



UNITED INITIATORS

driving your success



CUROX[®]

Thermoset Applications

PRODUCT CODE	DESCRIPTION	ACTIVE OXYGEN CONTENT %	PEROXIDE CONTENT %	SAFETY INFORMATION		APPLICATION TEMPERATURE																			
				Recommended max. storage temp. °C	SADT °C	Hand Lay-up/Spray-up	Casting/Winding	Polymer Concrete & Marble, Buttons	Gelcoats	Body Fillers	Chemical Anchors & Mine bolts	RTM, vacuum infusion	Coatings	Resin Transfer Molding (RTM)	Cured in Place Pipes (CIPP)	Artificial marble	Continuous Laminating	Pultrusion	SMC, BMC, GMC, TMC	SPECIAL RESINS	Vinylesters	Acrylic Resins			
KETONE PEROXIDES						AMBIENT														ELEVATED			HIGH		
Methyl ethyl ketone peroxide (CAS No. 1338-23-4)																									
CUROX M-303 *	General purpose MEKP with medium reactivity	9,1		30	60	●	●	●	●	●				●					●						
CUROX M-403 *	Faster gel & cure than CUROX M-303	9,7		30	60	●	●	●	●	●				●					●						
CUROX M-503 *	Faster gel than CUROX M-403	9,5		30	60	●	●	●						●					●						
CUROX M-103 **	MEKP designed for VE resins, less foaming	8,9		30	60	●	●		●				●	●					●		●				
CUROX M-370	Mixture with similar gel time but faster cure than CUROX M-312	7,7		30	60	●	●	●					●						●						
Methyl ethyl ketone peroxide (phthalatefree) (CAS No. 1338-23-4)																									
CUROX M-312 *	General purpose MEKP with medium reactivity, approved gelcoat type	8,9		30	60	●	●	●	●	●				●					●						
CUROX M-302 *	General purpose MEKP with medium reactivity	9,5		30	60	●	●	●	●	●				●					●						
CUROX M-102 *	MEKP designed for UP, VE resins, less foaming	8,6		30	60	●	●		●				●	●					●		●				
CUROX M-202	General purpose MEKP	9,1		30	60	●	●	●	●	●				●					●						
CUROX M-402 *	Faster gel than CUROX M-403	9,8		30	60	●	●	●						●					●						
Acetylacetone peroxide (CAS No. 37187-22-7)																									
CUROX A-300 *	Standard AAP	4,1		10-25	60	●	●	●						●					●						
CUROX A-140	Low exotherm temp AAP, longer gel & cure than A-300, for thicker laminates	3,1		5-25	70	●	●	●						●					●						
CUROX A-390	AAP with improved cure performance	4,5		0-25	60	●	●							●					●						
CUROX A-390W	AAP for potable water application, improved cure performance	3,9		5-25	60	●	●							●					●						
Methyl isobutyl ketone peroxide (CAS No. 37206-20-5)																									
CUROX I-200	MIBKP in aliphatic hydrocarbons	10,7		max 25	50	●	●	●	●					●					●	●	●				
CUROX I-300	High reactive MIBKP in aliphatic hydrocarbons	10,5		max 25	50		●	●						●					●	●	●				
HYDROPEROXIDES																									
Cumyl hydroperoxide (CAS No. 80-15-9)																									
CUROX CP-50 *	Promoted CHP for fast curing of some VE resins	4,5		30	60	●	●							●					●						
CUROX CM-50 */CM-70 *	Lower exotherm temp, longer gel & cure than CM-75, for thicker laminates	8,8/9,3		30/30	60/60	●	●							●					●						
CUROX CM-75 *	Lower exotherm temp, long gel time, good final cure, for thicker laminates	8,9		30	60	●	●							●					●		●				

* Available as colored-discolorizing system for improved homogenization during mixing. Natural resin color is restored during curing (optional).

