



Advanced Materials

Epoxy resins & hardeners

Selector guide

Epoxy resins

Hardeners

Accelerators

Additives

Waterborne system



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About Huntsman

Huntsman is a global manufacturer and marketer of differentiated chemicals. Its operating companies manufacture products for a variety of global industries, including chemicals, plastics, automotive, aviation, textiles, footwear, paints and coatings, construction, technology, agriculture, health care, detergent, personal care, furniture, appliances and packaging. Originally known for pioneering innovations in packaging and, later, for rapid and integrated growth in petrochemicals, Huntsman today has more than 12,000 employees and operates from multiple locations worldwide. The Company had 2011 revenues of over \$11 billion.

Advanced Materials

Epoxy resins

Basic liquid epoxy resins • Araldite® / Tactix® / Quatrex®

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Colour [Gardner] | Flash point [°C] | Comments/Applications |
|---------------|---------------------|---------------------|---------------------------|------------------|------------------|--|
| GY 250 | 5.30-5.45 | 183-189 | 10,000-12,000 | ≤2 | ≥200 | General purpose high viscosity unmodified basic liquid epoxy resin based on bisphenol-A. |
| GY 9708-3 | 5.20-5.50 | 182-192 | 11,000-14,000 | ≤1 | ≥200 | General purpose high viscosity unmodified basic liquid epoxy resin based on bisphenol-A. |
| GY 6010 | 5.20-5.50 | 182-192 | 11,000-14,000 | ≤1 | ≥200 | General purpose high viscosity unmodified basic liquid epoxy resin based on bisphenol-A. |
| GY 280 | 3.57-4.45 | 225-280 | 450-700 ¹⁾ | ≤3 ¹⁾ | ≥100 | Semi-solid epoxy resin based on bisphenol-A for high solid corrosion protective coatings. |
| GY 2600 | 5.29-5.43 | 185-189 | 12,000-14,000 | ≤2 | ≥200 | High purity bisphenol-A based epoxy resin for CED application, low hydrolyzable chlorine content (200-300 ppm). |
| Quatrex® 1010 | 5.26-5.50 | 182-190 | 11,000-14,000 | - | - | High purity bisphenol-A based epoxy resin, very low hydrolyzable chlorine content (< 200 ppm). |
| MY 790-1 | 5.70-5.90 | 169-175 | 4,000-5,500 | - | >200 | High purity bisphenol-A based epoxy resin, extremely low total chlorine content (about 700 ppm) and hydrolyzable chlorine content (< 200 ppm). |
| Tactix®123 | 5.68-5.80 | 172-176 | 4,400-5,600 | - | - | Very low viscosity bisphenol-A based epoxy resin for applications such as filament winding. |
| CY 179 | 7.0-7.6 | 131-143 | 350-450 | ≤1 | 118 | Low viscosity cycloaliphatic epoxy resin for outdoor applications. |
| CY 184 | 5.80-6.10 | 164-173 | 700-900 | - | ≥169 | Low viscosity cycloaliphatic epoxy resin for outdoor applications. |

1) being semi-solid, this is determined with a 70% solution in butylcarbitol

Basic solid epoxy resins • Araldite®

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Colour [Gardner] | Softening point [°C] | Comments/Applications |
|-----------|---------------------|---------------------|---------------------------|------------------|----------------------|---|
| GT 7071 | 1.90-2.00 | 500-525 | 200-250 | ≤1 | 77-82 | Standard basic type-1 resin for corrosion protective coatings. |
| GT 7072 | 1.68-1.75 | 570-595 | 280-340 | ≤1 | 82-90 | Standard basic type-2 resin for high flow powder coating or corrosion protective coatings. |
| GT 7004 | 1.33-1.40 | 715-750 | 500-600 | ≤1 | 95-101 | General purpose type 3½ epoxy resin for hybrid and straight epoxy powder coatings with high storage stability and good overall properties. |
| GT 6084-2 | 1.12-1.20 | 833-890 | 550-700 | ≤2 | 99-105 | Type 4 epoxy resin for functional applications, with outstanding flexibility and storage stability. In very hot climates, improving the storage stability of decorative powder coatings. |
| GT 6097 | 0.53-0.59 | 1,695-1,885 | 1,800-2,600 | ≤1 | 120-132 | Standard type 7 epoxy resin for packaging and coil coating application when combined with phenol-formaldehyde or amino resins. Coatings show excellent chemical resistance and flexibility. |
| GT 6099 | 0.34-0.42 | 2,380-2,940 | 5,000-10,000 | ≤2 | 143-158 | Standard type 9 epoxy resin with better flexibility than Araldite® GT 6097. |
| GT 6609 | 0.34-0.42 | 2,380-2,940 | 3,500-5,500 | ≤1 | -150 | Similar to Araldite® GT 6099 adhesives with greatly reduced viscosity. |
| GT 6610 | 0.26-0.34 | 2,940-3,846 | 5,000-8,000 | ≤2 | -150 | Similar to Araldite® GT 6099 adhesives, ideal for more flexible and higher viscous lacquers. |
| GT 7220 | 1.83-1.93 | 518-546 | 460-670 | ≤2 | -95 | Type 4 solid epoxy resin modified with epoxy phenol novolac high reactivity, medium melt viscosity with low temperature curing capabilities. Improves thermal and chemical resistance over conventional epoxy resins. |
| GT 7255 | 1.17-1.29 | 775-855 | 1,430-1,850 | ≤1 | 106-113 | Type 7 solid epoxy resin modified with epoxy phenol novolac, for powder coatings showing good chemical resistance and mechanical performances. |
| GT 6450 | 1.37-1.56 | 640-730 | 350-500 | ≤2 | 91-94 | Type 2½ epoxy resin based on Araldite® GT 6063 resin modified with 2% flow agent. For the formulation of hybrids with excellent flow and good storage stability. Type 2½ epoxy resin based on Araldite® GT resin 6063 modified with 2% flow agent. For the formulation of hybrids with excellent flow and good storage stability. |

