

BUILD PERFORMANCE AND COST-EFFICIENCY INTO YOUR FORMULATION

Components selector guide for formulators

Our building blocks and preformulated master-batches enhance product characteristics, while minimizing costs.



MARKET-LEADING BRANDS FOR NEXT GENERATION PRODUCTS

Our trusted brands
have served the global
adhesives and composites
industries for more than
half a century

Araldite®

Aradur®

Ara Cool™

Epalloy®

Erisys®

Gabepro™

Hypro®

Matrimid®

Omicure®

Rhodefтал®

Tactix®

Versamid®

Industrial Hygiene and Industrial Risks expertise

Huntsman Advanced Materials supports on average 25 customers every year with a broad array of Industrial Hygiene and Industrial Risks services, including:

- Personal Protective Equipment recommendations
- REACH clarifications including risk management
- Risk assessment and evaluation for practical manufacturing strategies
- Equipment advice
- Thermal risk management assessment



It is vital that your product development process integrates superior production efficiency with exceptional performance to deliver a stronger competitive advantage.

With Huntsman Advanced Materials, you can be sure your end-product will meet demanding and highly regulated specifications – and stay within budgets. We can also help you to drive quality and results across your entire production process in key areas such as rheology and reactivity, with proven methods and technologies to reduce costs and maintain a sustainable business platform.

STREAMLINE YOUR PROCESS

Shortening time-to-market is essential to reduce costs and to ensure your development process is as commercially viable as possible. To this end, we provide full-circle

99% Our quality control results in 99% customer satisfaction

100% All our sites have at least two industry certifications

services for building blocks processing, as well as support for all your risk management needs. We can also help you to understand and clarify your packaging requirements to facilitate processing and scale-up, when necessary.

BEST-IN-CLASS SECURITY OF SUPPLY

It is also crucial for you to have absolute confidence in your production line stability. This is where our global production footprint and raw materials supply chain deliver outstanding results.

We operate uncompromising quality control measures that always ensure consistent product quality, with specialist packaging services adapted to your specific processing requirements.

You will also benefit from:

- Dangerous goods logistics expertise
- ‘Preferential Origin’ status on most products, avoiding excessive custom taxes
- Duplication of manufacturing capabilities in different sites

Zero compromise on quality

Thanks to our Integrated Quality system from customer to supplier, less than 1% of delivery line items experience a complaint in any form, regarding both products and services.

	ISO 9001 Quality	ISO 14001 Environment	IATF 16949 Automotive	AS 9100 Aerospace
Number of certified sites	19	9	5	2



LET'S MAKE THE FUTURE A BETTER PLACE TO BE



At Huntsman Advanced Materials, the future matters to us. It is simply not viable to create high performance products if the planet pays the price. That is why we integrate sustainable practices into all our products and manufacturing processes, and why our solutions can be found in thousands of leading products across virtually every industry.

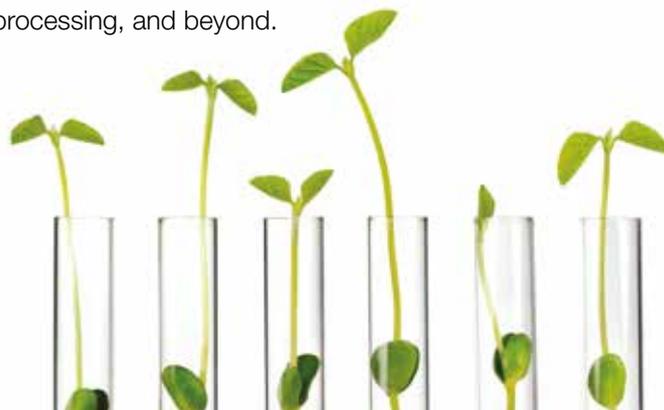
BUILDING A SUSTAINABLE FUTURE

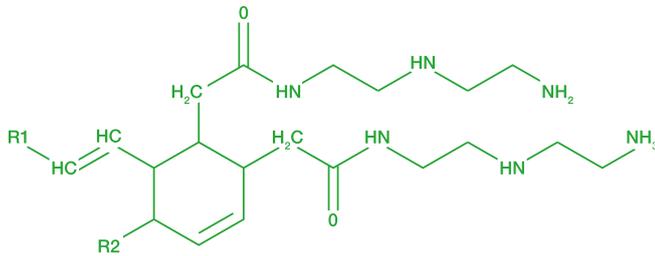
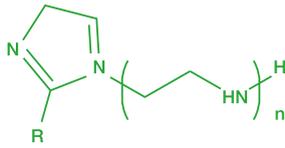
We recognize the important role we play in creating a sustainable industry. We enrich lives through innovation and deliver solutions that create value for our customers and make a brighter world possible for future generations. Our products enable a low-carbon economy and make a positive contribution to society and the environment.

SUPPORT FROM START TO SUCCESS

Customers depend upon us to improve the durability and performance of their products. However, we provide even greater value through our proven ability to reduce the time needed to bring ideas to market and increase overall success rate.

With a unique range of solutions and dedicated technical service teams, you can rely on us to support your needs from initial concept development to final processing, and beyond.





SUSTAINABLE CHEMISTRY

- We have used bio-sourced raw materials for more than a decade
- We work jointly with our customers to lower their impact on the environment by supplying REDcert^{2*} certified products with up to 100% bio-attribution and up to 80% less carbon footprint
- We are a leader in SVHC-free hardener technology
- We make continued use of substances of concern (SoC) risk evaluation tools to assess technical solutions and new materials
- We provide superior toxicological and regulatory expertise
- Huntsman proactively screens and seeks alternatives to SoC

* REDcert² is a **certification system for sustainable use of biomass**. Certified companies can provide evidence of replacement of fossil-based resources by sustainable biomass in the production chain of their final products.

Stay risk-free and compliant

We are a lead registrant and co-registrant under REACH of the major building blocks of Thermoset technology (BADGE / TGMDA / DDS / etc.), which results in active dialogue with regulators.

We are also an active member of environmental associations such as IAEG and AJIT, as well as Toxicological Network (ECETOC).

This means that your formulation will benefit from:

- Global regulatory risk assessment with a focus on globally compliant sourcing
- Guiding dialogue with suppliers and customers (e.g. 1500 raw materials screened)
- Onsite support of downstream users to ensure compliant use of exposure data and optimal risk management measures
- Life cycle analysis that generates environmental data, which in turn supports the industries

REAL-WORLD SUCCESS STORIES

Businesses worldwide across a broad variety of industries rely on us to support their success. Here are a few examples of how together we have solved key challenges and improved end-product results.

