

CeTePox[®]-Hardeners



Name	Characteristics	Nonylphenol-free Benzyl alcohol-free	Viscosity DIN EN ISO 3219 25 °C ca. [mPas]	Recommended Quantity of Hardener [g] ²⁾	H-Active-Equivalent Weight [g/Eq.]	Gardner Colour Index ISO 4630	Temp. Increase 23 °C → 40 °C appr. [min] ¹⁾	Properties and Fields of Application
1015-01 NBF H	modified aliphatic polyamines	● ●	230	81	148	< 8	13	free from nonylphenol and benzylalcohol, flexibilising, water-repellent; coatings, putties, castings
1278 NF H	modified cycloaliphatic polyamine, free from benzyl alcohol	● ●	140 ⁵⁾	46	78	< 6	30	solvent and benzyl alcohol-free primers and coatings
1285 H	modified cycloaliphatic polyamine	●	60 ⁵⁾	49	85	< 2	13	low-viscous; for superior quality coatings and highly filled mortars
1287-01 NF H	modified cycloaliphatic polyamine	●	120	50	87	< 5	24	very low viscous; for highly filled coatings, self-levelling and floor screed mortars
1312 NF H	EP-stabilized cycloaliphatic polyamine	●	450 ⁵⁾	66	113	< 2	22	superior quality coatings and mortars with good resistance to chemicals
1312 FS H	EP-stabilized cycloaliphatic polyamine	●	360	66	113	< 2	24	similar to CeTePox [®] 1312 NF H; suitable for food- and potable water contact
1312-05 H	EP-stabilized cycloaliphatic polyamine	●	620	60	104	< 2	18	superior quality coatings and mortars with good resistance to chemicals and good through-cure
1313-02 H	EP-stabilized cycloaliphatic polyamine, accelerated		700	66	115	< 2	13	superior quality coatings and mortars with good resistance to chemicals
1385 H	EP-stabilized cycloaliphatic polyamine	●	70 ⁵⁾	49	85	< 2	26	reactive, phenol-free hardener for coatings and self-levelling mortars; low yellowing
1393 H	EP-stabilized cycloaliphatic polyamine		190 ⁵⁾	54	93	< 2	23	good stabilized standard hardener with excellent general properties
1393 NF H	EP-stabilized cycloaliphatic polyamine	●	235 ⁵⁾	54	93	< 3	25	nonylphenol-free version of CeTePox [®] 1393 H
1393-02 H	EP-stabilized cycloaliphatic polyamine, accelerated		400 ⁵⁾	54	93	< 2	14	similar to CeTePox [®] 1393 H, faster curing
1393-08 NF H	EP-stabilized cycloaliphatic polyamine, accelerated	●	300 ⁵⁾	54	93	< 3	15	nonylphenol-free version of CeTePox [®] 1393-02 H
1410 H	modified heterocyclic polyamine	a) ●	550 ⁵⁾	55	95	< 3	6	fast curing mortar coatings, adhesives, putties, tar-epoxy-systems
1434-01 NF H	modified aliphatic polyamine	● ●	175	66 ³⁾	134	< 6	32	flexibilised self-levelling coatings, indoor mastic asphalt surfaces
1490 H	modified aliphatic polyamine	a) ●	70 ⁵⁾	50	90	< 2	53	hardener with long pot-life and excellent yellowing resistance; decorative coatings and mortars
1502 H	EP-stabilized cycloaliphatic polyamine, accelerated	●	250	55 ⁴⁾	102	< 2	23	hardener with excellent resistance to chemicals and yellowing; decorative mortars
1510 H	EP-stabilized cycloaliphatic polyamine	● ●	525	53	93	< 5	27	low emission standard flooring hardener with excellent general properties
1511 H	EP-stabilized cycloaliphatic polyamine	● ●	475 ⁵⁾	45 ⁴⁾	82	< 3	29	emission-free "full reactive" hardener with excellent general properties
1537 H	EP-stabilized cycloaliphatic polyamine, accelerated	●	220 ⁵⁾	50 ⁴⁾	95	< 2	16	accelerated hardener with good through-cure and improved resistance to water-spotting