1) 40% solution in butylcarbitol

Basic epoxy resin solutions • Araldite®

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Colour [Gardner] | Solids [°C] | Comments/Applications |
|--------------|---------------------|---------------------|---------------------------|------------------|-------------|--|
| GZ 280 X 80 | 3.10-3.40 | 290-323 | 600-850 | ≤3 | 79.0-81.0 | Araldite® GY 280 resin in xylene. |
| GZ 290 X 90 | 3.30-3.70 | 270-305 | 1,300-3,700 | ≤6 | 89.0-91.0 | Modified semi-solid resin in xylene for high solid content coatings in ship-building, maintenance, and anti-corrosion protection. |
| GZ 7071 X 75 | 1.50-1.67 | 600-670 | 7,000-10,000 | ≤2 | 74.0-76.0 | Araldite® GT 7071 resin in xylene. |
| GZ 7488 V 40 | ≤0.06 | ≥17,000 | 3,000-6,000 | ≤4 | 39.0-41.0 | Epoxy resin solution with high molecular weight, mainly with amino and phenolformaldehyde resins for very flexible coil primers and to flexibilise can coatings. |
| GZ 7488 N 50 | ≤0.08 | ≥12,500 | 2,000-5,000 | ≤4 | 49.0-51.0 | Similar to Araldite® GZ 7488 V 40 resin but dissolved in MEK/cyclohexanon. Due to the MEK, preferably for ambient curing corrosion protection. |

Advanced Materials

Epoxy resins

Premium resins • Araldite®

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Colour [Gardner] | Flash point [°C] | Comments/Applications |
|---------|---------------------|---------------------|---------------------------|------------------|------------------|-----------------------|
|---------|---------------------|---------------------|---------------------------|------------------|------------------|-----------------------|

Bisphenol F and A/V pure • Araldite®

| | | | | | | |
|----------|-----------|-----------|-------------|----|------|---|
| GY 281 | 5.80-6.30 | 158-172 | 5,000-7,000 | <4 | ≥200 | Unmodified, bis F epoxy for coating, adhesives, composites and casting. |
| GY 282 | 5.80-6.10 | 164-172 | 3,000-4,000 | <5 | ≥200 | Low viscosity bis F epoxy for coating, adhesives, composites and casting. |
| GY 285 | 5.80-6.10 | 164-173 | 2,000-3,000 | <5 | ≥200 | Very low viscosity bis F epoxy for coating, adhesives, composites and casting. |
| PY 302-2 | 5.65-5.90 | 169-177 | 6,500-8,000 | <3 | ≥200 | BPA/BPF resin, absolutely no crystallization. |
| PY 304 | 5.50-5.80 | 172-182 | 6,500-8,000 | <3 | ≥200 | BPA/BPF resin, extremely low crystallization tendency. |
| PY 306 | 6.00-6.40 | 6.00-6.40 | 1,200-1,600 | - | ≥200 | High purity, very low viscosity bis F epoxy for coating, adhesives, composites and casting. |

Bisphenol F and A/V with reactive diluent • Araldite®

| | | | | | | |
|--------|-----------|---------|-------------|----|------|--|
| GY 191 | 4.95-5.25 | 190-208 | 500-1,000 | ≤3 | ≥155 | For solvent free coatings, mortars and injection system. |
| GY 253 | 5.40-5.80 | 172-185 | 800-1,300 | ≤2 | ≥145 | For solvent free coatings, mortars and injection system. |
| GY 257 | 5.20-5.50 | 182-192 | 500-650 | ≤3 | ≥120 | Good chemical resistance to acid but less resistant to solvents. |
| GY 298 | 2.20-2.50 | 400-455 | 2,000-4,000 | ≤2 | ≥188 | High flexibility, nearly non-crystallizing. |
| GY 776 | 5.10-5.40 | 185-196 | 2,700-3,800 | ≤2 | ≥190 | For solvent free coatings, dispersion coatings and adhesives. |
| GY 783 | 5.10-5.40 | 185-196 | 800-1,100 | ≤2 | ≥130 | For floorings and mortars application, flexibilizing. |

Toughened/Flexibilized Resins • Araldite®

| | | | | | | |
|-------------|-----------|-------------------------|---------------------------|----|------|--|
| GY 298 | 2.20-2.50 | 400-455 | 2,000-4,000 | ≤2 | ≥188 | High flexibility, nearly non-crystallizing. |
| XU 3508 | 4.85-5.20 | 191-206 | 11,000-13,000 | - | - | Liquid toughened epoxy resin based on bisphenol A for filament winding, pultrusion and adhesive applications. |
| DY 965 | - | 1.00-1.15 ²⁾ | 440-1,280 ³⁾ | - | ≥200 | Polyurethane polyol for high impact resistance epoxy resin for improving adhesion to metals and for dust-free electronics. |
| LT 1522 | 0.55-0.64 | 1,562-1,820 | - | - | - | Type-4 epoxy resin modified with CTBN copolymer for adhesives, composites and powder coating. |
| Tactix® 695 | 2.4-3.0 | 335-410 | 1,500-5,500 ³⁾ | - | 325 | Single phase toughened epoxy. |

