

SAFETY DATA SHEET

Version: 3.1
Date of Issue: 17 August 2017
Date of First Issue: 20 March 2012

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ACCORDING TO OSHA HCS (29 CFR 1910.1200)

SECTION 1: IDENTIFICATION

Product identifier used on the label	M-Bond 610 Adhesive
Other means of identification	Not applicable
Recommended use of the chemical and restrictions on use	
Recommended use	Adhesives
Restrictions on use	None known
Details of the supplier of the safety data sheet	
Supplier	VISHAY MEASUREMENTS GROUP, INC.
Address of Supplier	Post Office Box 27777 Raleigh, NC 27611 USA
Telephone	+1 919-365-3800
Fax	+1 919-365-3945
E-Mail (competent person)	mm.us@vishaypg.com
Emergency telephone number	1-800-424-9300
	CHEMTREC (24 hours)

SECTION 2: HAZARD(S) IDENTIFICATION

Classification of the substance or mixture in accordance with paragraph (d) of 29 CFR 1910.1200	
Physical hazards	Flammable Liquid, Category 2
Health hazards	Acute Toxicity, Category 4 Skin Irritation, Category 2 Skin Sensitisation, Category 1 Eye Irritation, Category 2 Specific target organ toxicity — single exposure, Category 3 Carcinogen, Category 2
Environmental hazards	Hazardous to the aquatic environment, Chronic, Category 2

Hazard Symbol



Signal Word(s)

Danger

Hazard Statement(s)

Highly flammable liquid and vapour.
Harmful if swallowed.
Causes skin irritation.
May cause an allergic skin reaction.
Causes serious eye irritation.
May cause respiratory irritation.
Suspected of causing cancer.
Toxic to aquatic life with long lasting effects.

Precautionary Statement(s)

Obtain special instructions before use.
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Keep container tightly closed.
Avoid breathing vapours.
Wash hands and exposed skin thoroughly after handling.

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Wear protective gloves/protective clothing/eye protection/face protection.
IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
Rinse mouth.
IF ON SKIN: Wash with plenty of water.
If skin irritation or rash occurs: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTER/doctor if you feel unwell.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists, get medical advice/attention.
IF exposed or concerned: Get medical advice/attention.

Other hazards

May form explosive peroxides.

Percent of the mixture consists of ingredient(s) of unknown acute toxicity: 0%

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Substances Not applicable

Mixtures Substances in preparations / mixtures

Chemical identity of the substance	%W/W	CAS No.	EC No.	Hazard classification
Tetrahydrofuran	55 – 65	109-99-9	203-726-8	Flammable Liquid, Category 2 Acute toxicity, Category 4 - Oral Eye Irritation, Category 2 (SCL ≥ 25%) Specific target organ toxicity — single exposure, Category 3 – Respiratory Irritation (SCL ≥ 25%) Carcinogen, Category 2
Polyglycidyl Ether of Phenol-Formaldehyde	25 – 32	28064-14-4	608-164-0	Skin Irritation, Category 2 Skin Sensitisation, Category 1 Eye Irritation, Category 2 Hazardous to the aquatic environment, Chronic, Category 2
Ethyl methyl ketone	5 – 10	78-93-3	201-159-0	Flammable Liquid, Category 2 Eye Irritation, Category 2 Specific target organ toxicity — single exposure, Category 3 – Narcotic effects

SECTION 4: FIRST AID MEASURES



Description of first aid measures

Self-protection of the first aider

Use personal protective equipment as required. Wear appropriate personal protective equipment, avoid direct contact. Ensure adequate ventilation. Avoid breathing vapours. Avoid all contact. Contaminated clothing should be laundered before reuse.

Inhalation

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. IF exposed or concerned: Get medical advice/attention.

