

# Coatings and Construction Applications

Epotec Epoxy Systems



## Epotec<sup>®</sup> Epoxy Products for Coatings & Civil Applications

### Epotec<sup>®</sup> Epoxy Resins - Bisphenol A Type

#### Unmodified Resins

Unmodified Bisphenol-A-based Epotec Epoxy Resins are mainly used for protective coatings, Industrial maintenance paints, underwater coatings, structural adhesives and civil engineering applications.

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
YD 124	192 - 204	4,000 -7,000	1	Low viscosity modified epoxy resin with better crystallization resistance.
YD 125	169 - 176	3,500 - 4,500	0.5	High purity BisphenolA based liquid epoxy resin
YD 125	172 - 178	4,000 - 6,000	0.5	High purity BisphenolA based liquid epoxy resin
YD126	178 - 186	7,500 - 10,000	0.5	Unmodified low viscosity grade
YD127	180 - 188	8,000 - 11,000	0.5	Standard grade, low viscosity.
YD127LC	180 - 190	9,500 - 12,500	0.5	Less crystallization tendency.
YD128	185 - 194	11,000 -14,000	0.5	General purpose resin.
YD128ED	185 - 194	11,000 -13,500	0.5	Very high purity liquid resin for use in electro-deposition paints, electrical and electronic components.

<sup>1</sup>Epoxy Equivalent Weight (gm / eq), <sup>2</sup>Brookfield Viscosity @ 25°C (cPs), <sup>3</sup>Gardner Colour scale (max)

#### Solution-Cut Solid / Semi-Solid BP-A based Resins

Solution-Cut BP-A based Epotec<sup>®</sup> Epoxy Resins have low molecular weight and are supplied in solution form for the ease of processing. They find usage in solvent-based protective coatings, marine paints and varnishes. They offer the advantages of faster drying and longer pot life compared to standard liquid epoxy resins.

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	%NV <sup>4</sup>	Features
YD 134X80	240 - 260	500 – 1500	0.5	79 - 81	Low VOC coatings, high chemical resistance.
YD 134X90	240 - 260	10000 – 20000	0.5	89 – 91	Low VOC coatings, high chemical resistance.
YD 136X80	290 - 335	2500 - 5000	0.5	79 - 81	Low VOC coatings, high chemical resistance.
YD011X75	450 - 500	8000 – 13000	0.5	74 – 76	Standard Type 1 solid BPA resin supplied in Xylene
YD 901EK80	460 – 500	4000 – 8000	1	79 – 81	Type 1 solid resin supplied in MEK for faster drying coatings
YD 012X75	660 - 720	45000 – 90000	0.5	74 - 76	Type 2 solid BPA resin supplied in Xylene. Gives higher flexibility and very fast drying.

NOTE: X-Xylene

<sup>1</sup>Epoxy Equivalent Weight (grams / equivalent) on solid resins, <sup>2</sup>Brookfield Viscosity @ 25°C (cPs), <sup>3</sup>Gardner Colour Scale (max)

## Epotec<sup>®</sup> Epoxy Resins - Bisphenol - F Type

### Liquid Bisphenol – F Resins

Unmodified Bisphenol-F based Epotec Epoxy Resins have very good chemical resistance, good mechanical properties and are lower in viscosity compared to Bisphenol – A based resins. When properly formulated with Bisphenol- A resins they help reduce crystallization tendency and find applications in adhesives, laminates, coatings & civil engineering.

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
YDF170	160 - 180	2,000 - 5,000	3	Low viscosity liquid resin with better chemical and acid resistance
YDF171	170 - 180	5,000 - 7,000	1	Bisphenol-F resin for high solid coatings, adhesives and laminates
YDF170LV	160 - 170	2,000 - 3,000	1	Lower viscosity, standard resin.
YDF173	167 - 175	11,000 - 15,000	1	Higher functionality than standard Bisphenol-F resin, improved chemical resistance.
YDF 172	165 - 175	3,000 - 5,000	1	Higher crystallisation resistance than standard YDF 170
YDF 172LV	165 - 175	2,000 - 3,000	1	Low viscosity with high crystallisation resistance.

<sup>1</sup>Epoxy Equivalent Weight (gm / eq), <sup>2</sup>Brookfield Viscosity @ 25°C (cPs), <sup>3</sup>Gardner Colour scale (maximum)

### Epoxy<sup>®</sup> Phenol Novolac Resins

High functionality liquid resins offering increased temperature and chemical resistance. Suitable for use in high temperature resistant adhesives, corrosion resistant coatings, industrial maintenance paints, chemical resistant coatings & linings.

Epotec Grade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	FN <sup>4</sup>	Features
YDPN 631	172 - 180	1,100 - 1,700	1	2.8	Lower viscosity and lower functionality version of YDPN 638
YDPN 638	175 - 182	20,000 - 50,000	1	3.6	Standard Epoxy Novolak Resin. High Viscosity, Highest Functionality Available
YDPN 638LV	171 - 182	20,000 - 30,000	1	3.6	Lower viscosity version of YDPN 638
YDPN 661	170 - 178	20,000 - 40,000 <sup>5</sup>	3	2.5	Lowest viscosity novolak resin.
YDPN 638X80	175 - 182*	200 - 600 <sup>5</sup>	2	-	Solution of EPN in Xylene
YDPN 638EK85	175 - 182*	600 - 1,600	2	-	Solution of EPN in MEK solvent. . Faster drying characteristics than Xylene version..