** Available on request

● = Recommended application ● = Other possible application

PRODUCT CODE	DESCRIPTION	ACTIVE OXYGEN CONTENT %	PEROXIDE CONTENT %	SAFETY INFORMATION		APPLICATION TEMPERATURE																	
				Recommended max. storage temp. °C	SAOT °C	Hand Lay-up/Spray-up	Casting/Winding	Polymer Concrete & Marble, Buttons	Gelcoats	Body Fillers	Chemical Anchors & Mine bolts	RTM, vacuum infusion	Coatings	Resin Transfer Molding (RTM)	Cured in Place Pipes (CIPP)	Artificial marble	Continuous Laminating	Pultrusion	SMC, BMC, GMC, TMC	SPECIAL RESINS	Vinylesters	Acrylic Resins	
DIACYL PEROXIDES						<div style="display: flex; justify-content: space-between;"> AMBIENT ELEVATED HIGH </div>																	
Dibenzoyl peroxide (CAS No. 94-36-0)																							
BENOX L-40LV-EU	40%, sprayable BPO dispersion	2,6	40	0-25	50	●		●		●	●	●	●								●	●	
BP-50-FT (FT1)	50% BPO powder with phthalate (free flowing)	3,3	50	30	60	●		●		●	●	●	●								●	●	
BP-30-FT1	30% BPO powder with phthalate, free flowing	2,2	30	30	60			●		●	●											●	
PERESTERS																							
tert-Butylperbenzoate (CAS No. 614-45-9)																							
TBPB	High efficient perester, lowest residual styrene	8,1	>98	10-30	60										●	●	●		●	●	●		
TBPB-HA-M1	Promoted TBPB for elevated/high temperature processes	7,4	90	10-30	60								●		●	●	●		●	●	●		
TBPB-HA-M3	Higher promoted TBPB for elevated/high temperature processes	6,6	80	10-30	60								●		●	●	●		●	●	●		
tert-Butylperoxy-2-ethylhexylcarbonate (CAS No. 34443-12-4)																							
TBPEHC	High efficient, low TOC-emission	6,4	97	max 30	70															●	●	●	
tert-Butylperoxy-2-ethylhexanoate (CAS No. 3006-82-4)																							
TBPEH	Fast perester, reduced cycle times	7,3	99	max 10	40										●				●	●			
TBPEH-LA-M3	Longer prepreg shelflife	6,7	90	max 15	40										●				●	●			
tert-Amylperoxy-2-ethylhexanoate (CAS No. 686-31-7)																							
TAPEH	Fast perester, reduced cycle times	6,9	99	max 10	40										●				●	●			
tert-Butylperoxy-3,5,5-trimethylhexanoate (CAS No. 13122-18-4)																							
TBPIN	High efficient perester, drinking water application	6,9	99	max 30	60											●	●		●	●	●		
TBPIN-HA-M1	Promoted TBPIN for elevated temperature processes	6,3	90	max 30	55								●		●	●	●		●	●	●		
PEROXYDICARBONATES																							
Di(4-tert.butylcyclohexyl)peroxydicarbonate (CAS No. 15520-11-3)																							
BCHPC	Fast kick off peroxide for two step curing	3,8	>96	max 20	45										●		●		●	●		●	
PERKETALS																							
1,1-Di(tert.amylperoxy)cyclohexane (CAS No. 15667-10-4)																							
ACH-80-AL3	Improved SMC surface properties	8,8	80	30	60															●	●		
1,1-Di(tert.butylperoxy)cyclohexane (CAS No. 3006-86-8)																							
CH-80-AL	Higher concentrated version, moderate exothermal reaction	9,7	80	30	60															●	●		
1,1-Di(tert.butylperoxy)-3,3,5-trimethylcyclohexane (CAS No. 6731-36-8)																							
TMCH-90-AL	Most efficient perketale	9,5	90	30	60															●	●		
TMCH-HA-M1	Accelerated curing performance	5,8	mix	max 20	50															●	●		

Safety Information

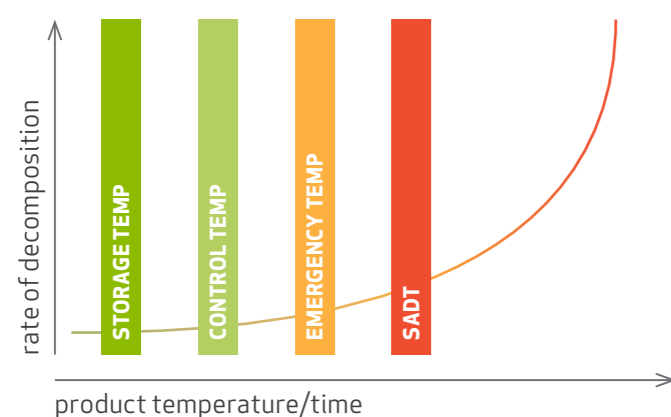
Half-life

Decomposition rates of peroxides are commonly reported in terms of half-life time. The half-life time is a measure of a peroxide's rate of decomposition at a certain temperature. It indicates the time when 50% of the peroxide has decomposed. The thermal stability of organic peroxides is commonly characterised by giving the temperature at which the half-life time of the product is 10 hours, 1 hour and 1 minute. The higher the temperature corresponding to the half-life, the more stable the peroxide. Half-life temperatures can vary based on the manner in which they are determined, especially the solvent used.