CASE 1:

COMPOSITES FOR AIRCRAFT

ARALDITE® MY 0600 and ARALDITE® MY 0610 were developed in the early 2000s to provide higher modulus compared with similar multifunctional epoxy resins for aerospace prepregs. This innovation enabled the use of composites for highly loaded parts, such as the fuselage of commercial aircraft.



CASE 2:

ADHESIVES FOR AUTOMOTIVE

HYPOX® RA 1340 and Flexibilizer DY 965 helped one of our customers to develop a range of structural adhesives for the automotive sector. The unique behavior and synergistic effect of the reactive liquid rubber (CTBN adduct) and flexibilizer made it possible to achieve high-speed impact resistance (also known as 'crash-test' resistance). HYPRO® CTBN helped for improving low temperature, toughness, and adhesion properties.

ARADUR® 9506 was selected by one of our customers due to its outstanding latency at room temperature and to its snap-cure behavior. This unique hardener allowed formulating one-component adhesives that are room-temperature storable and able to cure in 10 minutes at 110°C, thereby reducing the storage costs for customers.

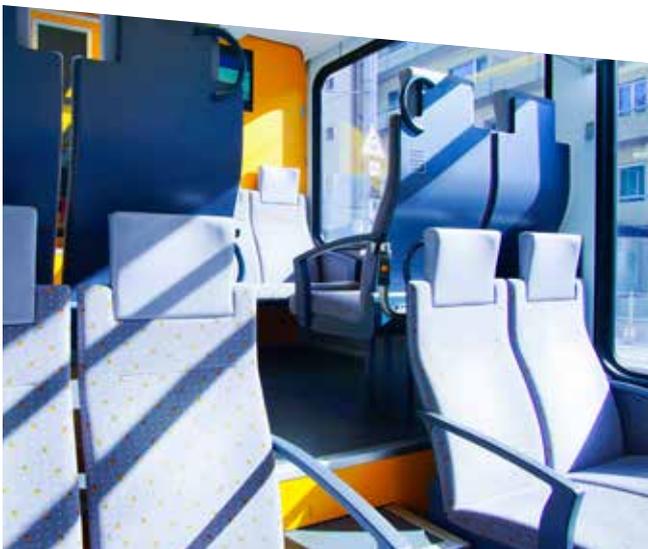


CASE 3:

ACRYLIC ADHESIVE APPLICATION

Accelerator HP 85 is a liquid catalyst used for both two-part acrylic adhesive formulations and solid rubbers that require fast and controllable crosslinking, high peel and impact strength, and excellent bondability to various surfaces. Typically designed as fast-curing adhesives, acrylic adhesives improve productivity, particularly in the transportation and industrial sectors, by offering a balanced reactivity profile.

Thanks to the high purity of Accelerator HP 85, it enables excellent adhesion and high strength with consistent quality assurance. Accelerator HP 85's very low aniline content (0-0.1%) has little impact on odor of the final formulation, contributing to employee well-being and satisfaction, especially in closed work environments.



CASE 4:

THERMOSET COMPONENTS FOR EXTREME CONDITIONS

Epoxy latent curing agent, ARADUR® 33225 was selected by several of our customers as a very latent curing agent along with excellent sea water resistance, outstanding adhesion on many different substrates, and easy processing due to its viscosity. Besides these features, ARADUR® 33225 is based on 71% of renewable-based raw materials. Its field of application is broad from room to higher curing temperature in adhesives or casting requiring a good level of flexibility.

Epoxy resin ARALDITE® PY 4122-1, free of plasticizer, enables our customer to keep a good level of flexibility and adhesion at sub-ambient temperature. When cured with ARADUR® 33225, the resulting material bonds very well to most substrates while maintaining outstanding hydrophobicity.



PRODUCT LIST

Note

EHC: Easily Hydrolysable Chlorine

n.m.: Not Measured

n.a.: Not Applicable

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PRODUCT NOMENCLATURE GUIDE

<p>Nomenclature</p>	<p>Huntsman Advanced Materials' registered trademark for commercial hardeners are ARADUR®; HYPRO®; GABEPRO™; and VERSAMID®. And for commercial resins ARA® COOL; ARALDITE®; EPALLOY®; ERISYS®; HYPOX®; PHENOXY; TACTIX® and MATRIMID®.</p> <p>The number following the product letter code is the characteristic for the product name.</p> <p>In case of minor product changes, we indicate the actual version by a figure separated from the product number by a dash.</p> <p>Example: ARADUR® 75-1</p>	<p>In case of ARALDITE® resin, the two-letter code following the registered trademark has the following meaning:</p> <p>First letter indicates the intended use of the product.</p> <p>Example: ARALDITE® PY 302-2 CH</p> <p>B Special resin for civil engineering applications D Modification product (reactive diluent, flexibilizer, matting agent, etc.) G Standard resin P Special resin EPN Epoxy phenol novolac ECN Epoxy cresol novolac</p> <p>Second letter indicates the supply form.</p> <p>Example: ARALDITE® PY 302-2 CH</p> <p>T Solid product Y Liquid product Z Resin in solution, emulsion or dispersion form</p>
<p>Acronyms legend</p>	<p>ATBN Amine-Terminated poly(Butadiene-co-acryloNitrile) BPA Bisphenol A BPF Bisphenol F GA Glycidyl Amine GE Glycidyl Ether MBC Mass Balance Certified</p>	<p>Example: ERISYS® GE 60 ERISYS® GA 240 HYPRO® 1300x45 ATBN</p>
<p>REACH</p>	<p>All products mentioned hereby are:</p> <ul style="list-style-type: none"> • Nonyl phenol-free • Phenol-free • Tert-butyl phenol-free • Bisphenol-A-free¹ • Bisphenol-F-free¹ • Salicylic Acid-free 	<p>All the components of the products contained in this brochure have been pre-registered and will be registered under REACH (or might be REACH exempt).</p> <p>¹ Certain products may contain trace amounts where adducted with BPA or BPF epoxy resins. BPA/BPF resins may contain low traces of BPA/BPF</p>
<p>Gel times</p>	<p>The values under «Gel time» have been measured using TECAM, 250g/23°C with ARALDITE® GY 250 unless otherwise specified (n.m. = not measured).</p>	
<p>Safety and handling precautions</p>	<p>The Material Safety Data Sheet (MSDS) should be consulted prior to handling any of here listed products.</p>	
<p>Product range</p>	<p>Additional products are available upon request.</p>	