<sup>1</sup>Epoxy Equivalent Weight (grams / equivalent) on solid resins, <sup>2</sup>Brookfield Viscosity @ 52°C (cPs), <sup>3</sup>Gardner Colour Scale (max), <sup>4</sup>Functionality, <sup>5</sup>Brookfield viscosity @ 25°C (cPs), <sup>6</sup>Brookfield Viscosity @ 130oC (P) NOTE: \* on solids

## Epoxy<sup>®</sup> Bisphenol - A Novolac Resins

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	FN <sup>4</sup>	Features
YDBN 602	195 - 230	10 - 60	6	-	High functionality BPA novolac based epoxy resin with excellent temperature and chemical resistance

<sup>1</sup>Epoxy Equivalent Weight (grams / equivalent) on solid resins, <sup>2</sup>Brookfield Viscosity @ 52°C (cPs), <sup>3</sup>Gardner Colour Scale (max), <sup>4</sup>Functionality, <sup>5</sup>Brookfield viscosity @ 25°C (cPs), <sup>6</sup>Brookfield Viscosity @ 130oC (P) NOTE: \* on solids

## Reactive Diluents

Epotec<sup>®</sup> Reactive Diluents are low viscosity epoxy group-containing functional products that can react with curing agents in a similar fashion to liquid epoxy resins. Reactive diluents are mainly used to reduce the viscosity of the base resin, to improve handling and ease of processing in various applications. They can also be used to optimize performance properties such as impact strength, flexibility, filler-loading and solvent resistance of the epoxy system.

Epotec<sup>®</sup> Reactive Diluents are mainly divided into three groups - Aliphatic, Aromatic and Cycloaliphatic. They are further classified based on their functionality as Mono-Functional (MGE), Di-Functional (DGE) and Tri-Functional (TGE) Glycidyl-Ethers.

## Mono-Functional Aliphatic Reactive Diluents

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
RD 108	275 - 300	5 - 10	0.5	C12-C14 -MGE. High Dilution Efficiency. Can reduce brittleness
RD 109	275 - 300	5 - 10	0.5	C12-C13 -MGE. High Dilution Efficiency
RD 110	215 - 230	2 - 15	0.5	2-Ethyl-hexyl-MGE. Highest Dilution Efficiency
RD 118	225 - 245	4 - 9	0.5	C8 - C10-MGE. High Dilution Efficiency

<sup>1</sup>Epoxy Equivalent Weight (grams / equivalent), <sup>2</sup>Brookfield Viscosity @ 25°C (cPs), <sup>3</sup>Gardner Colour scale (maximum)

## Di-Functional Aliphatic Reactive Diluents

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
RD 103	130 – 145	12 - 22	0.5	1.4-Butanediol-DGE. Moderate dilution efficiency.
RD 103LE	120 – 130	10 - 20	0.5	1.4-Butanediol-DGE. Lower EEW with improved dilution efficiency
RD 107	140 – 155	15 - 25	0.5	1.6-Hexanediol-DGE. Moderate dilution Efficiency.
RD 111	145 – 165	45 - 75	0.5	Cyclohexane-dimethanol-DGE. Moderate dilution Efficiency
RD 114	140 - 160	15 - 25	0.5	Neopentyl-glycol-DGE. Moderate dilution Efficiency
RD 114LE	130 – 145	15 - 25	0.5	Neopentyl-glycol-DGE. Lower EEW with improved dilution efficiency
RD 119	330 - 360	40 - 60	1	Polypropylene-glycol-DGE. Imparts flexibility, improves impact resistance and tensile elongation

RD 130SP	109 - 136	13 - 30	3	Ethylene-glycol-DGE. Moderate dilution efficiency.
RD 133	390 - 470	400 - 900	10	Dimer acid-DG-Ester. Imparts flexibility, maintains hydrophobicity, can optimise corrosion resistance. Low dilution efficiency
RD 119ED	385 - 405	37 - 47	3	Polypropylene glycol based glycidyl ether.
RD 121	165 - 180	15 - 30	0.5	Dipropylene glycol diglycidyl ether
RD 130SP	109 - 136	13 - 30	3	Ethylene glycol diglycidyl ether
RD 133	390 - 470	400 - 900	10	Dimer acid diglycidyl ester, low viscosity flexibilizer. Improves toughness of epoxy systems.

### Tri-functional Aliphatic Reactive Diluents

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
RD 113	130 - 150	100 - 250	0.5	Trimethylol-propane-TGE.
RD 124	500 - 600	250 - 500	8	Castor Oil-TGE. Imparts flexibility, can improve impact resistance. Low dilution efficiency

<sup>1</sup> Epoxy Equivalent Weight (gm / eq), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Gardner Color Scale (Maximum)

### Multi-functional Aliphatic Reactive Diluents

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
RD 129	150 -165	700 - 1,000	0.5	Penta -erythritol based polyglycidyl ether
RD 131	160 -180	1,000 - 1,360	1	Medium viscosity polyglycerol based glycidyl ether. Low dilution efficiency

<sup>1</sup> Epoxy Equivalent Weight (gm / eq), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Gardner Color Scale (Maximum)