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<u>1587 H</u>	EP-stabilized cycloaliphatic polyamine	a)	440 ⁵⁾	50	87	< 4,5	28	stabilised hardener with good general properties and longer pot-life for warmer climates
<u>1588 H</u>	EP-stabilized cycloaliphatic polyamine, accelerated	●	350	50 ⁴⁾	93	< 2	15	stabilised hardener with good through-cure and water spotting resistance, excellent general properties
<u>1588 L H</u>	EP-stabilized cycloaliphatic polyamine	●	240	50 ⁴⁾	93	< 2	30	non-accelerated version of CeTePox® 1588 H
<u>1590 H</u>	EP-stabilized aliphatic polyamine	●	200 ⁵⁾	52	90	< 1	71	stabilised hardener with long pot-life, suitable for warmer climates
<u>1594 H</u>	EP-stabilized cycloaliphatic polyamine	●	180	54	94	< 2	15	low-viscous stabilised standard hardener with excellent general properties
<u>1613 H</u>	Mannich-base, accelerator	● ●	300 ⁵⁾	-	0	< 7	-	acceleration of epoxy hardeners (2-5 w.-% addition); in special cases for epoxy polymerisation
<u>1614 NF H</u>	Mannich-base, phenol-free	●	530	40 ⁴⁾	75	max. 4	12	low-viscous fast-setting hardener for chemical-resistant coatings and epoxy mortars
<u>1693 H</u>	Mannich-base, phenol-free	●	1.300	54	93	< 6	11	solvent-free chemical resistant epoxy systems
<u>1950 H</u>	EP-stabilized polyamidoamine	●	1.900	60	115	< 10	36	primers for difficult, wet/moist substrates with excellent adhesion
<u>1960 H</u>	EP-stabilized polyamidoamine	● ●	1.700	60 ⁴⁾	115	< 10	60	low emission version of CeTePox® 1950 H
<u>1951 H</u>	EP-stabilized polyamidoamine, accelerated	●	1.000	60 ⁴⁾	115	< 10	25	accelerated version of CeTePox® 1950 H
<u>1961 LV H</u>	EP-stabilized polyamidoamine, accelerated	● ●	300	60 ⁴⁾	115	< 10	38	low-viscous, emission-poor version of CeTePox® 1951 H , free from critical raw materials
<u>1976-02 NF H</u>	EP-stabilized flexibilised polyamines	● ●	1.500	110-133 ⁴⁾	254	max. 8	24	flexibilising hardener, for flexible coatings, (joint) sealants etc.
<u>VP 388-69 H</u>	accelerated cycloaliphatic polyamines	● ●	200	40	75	max. 6	10	low-viscous fast-setting hardener with mannich-base like through-cure and excellent properties
<u>VP 1728-9 H</u>	EP-stabilized cycloaliphatic polyamine	●	350	48 ⁴⁾	88	< 5	17	stabilised polyamine hardener yielding excellent resistance to chemicals

1) Temperature increase from 23 °C to 40 °C /100 ml mixture (insulated beaker) a) also available as **nonylphenol-free version**

2) with 100 g **CeTePox® 152 R**; 3) with 100 g **CeTePox® 134 R** 4) with 100 g **CeTePox® 245 R** 5) at 23 °C

The current product specifications can be taken from our Technical Data Sheets (TDS) or the respective Quality Control Certificates (QCC).



