

Accessory Products



THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

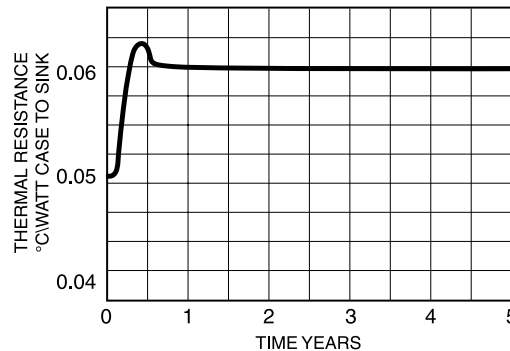
120 SERIES



The **120 Series** Silicone Oil-Based Thermal Joint Compound fills the minute air gap between mating surfaces with a grease-like material containing zinc oxide in a silicone oil carrier. It possesses an excellent thermal resistance of only 0.05°C/W for a 0.001 in. film with an area of one square inch. There is no measurable increase in case temperature of a mounted semiconductor on a heat sink after the 6-month stabilization period (Time versus Thermal Resistivity graph below).

TYPICAL VALUES FOR THERMAL RESISTANCE, CASE TO SINK (θ_{CS}) WHEN THERMAL JOINT COMPOUNDS ARE USED		
Case Style Characteristics	Mounting Torque in inch • pounds (N•M)	Typical Thermal Resistance (°C/W)
T0-3	8 (0.9)	0.09
T0-66	9 (0.9)	0.14
T0-220	8 (0.9)	0.50
0.19 (4.8) stud x 0.44 (11.2) hex	15 (1.7)	0.16
0.25 (6.4) stud x 0.69 (17.5) hex	30 (3.39)	0.10
0.38 (9.7) stud x 1.06 (26.9) hex	75 (8.47)	0.07
0.50 (12.7) stud x 1.06 (26.9) hex	125 (14.12)	0.07
0.75 (19.1) stud x 1.25 (31.8) hex	600 (67.79)	0.052

120 SERIES - THERMAL JOINT COMPOUND	
Characteristic	Description
Volume Resistivity	5 X 10 ¹⁴ ohm-cm
Dielectric Strength	225 volts/mil
Specific Gravity	2.1 min.
Thermal Conductivity @ 36°C	0.735 W/(m)(K) 5.1(Btu) (in.)/(hr)(ft ²)(°F)
Thermal Resistivity (P)	56 (°C)(in.)/watt
Bleed, % after 24 hrs @ 200°C	0.5
Evaporation, % after 24 hrs @ 200°C	0.5
Color	opaque white
Shelf life	5 years
Operating Temperature Range (°C)	-40/+200



120 SERIES - ORDER GUIDE	
Series - P/N	Container Size
120-SA	4 gram plastic pak
120-2	2 oz (0.06 kg) jar
120-5	5 oz (0.14 kg) tube
120-8	8 oz (0.23 kg) jar
120-80	5 lb (2.27 kg) can
120-320	20 lb (9.08 kg) can

HIGH PERFORMANCE THERMAL COMPOUND

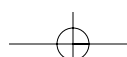
122 SERIES



122 Series Thermal Joint Compound is a stable, silicone based, thixotropic paste developed to provide premium performance at an affordable price. It is formulated to significantly reduce contact thermal resistance where power densities are concentrated in devices such as flip chip, reduced die size, and 'overclock' microprocessors. When applied as a thin film between a Wakefield heat sink and device it possesses superior thermal conductivity compared to traditional 'grease'. It is compatible with automated or manual dispensing methods and is fully RoHS compliant.

122 SERIES THERMAL JOINT COMPOUND	
Typical Characteristics	Description
Appearance	Smooth Gray paste
Thermal Conductivity	2.5 W / m °K, 17.3 (Btu) (in.)/(hr) (ft ²) (°F)
Thermal Resistance	0.02 °C in 2 / W
Bleed	0.015 wt%, 24 hrs at 200°C
Evaporation	0.150 wt%, 24 hrs at 200°C
Volume Resistivity	1.4 x 10 ¹⁰ ohm-cm
Dielectric Strength	225 volts/mil
Specific Gravity	2.23 (gm/cc) at 25°C
Operating Range	-40°C to 205°C
Shelf Life	5 years

122 SERIES - ORDER GUIDE	
Series - P/N	Container Size
122-10CC	10cc syringe
122-2	2 oz (0.06 kg) jar
122-30CC	30cc syringe





THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

126 SERIES



The **126 Series** is a nontoxic, synthetic, ester-based (nonsilicone) Thermal Joint Compound with metal oxide fillers designed to enhance thermal performance characteristics of plastic and metal package devices exceeding that of silicone-based compounds. Solved are problems associated with contamination of wave solder baths and migration of silicone-based products. Shelf life: 5 years.