## Mono- Functional Aromatic Reactive Diluents

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
RD 104	155 - 170	2 - 15	0.5	Phenyl GE - High dilution efficiency. High Mechanical Strength and chemical resistance
RD 105	175 - 190	5 - 10	0.5	Cresyl GE – High dilution efficiency. High Mechanical Strength and chemical resistance.
RD 105HP	162 - 174	4 - 9	0.1	High purity cresyl GE. Higher Dilution efficiency
RD 106	215 - 240	10 - 30	0.5	p-tertiary Butyl phenyl GE – low odour, low dilution efficiency. Can improve crystallisation resistance.
RD 136	200 - 220	5 - 10	0.5	MGE of benzylic alcohol with good dilution efficiency , heat resistance and low toxicity
RD 138	300 - 325	100 - 140	2	Nonyl-Phenol GE

<sup>1</sup> Epoxy Equivalent Weight (gm / eq), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Gardner Color Scale (Maximum)

## Di- Functional Aromatic Reactive Diluents

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
RD 137	120 - 135	300 - 500	2	Resorcinol based GE. Low dilution efficiency Good mechanical properties. Good heat and chemical resistance.

<sup>1</sup> Epoxy Equivalent Weight (gm / eq), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Gardner Color Scale (Maximum)

## High Performance Multi-functional Epoxy Resins

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
YDM 441	111 -117	3,000 - 6,000 <sup>4</sup>	-	Tetra-glycidyl ether of MDA
YDM 450	105 - 115	1,000 - 4,000	-	PAP based trifunctional epoxy Resin
YDM 451	95 - 106	550 - 850	11	High purity PAP based trifunctional Epoxy Resin

<sup>1</sup> Epoxy Equivalent Weight (gm / eq), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Gardner Colour scale (max), <sup>4</sup> cPs at 50°C

## Reactive Diluents Modified Resins

Blends of liquid BPA resin and RD are available in various viscosities and are mainly used for applications in civil engineering, adhesives and low VOC coatings.

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
YD508	178 - 185	800 - 1,100	0.5	Aromatic reactive diluent modified, very low crystallization tendency.
YD510	185 - 200	1,500 - 2,000	0.5	Aliphatic reactive diluent modified, good mechanical and impact properties.
YD515	195 - 210	600 - 900	0.5	Aliphatic reactive diluent modified, low viscosity, better flexibility and impact strength.
YD519	182 - 196	7,500 - 9,500	0.5	Aromatic reactive diluent modified, low crystallization tendency, retention of chemical and mechanical properties.
YD522	180 - 190	500 - 700	0.5	Aromatic reactive diluent modified.

<sup>1</sup> Epoxy Equivalent Weight (gm / eq), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Gardner Color Scale (Maximum)

## Liquid BP-A / BP-F Resin Blends With / Without Reactive Diluent

Liquid resin blends consisting of Bis-A and Bis F resin and also reactive diluent are available at a range of different viscosities. These grades offer superior crystallisation resistance compared to BP-A based resins and blends and are commonly used in construction and coating applications.

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	Features
YDFM 251	185 - 200	500 - 800	0.5	BP-A / BP-F Blend with MGE RD
YDFM 270	164 - 176	500 - 900	0.5	BP-A / BP-F Blend with MGE RD
YDFM 253	190 - 200	700 - 1,100	0.5	BP-A / BP-F Blend with MGE RD
YDFM 261LV	170 - 180	3,500 - 5,500	0.5	BP-A / BP-F Blend.
YDFM 261	172 - 179	4,500 - 6,000	0.5	BP-A / BP-F Blend.
YDFM 269	175 -185	7,000 - 9,000	0.5	BP-A / BP-F Blend.
YDFM 262	175 -185	6,000 - 8,000	0.5	BP-A / BP-F Blend.
YDFM 250	180 -190	8,000 - 10,000	0.5	BP-A / BP-F Blend.
YDFM 256	180 - 190	2,000 - 4,000	0.5	BP-A / BP-F Blend.

<sup>1</sup> Epoxy Equivalent Weight (gm / eq), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Gardner Color Scale (Maximum)

## Epotec<sup>®</sup> Epoxy Resins - Cycloaliphatic

Cycloaliphatic Epotec<sup>®</sup> Epoxy Resins give superior durability when exposed to U.V radiation compared to standard BP-A based liquid epoxy resins.

EpotecGrade	EEW <sup>1</sup>	Viscosity <sup>2</sup>	Color <sup>3</sup>	HyCl <sup>4</sup>	Features
YDH184	165 - 177	450 - 900	0.5	-	Based on hexa-hydrogenated Phthalic Anhydride.
YDH3000	215 - 235	1,500 - 2,500	0.3	0.1	Based on hydrogenated BP-A.

<sup>1</sup> Epoxy Equivalent Weight (grams / equivalent), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Gardner Colour scale (max), <sup>4</sup> Hydrolyzable chlorine % w/w max.

## Epotec Solid Epoxy Resins for Powder Coatings

### Solid BP-A Resins For Use In Powder Coatings - Standard Melt Viscosity

Conventional solid Medium Molecular Weight Epotec® Epoxy Resins based on Bisphenol-A with different molecular weights and viscosities are suitable for general purpose powder coatings for electric panel boards, automobile spares, bathroom fittings, decorative articles and fixtures.