1) 70°C; 2) OH+ Equiv. [eq/kg]; 3) 40°C, Pas

Reactive Diluents • Araldite®

| | | | | | | |
|---------|-----------|---------|---------|-----|------|---|
| DY-C | 5.60-6.00 | 167-179 | 60-90 | ≤2 | ≥130 | Diglycidylether of cyclohexane dimethanol. |
| DY-E | 3.05-3.35 | 299-328 | 4-12 | ≤2 | ≥155 | Monoglycidylether of C12-C14 alcohol. |
| DY-D | 8.00-8.50 | 118-125 | 15-25 | ≤2 | ≥156 | Diglycidylether of butanediol. |
| DY-F | 1.95-2.35 | 425-513 | 60-90 | ≤3 | ≥130 | Diglycidylether of polyoxypropylene glycol. |
| DY-H | 6.25-6.65 | 150-160 | 21-31 | ≤2 | ≥150 | Diglycidylether of 1.6-hexanediol. |
| DY-K | 5.30-5.70 | 175-189 | 6-12 | ≤2 | ≥125 | Monoglycidylether of cresol. |
| DY-L | 1.48-1.80 | 556-714 | 140-200 | ≤5 | ≥130 | Triglycidylether of polyoxypropylene glycol. |
| DY-P | 4.30-4.70 | 213-233 | 20-28 | ≤3 | ≥135 | Monoglycidylether of p-tert. butylphenol. |
| DY-T | 7.00-9.00 | 111-143 | 100-200 | ≤3 | ≥100 | Triglycidylether of trimethylpropane. |
| DY 3601 | 2.47-2.60 | 385-405 | 42-52 | ≤3 | ≥183 | Diglycidylether of polyoxypropylene glycol. |
| DY-CNO | 1.70-2.40 | 425-575 | 30-70 | ≤13 | ≥200 | Monoglycidylether of cashew nut shell liquid. |

Advanced Materials

Epoxy resins

Multifunctional resins • Araldite® / Tactix®

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Colour [Gardner] | Tg [DMA] ¹⁾ [°C] | Comments/Applications |
|---------|---------------------|---------------------|---------------------------|------------------|-----------------------------|-----------------------|
|---------|---------------------|---------------------|---------------------------|------------------|-----------------------------|-----------------------|

Epoxy Phenol Novolacs (EPN) • Araldite®

| | | | | | | |
|----------|-----------|---------|-----------------------------|----|-----|--|
| PY 307-1 | 5.60-5.90 | 165-179 | 30,000-50,000 | ≤4 | - | Lowest viscosity, pure EPN, functionality 2.2 for solvent free or high solid content coatings with high chemical resistance. |
| EPN 1179 | 5.60-5.80 | 172-179 | 1,100-1,700 ²⁾ | ≤3 | 200 | Semi-solid EPN, functionality 2.5 for solvent free or high solid content coatings with high chemical resistance. |
| EPN 1138 | 5.50-5.70 | 175-182 | 20,000-50,000 ³⁾ | ≤2 | 200 | Semi-solid EPN, functionality 3.6 for solvent free or high solid content coatings with high chemical resistance. |
| EPN 1183 | 6.30-6.90 | 145-159 | 7,000-11,000 | ≤3 | - | Medium viscosity, modified EPN, functionality 3.3. Used for coatings with high fuel resistance (with Aradur® 2973 hardener). |
| GY 289 | 5.70-6.00 | 167-175 | 7,000-11,000 | ≤5 | - | Low viscosity EPN, functionality 2.3. It's suitable for coatings coming into contact with foodstuffs according to FDA regulation 21 CFR 175.300. |

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Colour [Gardner] | Solids [°C] | Comments/Applications |
|---------|---------------------|---------------------|---------------------------|------------------|-------------|-----------------------|
|---------|---------------------|---------------------|---------------------------|------------------|-------------|-----------------------|

Epoxy Phenol Novolacs (EPN) solution • Araldite®

| | | | | | | |
|---------------|-----------|---------|-------------|----|-----------|-------------------------------------|
| EPN 1180 X 80 | 4.40-4.56 | 219-227 | 1,200-2,000 | ≤2 | 79.0-81.0 | Araldite® EPN 1138 resin in xylene. |
|---------------|-----------|---------|-------------|----|-----------|-------------------------------------|

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Softening point [Gardner] | Tg [DMA] ¹⁾ [°C] | Comments/Applications |
|---------|---------------------|---------------------|---------------------------|---------------------------|-----------------------------|-----------------------|
|---------|---------------------|---------------------|---------------------------|---------------------------|-----------------------------|-----------------------|

Epoxy Cresol Novolacs (ECN) • Araldite®

| | | | | | | |
|----------|-----------|---------|----------------------------|--------|-----|--|
| ECN 1273 | 4.30-4.60 | 217-233 | - | 68-78 | 200 | ECN with functionality 4.8. For high temperature adhesives, electrical and laminating product areas. |
| ECN 1280 | 4.30-4.70 | 212-233 | - | 78-85 | 200 | ECN with functionality 5.1. For high temperature adhesives, electrical and laminating product areas. |
| ECN 1299 | 4.10-4.60 | 217-244 | 7,000-15,000 ⁷⁾ | 85-100 | 200 | ECN with functionality 5.4. Highest melting ECN. |
| ECN 9511 | 4.40-5.00 | 200-227 | - | 32-42 | - | ECN with functionality 2.7. |
| ECN 9699 | 4.30-4.70 | 213-233 | 7,000-10,000 | 80-100 | - | ECN with high functionality (~5.5) as modifier in combination with standard epoxy resins or other multifunctional epoxy resins such as Araldite® GT 7220 resin and Araldite® GT 7255 resin for coatings showing very high chemical – and excellent temperature resistance. |

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Softening point [°C] | Tg [DMA] ¹⁾ [°C] | Comments/Applications |
|---------|---------------------|---------------------|---------------------------|----------------------|-----------------------------|-----------------------|
|---------|---------------------|---------------------|---------------------------|----------------------|-----------------------------|-----------------------|