126 SERIES THERMAL JOINT COMPOUND	
Characteristics	Description
Appearance	Smooth, white homogeneous paste
Solids Content, wt %	65% min
Thermal Conductivity at 36°C	.69 W / m °K, 4.8 (Btu)(in.)/(hr) (ft²) (°F)
Interface Thermal Resistance	0.043°C/W TO-3 at 0.0008 thick film
Bleed, 24 hrs at 200°C, wt%	0.09% max
Evaporation, 24 hrs at 200°C, wt%	0.6 max
Volume Resistivity	2.3 x 10 ¹² ohms-cm
Dielectric Strength	200 volts/mil
Specific Gravity @ 60°F	2.93 (gm/cc)
Penetration	280 to 320
Operating Range	-40°C to 200°C

126 SERIES - ORDER GUIDE	
Series - P/N	Container Size
126-2	2 oz (0.6 kg) jar
126-4	4 oz (0.11 kg) tube
126-4S	4 oz (0.11 kg) syringe
126-5LB	5 lb (2.27 kg) can

DeltaBond™ 152



DeltaBond™ 152 adhesive is ideal for general cementing; thermally bonding semiconductors and components to chassis or heat sinks, while electrically isolating one from the other; fabricating heat sinks or thermal links; and for all permanent bonding of assemblies which require high thermally conductive interfaces. It produces a rigid, high strength bond to most materials when cured. **DeltaBond™ 152** is available in bi-packs, kits, and quarts. Order one hottle of hardener A-4 or B-4 per one quart of **DeltaBond™ 152** separately. Shelf life: 152KA 3 year, all others 3 years.

DELTABOND™152		
Characteristics	Hardener Type	
Typical Properties Fully Cured	A4	B4
Thermal conductivity - W/(m) (°K)	0.836	0.908
(Btu) (in.)/(hr) (ft²) (°F)	5.8	6.3
Thermal resistivity - (°C) (in.)watt	47	42
Bond shear strength 77°F	2,900	2,300
1 in. overlap - psi 125°F	2,200	2,000
etched aluminum to etched aluminum 212°F	400	800
Heat distortion point - °F	130	225
Minimum dielectric strength, v/mil, 0.125 in. sample	400	400
Max operation temp - °C	65	150
	Continuous	Intermittent
	100	190

DELTABOND™152		
Mixing Proportions and Working Properties		
Characteristics	A4	B4
Parts of hardener per 100 parts of resin by weight	7.5	3.5
*Working Time - at 77°F	45 min	30 min
†Initial cure time 77°F	8 hrs	6 hrs
150°F	45 min	30 min
250°F	20 min	15 min
‡Post-cure time at a temp in °F	4 hrs @200°F	4 hrs @ 200°F
‡Alternate room temp. aging time at 77°F	4 days	4 days
Working consistency (77°F)	viscous liquid	paste
Working viscosity (77°F) cps	25,000	—

DELTABOND™152			
Ordering Guide - Resin and Hardener			
Model Number	Resin		Hardener
	Part No.	Container	
DeltaBond™ 152	152-1A	Bi-Pack (1 oz)	Included in PIN 152-1 A ("A-4") Type Included in P/N 152-1 B ("B-4") Type Included in P/N 152-KA A-4 (0.316 lb), B-4 (0.14 lb), (order 1 only)
	152-1B	Bi-Pack (1 oz)	
	152-KA	Kit (7 oz Resin, 0.5 oz Hardener)	
	152-Q	1 quart (4 lbs)	

All hardener part numbers A-4, B-4

NOTES:

* Since the hardener/resin reaction is exothermic, it is important that batch size be matched to hardener speed. Working times given are for approximate batch sizes: A—200 gms, B—200 gms. Larger batch sizes will greatly reduce working time.

** For optimum electrical properties, dry parts for 15 minutes at 150°F (65°C) or 30 minutes at 75°F (24°C) to slowly evaporate the thinner and then final cure for 4 hours at 275°F (135°C).

† After initial cure, material may be handled, removed from fixture, etc., but has not yet achieved full properties and should be room temperature aged or post-cured as shown to achieve full physical and electrical properties.