Epotec Grade	EEW <sup>1</sup>	Melt Viscosity <sup>2</sup>	Color <sup>3</sup>	S.P. <sup>4</sup>	Features
YD 901	450 - 525	200 - 700	0.5	65 - 75	Standard Type 1 resin. Sinters easily on storage
YD 901H	500 - 600	1000 - 2500	0.5	67 - 77	Higher molecular weight Type 1 resin. Sinters on storage
YD 902	660 - 725	2200 - 3500	0.5	81 - 91	Type 2 resin.
YD 903	725 - 800	3800 - 6000	0.5	90 - 96	Type 3 resin. Suitable for decorative powder coatings, hybrid and pure epoxy
YD 903M	740 - 800	3100 - 5200	0.5	98 - 104	Type 3 resin with superior storage stability.
YD 903H	800 - 880	4 000 - 7000	0.5	92 - 102	Type 3.5 resin.
YD 903HE	860 - 930	7000 - 10200	0.5	104 - 110	Type 3.5 resin with superior flexibility Suitable for DICY-cured FBE coatings
YD 903HEM	860 - 930	7000 - 10200	0.5	104 - 110	Type 3.5 resin with better flow and storage stability.
YD 904	900 - 975	800 - 1600 <sup>5</sup>	0.5	96 - 107	Type 4 resin. Suitable for epoxy ester formulation.
YD 905	1250 - 1400	2000 - 5000 <sup>5</sup>	1	105 - 120	Type 5 resin. Suitable for rebar/ pipe coating with high flexibility

<sup>1</sup> Epoxy Equivalent weight(grams/equivalent), <sup>2</sup> ICI Melt Viscosity @ 150°C (cPs), <sup>3</sup> Gardner Colour Scale (max), <sup>4</sup> softening Point °C (Mettler Ball and cup method), <sup>5</sup> ICI Melt Viscosity @ 200°C(cPs), <sup>6</sup> 40% solution in Butyl carbitol.

### Solid BP-A Resins For Use In Powder Coatings - Low Melt Viscosity

Medium Molecular Weight Epotec® Epoxy Resins based on Bisphenol-A but characterized by having overall lower melt viscosity. Suitable for general purpose powder coatings for electric panel boards, automobile spares, bathroom fittings, decorative articles and fixtures.

Epotec Grade	EEW <sup>1</sup>	Melt Viscosity <sup>2</sup>	Color <sup>3</sup>	S.P. <sup>4</sup>	Features
YD 012	660 - 720	1,200 - 2,000	0.5	78 - 90	Type 2 resin. Lowest viscosity, superior flow. May sinter on storage
YD 012HE	750 - 800	2,200 - 3,500	0.5	85 - 98	Type 2.5 resin
YD 903TP	710 - 760	1,800 - 2,800	0.5	85 - 95	Type 3 resin with low melt viscosity giving superior flow and high gloss
YD 013	820 - 880	3,600 - 5,000	0.5	85 - 98	Type 3 resin
YD 014	900 - 975	5, 300 - 7,000	0.5	91 - 102	Type 4 resin. Suitable for epoxy ester formulation.

<sup>1</sup> Epoxy Equivalent weight (grams/equivalent), <sup>2</sup> ICI Melt Viscosity @ 150°C (cPs), <sup>3</sup> Gardner Colour Scale(Max), <sup>4</sup> Softening Point °C (Mettler Ball and cup method)



## Modified Epoxy Resins

Solid epoxy resins based predominantly on Bisphenol A yet have been modified to exhibit much higher epoxy functionality compared to conventional solid resins. This increased functionality leads to powder coatings with increased thermal and chemical resistance. They are often used in combination with Epotec Phenolic Curing Agents in the formulation of Fusion Bonded Epoxy (FBE) powder coatings for the protection of concrete reinforcement bars (re-bar) and pipeline coatings.

Epotec Grade	EEW <sup>1</sup>	Melt Viscosity <sup>2</sup>	Color <sup>3</sup>	S.P. <sup>4</sup>	Features
YD942	500 - 560	1,500 - 4,000	0.5	80 - 90	Modified resin for better chemical resistance rebar/pipe coatings.
YD972	750 - 850	2,500 - 5,000	0.5	95 - 110	Modified resin for better chemical resistance rebar/pipe coatings.

<sup>1</sup> Epoxy Equivalent weight (grams/equivalent), <sup>2</sup> ICI Melt Viscosity @ 150°C (cPs), <sup>3</sup> Gardner Colour Scale(Max), <sup>4</sup> Softening Point °C (Mettler Ball and cup method)

## Phenolic curing agents (Ph-CA)

Epotec® Phenolic curing agents are used with the multi-functional solid resins for formulating FBE coatings. FBE powder coatings are commonly used for the protection of re-bars and pipelines. They give excellent chemical resistance and adhesion to the surface and retain properties to give good service life at elevated temperatures.

Epotec Grade	EEW <sup>1</sup>	Melt Viscosity <sup>2</sup>	Color <sup>3</sup>	S.P. <sup>4</sup>	Features
TH981	250 - 280	290 - 750	1	75 – 90	Standard reactivity
TH982	250 - 290	290 - 470	1	75 – 90	Accelerated version of TH 981
TH983	250 - 290	350 - 750	Milky Flakes	75 – 90	Accelerated version of TH 981 containing additional flow modifier
TH984	370 - 400	1,000 - 2,000	1	90 – 102	Higher molecular weight curing agent with improved flexibility

<sup>1</sup> Hydroxyl Equivalent Weight( grams / equivalent), <sup>2</sup> ICI Melt Viscosity @ 150°C (cPs), <sup>3</sup> Gardner Colour Scale (max), <sup>4</sup> Softening Point °C (Mettler)

## Modified Solid Epoxy Resins for Can Coatings

### High Molecular Weight Epoxy Resins

Epotec® Epoxy Systems for Can and Coil Coatings include high molecular weight resins used extensively for coatings for beverage and beer cans, sea food cans, fruit juice cans, enclosures for glass bottles, crown caps, coatings for aerosol/perfume spray bottles, general lining for dry food packs such as containers for cookies, cold creams, marker pens, roofing sheets, sheets for appliance bodies, sheet metal furniture, and modulated office cabins.