EPOXY RESINS

BIPHENOL-A BASED EPOXY RESINS

Unmodified liquid resins

Product designation	Viscosity	Epoxy equivalent weight	EHC	Characteristics / comments
Conditions	25°C			
Units	mPa.s	g/Eq	ppm	
TACTIX® 123	4 400 - 5 600	172 - 176	n.m.	Purified grade, lowest viscosity within the Bis-phenol A epoxy range. Aero grade.
XB 3523	60 - 80 at 70°C	169 - 178	n.m.	Purified grade.
ARALDITE® GY 240	7 000 - 9 000	178 - 183	0 - 400	Aero grade available.
ARALDITE® GY 266	9 500 - 12 000	189 - 196	n.m.	
ARALDITE® LY 1556	9 500 - 12 000	189 - 196	0 - 1 000	Controlled chlorine content.
ARALDITE® GY 250	10 000 - 12 000	183 - 189	0 - 400	
ARALDITE® LY 556	10 000 - 12 000	183 - 189	400 - 1 000	Aero grade.
ARALDITE® GY 2600	12 000 - 14 000	184 - 189	0 - 170	Low chlorine content. Aero grade available.
ARALDITE® GY 260	12 000 - 16 000	182 - 192	n.m.	
ARALDITE® GY 261	12 500 - 17 500	192 - 204	8 000 - 12 000	High chlorine content.
ARALDITE® GY 280	100 - 300 at 100°C	225 - 280	n.m.	Semi-solid (uncured Tg (°C): -4 to 0). Available at 80% in xylene.

Solid epoxy resins – low molecular weight

Product designation	Viscosity	Epoxy equivalent weight	Softening point	Characteristics / comments
Conditions	25°C / 40% in butylcarbitol			
Units	mPa.s	g/Eq	°C	
ARALDITE® GT 7071	200 - 250	500 - 525	77 - 82	Type 1. Available at 75% in xylene.
ARALDITE® GT 7072	280 - 340	570 - 595	82 - 90	Type 2.

PHENOXY and high molecular weight epoxy resins

Product designation	Viscosity 25°C	Solids	Color	Characteristics
Units / scale	mPa.s	%	Gardner	
PHENOXY PKHB	180 - 280 ¹	98 - 100	<200 (APHA) ¹	Medium molecular weight Phenoxy resin (~ 32 000 g/mol).
PHENOXY PKHH	525 - 715 ¹	98 - 100	<200 (APHA) ¹	High molecular weight Phenoxy resin (~ 56 000 g/mol).
PHENOXY PKHP-200	475 - 715 ¹	98 - 100	<200 (APHA) ¹	Micronized powder-grade Phenoxy resin. Particle Size D-100 < 550 µm.
PHENOXY PKHW-34	800 - 1 600	33 - 35	White	Anionically-stabilized colloidal dispersion of PHENOXY PKHB resin.
PHENOXY PKHW-35	1 000 - 4 000	30 - 32	White	Anionically-stabilized colloidal dispersion of PHENOXY PKHH resin.
PHENOXY PKLER-HB	20 000 - 50 000	100	≤ 2	Liquid Bisphenol A type epoxy resin having a 10% modification with low molecular weight PHENOXY PKHB.
PHENOXY PKHS-40	4 500 - 7 000	39 - 41	≤ 3	PHENOXY PKHH resin dissolved in MEK.
ARALDITE® GZ 488 V 32	1 500 - 2 500	31 - 33	≤ 3	EEW ≥ 20 000 g/mol. Solution: 32% in 1-methoxy-2-propylacetate/cyclohexanone (93:7).

¹ Viscosity and APHA with 20% solution in cyclohexanone

BISPHENOL-F BASED EPOXY RESINS

Unmodified liquid resins

Product designation	Viscosity	Epoxy equivalent weight	Characteristics / comments
Conditions	25°C		
Units	mPa.s	g/Eq	
ARALDITE® PY 306	1 200 - 1 800	156 - 167	Distilled, very low viscosity. Aero grade.
ARALDITE® GY 285	2 000 - 3 000	164 - 172	Aero grade available.
ARALDITE® GY 282	3 300 - 4 100	164 - 172	Aero grade available.
ARALDITE® GY 281	5 000 - 7 000	158 - 172	

EPOXY RESINS

Bisphenol-A / Bisphenol-F based liquid resins

Product designation	Viscosity	Epoxy equivalent weight	Characteristics / comments
Conditions	25°C		
Units	mPa.s	g/Eq	
ARALDITE® PY 304	6 500 - 8 000	172 - 182	
ARALDITE® PY 302-2	6 500 - 8 000	169 - 177	Non-crystallizing.
ARALDITE® PY 720	7 000 - 9 400	179 - 189	

EPOXY REACTIVE DILUENTS

Product designation	Viscosity	Epoxy equivalent weight	Characteristics / comments
Conditions	25°C		
Units	mPa.s	g/Eq	
ARALDITE® DY-E	4 - 12	275 - 315	Monoglycidylether of C12-C14 alcohol.
ARALDITE® DY-K	6 - 12	175 - 189	Monoglycidylether of cresol.
ARALDITE® DY-P	20 - 28	222 - 244	Monoglycidylether of p-tert. Butylphenol.
ARALDITE® DY-026	11 - 15	110 - 115	Diglycidylether of butanediol. Aero grade.
ARALDITE® DY-D	15 - 25	118 - 125	Diglycidylether of butanediol.
ARALDITE® DY-H	21 - 31	143 - 155	Diglycidylether of 1.6-hexanediol.
ARALDITE® DY 3601	42 - 52	385 - 405	Diglycidylether of polyoxypropylene.
ARALDITE® DY-C	50 - 100	154 - 167	Diglycidylether of cyclohexane dimethanol.
ARALDITE® DY-F	60 - 90	425 - 513	Diglycidylether of polyoxypropylene.
ARALDITE® DY-L	160 - 240	606 - 800	Glycerol propoxylated triglycidylether.
ARALDITE® DY-31	200 - 400	117 - 128	Multiglycidylether of aliphatic polymer (average functionality ~ 4).
ERISYS® GE 35H	300 - 500	550 - 650	Triglycidylether of Castor oil.
ERISYS® GE 60	8 000 - 18 000	160 - 195	Epoxidized sorbitol.

