

# resideo



# L8124B,E,G,L Aquastat<sup>®</sup> Relays

## INSTALLATION INSTRUCTIONS

### APPLICATION

These immersion type controllers provide high limit, low limit, and circulator control in forced hydronic heating systems that include domestic hot water. Table 1 lists the various L8124 models and applications.

### SPECIFICATIONS

**Low Limit:**  
Setting: 110°F to 220°F (43°C to 104°C), adjustable.  
Differential: 10°F to 25°F (6°C to 14°C), adjustable.

**High Limit:**  
Setting: 130°F to 240°F (54°C to 116°C), adjustable.  
Differential: 10°F (6°C), fixed.

Table 1. L8124 Models and Applications.

Model Number	Burner Control Circuit	Can Be used For Multizone With Circulators <sup>a</sup>	Number of V8043 Zone Valves Powered Without Additional Transformer	Electrical Ratings	
				Burner Circuit	Circulator Circuit
L8124B	<sup>b</sup>	—	—	0.25A at 1/4 to 12 Vdc	120 Vac: 7.4A (full load), 44.4A (locked rotor). 240 Vac: 3.7A (full load), 22.2A (locked rotor).
L8124E	24V	Yes	2	1.25A at 24 Vac; 30 VA (total load) B <sub>1</sub> -B <sub>2</sub> , T <sub>V</sub> -Z	
L8124G	120V	—	2	Same as circulator rating.	
L8124L	120V	Yes	2		

<sup>a</sup> Multizone control can be provided using a separate circulator and R845 Relay for each zone.

<sup>b</sup> Contacts are not powered; rated for switching of millivoltage loads.

These Aquastat<sup>®</sup> Relays have a diaphragm powerhead and Micro Switch Assembly that respond to temperature changes in the boiler water. L8124B has contacts rated for millivoltage loads. L8124E and G have large transformers and extra terminals for supplying power to low voltage valves. L8124L includes ZC-ZR terminals for multizone control, using a separate circulator and R845 Relay for each zone, and a large transformer and extra terminals for low voltage zone valves. All models have a case that allows vertical or horizontal mounting and include a tube of heat-conductive compound and limit stops. For information on heat-conductive compound, visit <http://customer.resideo.com>

Do not use these Aquastat<sup>®</sup> Relays where the pressure can exceed 100 psi (689.5 kPa) on the bulb when inserted directly or 200 psi (1379 kPa) when using an immersion well, or where the ambient temperature can exceed 150°F (66°C) at the case or 265°F (129°C) at the sensing element.

## INSTALLATION

### When Installing This Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.



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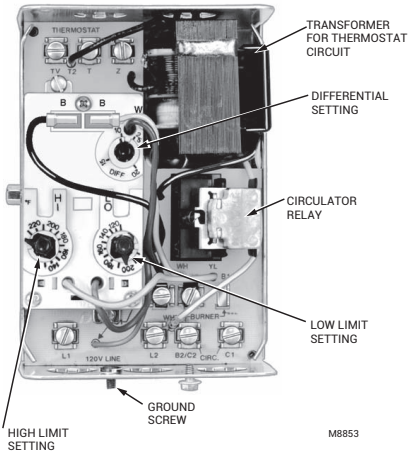


Fig. 1. Internal view of L8124G,L.

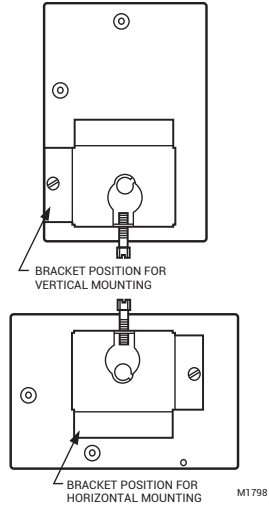


Fig. 2. Convertible case is designed for horizontal or vertical mounting.

**WARNING**

**Explosion Hazard.**  
**Can cause serious injury, death or property damage.**  
 Use this product only in systems with a pressure relief valve.

**WARNING**

**Electrical Shock Hazard.**  
**Can cause serious injury or death.**  
 Disconnect power supply before beginning installation to prevent electrical shock or equipment damage.

**IMPORTANT:**

1. Terminals on these Aquastat® Relays are approved for copper wire only.
2. Immersion well must snugly fit sensing element and bulb must rest against bottom of well. Bend the tubing, if necessary, to hold bulb against bottom of well. Do not make a sharp bend in the tubing. A sharp bend may produce a break in the tubing and cause loss of fill. This condition causes the high and low limit controllers to be continuously made.
3. Use the heat-conductive compound furnished with these L8124 models to obtain best thermal response. Fold the plastic bag of compound lengthwise and twist it gently. Snip off the end and work open end of bag all the way into the well. Slowly pull the bag out while squeezing it firmly to evenly distribute the compound.

