 75
Hydrochloric Acid, 10%	1.0 / 83	1.6 / 84	3.0 / 84
Sulfuric Acid, 55%	1.4 / 84	2.0 / 84	3.5 / 84
Nitric Acid, 10%	1.0 / 82	1.5 / 83	3.0 / 84
Sodium Hydroxide, 10%	0.3 / 84	0.4 / 84	0.7 / 85
Ammonia, 25%	0.8 / 82	1.2 / 80	2.2 / 79
Household Bleach, 100%	0.3 / 84	0.4 / 84	0.7 / 84
Ethanol, 50%	1.2 / 79	1.8 / 77	3.3 / 75
Tap Water	0.4 / 84	0.5 / 85	1.0 / 85
Mineral Spirits	0.1 / 84	0.1 / 85	0.1 / 85

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Storage

Aradur® 2978-1 Hardener should be stored in a dry place and in the sealed original container, at temperatures between 2°C and 40°C (36°F and 104°F). Under these storage conditions the shelf life is 2 years. The product should not be exposed to direct sunlight.

PRECAUTIONARY STATEMENT

Huntsman Advanced Materials Americas maintains up–to-date Material Safety Data Sheets (MSDS) on all of its products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Users should review the latest MSDS to determine possible health hazards and appropriate precautions to implement prior to using this material.

First Aid!

Refer to MSDS as mentioned above.

KEEP OUT OF REACH OF CHILDREN

FOR PROFESSIONAL AND INDUSTRIAL USE ONLY

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