Other multifunctional resins • Araldite® / Tactix®

| | | | | | | |
|-------------|----------|---------|-----------------------------|-------|-----|--|
| MY 0500 | 8.6-9.5 | 105-115 | 2,000-5,000 | - | 250 | Trifunctional low viscosity epoxy resin. Used for rapid cure adhesives, laminates, etc., having exceptional high heat deflection temperature. |
| MY 0510 | 9.3-10.5 | 95-107 | 550-850 | - | 250 | High purity MY 0500. Improved stability. |
| MY 0600 | 9.2-9.8 | 102-109 | 6,000-11,000 | - | 250 | High Tg low viscosity resin can be used for adjustments of multifunctional resin formulations, or to help the blending of tougheners. Also are frequently used in adhesive formulations to upgrade thermal performance of liquid epoxy resins. |
| MY 720 | 7.5-8.5 | 117-134 | 8,000-18,000 ³⁾ | - | 250 | Tetra-functional liquid epoxy resin. Excellent high temperature, chemical and radiation resistance. Used for high performance composites, adhesives, laminates and high-energy radiation resistant components. Suitable for continuous use in moist environment up to 120°C. |
| MY 721 | 8.6-9.1 | 109-115 | 3,600-5,000 ³⁾ | - | 250 | Lowest viscosity, tetra-functional epoxy resin with the same chemistry as MY 720. |
| XB 9721 | 8.6-9.1 | 109-115 | 3,600-5,000 ³⁾ | - | 250 | Industrial grade MY 721. |
| MY 9512 | 7.5-8.5 | 117-134 | 11,000-13,000 ³⁾ | - | 250 | Narrow viscosity of tetra-functional epoxy resin with the same chemistry as MY 720. |
| MY 9612 | 7.5-8.5 | 117-134 | 10,000-12,000 ³⁾ | - | 250 | Narrow viscosity of tetra-functional epoxy resin with the same chemistry as MY 720. |
| MY 9634 | 7.5-8.5 | 117-134 | 13,000-15,000 ³⁾ | - | 250 | Narrow viscosity of tetra-functional epoxy resin with the same chemistry as MY 720. |
| MY 9655 | 7.5-8.5 | 117-134 | 7,000-10,000 ³⁾ | - | 250 | Narrow viscosity of tetra-functional epoxy resin with the same chemistry as MY 720. |
| MY 9663 | 7.4-8.6 | 115-135 | 17,000-19,000 ³⁾ | - | 250 | Narrow viscosity of tetra-functional epoxy resin with the same chemistry as MY 720. |
| Tactix® 556 | 4.2-4.6 | 215-235 | 1,000-1,500 ⁴⁾ | ~53 | 235 | Dicyclopentadiene based epoxy. Very low moisture pickup. Recommended for adhesives and composites used at elevated temperatures in a moist environment. |
| Tactix® 742 | 5.9-6.7 | 150-170 | 25-60 ⁶⁾ | ~49 | 325 | Trifunctional epoxy with excellent Tg and thermal stability in the cured state. |
| Tactix® 756 | 3.7-4.1 | 245-265 | - | 77-87 | - | Hydrocarbon epoxy novolac resin with lower moisture absorption. Recommended for adhesives and composites used at elevated temperatures in a moist environment. |

1) when cured with Aradur® 976-1; 2) 52°C; 3) 50°C; 4) 85°C; 5) 70°C; 6) 150°C; 7) 40% solution in butylcarbitol

Special resins • Rhodafal®

Polyamide-imide (PAI) • Rhodafal®

| Product | Viscosity at 25°C [mPa s] | Solids [%] | Solvent | Tg [DMA] ¹⁾ [°C] | Relative thermal stability | Comments/Applications |
|---------------|---------------------------|------------|------------|-----------------------------|----------------------------|--|
| Rhodafal® 311 | 2,500-4,000 | 23-25 | NMP/Xylene | 280 | ••• | high temperature impregnation varnishes. |

Epoxy resins

Advanced Materials

Hardeners

Basic liquid epoxy resins • Aradur®

| Product | Viscosity at 25°C [mPa s] | Amine value [mg KOH/g] | Colour [Gardner] | H+ Equivalent [g/Eq] | Typical mix ratio [g/100g GY 250] | Gel time ¹⁾ [min] | Comments/Applications |
|---------|---------------------------|------------------------|------------------|----------------------|-----------------------------------|------------------------------|-----------------------|
|---------|---------------------------|------------------------|------------------|----------------------|-----------------------------------|------------------------------|-----------------------|

Polyamine based hardeners • Aradur®

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|----------------|-------------------------|-------------|-----|------|--------------------|----------------------|---|
| Aradur® 14 | 400-600 | 350-390 | ≤5 | 75 | 40 | 17 | Low moisture-sensitivity, high reactivity. Used for solvent free coating, flooring and mortar. Suitability for use with drink water systems. |
| Aradur® 3275 | 200-300 | 100-170 | ≤6 | 250 | 129 ⁷⁾ | 86 ⁸⁾ | Nonylphenol-free. Highly flexible, even down to -10 °C. Distinctly lower viscosity than Aradur® 75 hardener and even than Aradur® 76 hardener. For the production of nonylphenol-free viscoplastic binder systems, impact-elastic coatings, crack-covering membranes and liquid foils for sealing purposes. |
| Aradur® 835 | 600-1,200 ⁹⁾ | 180-210 | ≤5 | 200 | 115 | >1,200 ²⁾ | For absolutely non-blush solvent based coatings. FDA-and BGA approved for contact to foodstuffs. |
| Aradur® 837 | 2,900-3,600 | 395-415 | ≤2 | 66 | 35 | 15 | High reactivity, speeds slow hardeners with no negative effect. Tackyness can be eliminated by formulation. |
| Aradur® 847 | 150-300 | 350-375 | ≤2 | 75 | 40 | 30 | For solvent free coatings for lining containers in contact with potable water and non-fatty food. |
| Aradur® 3484 | 300-550 | 350-450 | ≤6 | 95 | 50 | 30 | All purpose hardener for SL flooring applications, good abrasion resistance. Recommended with Araldite® PY 3483 resin. |
| Aradur® 2863-1 | 50-250 | - | ≤18 | 6-38 | 3-20 ⁷⁾ | - | Liquid, solvent-free, latent, warm-curing catalytically active hardener. |
| Aradur® 943 | 3,400-5,000 | 730-840 | ≤5 | 38 | 20 | 10 | For the formulation of solvent free coatings with good resistance to alcohols. Tackyness can be eliminated by formulation. |
| Aradur® 956-2 | 290-500 | 1,020-1,080 | ≤4 | 47 | 25 | 35 | Low viscosity amine adduct, light colored, very reactive. For room temperature curing adhesives. |
| Aradur® 2958 | 190-250 | 954-999 | ≤7 | 33 | 18 | 8 | Very fast curing, for mortar, adhesives and chemically resistant solvent free coatings. |
| Aradur® 2963 | 30-70 | 325-350 | ≤2 | 85 | 45 | 40 | Very low viscosity, formulated light-coloured hardener for self levelling floorings and mortar (phenol-free). |
| Aradur® 2965 | 100-300 | 300-325 | ≤4 | 94 | 50 | 35 | Very low viscosity hardener for self levelling floorings and mortar. Good cure down to 5°C. Lowest tendency to waterspotting. |
| Aradur® 2973 | 900-1,400 | 300-335 | ≤7 | 85 | 45 | 35 | Possible replacement of aromatic amines. Same blush free cure. Higher flexibility and resistance to inorganic acids, lower resistance to organic acids. With EPN 1183 very good fuel resistance. |
| Aradur® 2992 | 10-20 | 575-605 | ≤2 | 55 | 30 | 5 | Very fast curing, for adhesives repair mortars and injection systems used with BY 158 or GY 783. |
| Aradur® 3224 | 30-90 | 300-320 | ≤1 | ~76 | 40 | 130 | Very low viscosity and low reactivity hardener for self levelling floorings and mortar. Suitable for hot countries or extending gel time of other fast amine hardeners. |
| Aradur® 3225 | 150-250 | 310-340 | ≤2 | ~75 | 40 | 48 | Medium reactivity as general purpose grade hardener for self-levelling flooring. Outstanding resistance to amine blushing and water spots. |
| Aradur® 3226 | 160-240 | 320-350 | ≤2 | ~76 | 40 | 25 | Fast curing for winter application or to speed up other slow amine hardeners for self-levelling flooring. Very good surface aspect, excellent resistance to amine blushing and water spots. |
| Aradur® 3233 | 130-190 | 300-340 | ≤1 | ~75 | 40 | 50 | Very light colour and excellent yellowing resistance. Outstanding resistance to amine blushing and water spots. Suitable for colour stone floors, handicraft products, adhesives and insulation materials. |
| Aradur® 3229 | 165-210 | 460-500 | ≤1 | ~80 | 40 | ~9 | Very fast curing for winter application or to speed up other slow amine hardeners for self-levelling flooring. |
| Aradur® 265-1 | 2,700-10,000 | - | ≤10 | 94 | 50 | 49 ⁹⁾ | Exceptional resistance to H2SO4 (96-98%) used with EPN 1138 . |