**Mounting**

Position mounting bracket properly on back of case for mounting case horizontally or vertically, as desired. See Fig. 2.

1. Shut off the electric power and remove the old control. Leave the old immersion well in place if it is suitable for use with the L8124. A 124904 Well Adapter (purchased separately) can be used to convert some old wells to be compatible with the L8124 mounting. See form 68-0040 for ordering information.
2. If the old well is unsuitable, drain the system, remove the old well, install a new immersion well, then refill the system. Refer to form 68-0040, Wells and Fittings for Temperature Controllers, to order well. Make sure the well is screwed in tightly enough to prevent leakage.

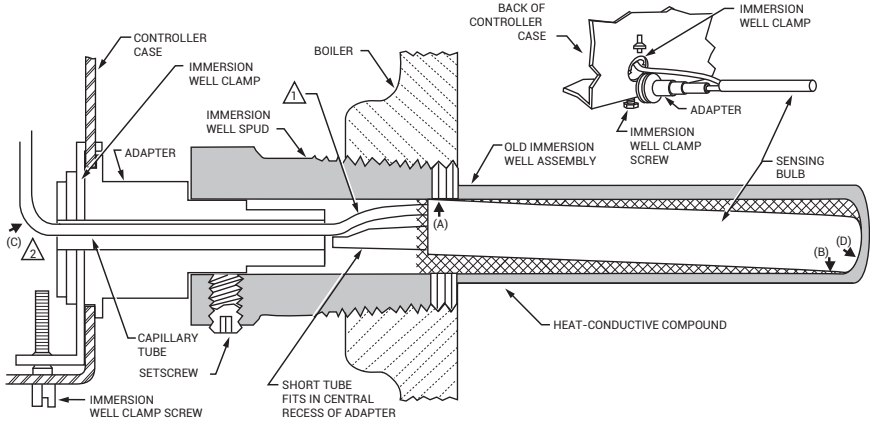
NOTE: Do not attempt to tighten well using the case as a handle.

3. Loosen, but do not remove, the immersion well clamp screw.
4. If the immersion well fits the L8124 Immersion Well Clamp, proceed as follows:
  - a. Partially fill the immersion well with heat-conductive compound. Fold the plastic bag of compound lengthwise and twist it gently. Snip off the end and work open end of bag all the way into the well. Slowly pull out the bag while squeezing it firmly to evenly distribute the compound in the well. Wipe excess compound from outer end of the well.
  - b. Insert the bulb into the well, assuring the bulb bottoms in the well.
  - c. Make sure the well fits into the hole in the case. Position the clamp properly on the well flange, then tighten the clamp screw.
  - d. Center the loop of excess capillary tubing in front of the immersion well so it cannot touch any electrical parts.

NOTE: Some models have a tubing length adjustable to 3 in. (.76 mm). In these models, pull out extra tubing from inside the case if needed.

5. If the old immersion well clamp is otherwise suitable but does not fit the L8124 Clamp, the 124904 Well Adapter (ordered separately) must be used as follows:

- a. After loosening the immersion well clamp screw, fit the adapter onto the capillary tube (Fig. 3).
- b. Make sure the adapter fits into the hole in the case. Position the clamp properly on the adapter flange, then tighten the clamp screw.
- c. Return to step 4a. above, and complete the installation.



- ⚠ BEND THE CAPILLARY TUBE TO HOLD THE SENSING BULB IN GOOD THERMAL CONTACT WITH THE IMMERSION WELL AT POINTS (A) AND (B).
- ⚠ ASSURE THAT CAPILLARY TUBE FITS FREELY IN THE ADAPTER SO THE TENSION OF THE CAPILLARY TUBE AT POINT (C) HOLDS THE SENSING BULB IN GOOD THERMAL CONTACT WITH THE IMMERSION WELL AT POINT (D).

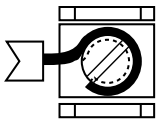
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Fig. 3. Position of bulb in immersion well and use of well adapter.

### Wiring

**IMPORTANT:**

Terminals on the L8124 Aquastat® Relay are approved for use with copper wire only. The terminals allow wraparound wiring only.



1. Strip 7/16 in. of insulation from the wire end.
2. Wrap the wire at least three fourths of the distance around the screw as shown.
3. Using a standard, flat-headed screwdriver, tighten the screw until the wire is snugly in contact with the screw and contact plate.
4. Tighten the screw an additional one-half turn.