The half-life time can be derived from the Arrhenius equation:

$$k_d = A \cdot e^{-E_A/RT} \text{ and } t_{1/2} = \ln 2 / k_d$$

- k_d : Rate constant of the peroxide dissociation
- A: Arrhenius frequency factor
- E_A : Activation energy for the dissociation
- R: Ideal gas constant
- T: Temperature
- $t_{1/2}$: Half-life time



No single parameter is as important as the control of the temperature. Whether shipping, handling or storing, if the temperature is maintained well below its self-accelerating decomposition temperature (SADT), most hazards are avoided. For storage over a longer period of time, the manufacturer's recommended temperature for storage should be rigorously followed.

Self-Accelerating Decomposition Temperature (SADT)

The SADT is the lowest temperature at which self-accelerating decomposition occurs for a peroxide formulation in its packaging used for transport when held at that temperature. At the SADT, the rate of evolution of heat from decomposition exceeds the rate of heat loss to the surroundings so that the peroxide's temperature increases with time and the decomposition becomes increasingly more rapid or self-accelerating. The final decomposition may be uncontrollable.

Minimum/Maximum recommended storage temperatures

The maximum recommended storage temperature is lower than the control temperature, not for safety, but to maintain product quality. On the other hand, some liquid or paste organic peroxides must not be stored below a certain minimum temperature as turbidity, phase separation, crystal deposits or solidification can occur.

Control Temperature T_C

The T_C is the maximum temperature at which the product can be safely transported for an extended period of time. T_C is not required if the SADT exceeds 50°C (122°F). Generally the T_C is derived from the SADT as shown for canisters:

$$T_C = \text{SADT minus } 20^\circ\text{C if SADT} < 20^\circ\text{C}$$

$$T_C = \text{SADT minus } 15^\circ\text{C if SADT} < 35^\circ\text{C}$$

$$T_C = \text{SADT minus } 10^\circ\text{C if SADT} < 50^\circ\text{C}$$

Transportation temperatures are derived from the SADT according to the recommendations by the UN Committee of Experts on the Transport of Dangerous Goods.

Emergency Temperature T_E

The Control Temperature T_C is supplemented by an Emergency Temperature T_E which is higher than the T_C but still well below the SADT. The T_C may be exceeded if maintenance is necessary or until alternative cooling (e.g. dry ice or wet ice) is available. However, if the Emergency Temperature T_E is reached, emergency procedures must be implemented immediately, e.g. cooling down the organic peroxides.