NOVOLAC RESINS

Epoxy Phenol Novolac (EPN)

Mainly used for improvement of Tg levels, modulus, strength, and chemical resistance. Typical applications in filament winding, RTM, prepregs, and high Tg adhesives.

Product designation	Viscosity	Epoxy equivalent weight	EHC	Characteristics / comments
Conditions	52°C			
Units	mPa.s	g/Eq	ppm	
ARALDITE® GY 289	7 000 - 11 000 at 25°C	167 - 175	n.m.	Low viscosity, functionality 2.2.
ARALDITE® PY 307-1	30 000 - 50 000 at 25°C	169 - 179	n.m.	Medium viscosity, functionality 2.2.
ARALDITE® EPN 1179	1 100 - 1 700	172 - 179	0 - 1 500	Semi-solid, functionality 2.8.
ARALDITE® EPN 1139	1 100 - 1 700	172 - 179	n.m.	Semi-solid, functionality 2.8. Aero grade.
ARALDITE® EPN 1180	20 000 - 50 000	175 - 182	n.m.	Semi-solid, functionality 3.6. Available at 80% in xylene.
ARALDITE® EPN 1138	20 000 - 50 000	175 - 182	0 - 1 000	Semi-solid, functionality 3.6. Controlled chlorine content. Aero grade.

Epoxy Cresol Novolac (ECN)

Use to upgrade epoxy formulations to improve thermal, mechanical, and chemical resistance. Typical applications in high temperature adhesives, composites, electrical, and laminating products.

Product designation	Viscosity	Epoxy equivalent weight	Softening point	EHC	Characteristics / comments
Conditions	130°C				
Units	mPa.s	g/Eq	°C	ppm	
ARALDITE® ECN 9511	n.m.	200 - 227	32 - 42	0 - 1 500	Functionality 2.7.
ARALDITE® ECN 1273	1 000 - 2 700	217 - 233	68 - 78	0 - 1 500	Functionality 4.8.
ARALDITE® ECN 1280	3 000 - 4 000	206 - 224	75 - 85	0 - 1 500	Functionality 5.1. Aero grade available.
ARALDITE® ECN 1299	7 000 - 15 000	206 - 230	85 - 100	0 - 2 000	Functionality 5.4. Aero grade available.

Epoxy Dicyclopentadiene Novolac (EDCPDN)

Lower moisture absorption than other novolac epoxies commonly used in advanced composites. Equivalent glass transition temperatures in dry conditions as standard epoxy novolac resins. Ideal for use when retention of properties under hot and wet conditions is critical.

Product designation	Viscosity	Epoxy equivalent weight	Softening point	EHC	Characteristics / comments
Conditions	85°C				
Units	mPa.s	g/Eq	°C	ppm	
TACTIX® 556	1 000 - 1 500	225 - 240	50 - 55	0 - 300	Multifunctional hydrocarbon epoxy novolac with high moisture resistance. Aero grade.
TACTIX® 756	n.m.	250 - 274	78 - 90	0 - 100	Multifunctional hydrocarbon epoxy novolac with high moisture resistance. Aero grade.

EPOXY RESINS

CYCLOALIPHATIC EPOXY RESINS

Non aromatic, UV resistant, medium to high Tg.

Product designation	Viscosity	Epoxy equivalent weight	Characteristics / comments
Conditions	25°C		
Units	mPa.s	g/Eq	
ARALDITE® CY 179	250 - 450	130 - 143	Bis-(epoxycyclohexyl)methylcarboxylate. Low viscosity, high deflection temperature, excellent dielectric properties, good UV resistance. Typical applications in insulators, transformers, generators, and motors.
ARALDITE® CY 192-1	430 - 660	150 - 164	Tetrahydrophthalic acid diglycidylester. Low viscosity, solventless impregnating resin. Typical applications in insulators, transformers, generators, and motors.
ARALDITE® CY 184	700 - 900	164 - 172	Hexahydrophthalic acid diglycidylester. Low viscosity, high deflection temperature, excellent dielectric properties, good UV resistance. Typical applications in insulators, transformers, generators, and motors.
EPALLOY® 5000	1 300 - 2 500	210 - 230	Hydrogenated Bisphenol-A Epoxy Resin.



GLYCIDYL AMINE BASED EPOXY RESINS

Unique combination of high epoxy functionality, aromatic backbone, and relatively low viscosity. Main features: strong improvement of Tg levels and modulus in epoxy formulations. Typical applications: prepregs, RTM, filament winding, and high Tg adhesives.

Product designation	Viscosity	Epoxy equivalent weight	EHC	Characteristics / comments
Units	mPa.s	g/Eq	ppm	
ARALDITE® MY 0500	2 000 - 5 000 at 25°C	100 - 115	300 - 3 000	TGPAP based trifunctional epoxy resin, liquid. Aero grade.
ARALDITE® MY 0510	550 - 850 at 25°C	96 - 106	0 - 2 000	Distilled TGPAP based trifunctional epoxy resin, lower viscosity, and higher stability than MY 0500. Aero grade.
ARALDITE® MY 0600	7 000 - 13 000 at 25°C	101 - 111	0 - 3 000	TGMAP based trifunctional epoxy resin, liquid. Aero grade.
ARALDITE® MY 0610	1 500 - 4 800 at 25°C	94 - 102	0 - 2 000	Distilled TGMAP based trifunctional epoxy resin, lower viscosity, and higher stability than MY 0600. Aero grade.
ARALDITE® MY 721	3 000 - 6 000 at 50°C	111 - 117	0 - 2 000	TGMDA based tetrafunctional epoxy resin, liquid. Aero grade. Industrial version available.
ARALDITE® MY 9655	6 900 - 11 400 at 50°C	113 - 125	0 - 1 000	TGMDA based tetrafunctional epoxy resin, liquid. Aero grade.
ARALDITE® MY 9612	10 000 - 12 000 at 50°C	117 - 134	700 - 1 000	TGMDA based tetrafunctional epoxy resin, liquid. Aero grade.
ARALDITE® MY 9512	11 000 - 13 000 at 50°C	117 - 134	0 - 1 000	TGMDA based tetrafunctional epoxy resin, liquid. Aero grade.
ARALDITE® MY 9634	13 000 - 15 000 at 50°C	118 - 133	0 - 1 000	TGMDA based tetrafunctional epoxy resin, liquid. Aero grade.
ARALDITE® MY 9663	17 000 - 19 000 at 50°C	117 - 133	0 - 1 000	TGMDA based tetrafunctional epoxy resin, liquid. Aero grade.
ARALDITE® MY 720	7 000 - 19 000 at 50°C	117 - 134	0 - 1 000	TGMDA based tetrafunctional epoxy resin, liquid.
ARALDITE® MY 722	8 000 - 11 000 at 25°C	118 - 133	0 - 1 000	E-TGMDA based tetrafunctional epoxy resin, liquid, lower viscosity. Aero grade.
ERISYS® GA 240	1 600 - 3 000 at 25°C	95 - 110	n.m.	Tetraglycidyl ether of meta-Xylenediamine.