Epotec Grade	EEW <sup>1</sup>	Melt Viscosity <sup>2</sup>	Color <sup>3</sup>	S.P. <sup>4</sup>	Features
YD 017	1750 - 2100	2000 - 4000	0.5	117 – 127	Standard type 7 resin. For coatings with optimized flexibility and solids content.
YD 017S	1750 - 2100	1290 - 2270	0.5	113 – 123	Standard type 7 resin with lower melt viscosity. For coatings with higher solids content and higher dry film thicknesses.
YD 907	1750 - 2100	1600 - 2200	0.5	117 – 127	Standard type 7 resin. For coatings with optimized flexibility and solids content.
YD 907-BnX-50	1750 - 2200	2000 - 4000	1	117 - 127	High flexibility and optimum food chemical resistance. Can be used to prepare ambient poly-isocyanates curable 2K systems.
YD 019	2500 - 2900	4630 - 9850	0.5	130 – 145	Standard type 9 resin. For coatings with high flexibility.
YD 019S	2500 - 2900	1760 - 4630	0.5	124 – 133	Standard type 9 resin with lower melt viscosity. For coatings with higher solids content and higher dry film thicknesses.
YD 909	2500 - 2900	5000 - 8000	0.5	130 – 145	Standard type 9 resin. For coatings with high flexibility.
YD 909-BnX-50	2500 - 2800	7000 - 15000	1	130 - 145	High flexibility and optimum food chemical resistance. Can be used to prepare ambient poly-isocyanates curable 2K systems.
YD 010S	4500 - 5500	4600 - 9000	0.5	135 - 150	Standard Type 10 resin. Highest molecular weight resin available but with a useable melt viscosity. For highest flexibility coatings

<sup>1</sup> Epoxy Equivalent weight (grams/equivalent), <sup>2</sup> ICI Melt Viscosity @ 150°C (cPs), <sup>3</sup> Gardner Colour Scale(Max), <sup>4</sup> Softening Point °C (Mettler Ball and cup method)

## Waterborne Epoxy<sup>®</sup> Resins

A wide range of waterborne epoxy resins exhibiting high stability and excellent dilution efficiency, are available, offering different functionalities for a variety of applications. These aqueous epoxy dispersions incorporate non-ionic epoxy-functional emulsifiers which allow the emulsifier to become a part of the cured product with minimal impact on the mechanical properties.

Epotic Grade	EEW <sup>1</sup>	Visosity <sup>2</sup>	Colour <sup>3</sup>	%NV <sup>4</sup>	%Co-Solvent	Features
TW 5001 (Aq. emulsion of LER)	195 - 220	300 - 3,500	Off-white	60	0	High reactive resin, good chemical resistance. Aq. emulsion of LER
TW 5001C (Aq. emulsion of LER)	200 - 209	100 – 6,000	White	64 - 66	0	Moderate viscosity, completely water reducible and no organic solvents. Aq. emulsion of LER
TW 5003HJ (Aq. dispersion of type 7)	1,500 -1,900	7,000 – 17,000	White	51 - 55	13	Medium viscosity, completely water reducible. Aq. dispersion of type 7

<sup>1</sup> Epoxy Equivalent Weight (gm / eq), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup>% Non-volatile (+/-2%), <sup>4</sup>Methoxy Propanol, and Benzyl Alcohol, <sup>5</sup> Propoxyethanol.

## Waterborne Curing Agents

Epotec<sup>®</sup> waterborne curing agents are based on modified polyamines. In addition to cross-linking liquid epoxy resins on the final film they also act as emulsifiers allowing the formulation of zero VOC systems and avoiding the need for additional emulsifiers. They find wide applications in self-leveling, trowelable flooring, coatings, water wipeable tile grouts etc.

## Mono functional Aliphatic RD

Epotic Grade	%NV <sup>1</sup>	Colour <sup>2</sup>	Viscosity <sup>3</sup>	Phr <sup>4</sup>	Pot Life <sup>5</sup>	TFST <sup>6</sup>	Features
THW 4504	60	Pale yellow liquid	1,500 - 2,500	110	55 - 70	3 - 5	High strength, low colour, easy to spread and dilute with water, can emulsify liquid epoxy, easy to clean
THW 4505	70	Pale yellow liquid	15,000 – 25,000	110	75 - 110	3 - 4	Can be used with waterborne epoxyresin, good adhesion to metal , gives good gloss even at high pigment levels
THW 4506	60	Pale yellow liquid	1,500 – 4,000	125	70 – 100	3	Low viscosity, good film forming and flow characteristics allows the formulation of highly filled epoxy cement compositions.
THW 4508	70	Ambre yellow liquid	25,000 – 35,000	70 - 80	30- 45	2 – 3	Excellent performance in combination with different epoxy resins
THW4509	55	Opaque yellow emulsion	5,000 – 10,000	140 – 170	80 - 120	2 – 3	Superior performance for a wide range of application

<sup>1</sup>% Non-volatile (+/-2%), <sup>2</sup> Brookfield Viscosity @ 25°C (cPs), <sup>3</sup> Parts per hundred of resin, <sup>4</sup> Pot life in minutes, @25°C, <sup>5</sup> Thin Film set Time in hours @ 25°C.