Skin Contact

IF ON SKIN: Remove contaminated clothing and wash all affected areas with plenty of water. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical advice/attention. IF exposed or concerned: Get

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Eye Contact	medical advice/attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF exposed or concerned: Get medical advice/attention.
Ingestion	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth. Make victim drink plenty of water. Do not give anything by mouth to an unconscious person. Do not induce vomiting unless instructed to do so by medical personnel. IF exposed or concerned: Get medical advice/attention.
Most important symptoms and effects, both acute and delayed	Harmful if swallowed. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. May cause respiratory irritation. Suspected of causing cancer.
Indication of any immediate medical attention and special treatment needed	Treat symptomatically.
Notes to a physician:	IF INHALED: Respiratory symptoms, including pulmonary edema, may be delayed. IF IN EYES: After rinsing affected eyes must be seen by an ophthalmologist.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing media Suitable Extinguishing Media	As appropriate for surrounding fire. Extinguish with carbon dioxide, dry chemical, foam or waterspray.
Unsuitable extinguishing Media	Do not use water jet. Direct water jet may spread the fire.
Special hazards arising from the substance or mixture	Highly flammable liquid and vapour. May decompose in a fire giving off toxic fumes. Carbon monoxide, Carbon dioxide, Phenolic and Explosive Peroxides. Vapours are heavier than air and may travel considerable distances to a source of ignition and flashback. Prevent liquid entering sewers, basements and workpits; vapour may create explosive atmosphere. May form explosive peroxides.
Special protective equipment and precautions for fire fighters	Fire fighters should wear complete protective clothing including self-contained breathing apparatus. Do not breathe fumes. Keep containers cool by spraying with water if exposed to fire. Avoid run off to waterways and sewers.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	Ensure adequate ventilation. Stop leak if safe to do so. Eliminate all ignition sources if safe to do so. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use personal protective equipment as required. See Section: 8. Avoid breathing vapours.
Methods and material for containment and cleaning up	Use non-sparking equipment when picking up flammable spill. Adsorb spillages onto sand, earth or any suitable adsorbent material. Transfer to a container for disposal. Ventilate the area and wash spill site after material pick-up is complete. Dispose of this material and its container as hazardous waste.

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling	Ensure operatives are trained to minimise exposures. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid all contact. Do not breathe vapour. Ensure adequate ventilation. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. May form explosive peroxides. Take precautionary measures against static discharges. Use personal protective equipment as required. See Section: 8. Do not eat, drink or smoke when using this product. Wash hands before breaks and after work.
Conditions for safe storage, including any incompatibilities	Ground/bond container and receiving equipment. Keep only in original container. Store in a well-ventilated place. Keep container tightly closed. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. May form explosive peroxides. Keep away from direct sunlight.

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Storage temperature
Incompatible materials

Ambient. Keep at temperature not exceeding (°C): 32
Keep away from: Oxidizing agents, Corrosive Substances, Reducing agents,
Strong Acids and Alkalis.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

SUBSTANCE	CAS No.	LTEL (8 hr TWA ppm)	LTEL (8 hr TWA mg/m ³)	STEL (ppm)	STEL (mg/m ³)	Note
Tetrahydrofuran	109-99-9	200	590	250*	735*	NIOSH
		200	590	-	-	OSHA
		50	-	100	-	ACGIH, Sk, A3
Methyl ethyl ketone	78-93-3	200	590	300*	885*	NIOSH
		200	590	-	-	OSHA
		200	-	300	-	ACGIH

Note: OSHA PELs 1910.1000 TABLE Z-1 / NIOSH RELs / ACGIH TLVs

*NIOSH average value of 15 minutes.

Sk: Can be absorbed through the skin.

A3: Confirmed Animal Carcinogen with Unknown Relevance to Humans: The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histological type(s), or by mechanism(s) that may not be relevant to worker exposure. Available epidemiological studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agent is likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

The other components listed in Section 3 do not have occupational exposure limits.

Biological Exposure Indices

SUBSTANCE	CAS No.	Determinant	Biological Exposure Indices	Sampling Time	Note
Tetrahydrofuran	109-99-9	Tetrahydrofuran in urine	2 mg/L	End of shift	-
Methyl ethyl ketone	78-93-3	Methyl ethyl ketone in urine	2 mg/L	End of shift	Ns

Source: 2015 ACGIH Biological Exposure Indices (BEIs)

Ns – Nonspecific

The other components listed in Section 3 do not have biological exposure indices.