OTHER SPECIALTY EPOXY RESINS

Product designation	Viscosity	Epoxy equivalent weight	Softening point	EHC	Characteristics / comments
Units	mPa.s	g/Eq	°C	ppm	
TACTIX® 742	700 - 800 at 100°C	150 - 170	45 - 55	0 - 500	Tris(hydroxyphenyl)methane based epoxy resin. Provides very high glass transition temperatures. Most commonly used in adhesive and composite formulation, especially for parts and components near high-heat zones. Aero grade.
ARALDITE® LY 3508	11 000 - 20 000	191 - 206	n.a.	n.m.	Liquid toughened epoxy resin. Similar viscosity as standard liquid Bisphenol-A based epoxy resins. Unique multi-phase toughening technology. Provides high toughness with minor effect on glass transition temperature. Suggested use in adhesives and composite formulations.
ARALDITE® DY 1158	< 20	450 - 550	n.a.	n.m.	Low viscosity epoxy silane with unique substituents. Suitable as adhesion promoter and flexibilizer in epoxy formulations. Typical usage in high temperature epoxy adhesives.
ARALDITE® PY 4122-1	7 500 - 22 500	450 - 480	n.a.	n.m.	Flexible Bisphenol-A based Epoxy Resin.

EPOXY RESINS

FORMULATED RESINS AND WATERBORNE

Formulated liquid resins

Product designation	Viscosity	Epoxy equivalent weight	Characteristics / comments
Conditions	25°C		
Units	mPa.s	g/Eq	
ARALDITE® BY 158	280 - 360	154 - 161	BPA resin with difunctional reactive diluent.
ARALDITE® GY 764	350 - 550	179 - 189	BPA resin with difunctional reactive diluent.
ARALDITE® GY 257	500 - 650	182 - 192	BPA resin with monofunctional reactive diluent.
ARALDITE® GY 253	700 - 1 400	172 - 185	BPA resin with difunctional reactive diluent.
ARALDITE® GY 298	2 000 - 4 000	400 - 455	BPA resin with reactive flexibilizer.
ARALDITE® GY 776	2 700 - 3 800	185 - 196	BPA resin with monofunctional reactive diluent.
ARALDITE® GY 793	650 - 750	185 - 200	BPA/F resin with monofunctional reactive diluent.
ARALDITE® GY 783	800 - 1 100	185 - 196	BPA/F resin with monofunctional reactive diluent.
ARALDITE® PY 3483	1 000 - 1 600	196 - 208	BPA/F resin with monofunctional reactive diluent.
ARALDITE® EPN 1183	7 000 - 13 000	145 - 159	Medium viscosity, modified EPN, functionality 3.3.

Waterborne resins

Product designation	Viscosity	Epoxy equivalent weight	Solid content	Characteristics / comments
Conditions	25°C			
Units	mPa.s	g/Eq	wt. %	
ARALDITE® PZ 33757/67	50 - 400, sl. thixotropic	256 - 274	65 - 69	Emulsified, crystallization-resistant liquid epoxy resin.
ARALDITE® PZ 756-1/67	50 - 400	270 - 295	66 - 68	Emulsified, crystallization-resistant liquid epoxy resin.
ARALDITE® PZ 3961-1	450 - 820	925 - 1 048	51 - 55	Aqueous dispersion of BPA type 1 resin.
ARALDITE® PY 33757	5 000 - 8 000	172 - 182	100	Emulsifiable, crystallization-resistant liquid epoxy resin.
ARALDITE® PY 22783	800 - 1 400	188 - 204	100	Emulsifiable, crystallization-resistant epoxy resin.

EPOXY CURING AGENTS AND ACCELERATORS

POLYAMIDOAMINE BASED

Hardeners for low to medium Tg two-components system, typical applications in adhesives.

Product designation	Viscosity	H+ active equivalent weight	Gel time	Characteristics / comments
Conditions	25°C		with ARALDITE® GY 250, 250g	
Units	mPa.s	g/Eq	min	
ARADUR® 350	100 - 400	95	180	Polyaminoimidazoline.
ARADUR® 33225	100 - 400	75 - 115	900	Polyamidoimidazoline. Good latency at room temperature.
ARADUR® 370	150 - 350	95	70	Polyaminoimidazoline.
ARADUR® 3282-1	900 - 1 900	115	100	Formulated polyamidoamine adduct for enhanced adhesion properties. Good adhesion on unprepared surface.
ARADUR® 145	2 400 - 4 000	95	180	Polyaminoimidazoline.
ARADUR® 140	300 - 600 at 75°C	95	120	Polyaminoimidazoline.
ARADUR® 125	700 - 900 at 75°C	130	120	Polyamidoamine. Available in solvent.
ARADUR® 115	3 100 - 3 700 at 75°C	240	> 1 000 (50% in methoxypropylacetate)	Semi-solid polyamidoamine. Available in solvent.

EPOXY CURING AGENTS AND ACCELERATORS

AROMATIC AMINE BASED

High performance curing agents for epoxy resins when thermal stability, high temperature performance, and chemical resistance are key.

Product designation	H+ active equivalent weight	Softening point	Characteristics / comments
Units	g/Eq	°C	
ARADUR® 976-1	63	176 - 180	4,4'-DiaminoDiphenylSulfone. Aero grade. Industrial grade available.
ARADUR® 9664-1	63	176 - 185	Micropulverised. 4,4'-DiaminoDiphenylSulfone. Aero grade.
ARADUR® 9719-1	63	170 - 180	Micropulverised. 3,3'-DiaminoDiphenylSulfone. Aero grade.

ANHYDRIDE BASED

Hardeners of choice when process requires very long latency, low viscosity, and also when high temperature resistance is targeted.

Product designation	Viscosity	Molecular weight	Characteristics / comments
Conditions	25°C		
Units	mPa.s	g/mol	
ARADUR® 917-1	50 - 100	166	Methyl tetrahydrophthalic anhydride for high temperature industrial composite applications by filament winding, RTM, and pultrusion.
ARADUR® HY 906	175 - 350	178	Nadic methyl anhydride for high Tg composites and potting applications.