NOTE: Do not use a push-type ratchet screwdriver.

Be sure all wiring complies with local electrical codes and ordinances. Do not exceed the limits in the Application section when applying this control.

Disconnect power before wiring to prevent electrical shock or equipment damage.

Refer to insert inside of Aquastat Relay cover or to Table 1 for electrical ratings and maximum load information.

Use manufacturer instructions when wiring controlled equipment or refer to typical hookups in Fig. 4 through 11.

When the B1 terminal on the device being replaced is a 1/4 in. tab terminal, use the existing wiring harness terminals to install the replacement device. When B1 on the device being replaced is a screw terminal, insert the provided tab terminal to screw terminal adapter on the 1/4 in. tab terminals of the replacement device. After the adapter is installed, the existing wrap-around wire end can be reused to make an electrical connection to the B1 terminal.

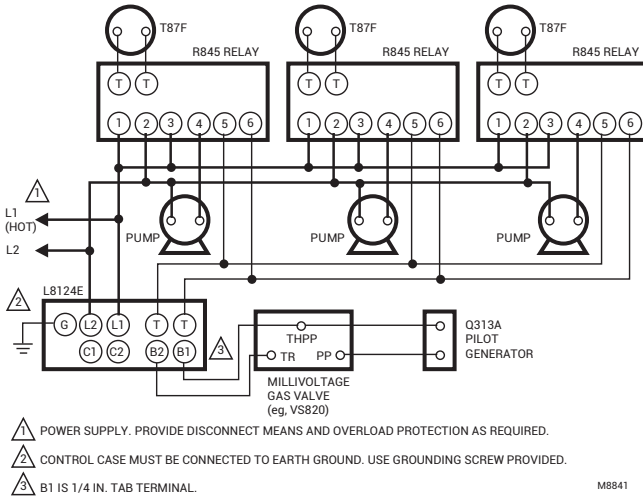


Fig. 4. L8124B in gas-fired, millivolt, forced hot water, tankless, zoned pump system.

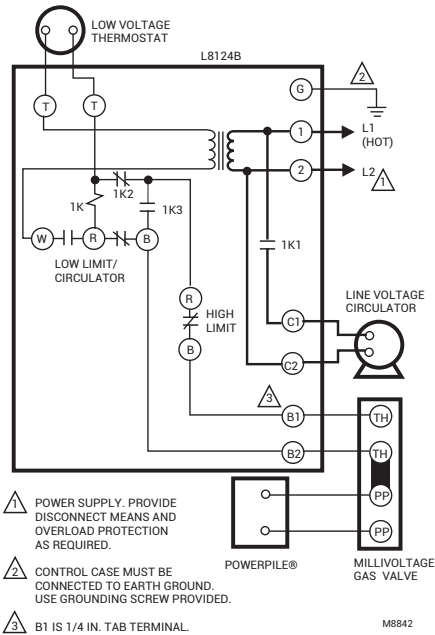


Fig. 5. L8124B single zone connections and internal schematic.

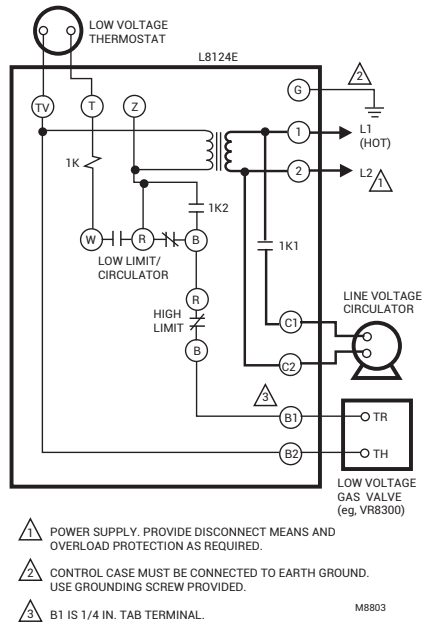


Fig. 6. L8124E single zone connections and internal schematic.

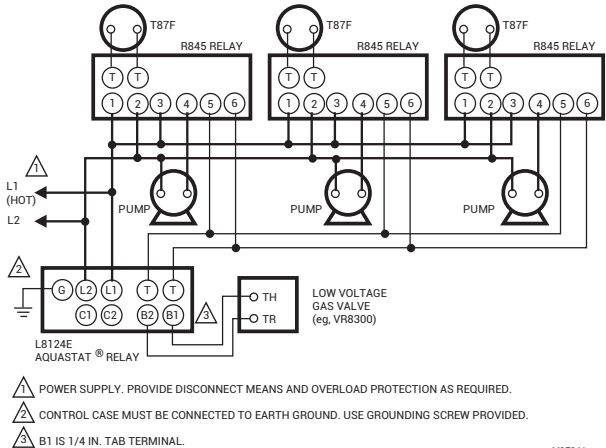


Fig. 7. L8124E in 24V, gas-fired, forced hot water, tankless, zoned, pump system.