Aromatic amine based hardeners • Aradur®

| | | | | | | | |
|-------------------|---------------|---------|-----|-----|----|------|---|
| Aradur® 830 | 3,800-5,800 | 260-285 | ≤10 | 114 | 60 | >300 | With Aradur® 850 hardener for solvent free coatings or adhesives with high chemical resistance (organic acids). Extremely long pot life. Absolutely no blushing. |
| Aradur® 850 | 15,000-21,000 | 245-270 | ≤12 | 120 | 65 | 15 | With Aradur® 830 hardener for solvent free coatings or adhesives with high chemical resistance (organic acids). Extremely long pot life. Absolutely no blushing. |
| Aradur® 2969 | 700-900 | 260-280 | ≤12 | 114 | 60 | 90 | For solvent free coatings with high chemical resistance (organic acids and also fuels). Absolutely no blushing. |
| Aradur® 863 XW 80 | 9,000-11,000 | 300-345 | ≤12 | 96 | 51 | 412 | For solvent based and high solid coatings. Absolutely no blushing, very high resistance to organic acids. With Aradur® 943 hardener or Aradur® 22 hardener to resist even crude methanol. |

Phenalkamine • Aradur®

| | | | | | | | |
|--------------------|---------------|---------|-----|---------|----|-----|---|
| Aradur® 3440 | 1,000-3,000 | 475-505 | ≤17 | ~80 | 43 | 35 | For fast-curing solvent-free anticorrosion coatings. Can blush. |
| Aradur® 3441 | 10,000-50,000 | 290-325 | ≤17 | ~130 | 80 | 60 | For fast-curing solvent-based or HS marine coatings. Low blush. To make no-blush adducts. |
| Aradur® 3442 | 1,000-5,000 | 320-350 | ≤17 | ~125 | 60 | 35 | Low-viscous version of Aradur® 3441 hardener. |
| Aradur® 3460 | 2,000-5,000 | 305-335 | ≤17 | 120 | 65 | - | For high solids and solvent-free marine coatings down to 0°C. Non-blush under difficult conditions. (Ballast-tank coating in winter.) |
| Aradur® 3467 XW 70 | 1,000-3,000 | 170-210 | ≤18 | 180-220 | - | 120 | Phenalkamine adduct for fast-curing solvent-based or high solids marine coatings. |

Pure Amine • Aradur®

| | | | | | | | |
|------------|--------|---------|----|----|----|-----|---|
| Aradur® 21 | ≤10 | 680-720 | ≤1 | 40 | 21 | 60 | Aliphatic polyamine. Mostly in formulated form for solvent-free coatings, solvent-free self-levelling floorings and mortars. |
| Aradur® 22 | ≤8 | 810-830 | ≤2 | 34 | 18 | 60 | Aliphatic polyamine. Mostly in formulated form for solvent-free coatings, solvent-free self-levelling floorings and mortars. |
| Aradur® 40 | 80-100 | 460-480 | ≤1 | 60 | 31 | 450 | Cycloaliphatic polyamine. Mostly in formulated form for solvent-free coatings, solvent-free self-levelling floorings and mortars. |
| Aradur® 42 | 10-20 | 645-665 | ≤1 | 42 | 22 | 120 | Cycloaliphatic polyamine. Mostly in formulated form for solvent-free coatings, solvent-free self-levelling floorings and mortars. |