FORMULATED HARDENERS AND ACCELERATORS

Formulated hardeners

Product designation	Viscosity	H+ active equivalent weight	Gel time	Tg range	Characteristics / comments
Conditions	25°C		with ARALDITE® GY 250 (100g, 23°C)	cured with ARALDITE® GY 250	
Units	mPa.s	g/Eq	min	°C	
ARADUR® 70	16 000 - 27 000	~ 900	300 - 500	< -10	Polyetherurethane amine. Hardener giving very high flexibility. Max elongation at 23°C 350% and at -10°C > 250%.
ARADUR® 3275	200 - 300	250	~ 85	< -10	Formulated polyetherpolyamine giving high level of flexibility. Elongation 110% at 23°C and up to 50% down to -10°C.
ARADUR® 75-1	3 000 - 9 000	250	40	< -10	Polyetherurethane amine.
ARADUR® 2992	10 - 20	55	~ 5	75 - 95	Polyamine. Can be used as reactive fast accelerator in combination with other hardener or for anchor bonding adhesive.
ARADUR® 3486	10 - 20	57	~ 550	95 - 110	Polyamine. Can be used in 2K systems for wet lay-up, infusion, adhesives. Exhibits very high ultimate elongation in combination with a long pot life.
ARADUR® 20317	2 500 - 6 000	~ 65	65	85 - 110	Formulated aliphatic polyamine adduct. UV resistant (low yellowing).
ARADUR® 33641	4 000 - 8 000	58	~ 15	90 - 110	Formulated araliphatic amine for fast cure. Recommended to enhance chemical resistance. Suitable for food contact (EU).
ARA® COOL 3077-1	200 - 400	75	19	80 - 100	Formulated araliphatic amine for fast cure. Good surface aspect even at low curing temperature.
ARADUR® 837-1	4 600 - 6 500	66 - 75	19	80 - 100	Formulated araliphatic amine for fast cure. Good surface aspect even at low curing temperature.
ARADUR® 20250	130 - 210	30	21	110 - 130	Formulated polyamine for fast cure and processes requiring low viscosity. Good adhesion to most substrates.
ARADUR® 20315	5 500 - 8 000	59	112	135 - 150	Formulated polyamine adduct. Recommended for 2-components industrial composites and adhesives applications. Suitable for food contact (EU).
ARADUR® 3064	1 200 - 1 850	43	66	140 - 160	Formulated polyamine adduct. Recommended for 2-components industrial composites and adhesives applications.
ARADUR® 3741	5 - 25	39	~ 84	115 - 140	Polyamine. Can be used in 2K systems for wet lay-up, infusion, adhesives. Exhibits excellent mechanical properties and good thermal resistance.
XB 3473	80 - 125	~ 43	21 - 29 at 140°C	165 - 195	Latent polyamine for high temperature applications.
ARADUR® 835	Solid	200	-	< 80	Purified solid aliphatic polyamine adduct. Flexibilizing hardener with good chemical resistance. Available in solvent.
ARADUR® 9506	Solid	~ 75	0 - 10 at 100°C	85 - 105	Solid cyclic polyaminoamide in powder form. Outstanding latency at room temperature. Very high reactivity when temperature rises 95-100°C.
GABEPRO™ GPM 800	10 000 - 15 000	~ 285	n.a.	< 50	Polymercaptan.
GABEPRO™ GPM 895	8 000 - 15 000	180 - 200	< 1 (20g)	< 50	Polymercaptan accelerated.

EPOXY CURING AGENTS AND ACCELERATORS

Paste hardeners and accelerators

Product designation	Viscosity	Gel time	Characteristics / comments
Conditions	25°C	with ARALDITE® GY 250 (ratio 100/20, 130°C)	
Units	mPa.s	min	
ARADUR® 1571	28 000 - 40 000	n.a.	DICY paste (28% DICY in epoxy resin). Particle size: 98% < 10 µm. Eliminates manipulation of dicyandiamide in powder form and the need for heavy dispersion equipments. Homogeneous, agglomerate-free dispersion. Easy to manipulate and introduce in epoxy resins formulations.
Accelerator 1573	60 000 - 90 000	15 - 19	Urea based accelerator paste, suggested for use in combination with ARADUR® 1571. Particle size: 98% < 10 µm.

Waterborne hardeners

Product designation	Viscosity	H+ active equivalent weight	Pot life	Characteristics / comments
Conditions	25°C		with ARALDITE® GY 776	
Units	mPa.s	g/Eq	min	
ARADUR® 3985	1 000 - 6 000	~ 265	~ 60	Polyamine adduct 54 - 56% in water.
ARADUR® 36	4 000 - 7 000	~ 165	~ 150	Polyamine adduct 79 - 81% in water.
ARADUR® 38-1	12 000 - 20 000	~ 150	~ 75	Polyamine adduct 79 - 81% in water.
ARADUR® 39	11 000 - 19 000	~ 335	120 - 240	Polyamine adduct 49 - 51% in water.
ARADUR® 435	13 000 - 23 000	~ 250	90 - 120	Polyamidoamine adduct 49 - 51% in water.
ARADUR® 340	18 000 - 23 000	~ 210	120 - 180	Polyamidoamine adduct 49 - 51% in water.
ARADUR® 3986	15 000 - 35 000	~ 415	~ 180	Polyamine adduct 39 - 41% in water.
ARADUR® 35-1	19 000 - 35 000	~ 380	~ 90	Polyamine adduct 50 - 55% in water.
ARA® COOL WB 007	1 500 - 2 000	400 - 500	~ 5	Watersoluble accelerator.

Liquid accelerators

Product designation	Viscosity	Characteristics / comments
Conditions	25°C	
Units	mPa.s	
Accelerator DY 062	0 - 10	Tertiary amine based accelerator. Extremely low viscosity. For ambient and high temperature cure epoxy systems.
Accelerator 3130	10 - 100	Non amine accelerator for epoxy system. Extremely high reactivity at ambient temperature. Ideal as drop-in accelerator to cope with cold weather.
Accelerator 960-1	150 - 300	Tertiary amine based accelerator. For ambient cure epoxy systems and alternatively as hardener/catalyst for high temperature cure epoxy system.
Accelerator 2950	2 000 - 6 000	Reactive, tertiary amine based accelerator, for ambient cure epoxy systems. Low plasticising effect.
Accelerator DY 079	30 - 50	Non aromatic tertiary amine for ambient cure epoxy systems. Amine Index: 700 - 800 mgKOH/g.
VERSAMID® EH50	150 - 400	Non aromatic tertiary amine for ambient cure epoxy systems (low color).
Accelerator HP 85	30 - 80	Catalyst for 2-component acrylic adhesive formulations with excellent property development and low influence on color.