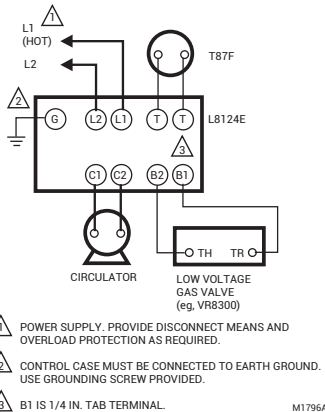


Fig. 8. L8124E in 24V, gas-fired forced hot water, tankless system.

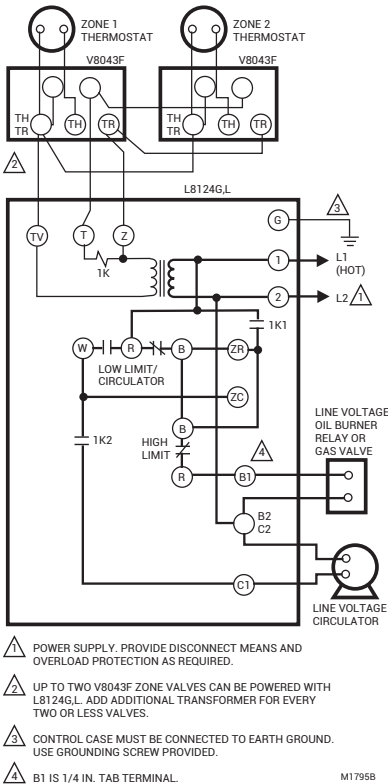


Fig. 9. L8124G,L multizone system with zone valve connections and internal schematic.

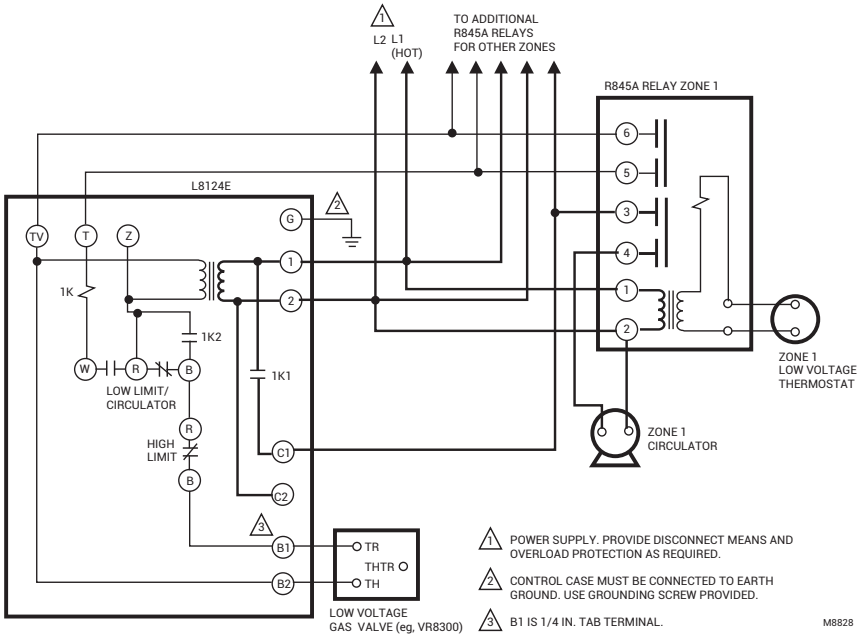


Fig. 10. L8124E multizone system with circulator connections and internal schematic.