‡ After initial cure, material may be brought to full physical and electrical properties during post-cure or may be room temperature aged for charted length of time to achieve same full properties.

The information contained herein is based on data believed to be reliable but we do not assume responsibility for accuracy. All such information is used at the customer's own risk, conditions of use being beyond our control.



Accessory Products



THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

DeltaBond™ 153



DeltaCast™ 153 is a pourable casting resin having thermal expansion characteristics similar to aluminum and copper allowing assemblies to operate over a very wide temperature range. Ideal for encapsulating components and assemblies, this series' major advantages and uses include potted systems (virtually indestructible), protecting components and systems from moisture and contaminants, securing proprietary circuitry, mechanical support of devices, removal of heat from hot components and the assembly equalizing temperatures, and high voltage isolation. **DeltaCast™ 153** is available in quarts and gallons. Order one bottle of hardener A4 or B4 per one quart of **DeltaCast™ 153** separately. Shelf life: 3 years.

DELTACAST™153		
Characteristics	Hardener Type	
Typical Properties Fully Cured	A4	B4
Thermal conductivity - W/(m) (°K)	0.836	0.908
(Btu) (in.)/(hr) (ft²) (°F)	5.8	6.3
Thermal resistivity - (°C) (in.)watt	47	42
Bond shear strength 77°F	2,500	1,900
1 in. overlap - psi 125°F	—	—
etched aluminum to etched aluminum 212°F	—	—
Heat distortion point - °F	130	225
Minimum dielectric strength, v/mil, 0.125 in. sample	400	400
Max operation temp - °C	65	150
Continuous Intermittent	100	190

DELTACAST™153		
Mixing Proportions and Working Properties		
Characteristics	A4	B4
Parts of hardener per 100 parts of resin by weight	7.5	3.5
*Working Time - at 77°F	45 min	30 min
† Initial cure time 77°F	8 hrs	6 hrs
150°F	45 min	30 min
250°F	20 min	15 min
‡Post-cure time at a temp in °F	4 hrs @200°F	4 hrs @ 200°F
‡Alternate room temp. aging time at 77°F	4 days	4 days
Working consistency (77°F)	heavy liquid	viscous liquid
Working viscosity (77°F) cps	10,000	30,000

DELTACAST™153			
Ordering Guide - Resin and Hardener			
Model Number	Resin		Hardener
	Part No.	Container	Part Number
DeltaCast™ 153	153-Q	1 quart (4 lbs)	A-4 (0.316 lb), B-4 (0.14 lb), (order 1 only)

All hardener part numbers A-4, B-4

DeltaBond™ 154



DeltaBond™ 154 is a medium viscosity, aluminum-filled resin with the best thermal conductivity of this series. It is, however, neither a good electrical insulator nor conductor. Its principal application is that of a good thermal mechanical adhesive for applications such as bonding fins to base plates or structural mounting blocks or brackets to heat sinks. Order one bottle of hardener A4 or B4 per one quart of **DeltaBond™ 154** separately. Shelf life: 3 years.

DELTABOND™154		
Characteristics	Hardener Type	
Typical Properties Fully Cured	A4	B4
Thermal conductivity - W/(m) (°K)	1.053	1.154
(Btu) (in.)/(hr) (ft²) (°F)	7.3	8.0
Thermal resistivity - (°C) (in.)watt	37	34
Bond shear strength 77°F	3,000	2,400
1 in. overlap - psi 125°F	2,300	2,100
etched aluminum to etched aluminum 212°F	500	800
Heat distortion point - °F	130	225
Minimum dielectric strength, v/mil, 0.125 in. sample	NA*	NA*
Max operation temp - °C	65	150
Continuous Intermittent	100	190

DELTABOND™154		
Mixing Proportions and Working Properties		
Characteristics	A4	B4
Parts of hardener per 100 parts of resin by weight	11.0	4.5
*Working Time - at 77°F	45 min	30 min
† Initial cure time 77°F	8 hrs	6 hrs
150°F	45 min	30 min
250°F	20 min	15 min
‡Post-cure time at a temp in °F	4 hrs @200°F	4 hrs @ 200°F
‡Alternate room temp. aging time at 77°F	4 days	4 days
Working consistency (77°F)	viscous liquid	paste
Working viscosity (77°F) cps	25,000	—

DELTABOND™154			
Ordering Guide - Resin and Hardener			
Model Number	Resin		Hardener
	Part No.	Container	Part Number
DeltaBond™ 154	154-Q	1 quart (2.5 lbs)	A-4 (0.316 lb), B-4 (0.14 lb), (order 1 only)