Appropriate engineering controls

Ensure operatives are trained to minimise exposures. Ensure adequate ventilation. Atmospheric levels should be controlled in compliance with the occupational exposure limit.

Individual protection measures, such as personal protective equipment (PPE)

General hygiene measures for the handling of chemicals are applicable. Keep good industrial hygiene. Avoid all contact. Avoid breathing vapours. Wash hands before breaks and after work. Keep work clothes separately. Do not eat, drink or smoke at the work place. IF exposed: Flush with fresh water if contact with skin or eyes.

Eye/face protection



Wear protective eye glasses for protection against liquid splashes. Wear eye protection with side protection.

Skin protection

Hand protection:

Wear impervious gloves. Gloves should be changed regularly to avoid permeation problems. Breakthrough time of the glove material: refer to the

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information provided by the gloves' producer. Recommended: Polyethylene-Laminate (Minimum thickness 0.1mm).

Respiratory protection



Body protection:

Wear impervious protective clothing, including boots, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

In case of inadequate ventilation wear respiratory protection. A suitable mask with filter type A may be appropriate.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Almost colourless Liquid
Odor	Ether-like Odour
Odor Threshold	Not available.
pH	Not established.
Melting Point/Freezing Point	Not available.
Initial boiling point and boiling range	66°C
Flash Point	-14 °C (Mixture)
Evaporation rate (Butyl acetate = 1)	8 (BuAc = 1)
Flammability (solid, gas)	Not applicable - Liquid
Upper/lower flammability or explosive limits	Flammable Limits (Lower) (%v/v): 1.8 Flammable Limits (Upper) (%v/v): 11.8
Vapour pressure	129 (mmHg) @ 20°C
Vapour density	2.4 (Air = 1)
Relative density	0.9 (H ₂ O = 1)
Solubility(ies)	Water: >50%
Partition coefficient: n-octanol/water	Not available.
Auto-ignition temperature	320 °C
Decomposition Temperature	Not available.
Viscosity	Not available.

Other information

Volatile Organic Compound Content: 637 g/L per EPA Method 24

SECTION 10: STABILITY AND REACTIVITY

Reactivity

Stable under normal conditions. May form peroxides on prolonged storage if air is present.

Chemical stability

Stable under normal conditions.

Possibility of hazardous reactions

Highly flammable liquid and vapour. The vapour may be invisible, heavier than air and spread along ground. May form explosive peroxides. Contact with aliphatic amines will cause irreversible polymerization with considerable heat build-up.

Conditions to avoid

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep away from direct sunlight. Keep at a temperature not exceeding (°C): 32. Avoid contact with air. Avoid contact with heat and ignition sources and oxidizers. Avoid distillation to dryness, which can form explosive peroxides.

Incompatible materials

Oxidizing agents, Corrosive Substances, Reducing agents, Strong Acids and Alkalis.

Hazardous decomposition product(s)

May decompose in a fire giving off toxic fumes. Carbon monoxide, Carbon dioxide, Phenolic and Explosive Peroxides.

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SECTION 11: TOXICOLOGICAL INFORMATION

Information on toxicological effects (Substances in preparations / mixtures)

Acute toxicity - Ingestion

Acute Toxicity, Category 4: Harmful if swallowed.

Acute Toxicity Estimate Mixture Calculation: Estimated LC50 >750 mg/kg bw/day.

Tetrahydrofuran:

Test Result LD50 <1 ml/kg bw (Standard acute method).

Acute toxicity - Inhalation

Based upon the available data, the classification criteria are not met.

Acute Toxicity Estimate Mixture Calculation: Estimated LC50 >20.0 mg/l.

Based upon the available data, the classification criteria are not met.

Acute toxicity - Skin Contact

Acute Toxicity Estimate Mixture Calculation: Estimated LC50 > 2000 mg/kg bw/day.

Skin corrosion/irritation

Skin Irritation, Category 2: Causes skin irritation.

Polyglycidyl Ether of Phenol-Formaldehyde:

No data. EU classification and labelling inventory

Ethyl methyl ketone:

Prolonged skin contact will result in defatting of the skin, leading to irritation, and in some cases, dermatitis. (Smith R & Mayers MR, 1944).