Name	Characteristics	nonyl-phenol-free	Mixing Ratio (A : B parts by weight)	Viscosity of Mixture DIN EN ISO 3219 23 °C appr. [mPas]	Temp. Increase 23 °C → 40 °C appr. [min] ¹⁾	Shore-D Hardness after 7d/23 °C ISO 868	Properties and Fields of Application
<u>103 NF S</u>	two-component epoxy system, free from solvents, alkylphenols and benzyl alcohol	●	100 : 42	500	30	87	low viscosity, excellent wetting and adhesion properties, low sensitivity to early water stress; primers on concrete, even when moisture-permeated from the backside
<u>132 NF S</u>	two-component epoxy system free from solvents and alkylphenols	●	3 : 1	550	18	84	low viscosity, excellent wetting and adhesion properties, low sensitivity to early water stress; primers on concrete
<u>140 S</u>	two-component epoxy system free from solvents, alkyl phenols and benzyl alcohol	●	100 : 40	580	24	80	low viscosity, excellent wetting and adhesion properties; low sensitivity to early water stress; low emission (according EMICODE); primers, mortars
<u>VP 1330 S</u>	two-component epoxy system free from solvents and alkyl phenols	●	100 : 60	600	19	88	excellent surface qualities, low yellowing, good water-spotting resistance; decorative sealers and coatings

1) Temperature Increase from 23 °C to 40 °C with 100 ml of mixture in an insulated beaker

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CeTePox[®] -Epoxy Resins & Flexible Modifiers



Name	Characteristics	Viscosity DIN EN ISO 3219 appr. [mPas]	Epoxy Equivalent Weight appr. [g/Eq]	Epoxy Value appr. Eq./100 g]	Gardner Colour Index ISO 4630	Properties and Fields of Application
<u>100 R</u>	unmodified bisphenol-A epoxy resin	15.000 (23 °C) 11.000 (25 °C)	188	0,53	< 1	medium viscosity, low crystallisation tendency, universal applicability in amine-curing, solvent-free epoxy systems
<u>152 R</u>	reactive diluted bisphenol-A epoxy resin	1.030 (23 °C)	182	0,55	< 2	low viscosity; standard type with universal applicability
<u>159 R</u>	reactive diluted bisphenol-A epoxy resin	165 (23 °C)	172	0,58	< 2	extremely low viscous; for highly filled primers/coatings
<u>200 R</u>	unmodified bisphenol-F epoxy resin	5.000 (25 °C)	169	0,59	< 1	medium viscosity, universal applicability in amine-curing, solvent-free epoxy systems
<u>212 R</u>	unmodified bisphenol-A/ bisphenol-F liquid resin	110.500 (23 °C)	181	0,55	< 2	medium viscosity, crystallisation-free universal applicability
<u>220 R</u>	accelerated bisphenol-A/ bisphenol-F liquid resin	5.500 (25 °C)	195	0,51	< 2	medium viscous, crystallisation-free for accelerating through-cure
<u>245 R</u>	reactive diluted bisphenol-A/ bisphenol-F liquid resin	950 (23 °C)	193	0,52	< 2	low viscosity, crystallisation-free; for solvent-free coating-systems, laminating and casting resins
<u>252 R</u>	reactive diluted bisphenol-A/ bisphenol-F liquid resin	850 (23 °C)	179	0,56	< 2	low viscosity, crystallisation-free; for solvent-free coating-systems, laminating and casting resins
<u>293 R</u>	reactive diluted bisphenol-A/ bisphenol-F liquid resin	800 (23 °C) 700 (25 °C)	193	0,52	< 2	compared to CeTePox[®] 245 R lower viscosity at lower temperatures, for solvent-free coating-systems

Name	Characteristics	Viscosity DIN EN ISO 3219 23 °C appr. [mPas]	Epoxy Equivalent Weight appr. [g/Eq]	NCO-Content (blocked) [%]	Gardner Colour Index ISO 4630	Properties and Fields of Application
<u>700 FM</u>	branched polyether-urethane with capped isocyanate groups	61.000	900	2,6	-	solvent-free, for elastifying of amine-curing epoxy systems, e.g. highly flexible coatings, adhesives, sealing materials

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Waterborne CeTePox[®]-Epoxy-Binders