All hardener part numbers A-4, B-4





THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

DeltaBond™ 155



DeltaBond™ 155 is an epoxy adhesive formulated for use within the semiconductor industry. An easy to mix spread thixotropic paste, it offers high heat transfer, low shrinkage, and a coefficient of thermal expansion comparable to that of copper and aluminum. This adhesive is principally used to form thermally conductive joints in fabricated heat sinks and between heat sinks and power devices. When used to bond semiconductors to heat sinks, it also serves as an electrical insulator. Its strong bond to a wide variety of substrates resists severe temperature cycling. **DeltaBond™ 155** is only available in kit size. Simply squeeze out equal lengths and mix to uniform color. Shelf life: 3 year.

DELTABOND™155		
Characteristics		Hardener Type
Typical Properties Fully Cured		DeltaBond™155
Thermal conductivity - W/(m) (°K)		0.836
(Btu) (in.)/(hr) (ft²) (°F)		5.8
Thermal resistivity - (°C) (in.)watt		47
Bond shear strength 77°F		2,600
1 in. overlap - psi 125°F		—
etched aluminum to etched aluminum 212°F		—
Heat distortion point - °F		130
Minimum dielectric strength, v/mil, 0.125 in. sample		400
Max operation temp - °C		65
Continuous Intermittent		100

DELTABOND™ 155	
Mixing Proportions and Working Properties	
Parts of hardener per 100 parts of resin	by volume 100
*Working Time - at 77°F	90 min
†Initial cure time 77°F	8 hrs
150°F	45 min
250°F	20 min
‡Post-cure time at a temp in °F	4 hrs @ 200°F
‡Alternate room temp. aging time at 77°F	4 days
Working consistency (77°F)	paste
Working viscosity (77°F) cps	paste

DELTABOND™155			
Model Number	Ordering Guide - Resin and Hardener		
	Part No.	Resin Container	Hardener Part Number
DeltaBond™ 155	155	Kit (3 oz resin, 3 oz hardener)	Included in P/N 155

DeltaBond™ 156



DeltaBond™ 156 Thermally Conductive Adhesive is a modified acrylic adhesive designed for permanent mounting on components where heat must be effectively transmitted. Recommended for electromechanical assemblies to bond components and dissipate heat, it replaces mechanical fasteners and compressible pads, silicone grease, and epoxies; eliminates air entrapment, and other variables related to epoxy mixing. This soft paste requires no mixing and flows easily to allow thin bond lines. Primer activated, cure begins upon assembly. DeltaBond™ Activator fixtures at room temperature in less than 5 minutes. Full strength is developed in 4 to 12 hours and fillets become dry to the touch in 24 hours. It is not recommended to use this durable adhesive without the use of DeltaBond™ Activator. **DeltaBond™ 156** is available in kit size; order 156-K (25 ml Syringe and Activator Kit). Shelf life: 1 year.

DELTABOND™156		
Characteristics	Description	
Typical Properties Fully Cured	Results	ASTM
Temperature Range	-65 to 300°F (-54 to 149°C) 300°F to (177°C) Intermittent	
Tensile Strength, at break	2360 psi	D638
Modulus	233,000 psi	D638
Elongation, at break	7.75%	D638
Outgassing	2.5% TLM 0.05% CVCM	E595
Coefficient of Thermal Expansion	7.1 x 10 ⁻⁴ (cm/cm°C)	
Tensile Shear	2500psi	D1002
Thermal Conductivity, K (absolute at 86°F (30°C))	3.47 Btu x in./hr ft² °F (0.50 W/m °C)	

Note: The absolute thermal conductivity test was developed specifically for measuring thermal properties of thin film adhesive bonds.

DELTABOND™156		
Typical Electrical Properties		
Test	Results	ASTM
Dielectric Strength	220 volts/mil	D149
Dielectric Constant, 77°F (25°C)		D150
100 Hz	14.92	
1000 Hz	14.26	
1MM Hz	12.34	
Dissipation Factor, 77°F (25°C)		D150
100 Hz	0.05	
1000 Hz	0.03	
1MM Hz	0.06	
Volume Resistivity	5.2x10 ¹¹ (ohms-cm)	D257
Surface Resistivity	8.6 x 10 ¹³ (ohms)	D257

Note: DeltaBond™ Thermally Conductive Adhesive-High Strength contains a metallic filler which, in certain applications, may have an effect on electrical properties. Therefore, test each particular application to ensure that electrical properties are as required.