Serious eye damage/irritation

Eye Irritation, Category 2; Causes serious eye irritation.

Tetrahydrofuran:

No data. EU Harmonised Classification.

Polyglycidyl Ether of Phenol-Formaldehyde:

No data. EU classification and labelling inventory

Ethyl methyl ketone:

Test Result: Irritating to eyes. (OECD 405)

Respiratory or skin sensitization

Skin Sensitisation, Category 1: May cause an allergic skin reaction.

Polyglycidyl Ether of Phenol-Formaldehyde:

Allergic contact dermatitis (Pontén, A et al, 1999)

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Carcinogenicity

Carcinogen, Category 2: Suspected of causing cancer.

Tetrahydrofuran:

Test Result: NOAEC 1800 ppm Suspected carcinogen (Unnamed, 1998)

Reproductive toxicity

Based on available data, the classification criteria are not met.

STOT - single exposure

Specific target organ toxicity - single exposure, Category 3: May cause respiratory irritation. May cause drowsiness or dizziness.

Tetrahydrofuran:

Test Result: Central nervous depression (Malley, L.A. et al, 2001)

Ethyl methyl ketone:

Rats at all dose levels: gait and/or posture abnormalities. Higher dose groups some rats were comatose or prostrate within a few hours of dosing, with some animals being unconscious for 24 hours. (OECD 423)

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Aspiration hazard

Based on available data, the classification criteria are not met.

Information on likely routes of exposure

Inhalation

Possible – accidental exposure.

Ingestion

Unlikely – accidental exposure.

Skin Contact

Possible – accidental exposure.

Eye Contact

Possible – accidental exposure.

Early onset symptoms related to exposure

Harmful if swallowed. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. May cause respiratory irritation.

Delayed health effects from exposure

Suspected to causing cancer.

Other information

NTP Report on Carcinogens

Not listed.

IARC Monographs

Not listed.

OSHA Designated Carcinogen

Not listed.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Aquatic Chronic 2; Toxic to aquatic life with long lasting effects.

Estimated Mixture LC50 > 1 to ≤ 10 mg/l. (Fish)

Polyglycidyl Ether of Phenol-Formaldehyde:

EC50 1.6 mg/l 48hr (Daphnia magna) (Wyness LE et al, 1993)

Persistence and degradability

Part of the components are poorly biodegradable.

Bioaccumulative potential

The product has low potential for bioaccumulation.

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Mobility in soil
Other adverse effects

The product is predicted to have high mobility in soil.
None known.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods

Dispose of this material and its container as hazardous waste. Send after pre-treatment to a appropriate hazardous waste incinerator facility according to legislation. Send after pre-treatment to a appropriate hazardous waste incinerator facility according to legislation.

Additional Information

Dispose of contents in accordance with local, state or national legislation.

SECTION 14: TRANSPORT INFORMATION

UN number	ADR/RID	IMDG	IATA
UN 1133	UN 1133	UN 1133	UN 1133
UN proper shipping name	ADHESIVES containing flammable liquid	ADHESIVES containing flammable liquid	ADHESIVES containing flammable liquid
Transport hazard class(es)	3	3	3
Packing group	II	II	II
Environmental hazards	Environmentally hazardous substance	Classified as a Marine Pollutant.	Environmentally hazardous substance
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable.		
Special precautions for user	See Section: 2		

SECTION 15: REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

US Federal Regulations

TSCA (Toxic Substance Control Act)	Tetrahydrofuran - Subject to 25,000 lb reporting threshold. Ethyl methyl ketone - Subject to 25,000 lb reporting threshold.
EPCRA/SARA Section 302 Extremely Hazardous Substances	Not listed.
EPCRA Section 313 Toxics Release Inventory (TRI) Program	Not listed.
NIOSH Occupational Carcinogen List	Not listed.
OSHA List of highly hazardous chemicals, toxics and reactives	Not listed.
NTP Report on Carcinogens (RoC) List	Not listed.
Poison Prevention Packaging Act	Not listed.