CeTePox[®]-Epoxy Resins



Name	Characteristics	Viscosity DIN EN ISO 3219 23 °C appr. [mPas]	Epoxy Equivalent Weight appr. [g/Eq]	Epoxy Value appr. Eq./100 g]	Gardner Colour Index ISO 4630	Properties and Fields of Application
<u>245 R</u>	reactive diluted bisphenol-A/ bisphenol-F liquid resin	920	193	0,52	< 2	low viscosity, cristallisation-free for solvent-free and water-borne coating-systems, laminating and casting resins
<u>440 R</u>	emulsifiable BP-A/F resin with epoxy- functional emulsifier	6.700 (25°C)	198	0,51	< 2	water-reducible, pigmentation possible, for water reducible primers and coatings
<u>464 R</u>	special modified bisphenol-A/ bisphenol-F liquid resin	1700	208	0,48	< 3	water-reducible, pigmentation possible, for water reducible primers and coatings
<u>490 E</u>	emulsifier concentrate based on liquid bisphenol-A epoxy resin	320 (25 °C)	295	0,34	< 2	for manufacturing of water-dilutable liquid epoxy resins

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Name	Characteristics	Viscosity DIN EN ISO 3219 23 °C appr. [mPas]	Recommended Quantity of Hardener [g] ²⁾	H-Active-Equivalent Weight [g/Eq.]	Gardner Colour Index ISO 4630	Pot-life, appr. [min] ¹⁾	Properties and Fields of Application
<u>1921 H</u>	modified polyamidoamine, 50 % in water	18.000	100	210	< 12	120 ⁴⁾	water reducible hardener; for water reducible primers and (finishing) coatings
<u>2320 H</u>	water-reducible modified cycloaliphatic polyamine 80% in water	14.000	100	200	< 6	210 ³⁾	water reducible hardener; for water reducible primers and (finishing) coatings, longer pot-life
<u>2419 H</u>	water-reducible modified cycloaliphatic polyamine 70% in water	14.500	105	215	< 6	180 ⁴⁾	water reducible hardener; for water reducible primers and (finishing) coatings, with pot-life indication
<u>2420 H</u>	water-reducible modified cycloaliphatic polyamine 80% in water	6.750	100	185	< 6	150 ⁴⁾	similar to CeTePox [®] 2419 H, better dilution properties, higher solid content; with pot-life indication
<u>VP 1528-1 H</u>	modified polyamidoamine, 50 % in water	43.000	146	210	max. 16	150 ⁴⁾	water reducible hardener; for water reducible concrete primers and coatings, sealers

1) 100 ml mixture (insulated beaker), 50 % mixture solid content

2) with CeTePox[®] 245 R

3) no visible viscosity increase 4) visible potlife increase with CeTePox[®] 245 R, solid content of mixture 50 w.-%

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Property Survey CeTePox®-Epoxy Binders



Name Resin Component CeTePox®	103 S / A	103 NF S / A	132 S / A	140 S / A	152 R	152 R	255 R	152 R	245 R	245 R	293 R
Name Hardener Component CeTePox®	103 S / B	103 NF S / B	132 S / B	140 S / B	1285 H	1386 NF H	1386-01 NF H	1393 H	1393 H	1393-02 H	1510 H
Mixing Ratio Resin : Hardener (parts by weight)	100 : 42 2 : 1 ^{a)}	100 : 42	3 : 1	100 : 40	2 : 1	2 : 1	2 : 1	100 : 53	2 : 1	2 : 1	2 : 1
Viscosity of Mixture [mPa*s at 25 °C]	330	500	370	500	310	460	490	440	480	520	790
Density of Mixture [g/cm ³ at 23 °C]	1.05	1.08	1.10	1.09	1.09	1.10	1.10	1.10	1.09	1.09	1.08
pot-life 100 g, 23 °C → 40 °C [min]	40	29	20	21	13	12	14	23	26	14	29
Gel-time, 100 g, appr. [min]	60	55	40	43	24	25	26	32	47	28	53
Recommended Minimum Curing Temperature [°C]	10	10	10	8	8	8	8	10	8	8	8
Shore-D-Hardness after 1 d curing at r.t.	71	78	78	82	72	82	70	75	66	70	76
Surface Quality, curing at r.t. [0 = excellent to 5 = bad]	0	0	0	0	0	0	0	0	1	1-2	0-1
Resistance to water-spotting, after 1 day at r.t. [0 = no change bis 5 = bad]	0-1	0	0-1	0-1	1	0	0	0	0	0	0
Yellowing Resistance; Delta-E value after 12 months outdoor weathering Central Europe	11	19	9	> 16 (6 mo) ^{d)}	17	19	16	12	12	15	13
Compressive Strength at 10% compression [MPa]	73	71	63	87	62	74	70	63	63	62	70
Tensile Strength [MPa]	60	55	44	56	41	47	39	39	39	38	59
Flexural Strength [MPa]	108	113	70	76	67	68	61	63	58	56	82
Modulus of Elasticity, bending test [MPa]	3100	3390	2150	3200	2150	2400	1400	2100	1850	1800	2500
Elongation at Break, bending test [%]	6,5	7,4	7,5	2,4	8,5	7	7	9	7,3	7,5	6,9
Glass Transition Temperature, appr. [°C]	65	61	47	70	49	47	44	48	44	44	58