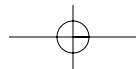
Model Number	DELTABOND™156		
	Ordering Guide - Resin and Hardener		
	Part No.	Resin Container	Hardener Part Number
DeltaBond™ 156	156-K	Resin Kit Hardener Syringe - 0.85 fl oz - 25 ml - 2 oz net/0.44 oz fl contents bottle -12ml	Included in kit hardener with brush applicator - 4.2 oz total wt/kt

* Since the hardener/resin reaction is exothermic, it is important that batch size be matched to hardener speed. Working times given are for approximate batch sizes: A—200 gms, B—200 gms. Larger batch sizes will greatly reduce working time.

† After initial cure, material may be handled, removed from fixture, etc., but has not yet achieved full properties and should be room temperature aged or post-cured as shown to achieve full physical and electrical properties.

‡ After initial cure, material may be brought to full physical and electrical properties during post-cure or may be room temperature aged for charted length of time to achieve same full properties.

The information contained herein is based on data believed to be reliable but we do not assume responsibility for accuracy. All such information is used at the customer's own risk, conditions of use being beyond our control.



Accessory Products



THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS



The 173, 174, and 175 Series are highly efficient thermally conductive insulators designed for semi-conductor interface to heat sinks. Their properties eliminate messy concerns associated with thermal greases.

173/174 SERIES *DeltaPads™ Thermally Conductive Insulators*

TO-3, TO-66, TO-220, DO-4, DO-5 SHEET

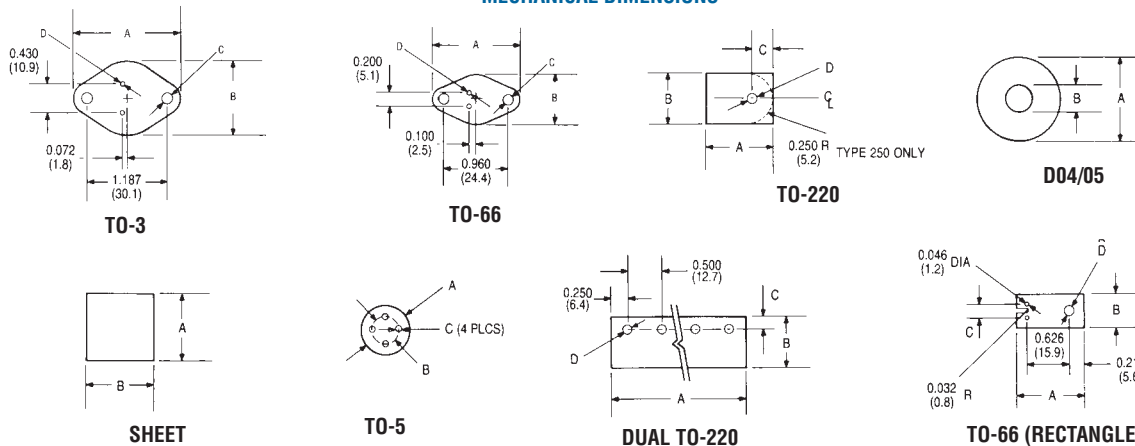
175 SERIES *Greaseless Thermally Conductive Kapton® Reinforced Insulators*

Characteristics	DeltaPads™ 173-7 Series	DeltaPads™ 173-9 Series	DeltaPads™ 174-9 Series	Kapton® 175-6 Series	Test Method
Material Thickness	0.007 in.	0.009 in.	0.009 in.	0.006 in.	Micrometer
Color	Gray	Gray	Tan	Gray	Visual
Tear Strength, lb/in. Typical100	100	100	100	ASTM 0624	
Volume Resistivity, megohm-cm, Minimum Normal	1.0 x 10 ⁹	1.0 x 10 ⁹	1.0 x 10 ¹³	1 x 10 ¹³	ASTM D257
Breakdown Voltage, Minimum	4,000	5,000	5,000	6,000	ASTM 0149
Dielectric Constant at 60 Hz and 100 V Maximum	2.70	2.40	2.50	5.5 @ 1,000 Hz	ASTM D 150
Continuous Use Temperature, °C	-60/+200	-60/+200	-60/+200	-60/+200	-
Thermal Conductivity, cal/cm sec. °C, Minimum	3 x 10 ⁻³	3 x 10 ⁻³	1 x 10 ⁻²	1.2 x 10 ⁻³	-
Thermal Resistance (TO-3), 1 in. ² °C/W	0.33	0.50	0.25	0.40	-
Recommended Mounting Pressure, lb/in. ²	350/550	350/550	350/550	350/550	Formula*