Solid accelerators

Product designation	Softening point	Characteristics / comments
Units	°C	
Accelerator DY 9577	25 - 31	Latent accelerator based on boron trichloride amine complex. Good latency up to 80°C. High reactivity above 120°C. Fosters homopolymerization of epoxy. Also used as accelerator for anhydride hardener.
ARADUR® HT 973	80 - 95	Boron trifluoride amine complex. Commonly used to cure epoxy at 80 - 100°C.
ARADUR® 3123	180 - 250	Low toxicity imidazole based accelerator. Low solubility in epoxy resins at room temperature. Outstanding latency vs. standard imidazole.
ARADUR® 1167	89 - 102	Latent modified phenolic accelerator. Outstanding latency up to 80°C. Similar reactivity than urea accelerator at 120°C and above (dicyandiamide cure of epoxy resins).
OMICURE® U-24M	180 - 195	Substituted urea (2,4' Toluene Bis Dimethyl Urea). Intended for use as a latent accelerator for the dicyandiamide cure of epoxy resins.
OMICURE® U-405M	126 - 136	Substituted urea (Phenyl Dimethyl Urea). Intended for use as a latent accelerator for the dicyandiamide cure of epoxy resins. Does not contain any chlorine.
OMICURE® U-410M	180 - 195	Substituted urea (Toluene Bis Dimethyl Urea). Intended for use as a latent accelerator for the dicyandiamide cure of epoxy resins.
OMICURE® U-52M	220 - 230	Substituted urea (4,4' Methylene Bis-(Phenyl Dimethyl Urea)). Intended for use as a latent accelerator for the dicyandiamide cure of epoxy resins.

TOUGHENERS AND FLEXIBILIZERS

CO-POLY((BUTADIENE)-(ACRYLONITRILE))

Huntsman offers a broad range of HYPRO® and HYPOX® Reactive Liquid Elastomers that differ in Butadiene and Acrylonitrile content, as well as the nature of the reactive end group. This allows formulators to balance properties and develop specific toughening solutions. HYPRO®, HYPOX® tougheners give formulations unparalleled performance, with significant increases in T-peel and impact wedge peel strength, and impact resistance as well as thermal cycling and fatigue resistance. Toughness is achieved across a wide range of temperatures, including temperatures as low as -40°C. These benefits are achieved with minimal impacts to other cured formulation properties such as thermal resistance and modulus.

Carboxyl Terminated (CTBN)

Product designation	Viscosity at 27°C	Acrylonitrile Content	Polymer Functionality	Reactive End Group	Characteristics / comments
Units / scale	mPa.s	%			
HYPRO® 1300X13 CTBN	360 000 - 640 000	26	1,8	Carboxylic acid (32 mg KOH/g)	CTBN (carboxyl-terminated butadiene-acrylonitrile copolymer) used as a reactant with a base thermoset resin to gain product performance improvements. Polymer: Mn ~ 3150 g/mol; Tg: -39°C.
HYPRO® 1300X8 CTBN	110 000 - 160 000	18	1,8	Carboxylic acid (29 mg KOH/g)	CTBN (carboxyl-terminated butadiene-acrylonitrile copolymer) used as a reactant with a base thermoset resin to gain product performance improvements. Polymer: Mn ~ 3550 g/mol; Tg: -52°C.
HYPRO® 1300X31 CTBN	50 000 - 80 000	10	1,9	Carboxylic acid (28 mg KOH/g)	CTBN (carboxyl-terminated butadiene-acrylonitrile copolymer) used as a reactant with a base thermoset resin to gain product performance improvements. Polymer: Mn ~ 3800 g/mol; Tg: -66°C.
HYPRO® 2000X162 CTB	30 000 - 70 000	0	1,9	Carboxylic acid (25 mg KOH/g)	CTBN (carboxyl-terminated butadiene-acrylonitrile copolymer) used as a reactant with a base thermoset resin to gain product performance improvements. Polymer: Mn ~ 4200 g/mol; Tg: -77°C.

Amine Terminated (ATBN)

Product designation	Viscosity at 27°C	Acrylonitrile Content	Polymer Functionality	Reactive End Group	Characteristics / comments
Units / scale	mPa.s	%			
HYPRO® 1300X42 ATBN	75 000 - 125 000	18	1,8	Amine (amine value: 375 - 525 mg KOH/g)	Adhesion to difficult substrates is improved. Residual free amine methylpentamethylenediamine ~ 10%.
HYPRO® 1300X45 ATBN	300 000 - 450 000	18	1,8	Amine (amine value: 1750 - 1950 mg KOH/g)	Very low content of residual N-AEP (<0.1%).

Epoxy terminated (Epoxy CTBN adduct)

Product designation	Viscosity at 27°C	CTBN Content	Epoxy Equivalent Weight	Description	Characteristics / comments
Units / scale	mPa.s	%	g/Eq		
HYPOX® RA 840	150 000 - 230 000	40	325 - 360	BisA epoxy resin adduct with HYPRO® 1300X8 CTBN	High CTBN content, thermal shock, and peel resistance to increase toughness – peel strength, impact, and fatigue resistance.
HYPOX® RA 1340	300 000 - 600 000	40	325 - 375	BisA epoxy resin adduct with HYPRO® 1300X13 CTBN	High CTBN content, thermal shock, and peel resistance.
HYPOX® RF 928	35 000 - 75 000	20	210 - 225	EPN epoxy resin adduct with HYPRO® 1300X8 CTBN	Thermal shock and peel resistance to increase toughness. Limited decrease of Glass Transition Temperature.
HYPOX® RM 22	15 000 - 25 000	50	320 - 360	Cyclohexanedimethanol diglycidyl Ether adduct with HYPRO® 1300X13 CTBN	Low viscosity and High CTBN content. Thermal shock and peel resistance.
HYPOX® RK 820	250 000 - 650 000 (100°C)	20	850 - 1 050	Solid BisA epoxy resin adduct with HYPRO® 1300X8 CTBN	Adduct of solid bis-A epoxy resin toughened with CTBN. It improves impact tolerance, toughness, and adhesion. (Softening Point: 75 - 95°C).
HYPOX® RK 84 L	300 000 - 500 000 (100°C)	30	1 250 - 1 500	Solid BisA epoxy resin adduct with HYPRO® 1300X13 CTBN	Adduct of solid bis-A epoxy resin toughened with CTBN. It improves impact tolerance, toughness, and adhesion. Solid (Softening Point: <100°C).
ARALDITE® LT 1522	1 600 - 3 000 (40% in Butyl diglycol)	30	1 560 - 1 820	Solid BisA epoxy resin adduct with HYPRO® 1300X13 CTBN	Solid epoxy CTBN adduct (Softening Point: <110°C).