US State Regulations

California State, Proposition 65 List	Not listed.
California State, Safer Consumer Products Regulations	Tetrahydrofuran - Initial Candidate Chemicals List, Group Member List: Polychlorinated dibenzo-p-furans (PCDFs) and Furan Compounds. Ethyl methyl ketone- Candidate Chemicals List.
Maine State, Toxic Chemicals in Children's Products Act	Not listed.
New Jersey State Worker and Community RTK Act	Tetrahydrofuran - RTKHSL and SHHSL. Ethyl methyl ketone - RTKHSL and SHHSL.
Pennsylvania State, Worker and Community RTK Act	Tetrahydrofuran - Hazardous Substances List and the Environmental Hazard List. Ethyl methyl ketone - Hazardous Substances List and the Environmental Hazard List.
Rhode Island State, Hazardous Substances RTK Act	Tetrahydrofuran - Hazardous Substances List. Ethyl methyl ketone - Hazardous Substances List.

Non-Regional

IARC Monographs, List of Classifications	Not listed.
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SECTION 16: OTHER INFORMATION

The following sections contain revisions or new statements: Section 9- Updated VOC content per EPA Method 24 results.

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References:

Existing Safety Data Sheet (SDS), EU Data: Harmonised Classification(s) for Tetrahydrofuran (CAS No. 109-99-9) and Ethyl methyl ketone (CAS No. 78-93-3). Existing ECHA registration(s) for Tetrahydrofuran (CAS No. 109-99-9), Ethyl methyl ketone (CAS No. 78-93-3), the Classification and Labelling Inventory for Polyglycidyl Ether of Phenol-Formaldehyde (CAS No. 28064-14-4).

Literature References:

1. Smith R & Mayers MR, 1944, Study of poisoning and fire hazards of butanone and acetone, Industrial Hygiene: 23, 174-176
2. Pontén, A. and Bruze, M. (1999), Occupational allergic contact dermatitis from epoxy resins based on bisphenol F. Contact Dermatitis, 41: 235. doi:10.1111/j.1600-0536.1999.tb06149.x
3. Malley, L.A., Christoph G.R., Stadler, J.C., Hansen, J.F., Biesemeir, J.A. and Jasti, S., 2001, Acute and subchronic neurotoxicology evaluation of tetrahydrofuran by inhalation in rats, Drug Chem. Toxicol., 24(3): 201-219
4. Wyness LE, Cheeman H, Lad DD and Baldwin MK (1993), EPIKOTE 862: Acute toxicity to *Oncorhynchus mykiss*, *Daphnia magna* and *Selenastrum capricornutum*; SBGR.92.237

GHS Classification of the substance or mixture	Classification Procedure
Flammable Liquid, Category 2	Flash Point [Closed cup] Test Result/ Boiling Point (°C)Test Result
Acute toxicity, Category 4	Acute Toxicity Estimate (ATE) Calculation.
Skin Irritation, Category 2	Threshold Calculation
Skin Sensitisation, Category 1	Threshold Calculation
Eye Irritation, Category 2	Threshold Calculation
Specific target organ toxicity — single exposure, Category 3	Threshold Calculation
Carcinogen, Category 2	Threshold Calculation
Hazardous to the aquatic environment, Chronic, Category 2	Summation Calculation

LEGEND

ACGIH: American Conference of Governmental Industrial Hygienists
BEI: Biological Exposure Indices (ACGIH)
IARC: International Agency for Research on Cancer
Irr: Irritation
NIOSH: National Institute of Occupational Safety and Health
NTP: National Toxicology Program
OSHA: The Occupational Safety & Health Administration
PBT: Persistent, Bioaccumulative and Toxic
PEL: Permissible exposure limit

REL: Recommended exposure limit
SCL: Specific Concentration Limit
Skin": Risk of overexposure via dermal contact
STEL: Short Term Exposure Limit
TLV: Threshold Limit value
TSCA: Toxic Substance Control Act
TWA: Time Weighted Average
URT: Upper respiratory tract
vPvB: very Persistent and very Bioaccumulative

Training advice: Consideration should be given to the work procedures involved and the potential extent of exposure as they may determine whether a higher level of protection is required.

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