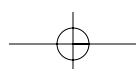
$$*P \text{ (pressure in psi)} = \frac{T \text{ (torque [in.-lb]} \times N \text{ (number of fasteners)}}{0.2 \times D \text{ (Thread Dia)} \times A \text{ (contact surface area square inches)}}$$

173-7 Series		173-9 Series	174-9 Series	175-6 Series
No Adhesive	Adhesive Backing	No Adhesive	No Adhesive	Greaseless
-	-	173-9-210P	-	175-6-210P
173-7-220P	-	-	-	175-6-220P
173-7-230P	-	173-9-230P	-	175-6-230P
173-7-240P	173-7-240A	173-9-240P	-	175-6-240P
-	-	-	-	175-6-250P
-	-	-	-	175-6-280P
-	-	-	174-9-310P	175-6-310P
-	-	-	-	175-6-320P
-	-	-	-	175-6-330P
-	-	-	-	175-6-410P
-	-	-	-	175-6-610P
173-7-1212P	-	173-9-1212P	174-9-1212P	-

MECHANICAL DIMENSIONS



Dimensions: in. (mm)



Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



1. Identification

1.1. Product identifier

Product Identity B-4 Hardener

Alternate Names B-4 Hardener

1.2. Relevant identified uses of the substance or mixture and uses advised against

Intended use See Technical Data Sheet.

Application Method See Technical Data Sheet.

1.3. Details of the supplier of the safety data sheet

Company Name Cast-Coat, Inc.
354 West Street
W. Bridgewater, MA 02379

Emergency

CHEMTREC 24 hour Emergency Telephone No. 1-800-424-9300 or 1-703-527-3887

Customer Service: Cast-Coat, Inc. 1-800-527-4502 or 1-508-587-4502

2. Hazard(s) identification

2.1. Classification of the substance or mixture

Acute Tox. 3;H311	Toxic in contact with skin.
Skin Corr. 1B;H314	Causes severe skin burns and eye damage.
Eye Dam. 1;H318	Causes serious eye damage.
Skin Sens. 1;H317	May cause an allergic skin reaction.

2.2. Label elements

Using the Toxicity Data listed in section 11 and 12 the product is labeled as follows.



Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



Danger

H311 Toxic in contact with skin.

H314 Causes severe skin burns and eye damage.

H317 May cause an allergic skin reaction.

H318 Causes serious eye damage.

[Prevention]:

P261 Avoid breathing dust / fume / gas / mist / vapors / spray.

P264 Wash thoroughly after handling.

P272 Contaminated work clothing should not be allowed out of the workplace.

P280 Wear protective gloves / eye protection / face protection.

[Response]:

P301+330+331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P302+352 IF ON SKIN: Wash with plenty of soap and water.

P303+361+353 IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothing. Rinse skin with water / shower.

P304+312 IF INHALED: Call a POISON CENTER or doctor / physician if you feel unwell.

P305+351+338 IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing.

P310 Immediately call a POISON CENTER or doctor / physician.

P313 Get medical advice / attention.

P321 Specific treatment (see information on this label).

P333+313 If skin irritation or a rash occurs: Get medical advice / attention.

P340 Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P363 Wash contaminated clothing before reuse.

[Storage]:

P405 Store locked up.

[Disposal]:

P501 Dispose of contents / container in accordance with local / national regulations.

Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



3. Composition/information on ingredients

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances regulations.

Ingredient/Chemical Designations	Weight %	GHS Classification	Notes
Triethylenetetramine CAS Number: 0000112-24-3	100	Acute Tox. 3;H311 Skin Corr. 1B;H314 Skin Sens. 1;H317 Aquatic Chronic 3;H412	[1]

In accordance with paragraph (i) of §1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

[1] Substance classified with a health or environmental hazard.

[2] Substance with a workplace exposure limit.

[3] PBT-substance or vPvB-substance.

*The full texts of the phrases are shown in Section 16.

4. First aid measures

4.1. Description of first aid measures

General

In all cases of doubt, or when symptoms persist, seek medical attention.
Never give anything by mouth to an unconscious person.

Inhalation

Remove to fresh air, keep patient warm and at rest. If breathing is irregular or stopped, give artificial respiration. If unconscious place in the recovery position and obtain immediate medical attention. Give nothing by mouth.

Eyes

Immediately flush eyes with water for at least 30 minutes. Seek medical attention.