## Epotec® Curing Agents

### Modified Aliphatic Amine Curing Agents

Modified Aliphatic Amines are room temperature reacting curing agents derived from aliphatic amines. The basic aliphatic amine is modified to optimize the hardness, reactivity, handling time of system and also to improve the carbonation resistance.

Epotec Grade	Colour <sup>1</sup>	Viscosity <sup>2</sup>	Amine value <sup>3</sup>	Sp. Gr <sup>4</sup>	A.H.E.W. <sup>5</sup>	p <sub>hr</sub> <sup>6</sup>	Gel time <sup>7</sup>	TFST <sup>8</sup>	
TH 7201	3	20 - 60	475 - 520	1.05	60	33	19 -30	2 - 3	Low Viscosity, Low phr
TH 7202	3	80 - 130	1050 - 1080	1.06	31	15	10 – 16	2 - 3	Very low phr, fast react
TH 7207	3	150 - 350	615 - 675	1.06	95	50	5 – 10	1 - 2	High reactivity. Can be
TH 7210F	4	2800 - 4000	770- 820	1.08	38	20	12 – 16	3 - 4	Very low phr, fast react
TH 7211	2	35 - 80	315 - 345	0.95	76	40	80 – 120	9 - 12	Low Viscosity, Low phr
TH 7212	2	15 - 30	690 - 720	1.05	48	25	30 – 50	2 - 4	Excellent mechanical
TH 7218	8	60000 – 100000	340 - 370	1.02	160	85	5 - 10	-	High hardness good a
TH 7222N	8	450 - 700	430 - 490	1.01	112	60	20 – 30	3 - 5	Higher colour, high me
TH 7236	8	19000 - 31000	625 - 665	1.06	66	35	15 – 25*	-	Good stability modera
TH 7237	7	1200 - 1800	350 - 380	1.07	135	70	10 - 15	1-2	Fast reactivity, fast ear at low temperatures.
TH 7238	8	20000 – 35000	200 - 220	0.98	220	115	10 - 15	-	Good stability modera
TH 7903	6	1200 - 2100	760 - 800	1.09	50	25	10 – 18	1 - 3	High reactivity at low t
TH 7905	5	450 - 650	350 - 390	1.06	75	40	15 – 20	1 – 2	High reactivity and lov
TH 7214-2	10	1000 – 1800	640 - 660	1.03	95	50	8 - 12	-	Low viscosity fast curi epoxy curing agents. I
TH 7234E	14	1000 – 3000	432	0.99	90	48	6 - 10	-	Low viscosity, fast cur curing agents. Low ha

<sup>1</sup>GardenerColourScale (Maximum), <sup>2</sup>Brookfield Viscosity @ 25°C (cP), <sup>3</sup>mg of KOH/g, <sup>4</sup>specific Gravity @ 25°C (cP) <sup>5</sup>Equivalent Weight per Active-H  
<sup>6</sup>Parts per hundred grams of Resin , <sup>7</sup>Gel Time in minutes, 150 grams @ 25°C , <sup>8</sup> Thin Film Set Time in hours @ 25°C (cP).

amines are modified to reduce their vapour-pressure and thereby reduce their corrosiveness. The modification is also done

### Features

low phr, high chemical resistance

high reactivity, Can be used as an accelerator for other curing agents

Can be used as an accelerator for other curing agents

high reactivity, Can be used as an accelerator for other curing agents

low phr, long pot life. Suitable for application in very hot climates

High mechanical strength with high adhesion to concrete. Frequently used in concrete repair systems.

Good adhesion moderate flexibility and fast setting. Suitable for manufacturing of epoxy putty.

High mechanical strength, suitable for concrete primers and epoxy mortars

Moderate flexibility, fast setting. Suitable for manufacturing of epoxy putty.

Fast early strength development. Can cure at temperatures down to zero degrees centigrade. Very high blush resistance even when cured.

Moderate viscosity fast setting. Suitable for manufacturing of epoxy putty. Exhibit good mechanical strength on curing.

Low temperature and curable in highly humid conditions.

Low temperature. curable in highly humid conditions with excellent chemical resistance. Good adhesion to concrete and steel..

Fast curing modified aliphatic amine curing agent designed. used in the formulation of fast setting adhesives or as an accelerator for other epoxies. Low hazard rating

Fast curing modified aliphatic amine curing agent used in the formulation of fast setting adhesives or as an accelerator for other epoxy systems. Low hazard rating.

## Modified Cycloaliphatic Amine Curing Agents

Modified Cycloaliphatic Amines are room temperature curing agents. Excellent colour and lower corrosiveness makes them the preferred choice for self-leveling floorings, primers, top coats, mortars and water-wipeable tile grouts. These Epotec Curing Agents possess low yellowing tendency and offer good early water spotting resistance.