Advanced Materials

Hardeners

| Product | Viscosity at 25°C [mPa s] | Amine value [mg KOH/g] | Colour [Gardner] | H+ Equivalent [g/Eq] | Typical mix ratio [g/100g] | Gel time ¹⁾ [min] | Comments/Applications |
|---------------------------------|---------------------------|------------------------|------------------|----------------------|----------------------------|------------------------------|--|
| Polyamidoamine • Aradur® | | | | | | | |
| Aradur® 100 | 700-1,100 ¹⁾ | 83-93 | ≤10 | -475 | 100 | >1000 ²⁾ | Semi-solid PAA. For solvent based coatings and as additive for hot melts. |
| Aradur® 115 | 3,100-3,700 ³⁾ | 240-260 | ≤10 | -240 | 50 | >1000 ²⁾ | Very high viscosity. The standard product for solvent based coatings, reactive adhesives. Optimal salt spray resistance. |
| Aradur® 125 | 700-900 ⁴⁾ | 340-370 | ≤10 | -130 | 65 | 120 | For reactive adhesives. solvent based coatings, mastics. |
| Aradur® 140 | 300-600 ⁵⁾ | 370-410 | ≤10 | -95 | 50 | 120 | For reactive adhesives, castings, heat-resistant mortars. |
| Aradur® 145 | 2,400-4,000 | 380-420 | ≤10 | -95 | 50 | 180 | Coatings, mastics, mortars, adhesives, castings. Similar to Aradur® 140 hardener, but lower viscous. |
| Aradur® 250 | 400-700 | 425-455 | ≤8 | -95 | 50 | 60 | Low viscosity PAA for mortars, adhesives, mastics. |
| Aradur® 350 | 100-400 | 370-410 | ≤10 | -95 | 50 | 180 | Mortars, castings. Long pot life, good physical properties. |
| Aradur® 370 | 150-350 | 480-520 | ≤10 | -95 | 50 | 70 | Mortars, castings and adhesives. |
| Aradur® 450 | 1,000-2,000 | 250-290 | ≤10 | 115 | 60 | 60 | Outstanding adhesion to wet concrete. Suitable for concrete primers, high solids coatings for corrosion protection under severe conditions and marine maintenance. |
| Aradur® 450S | 600-1,400 | 270-310 | ≤10 | 115 | 60 | 36 | Faster version of Aradur® 450 hardener |
| Aradur® 955 | 500-900 | 520-580 | ≤12 | 65 | 35 | 30 | With Araldite® BY 157 resin for mat, self-levelling floorings. |

Polyamidoamine and polyamine based hardeners solutions • Aradur®

| Product | Viscosity at 25°C [mPa s] | Amine value [mg KOH/g] | Colour [Gardner] | H+ Equivalent [g/Eq] | Typical mix ratio [g/100g] | Solids [%] | Comments/Applications |
|--------------------|---------------------------|------------------------|------------------|----------------------|----------------------------|------------|---|
| Aradur® 100 X 60 | 2,100-3,500 | 49-57 | ≤10 | -790 | 166 ²⁾ | 59-61 | 60% Aradur® 100 hardener solution in xylene. |
| Aradur® 115 X 70 | 750-1,250 | 168-182 | ≤10 | -340 | 70 ³⁾ | 69-71 | 70% Aradur® 115 hardener solution in xylene. |
| Aradur® 422 XW 70 | 6,000-12,000 | 140-170 | ≤10 | -340 | 70 ³⁾ | 69-71 | Polyamidoamine adduct in xylene/n-butanol (3:2). Tack-free cure up to 70% humidity. |
| Aradur® 423 XW 60 | 800-1,400 | 122-138 | ≤10 | -520 | 110 ²⁾ | 59-61 | Polyamidoamine adduct in xylene/n-butanol (4:1). Tack-free cure up to 80% humidity. |
| Aradur® 424 XW 50 | 600-2,400 | 80-110 | ≤10 | -785 | 165 ²⁾ | 49-51 | Polyamidoamine adduct in xylene/n-butanol (4:1). Tack-free cure up to 100% humidity. |
| Aradur® 460 J 90 | 2,500-5,500 | 240-270 | ≤10 | 190 | 100 | 82-84 | For high solid coatings, mortars, concrete adhesives, extreme humidity, underwater coatings. |
| Aradur® 30 XWM 55 | 2,000-2,800 | 104-120 | ≤8 | -370 | 74 ⁴⁾ | 54-56 | Non-blush solvent based coatings. Fast cure, good chemical resistance, particularly with EPN resins. FDA/BGA approved for food contact. |
| Aradur® 3776 XW 55 | 1,500-2,500 | 100-120 | ≤8 | 350 | 185 | 54-56 | Similar to Aradur® 30 XWM 55 BD, but no methoxypropanol. It is Aradur® 835 hardener in solution. Free amine content < 0.9%. |

1) Tecam 250g GY 250 at 23°C; 2) with GT 7071; 3) 30% xylene/n-butanol (1:1) solution; 4) 150°C; 5) 75°C; 6) 110g GY 6010 at 23°C; 7) with GY 783; 8) Tecam 250g GY 783 at 23°C