Skin

Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleanser.

Ingestion

Rinse mouth with water. If conscious, give small quantities of water to drink. Do not induce vomiting. If vomiting occurs, keep victim's head below hips to prevent vomit from entering lungs. Seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Overview

Eye Contact: Corrosive to the eyes and may cause severe damage, including blindness. Vapors may be irritating.

Skin Contact: Corrosive to the skin. May cause skin sensitization. May be toxic if absorbed through the skin.

Inhalation: Vapors / mists may be corrosive to the upper respiratory tract. Repeated or prolonged exposure can result in lung damage.

Ingestion: Not expected to be a relevant route of exposure, however, corrosive and may cause severe and permanent damage to the mouth, throat and stomach.

Aggravated Medical Conditions: Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product. Pre-existing respiratory and skin allergies may be increased from exposure to this product. Good practice requires that gross amounts of any chemical be removed from the skin as soon as practical, especially before eating or smoking. See section 2 for further details.

Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



Eyes	Causes serious eye damage.
Skin	Toxic in contact with skin. May cause an allergic skin reaction. Causes severe skin burns and eye damage.

5. Fire-fighting measures

5.1. Extinguishing media

Recommended extinguishing media; alcohol resistant foam, CO₂, powder, water spray.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition: Carbon monoxide, carbon dioxide, nitrous oxide.

Avoid breathing dust / fume / gas / mist / vapors / spray.

5.3. Advice for fire-fighters

At higher temperature vapors can cause pressure buildup in sealed containers. Use water to cool containers exposed to fire. Self-contained respirator equipment and full protective clothing required when smoke or fumes are generated. Electrical grounding not recommended.

ERG Guide No. 153

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Put on appropriate personal protective equipment (see section 8).

6.2. Environmental precautions

Do not allow spills to enter drains or waterways.

Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

6.3. Methods and material for containment and cleaning up

Construct a dike to prevent from entering sewers, rivers and waterways. Soak up residue with absorbent material and shovel into non leaking containers.

7. Handling and storage

7.1. Precautions for safe handling

Good practice requires that gross amounts of any chemical be removed from the skin as soon as practical, especially before eating or smoking. Wear splash proof chemical goggles, impervious gloves and protective clothing to prevent skin contact. Emergency eye wash stations should be readily accessible.

See section 2 for further details. - [Prevention]:

Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



7.2. Conditions for safe storage, including any incompatibilities

Handle containers carefully to prevent damage and spillage.

Incompatible materials: No data available.

Store in a cool, dry location in tightly sealed containers. Keep away from open flame and high temperatures. Do not pressurize containers to empty them.

See section 2 for further details. - [Storage]:

7.3. Specific end use(s)

No data available.

8. Exposure controls and personal protection

8.1. Control parameters

Exposure

CAS No.	Ingredient	Source	Value
0000112-24-3	Triethylenetetramine	OSHA	No Established Limit
		ACGIH	No Established Limit
		NIOSH	No Established Limit
		Supplier	No Established Limit

Carcinogen Data

CAS No.	Ingredient	Source	Value
0000112-24-3	Triethylenetetramine	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No;

8.2. Exposure controls

Respiratory

Wear NIOSH approved air purifying respirator in the absence of ventilation.

Eyes

Wear safety goggles or safety glasses with side shields. Emergency eye wash stations should be readily accessible.

Skin

Wear chemical resistant impervious gloves and protective clothing such as an apron to prevent skin contact.

Engineering Controls

Provide effective mechanical exhaust. Wear NIOSH approved respirator suitable for organic vapors in the absence of ventilation.

Other Work Practices

Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

See section 2 for further details. - [Prevention]:

Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



9. Physical and chemical properties

Appearance	Clear Amber Liquid
Odor	Amine odor
Odor threshold	Not Measured
pH	Not Measured
Melting point / freezing point	Not Measured
Initial boiling point and boiling range	Not Measured
Flash Point	143 °C
Evaporation rate (Ether = 1)	Not Measured
Flammability (solid, gas)	Not Applicable
Upper/lower flammability or explosive limits	Lower Explosive Limit: Not Measured Upper Explosive Limit: Not Measured
Vapor pressure (Pa)	< 0.01 mmHg at 20 °C
Vapor Density	Not Measured
Specific Gravity	0.98
Solubility in Water	Soluble
Partition coefficient n-octanol/water (Log Kow)	Not Measured
Auto-ignition temperature	Not Measured
Decomposition temperature	Not Measured
Viscosity (cSt)	Not Measured
VOC Content	< 0.1% by weight

9.2. Other information

No other relevant information.