PRODUCT CODE	CHEMICAL NAME	STORAGE TEMP	EA [KJ/MOL]	HALF LIFE TIME [°C]		
				10 H	1 H	1 MIN
DIPND	Di(2-neodecanoylperoxy-isopropyl)benzene	●	114	37	54	85
CUPND	Cumylperoxy-neodecanoate	●	115	38	55	90
TOPND	1,1,3,3-Tetramethylbutylperoxy-neodecanoate	●	117	40	57	92
TAPND	tert. Amylperoxy-neodecanoate	●	113	44	62	100
*)	Peroxydicarbonates	●	144	47	61	90
TBPND	tert. Butylperoxy-neodecanoate	●	121	47	64	100
TBPNH	tert. Butylperoxy-neoheptanoate	●	116	51	69	107
TAPPI	tert. Amylperoxy-pivalate	●	121	53	71	110
DCLBP	Di(2,4-dichlorobenzoyl)peroxide	●	121	54	72	110
TBPPI	tert. Butylperoxy-pivalate	●	121	56	74	110
INP	Di(3,5,5-trimethyl-hexanoyl)peroxide	●	117	59	78	120
DP	Didecanoyl-peroxide	●	126	62	80	120
LP	Dilauroyl-peroxide	●	126	62	80	120
AIBN	2,2'Azobis(isobutyronitrile)	●	130	62	80	120
DHPEH	2,5-Dimethyl-2,5-di(2-ethylhexanoylperoxy)hexane	●	137	67	84	125
APS	Ammoniumperoxodisulfate	●	135	69	87	125
PMBP	Di(4-methylbenzoyl)peroxide	●	125	70	89	130
BP	Dibenzoyl-peroxide	●	126	72	91	130
TAPEH	tert. Amylperoxy-2-ethylhexanoate	●	126	72	91	130
TBPEH	tert. Butylperoxy-2-ethylhexanoate	●	135	74	92	130
TBPIB	tert. Butylperoxy-isobutyrate	●	130	77	96	135
TBPM	tert. Butyl-monoperoxy-maleate	●	116	82	104	150
ACH	1,1-Di(tert. amylperoxy)cyclohexane	●	135	87	106	152
CUROX I	Methylisobutylketoneperoxide	●	125	90	110	155
TAPEHC	tert. Amylperoxy-(2-ethylhexyl)carbonate	●	151	95	113	150
TMCH	1,1-Di(tert. butylperoxy)-3,5,5-trimethyl-cyclohexane	●	143	95	114	155
CH	1,1-Di(tert. butylperoxy)cyclohexane	●	138	97	117	160
TBPIC	tert. Butylperoxy-isopropylcarbonate	●	138	97	117	160
TBPIN	tert. Butylperoxy-3,5,5-trimethyl-hexanoate	●	147	100	119	160
DHPBZ	2,5-Dimethyl-2,5-di(benzoylperoxy)hexane	●	147	100	119	160
TBPEHC	tert. Butylperoxy-(2-ethylhexyl)carbonate	●	128	100	122	175
TBPA	tert. Butylperoxy-acetate	●	149	102	121	160
TAPB	tert. Amylperoxy-benzoate	●	143	102	122	160
TBPB	tert. Butylperoxy-benzoate	●	143	104	124	165
BU	2,2-Di(tert. butylperoxy)butane	●	143	104	124	165
NBV	n-Butyl-4,4-di(tert. butylperoxy)valerate	●	141	110	131	175
EBU	Ethyl-3,3-di(tert. butylperoxy)butyrate	●	144	114	135	180
DCUP	Dicumyl-peroxide	●	152	116	136	175
BCUP	tert. Butylcumyl-peroxide	●	154	118	138	180
DTAP	Di(tert. amyl)peroxide	●	129	118	142	190
DIPP	Di(2-tert. butylperoxy-isopropyl)benzene	●	142	120	142	190
DHBP	2,5-Dimethyl-2,5-di(tert. butylperoxy)hexane	●	142	120	142	190
DTBP	Di(tert. butyl)peroxide	●	152	125	146	190
DYBP	2,5-Dimethyl-2,5-di(tert. butylperoxy)hexyne-3	●	154	128	149	195
HMCN	3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxa-cyclononane	●	146	135	158	205
TBHP	tert. Butyl-hydroperoxide	●	149	173	200	260
CUROX CC-DC	2,3-Dimethyl-2,3-diphenylbutane	●	195	210	234	285
*) PEROXYDICARBONATES						
EHPC	Di(2-ethylhexyl)peroxydicarbonate	●	CHPC	Dicyclohexylperoxydicarbonate		
SBPC	Di(sec-butyl)peroxydicarbonate	●	NBPC	Di(n-butyl)peroxydicarbonate		
BCHPC	Di(4-tert. butylcyclohexyl)peroxydicarbonate	●	MYPC	Dimyristylperoxydicarbonate		
CEPC	Dicylperoxydicarbonate	●				

Colour code for storage temperature:

● = Deep refrigeration ● = Moderate refrigeration ● = Ambient temperature

For precise values see specific product data sheets



UNITED INITIATORS

driving your success



Office



Plant



Office and plant



Joint Venture

www.united-initiators.com

Germany

United Initiators GmbH
Dr.-Gustav-Adolph-Str. 3
82049 Pullach
T: +49 89 74422 237
cs-initiators.eu@united-in.com

USA

United Initiators Inc.
555 Garden Street
Elyria, OH 44035

United Initiators Inc.
334 Phillips 311 Road
Helena, AR 72342-9033

United Initiators Inc.
Mobile, Alabama

Contact for USA
T: +1 800 231 2702
cs-initiators.nafta@united-in.com

China

Persulfates/Office:
United Initiators (Shanghai) Co. Ltd.
Room 201, No. 2398 Hutai Road
Baoshan District Shanghai

Persulfates/Plant:
United Initiators Hefei Co. Ltd.
No. 168, Qinquan Road

Hefei Circular Economy
Demonstration Park
Hefei

Contact for persulfates China:
T: +86 21 6117 2758
cs-initiators.cn@united-in.com

Organic Peroxides:
Shanghai United Initiators
Trading Co. Ltd.
1702, Asia Mansion
650 Han Kou Road
Shanghai 200001
T: +86 21 3429 3909
cs-initiators.cn@united-in.com

Australia

United Initiators Pty Ltd.
20-22 McPherson Street
Banksmeadow NSW 2019
T: +61 2 9316 0046
cs-initiators.au@united-in.com

India

UI VR Private Limited
10-13 Pancharatna Industrial Estate
Sarkhej-Bawla Highway, Changodar
Ahmedabad-382213
T: +91 9909724733
sales@vrpersulfates.com