Epotec Grade	Colour <sup>1</sup>	Viscosity <sup>2</sup>	Amine value <sup>3</sup>	Sp. Gr <sup>4</sup>	A.H.E.W. <sup>5</sup>	pHr <sup>6</sup>	Gel time <sup>7</sup>	TFST <sup>8</sup>	Features
TH 7301	1	270 - 380	300 - 320	1.03	115	60	28 - 45	3 - 4	Excellent color stability providing high gloss surface with good chemicals resistance.
TH 7302	3	280 - 420	300 - 320	1.05	95	50	25 - 35	6 - 7	High mechanical strength and resistance to amine blush and water spotting.
TH 7313	2	130 - 230	305 - 335	1.04	93	50	38 - 40	1 - 2	High reactivity, low viscosity, solvent free room temperature curable thermoset coatings.
TH 7901	4	100 - 300	280 - 325	1.06	102	55	23 - 30	4 - 7	High reactivity at low temperature, curable in highly humid conditions and excellent chemical resistance.
TH 7902	3	120 - 320	345 - 375	1.06	102	55	23 - 30	3 - 5	Phenol-free version of Epotec curing Agent TH 7901
TH 7320	1	250 - 500	235 - 270	1.03	95	50	30 - 45	5 - 8	Provides clear, glossy, hard surface
TH 7329	1	250 - 500	295 - 320	1.03	96	51	15 - 25	2 - 3	Ambient temperature curing, fast cure system, good toughness and adhesion properties.
TH 7332	8	200 - 300	470 - 530	0.94	72	38	80 - 90	-	Solvent free curing agent, ambient temperature curable thermoset coatings, good toughness and adhesion properties.
TH 7334	1	100 - 300	310 - 320	1.05	95	50	25 - 35	2 - 3	Low viscosity, low colour modified cycloaliphatic polyamine, solvent free room temperature curable, high blush resistance under high humidity condition and resistance to variety of chemicals
TH 7309	2	30 - 80	465 - 485	1.04	77	40	35-40	6	Lowest viscosity modified cycloaliphatic polyamine curing agent low mixing ratios with liquid epoxy resin allowing the formulation of low cost effective civil systems and coating.

<sup>1</sup>GardenerColourScale (Maximum), <sup>2</sup>Brookfield Viscosity @ 25°C (cP), <sup>3</sup>mg of KOH/g, <sup>4</sup>specific Gravity @ 25°C (cP) <sup>5</sup>Equivalent Weight per Active-H hundred grams of resin, <sup>7</sup> Gel Time in minutes, 150 grams @ 25°C, <sup>8</sup> Thin Film Set Time in hours @ 25°C

## Polyamides

Epotec Grade	Colour <sup>1</sup>	Viscosity <sup>2</sup>	Appearance <sup>3</sup>	Amine Value <sup>4</sup>	A.H.E.W <sup>5</sup>	Features
TH 7515	10	3200- 4200 <sup>9</sup>	Clear Yellow-brown liquid	230 - 260	240	Very High Viscosity polyamide providing high flexibility and long pot life. Used in Solvent based metal primers, Corrosion resistant coatings, marine coatings and adhesives
TH 7515X70	10	750 – 1250	viscous yellow liquid	230 - 260*	240*	Solution-cut polyamide giving high flexibility and long pot life. Used in Solvent based metal primers, Corrosion resistant coatings, marine coatings
TH 7525	10	9500 – 11000 <sup>10</sup>	Clear Yellow-medium viscosity brown liquid	280 - 320	130	Medium Viscosity Polyamide. Used in Adhesives and sealants, marine and maintenance coatings
TH 7540	10	10000 – 15000	Clear Yellow-brown liquid	370 - 410	95	Electrical potting, Castings and Corrosion resistant coatings

## Polyamidoamine

Epotec Grade	Colour <sup>1</sup>	Viscosity <sup>2</sup>	Appearance <sup>3</sup>	Amine Value <sup>4</sup>	A.H.E.W <sup>5</sup>	Features
TH 7560	8	200 - 600	Yellow-brown low viscosity liquid	350 - 400	95	Low viscosity amidoamine suitable for laminating applications and general propose concrete primers. Also applications with high filler levels including adhesives mortars grouts.

1 Gardner 2cPs @ 25°C 3 mg/g KOH 4 g.cm<sup>3</sup> 5 By Calculation 6 with Epotec YD 128 7 minutes (150 grams mix with Epotec YD 128) 8 By BK Drying recorder 9 cPs@75°C 10 cPs@40°C \* Based on solids

## Phenalkamines

Curing agents are a vital part of the Epotec Epoxy Resin and Curing Agent System. The selection of right curing agent is equally important as it influences the viscosity, reactivity, reactivity and working time in general and mechanical, chemical and optical properties in specific. Phenalkamines are curing agents based on Cardanol derived from Cashew shell nut liquid. They offer good adhesion, low-temperature cure and superior corrosion resistance. They are commonly used in solvent-based marine cotings.

Epotec Grade	Colour <sup>1</sup>	Viscosity <sup>2</sup>	Sp. Gr <sup>3</sup>	%SOLIDS <sup>4</sup>	A.H.E.W. <sup>5</sup>	phr <sup>6</sup>	Gel time <sup>7</sup>	TFST <sup>8</sup>	Features
TH 7940	17	2,000 - 3,000	0.97 - 1.0	100	80	40	30 - 45	2 - 5	High solids coal ngs, potable water pipe lines, concrete coa ngs.
TH 7940	17	2,000 - 3,000	0.95 - 0.99	95 +/-2	84	178	70 - 907	2 - 47	Solvent containing variant of Epotec® Curing Agent TH 7940
TH 7941	17	20,000 - 50,000	0.98 - 1.01	100	145	70	65 - 90	6 - 9	Medium to high solids marine and industrial maintenance coa ngs, potable water tank
TH 7941S10	17	200-700	0.93 - 0.98	75 +/-2	150	80	100 - 1408	6 - 8	Solvent based industrial coa ngs