Vinyl Terminated

Product designation	Viscosity at 27°C	Acrylonitrile Content	Vinyl Equivalent Weight	Description	Characteristics / comments
Units / scale	mPa.s	%	g/Eq		
HYPRO® 2000X168LC VTB	60 000 - 200 000	0	2 225	Methacrylate terminated polybutadiene for improving the toughness of acrylic adhesives, especially at low temperatures. (Functionality: 1.9). Polymer: Mn ~ 4450 g/mol; Tg: -80°C.	Low-molecular-weight, methacrylate-functional liquid synthetic rubber.
HYPRO® 1300X33LC VTBX	150 000 - 350 000	18	1 625	Methacrylate terminated Co-Poly((butadiene)-(acrylonitrile)). Additional functionality maximizes phase separation and toughening. (Functionality: 2.4). Polymer: Mn ~ 3900 g/mol; Tg: -49°C.	100% solids reactive polymer used primarily as an additive in acrylic adhesives, sealants, and coatings.
HYPRO® 1300X43LC VTBX	200 000 - 500 000	21,5	1 540	Methacrylate terminated Co-Poly((butadiene)-(acrylonitrile)). Additional functionality maximizes phase separation and toughening. (Functionality: 2.4). Polymer: Mn ~ 3700 g/mol; Tg: -45°C.	Typically used in adhesives, sealants, coatings, and resin systems based on vinyl esters or methacrylates.

PHENOL FUNCTIONALIZED POLYGLYCOL

Phenol functionalized adducts to increase toughness and flexibility in hot curing (> 100°C) thermoset formulations. Typical usage in adhesive and composite applications.

Product designation	Viscosity	Hydroxy equivalent weight	Characteristics / comments
Conditions	25°C		
Units	Pa.s	g/Eq	
Flexibilizer DY 965	440 - 1 280 at 40°C	869 - 1 000	Phenol terminated polyurethane adduct. Viscous liquid. Outstanding improvement of impact resistance, especially during high speed solicitation and when combined with CTBN based tougheners (synergistic effect). Improves adhesion on metals, especially at sub-zero temperatures, down to -40°C.



IMIDES AND BENZOXAZINES

IMIDES BASED RESINS

Bismaleimides

Thermosetting resins suitable for long-term thermal resistance above 200°C.

Product designation	Viscosity	Double bond content	Melting point	Characteristics / comments
Conditions	25°C			
Units	mPa.s	% of theoretical	°C	
MATRIMID® 5292 A	Solid	> 85	153 - 170	4,4 Bismaleimidodiphenylmethane. Outstanding heat performance (Tg range 250 - 300°C) and excellent mechanical properties at high temperature. Can be used in advanced composite structures and high performance structural adhesives. Can be used with Matrimid® 5292 B to optimize processing, toughness and performance.
MATRIMID® 5292 B	12 000 - 20 000	> 90	n.a.	O,O'- Diallyl bisphenol A. For use with Matrimid® 5292 A to optimize toughness, processing and performance.

Polyimides and Polyamide-imides

Thermosetting and thermoplastic resins for long-term thermal resistance above 200°C.

Product designation	Viscosity	Solid content	Characteristics / comments
Conditions	25°C		
Units	mPa.s	wt. %	
MATRIMID® 5218	n.a.	100	Soluble and fully imidized thermoplastic polyimide powder. Very high glass transition temperature (> 300°C). Excellent high temperature properties for use in structural composites and adhesives. Excellent adhesion on various substrates, excellent thermal performance, soluble in a variety of common solvents (i.e. CH ₂ Cl ₂ , CHCl ₃ , THF, DMAC, DMF, NMP).
MATRIMID® 9725	n.a.	100	Micropulverized version of Matrimid® 5218.
RHODEFTAL® 210	2 500 - 4 000	27 - 29	Solution in N-Ethylpyrrolidone (NEP). Binder for thermostable paints, lubricants, adhesives, impregnation, varnish. Heat class 220 - 250°C, good dielectric rigidity and flexibility, good chemical properties, outstanding adhesion at elevated temperature on many substrates. Compatible with epoxy resins to reach very good flexibility.

BENZOXAZINES

Resins providing phenolic-like matrices through addition reaction. No gas release and near-zero shrinkage on curing.

Product designation	Viscosity	Melting point	Gel time ¹	Characteristics / comments
Conditions	25°C		220°C	
Units	mPa.s	°C	sec	
ARALDITE® MT 35600	50 - 500 at 125°C	60 - 80	250 - 550	Bisphenol A based benzoxazine. Di-functional thermoset resin. Can be homopolymerized or co-reacted with epoxy or phenolic resins to produce polymers with extremely good thermal and mechanical properties. Proposed for advanced composites, structural adhesives, laminates for printed wiring boards, high performance coatings, encapsulating, and molding compounds. Available in solvent.
ARALDITE® MT 35700	1 000 - 7 000 at 100°C	60 - 80	200 - 450	Bisphenol F based benzoxazine. Di-functional thermoset resin. Can be homopolymerized or co-reacted with epoxy or phenolic resins to produce polymers with extremely good thermal and mechanical properties. Available in solvent (75% in MEK).

¹ Measured on solid film with hot plate

MADE POSSIBLE

HUNTSMAN

Enriching lives through innovation

Huntsman Advanced Materials

At Huntsman Advanced Materials, we make things possible. Serving many of the world's leading businesses across virtually every industry, we enable greater innovation, performance and sustainability to address global engineering challenges and contribute towards a better quality of life.

Our capabilities in high-performance adhesives and composites, delivered by more than 1600 associates, support over 2000 global customers with innovative, tailor-made solutions and more than 1500 pioneering epoxy, acrylic, phenolic and polyurethane-based polymer products.

We operate synthesis, formulating and production facilities around the world



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