Latent hardeners • Aradur®

| Product | Supply form | Mean particle size [µm] | Softening point [°C] | H+ Equivalent [g/Eq] | Gel time ¹⁾ [min] | Comments/Applications |
|----------------|---------------------------|-------------------------|-----------------------|----------------------|------------------------------|--|
| Aradur® 2844 | Powder | <75 | 139-143 ²⁾ | 37 | 10 ³⁾ | Dicyandiamide derivative with good solubility in epoxy resins providing excellent transparency in clear coats. Outstanding flow, high gloss, good mechanical strength and good chemical resistance. |
| Aradur® 3082 | Granulate | - | 73-83 | 230-250 | 73 sec ⁴⁾ | Suitable for low temperature and rapid (at high temperature) curing powder coatings with good flow, high solvent, chemical and corrosion resistance. |
| XB 3086 | Flakes | - | 84-94 | - | 48 sec ⁵⁾ | Used to formulate low bake (approx. 120°C), fast curing powder coatings. |
| Aradur® 3088 | Coarse powder | - | 85-105 ²⁾ | - | 41 sec ⁶⁾ | Solid epoxy amine adduct with high reactivity. Used as an accelerator and a co-hardener for epoxy powder coatings. |
| Aradur® 3261-1 | Granulate | - | 90-100 | - | 50 sec ⁵⁾ | Solid epoxy amine adduct with high reactivity designed for low temperature (<150°C) cure of epoxy powder coatings. |
| Aradur® 9690 | Flakes | - | 100-105 | ~ 115 | - | Cresol novolac hardener used in combination with multifunctional epoxies such as Araldite® ECN 1299 resin for the formulation of high temperature and chemical resistant powder coatings. |
| Aradur® 9506 | Powder | - | 90-100 | 35 | 10 | Modified polyamide hardener. Excellent shelf life with a six month latency at room temperature. Excellent adhesion, good mechanical, highly reactive at 100°C. Suitable for one part adhesive, tooling, vinyl plastisols, dipping compounds. |
| Aradur® 9664-1 | Tan colored powder | <64 | 174-178 | 63 | 180 | Micropulverized 4,4'-DDS. Excellent high temperature and chemical resistance. Suitable for adhesives, prepreps, composites and PWB laminates. |
| Aradur® 9719-1 | White to off-white powder | <60 | 165-175 | 63 | - | Micropulverized 3,3'-DDS. Excellent high temperature and chemical resistance. Suitable for adhesives, prepreps, composites and PWB laminates. |
| Aradur® 5200 | Clear, brown liquid | - | - | 45 | 480 ⁷⁾ | Low viscosity liquid aromatic amine for adhesives, filament winding and RM application. |
| DY 9577 | Amber or brown semi-solid | - | 26-35 ²⁾ | - | 10 ⁸⁾ | High activity above 120°C used for casting, encapsulation, filament winding, pultrusion, molding and electrical tape application |

1) with GY 6010, 100°C; 2) Melting point; 3) 120°C; 4) with GT 1999, 180°C; 5) with GT 6063, 180°C; 6) with GT 7013, 150°C; 7) with GY 6010, 35°C; 8) with GY 6010, 130°C

Advanced Materials

Accelerators Additives

Accelerators

| Product | Viscosity at 25°C [mPa s] | Amine value [mg KOH/g] | Colour [Gardner] | H+ Equivalent [g/Eq] | Softening point [°C] | Comments/Applications |
|-------------------|---------------------------|------------------------|------------------|----------------------|-----------------------|---|
| Accelerator 960-1 | 120-250 | 560-675 | ≤8 | -20 | - | Tertiary amine accelerator for polyamine, polyamidoamines and anhydrides. |
| Accelerator 2950 | 2,000-6,000 | 640-700 | ≤10 | -75 | - | Stable with all Aradur® hardeners. In type 1 EP/PAA same effect as Accelerator 960-1, but double the potlife. Solventfree systems open to foot traffic in less than a day at 5°C. |
| Accelerator 3130 | 10-100 | - | ≤3 | - | - | Extreme, unique speeding of drying time (less than half an hour). |
| DT 3126-2 | Fine powder | - | White | - | 100-110 ²⁾ | Accelerator for hybrid, polyester/TGIC, polyester/Araldite® PT 910 additive and polyester/Araldite® PT 912 additive powder coatings. |
| XB 5730 | - | - | - | - | - | Latent microgel carried imidazole type accelerator with excellent resistance against shear forces. |
| DY 070 | 1-5 | - | ≤3 | - | - | Heterocyclic amine. Used with anhydride hardeners to improve reactivity. |

Additives

Crosslinker for powder coatings

| Product | Supply form | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Melting point (DSC) [°C] | Comments/Applications |
|---------|---------------------|---------------------|---------------------|--------------------------|--|
| PT 710 | Pellets (dust free) | 8.80-9.80 | 102-114 | 84-98 | General purpose TGIC crosslinker in granules for the formulation of weatherable polyester powder coatings. |
| PT 810 | Pellets (dust free) | 9.3-10.00 | 100-108 | 88-98 | TGIC crosslinker in low dust supply form suitable for high quality weatherable polyester powder coatings. |
| PT 910 | Granulate | 6.50-7.10 | 141-154 | 90-102 | Multifunctional glycidylester crosslinker for TGIC free weatherable polyester powder coatings. |
| PT 912 | Granulate | 6.50-7.10 | 141-154 | 82-96 | High quality multifunctional glycidylester weatherable epoxy crosslinker with higher functionality than Araldite® PT 910 additive. |

Matting agents for powder coatings

| Product | Supply form | Softening point [°C] | Flash point [°C] | Comments/Applications |
|-----------|---------------|-----------------------|------------------|---|
| DT 125-2 | Fine powder | 59-71 ¹⁾ | ≥200 | Solid, wax-free, non-yellowing matting agent for epoxy/polyester hybrid and for polyester/Araldite® PT 810 additive powder coatings. The gloss range covered is >35 for hybrids and >70 for Araldite® PT 810 based systems. |
| DT 3329-1 | Coarse powder | 109-117 ²⁾ | ≥200 | Wax containing matting agent for weatherable polyester as well as for epoxy/polyester hybrid powder coatings. The gloss range covered is >25 for hybrids; >40 for polyester/Araldite® PT 810 based systems and >65 for polyester/Araldite® PT 910 or Araldite® PT 912 additive. |
| DT 3330 | Fine powder | 127-137 ²⁾ | >250 | Solid, wax-free matting agent for weatherable, non-yellowing polyester powder coatings cured with Araldite® PT 912 additive in the gloss range 60-80 or for low gloss dry blend systems. |
| DT 3360 | Fine powder | 120-135 ²⁾ | >250 | Solid, wax-free, non-yellowing matting agent for epoxy/polyester hybrid powder coatings in the gloss range 15-40. |

Additives for coatings

| Product | Supply form | Epoxy index [Eq/kg] | Flash point [°C] | Comments/Applications |
|---------|-------------|---------------------|------------------|--|
| DW 1765 | Paste | 1.20-1.60 | >100 | Mostly eliminates or greatly reduces exudation / blushing / tackyness and sensitivity to water (water spotting). |