10. Stability and reactivity

10.1. Reactivity

Hazardous Polymerization will not occur.

10.2. Chemical stability

Stable under normal circumstances.

10.3. Possibility of hazardous reactions

No data available.

10.4. Conditions to avoid

Avoid heat, flame and strong oxidizing agents.

10.5. Incompatible materials

No data available.

10.6. Hazardous decomposition products

Carbon monoxide, carbon dioxide, nitrous oxide.

Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



11. Toxicological information

Acute toxicity

Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LD50, mg/L/4hr	Inhalation Dust/Mist LD50, mg/L/4hr	Inhalation Gas LD50, ppm
Triethylenetetramine - (112-24-3)	2,780.00, Rat - Category: 5	550.00, Rabbit - Category: 3	No data available	No data available	No data available

Note: When no route specific LD50 data is available for an acute toxin, the converted acute toxicity point estimate was used in the calculation of the product's ATE (Acute Toxicity Estimate).

Classification	Category	Hazard Description
Acute toxicity (oral)	---	Not Applicable
Acute toxicity (dermal)	3	Toxic in contact with skin.
Acute toxicity (inhalation)	---	Not Applicable
Skin corrosion/irritation	1B	Causes severe skin burns and eye damage.
Serious eye damage/irritation	1	Causes serious eye damage.
Respiratory sensitization	---	Not Applicable
Skin sensitization	1	May cause an allergic skin reaction.
Germ cell mutagenicity	---	Not Applicable
Carcinogenicity	---	Not Applicable
Reproductive toxicity	---	Not Applicable
STOT-single exposure	---	Not Applicable
STOT-repeated exposure	---	Not Applicable
Aspiration hazard	---	Not Applicable

12. Ecological information

12.1. Toxicity

The preparation has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and GHS and is not classified as dangerous for the environment, but contains substance(s) dangerous for the environment. See section 3 for details

Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Triethylenetetramine - (112-24-3)	495.00, Pimephales promelas	33.90, Daphnia magna	20.00 (72 hr), Selenastrum capricornutum

Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



12.2. Persistence and degradability

There is no data available on the preparation itself.

12.3. Bioaccumulative potential

Not Measured

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

This product contains no PBT/vPvB chemicals.

12.6. Other adverse effects

No data available.

13. Disposal considerations

13.1. Waste treatment methods

Observe all federal, state and local regulations when disposing of this substance.

14. Transport information

	DOT	IMO / IMDG	ICAO / IATA
14.1. UN number	UN 2259	UN 2259	UN 2259
14.2. UN proper shipping name	Triethylenetetramine	Triethylenetetramine	Triethylenetetramine
14.3. Transport hazard class(es)	8	8	8
14.4. Packing group	II	II	II
14.5. Environmental hazards			
IMDG	Marine Pollutant: No		
14.6. Special precautions for user	No further information		

Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



15. Regulatory information

Regulatory Overview	The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented.
Toxic Substance Control Act (TSCA)	All components of this material are either listed or exempt from listing on the TSCA Inventory.
WHMIS Classification	D1B E
US EPA Tier II Hazards	Fire: No Sudden Release of Pressure: No Reactive: No Immediate (Acute): Yes Delayed (Chronic): No

EPCRA 311/312 Chemicals and RQs:

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

EPCRA 302 Extremely Hazardous:

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

EPCRA 313 Toxic Chemicals:

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Carcinogens (>0.0%):

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Developmental Toxins (>0.0%):

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Female Repro Toxins (>0.0%):

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Male Repro Toxins (>0.0%):

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

New Jersey RTK Substances (>1%):

Triethylenetetramine

Pennsylvania RTK Substances (>1%):

Triethylenetetramine

Safety Data Sheet

B-4 Hardener

SDS Revision Date:

03/17/2015



16. Other information

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

The full text of the phrases appearing in section 3 is:

H311 Toxic in contact with skin.

H314 Causes severe skin burns and eye damage.

H317 May cause an allergic skin reaction.

H412 Harmful to aquatic life with long lasting effects.

This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

All information appearing herein is based upon data obtained from the manufacturer and / or recognized technical sources. While the information is believed to be accurate, Cast-Coat makes no representations as to its accuracy or sufficiency. Conditions of use are beyond the control of Cast-Coat and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their purposes. Cast-Coat, Inc. assumes no responsibility for injury from the use of the product described herein.

End of Document