<sup>1</sup>Gardener color Scale (Maximum), <sup>2</sup>Brookfield Viscosity @25°C(cP), <sup>4</sup> Equivalent Weight per Active-H, <sup>5</sup> Parts per hundred grams of Resin with EpotecYD 128 (EEW = 190 g/eq), <sup>6</sup>Gel Time in minues, 150 grams 25°C with EPOTEC YD 128 (EEW = 190 g/eq), <sup>7</sup> with standard Bisphenol A epoxy resin EPOTEC YD 011 X 75 (EEW 475g/eq on solids), <sup>8</sup> By Gelnorm @ 35° C with YD 128, <sup>9</sup> Thin film set time in hours @ 25° C

## Epotec® Epoxy Systems for Constructions

Epotec Epoxy Systems are mainly used for oor toppings, grouts, heavy duty mortars, crack injection, wider crack lling syst

Application	System	Mix ratio <sup>1</sup>	Mix Viscosity <sup>2</sup>	Gel time <sup>3</sup>	TFST <sup>4</sup>	
Seamless self leveling epoxy flooring	YD 515 : TH 7301	100 : 60	500	35 - 45	5	Standard s
Seamless self leveling epoxy flooring with high Chemical Resistance	YDF 173 : TH 7302	100 : 55	900	25	1 - 2	Excellent c discolourat
Crack Injection concrete repair	YD 522 : TH 7212	100 : 25	400	40	2.5	Very low vi
Epoxy mortars	YD 522 : TH 7903	100 : 25	800	15	2	Fast setting
Epoxy mortars	YD 522 : THW 7905	100 : 40	490	17	2	Fast setting
Self-leveling Epoxy modified Cement Grout	TW 5001C : THW 4506	100 : 75	-	80	---	Epoxy mod impermeab
Marble Top Coat	YD 522 : TH 7209	100 : 25	400	20	10	Heat curing
Marble back Coat	YD 520 : TH 7227	100 : 11	500	10	9	Heat curing
Seamless self leveling epoxy flooring	YD 522 : TH7302	100 : 50	500	30	6	Fast streng
Water wipeable epoxy tile grout adhesives	YDFM 253 : TH 7332	100 : 38	400	120	-	Low viscos
Waterborne self leveling floor	YDFM 253 : THW 4509	100 : 160	-	120	2	Waterbase
Water based epoxy top coats	CTP 484 R : THW 4508	100 : 13	-	120	1 - 2	Fast drying
High blush resistance floor coatings	YD 522 : TH 7334	100 : 50	223	38	4	Solvent fre
Epoxy phenolic coatings for tank linings	YDPN 664A : TH 7330	100 : 30	1000	70	2	Designed t hydrocarbo

<sup>1</sup> part by Weight, <sup>2</sup>Mix Viscosity @ 25°C (cPs), <sup>3</sup>Gel time in minutes, <sup>4</sup>Thin Film Set Time in hours



systems, expansion joint filling systems and adhesives.

Feature
Hard system. Low colour, low yellowing, fast hardness development
Excellent chemical resistance to most strong mineral acids, alkalies and solvents. Very minimal impact of alkalies, acids can cause discoloration when exposed. Can resist conc. H <sub>2</sub> SO <sub>4</sub>
Low viscosity. Easy penetration into small narrow cracks. Excellent bonding to concrete. Fast setting.
Fast setting. Very good hardness high compressive strength low temperature curing
Fast setting high compressive strength low mix viscosity, high filler levels, high chemical resistance
Compatible with modified cement grouts and mortars. When used as a self-levelling mid layer epoxy mortar it provides a moisture barrier allowing breathable flooring to be applied onto green concrete.
Flooring only. High gloss low colour and high hardness
Flooring only. Strong adhesion, good penetration in smaller cracks
High strength build-up
High viscosity high strength system used in high build systems for formulating water-wipeable tile grouts.
Water-based system used for the formulation of breathable self-levelling flooring which can be applied to green concrete. Breathable flooring.
Formulating waterbased coatings with long pot lives. Used on concrete and in wall coatings.
Fast free hardener with exceptionally high blush resistance for use in flooring applications in high humidity environments.
Cures at room temperature. The system exhibits outstanding resistance to alcohols and strong acids many bases chlorinated hydrocarbons and methanol gasoline mixtures.



The Company has a state of art R&D and Application Development Centre (ADC) and its testing facilities are accredited by germanischer Lloyd (GL). Epotec resin systems are well established in the industry and the products range from low molecular weight liquids to different building blocks such as Bisphenol-A, Bisphenol-F, cycloaliphatics and modifications thereof to impart specific properties such as adhesion, flexibility, chemical resistance to fulfill needs of end use applications such as marine coatings, industrial maintenance paints, coil coatings, packaging coatings, and powder coatings.

Aditya Birla chemicals offers high level of technical expertise to work jointly with the end users to trouble-shoot and in improving and customizing to product performance based on the processing conditions in manufacturing.

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## Aditya Birla Chemicals

Aditya Birla Chemicals is the largest manufacturer of EPOTEC epoxy resin and systems in the ASEAN region. The company has manufacturing plants in Thailand, India (Grasim Chemicals) and Germany (CTP GmbH). EPOTEC resins and systems are exported to all continents with the product portfolio extending to all segments of epoxy applications.



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