1) ISO11357-3; 2) DIN 51920

Advanced Materials

Waterborne system

Waterborne System: Hardeners • Aradur®

| Product | Viscosity at 25°C [mPa s] | Amine value [mg KOH/g] | H+ Equivalent [g/Eq] | Colour [Gardner] | Solids [°C] | Comments/Applications |
|------------------|---------------------------|------------------------|----------------------|------------------|-------------|---|
| Aradur® 35 | 19,000-35,000 | 100-120 | ~380 | ≤6 | 51-55 | Polyamine adduct in water with fast low-temperature cure. |
| Aradur® 36 | 4,000-7,000 | 185-225 | ~165 | ≤6 | 79-81 | Polyamine adduct in water with good handling and flow. Suitable for waterborne coating and ECC. High solid content. |
| Aradur® 38 | 17,000-23,000 | 170-210 | ~150 | ≤6 | 79-81 | Polyamine adduct in water with good handling and flow. Suitable for waterborne coating and ECC. |
| Aradur® 39 | 12,000-20,000 | 120-140 | ~335 | ≤5 | 49-51 | Polyamine adduct in water with long pot life, fast cure. (Not recommended with solid resin). |
| Aradur® 429 Z 75 | 10,000-20,000 | 210-240 | ~190 | ≤10 | 74-76 | Polyamidoamine adduct in ethanol/sopropanol/Shellsol A (2:2:1). |
| Aradur® 435 | 13,000-23,000 | 160-200 | ~250 | ≤10 | 49-51 | Polyamidoamine adduct in water for waterborne coatings and adhesives. |
| Aradur® 340 | 18,000-23,000 | 155-175 | ~210 | ≤12 | 49-51 | Polyamidoamine in water with particularly good adhesion and flexibility. |
| Aradur® 3985 | 2,000-6,000 | 170-210 | ~265 | ≤6 | 54-56 | Modified polyamine adduct in water. Suitable for flooring and mortar. |
| Aradur® 3985S | 4,000-8,000 | 200-250 | ~210 | ≤6 | 54-56 | Similar to Aradur® 3985 hardener, fast cure. Suitable for flooring and mortar. |
| Aradur® 3986 | 15,000-35,000 | 90-110 | ~415 | ≤6 | 39-41 | Modified polyamine adduct in water for the formulation of water-based coatings for application to mineral and metallic substrates. No flash rust inhibitor necessary. |
| Aradur® 23919 | 110,000-145,000 | - | ~355 | light yellow | 26-30 | Polyamidoamine aqueous dispersion for ambient cure with Araldite® GY 23919 resin in 1:1 mix ratio for multipurpose concrete coating applications. |

Waterborne System: PU flooring • Arathane®

| Product | Epoxy index [Eq/kg] | Epoxy equiv. [g/Eq] | Viscosity at 25°C [mPa s] | Colour [Gardner] | Solids [%] | Comments/Applications |
|-----------|---------------------|---------------------|------------------------------|------------------|------------|--|
| PY 340-2 | 5.50-5.80 | 172-182 | 6,000-8,000 | ≤3 | 100 | Dispersible in water, non-crystallizing. Used for waterborne coating and ECC. |
| PZ 323 | 4.00-4.50 | 222-250 | Slightly thixotropic | white | 75-78 | Aqueous dispersion of polyfunctional EPN resin with good abrasion resistance, toughness and chemical resistance. Used for coatings, adhesives, fiber-sizing, textiles and paper treatment. |
| PZ 756/67 | ~3.55 | ~282 | ~ 5000 at 20 °C, thixotropic | white | 66-68 | Aqueous dispersion of liquid non-crystallizing resin. |
| PZ 3901 | 1.77-1.98 | 505-565 | 7,000-20,000 | white | 53.5-56.5 | Aqueous dispersion of Type-1 solid resin ² . Used for coatings, adhesives, fiber-sizing, textiles and paper treatment. |
| PZ 3907-1 | 0.45-0.57 | 1,800-2,200 | 8,000-20,000 | white | 52-55 | Aqueous dispersion of Type-7 solid resin ² . Used for coatings, adhesives, fiber-sizing, textiles and paper treatment. |
| PZ 3921 | 1.47-1.64 | 610-680 | 250-450 | white | 49-51 | Formulated waterborne epoxy emulsion designed for ambient temperature curing coatings in combination with a carboxyl-functional acrylic latex or waterborne amine Hardeners. |
| ECN 1400 | 4.00-4.50 | 220-250 | 900-1,500 | white | 39-41 | Aqueous dispersion of polyfunctional ECN resin with improved adhesion, temperature and chemical resistance. Used for coatings, adhesives, fiber-sizing, textiles and paper treatment. |
| GY 23919 | 3.08-3.28 | 305-325 | 20,000-30,000 | white | 60-66 | Aqueous dispersion for ambient cure with Aradur 23919 hardener in 1:1 mix ratio for multipurpose concrete coating applications. |

1) 23°C; 2) in water and 2-propoxyethanol

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For more information

EUROPE / AFRICA Huntsman Advanced Materials (Switzerland) GmbH • Klybeckstrasse 200 P.O. Box 4002 Basel • Switzerland • Tel +41 61 299 11 11 • Fax +41 61 299 11 12

INDIA / MIDDLE EAST Huntsman Advanced Materials (India) Pvt. Ltd • 5th Floor, Bldg. No. 10 Solitaire Corporate Park • 167, Guru Hargovindji Marg, Chakal Andheri (East) • Mumbai - 400 093 India • Tel +91 22 4095 1556 - 60 • Fax+91 22 4095 1300/1400/1500

AMERICAS Huntsman Advanced Materials Americas Inc. • 10003 Woodloch Forest Drive The Woodlands • Texas 77380, USA • Tel +1 888 564 9318 • Fax +1 281 719 4047

ASIA / PACIFIC Huntsman Advanced Materials (Guangdong) Co., Ltd • Rooms 4903-4906, Maxdo Centre, 8 Xing Yi Road, Shanghai 200336, China • Tel +86 21 2208 7588 • Fax +86 21 2208 7511

www.huntsman.com/advanced_materials
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