Status: October 2012 JG

Legend: a) parts by volume

b) not determinable due to high flexibility

c) from tensile testing

d) to be tested

Property Survey CeTePox®-Epoxy Binders



Name Resin Component CeTePox®	185 S / A	245 R	245 R	134 R	257-02 R	100 R	245 R	VP 473-1 R	255-2 R	245 R	
Name Hardener Component CeTePox®	185 S / B	1951 H	1976 H	1434-01 NF H	1692 H	VP 1074-13 H	1590 H	VP 473-49 H	VP 1152-1 H	1312 NF H	
Mixing Ratio Resin : Hardener (parts by weight)	2 : 1	5 : 3	1 : 1,1	3 : 2	100 : 55	100 : 20	2 : 1	100 : 29	100 : 30	100 : 60	
Viscosity of Mixture [mPa*s at 25 °C]	870	770	1500	1.900	1350	4400	400	500	250	630	
Density of Mixture [g/cm ³ at 23 °C]	1.11	1.08	1.03	1.08	1.14	.15	1.07	1.10	1.15	1.08	
pot-life 100 g, 23 °C → 40 °C [min]	23	25	25	32	9	18	82	3	72	31	
Gel-time, 100 g, appr. [min]	37	50	60	60	17	36	140	not tested	116	64	
Recommended Minimum Curing Temperature [°C]	8	12	10	12	5	5	15	0	15	8	
Shore-D-Hardness after 1 d curing at r.t.	82	70	20	48	90	87	12	90	60	50	
Surface Quality, curing at r.t. [0 = excellent to 5 = bad]	0	1	0	0	0	2	2	not tested	not tested	2	
Resistance to water-spotting, after 1 day at r.t. [0 = no change bis 5 = bad]	0	1	0	0	0	1	0	not tested	not tested	0	
Yellowing Resistance; Delta-E value after 12 months outdoor weathering Central Europe	9	11	21	6	> 20 (9 mo) ^{d)}	> 20 (6 mo) ^{d)}	8	30	not tested	10	
Compressive Strength at 10% compression [MPa]	69	38	n.m. ^{b)}	b)	100	115	63,5	d)	not tested	53	
Tensile Strength [MPa]	51	27	4	12	52	65	48,2	67	75	38	
Flexural Strength [MPa]	82	37	n.m. ^{b)}	b)	95	130	72,8	d)	119	53	
Modulus of Elasticity, bending test [MPa]	2600	1300	n.m. ^{b)}	b)	2500	2400	2189	2900 ^{c)}	3050 ^{c)}	1860	
Elongation at Break, bending test [%]	8,5	8	66 ^{c)}	55 ^{c)}	4	3	14	3,6 ^{c)}	4,5 ^{c)}	6	
Glass Transition Temperature, appr. [°C]	57	40	10	30	52	70	45	85	85	45	

Status: October 2012 JG

Legend: a) parts by volume

b) not determinable due to high flexibility

c) from tensile testing

d) to be tested