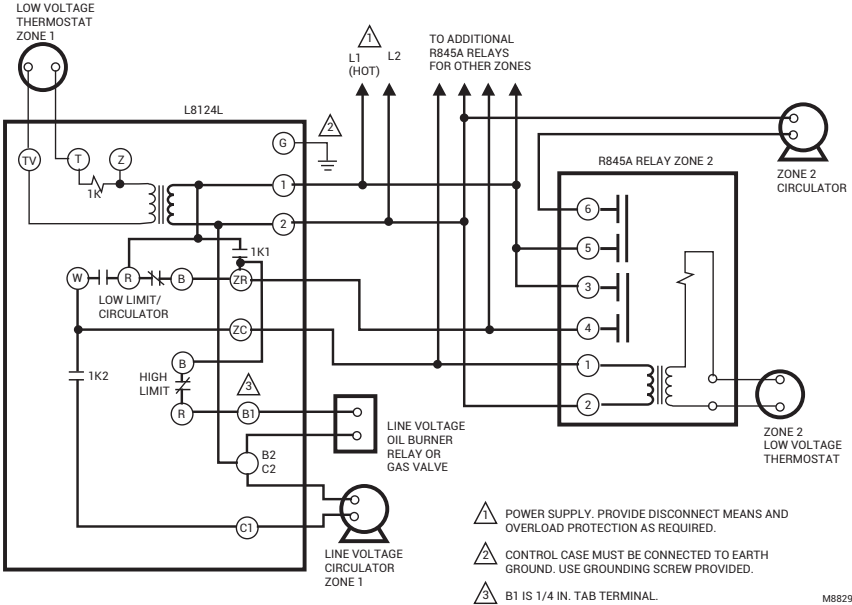


Fig. 11. L8124L multizone system with circulator connections and internal schematic.

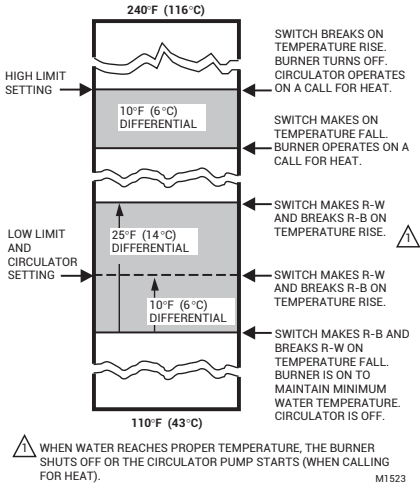


Fig. 12. Relationship of setpoints and differential adjustments.

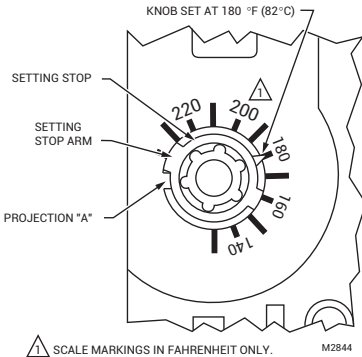


Fig. 13. Setting stop in position to limit the high limit setting to 180°F (82°C).

## OPERATION (FIG. 12)

### High Limit

The high limit opens and turns off the burner when the water temperature reaches the set point. The high limit automatically resets after the water temperature drops past the set point and through the 10°F (6°C) differential.

## WARNING

**Explosion Hazard.**

**Can cause serious injury, death or property damage.**

Use this product only in systems with a pressure relief valve.

## Low Limit and Circulator

On a temperature rise, with the adjustable differential at the minimum setting of 10°F (6°C), the burner circuit (R-B) breaks and the circulator circuit (R-W) makes at the control set point. On a temperature drop of 10°F (6°C) below the set point, the R-B circuit makes and the R-W circuit breaks.

At any differential setting greater than 10°F (6°C), the R-B make temperature and R-W break temperature remains the same control setting minus 10°F (6°C). The R-B break and R-W make temperature are the setpoint temperature plus the difference between the differential setting and 10°F (6°C).

EXAMPLE: The setpoint is set at 140°F (60°C); the differential is set at 25°F (14°C). On a temperature rise, R-B breaks and R-W makes at 155°F (68°C). On a temperature fall, R-B makes and R-W breaks at 130°F (54°C).

## SETTING

Follow the boiler manufacturer recommendations when making the L8124 settings. The high limit setting must be at least 20°F (11°C) higher than the low limit setting. Place the indicators over the selected temperature marks. Set the low limit differential by turning the differential adjustment knob to the desired amount of differential.

Set the thermostat heat anticipator at 0.2A.

### Setting Stop

A setting stop (Resideo part no. 126580, ordered separately) can be installed on the adjusting knob to prevent turning the knob beyond a predetermined point. Fig. 13 shows it installed on high limit switch knob to prevent setting higher than 200°F (93°C).

To install the setting stop, proceed as follows:

1. Turn knob to the established setting limit.
2. Place setting stop over knob in position so arm of setting stop strikes (after stop is pressed into place) projection A and prevents turning the knob beyond the desired limit setting.

### IMPORTANT:

*The setting stop cannot be reset once it is in place. If the stop must be removed, snip it off with cutters—do not twist it off.*

3. Press setting stop tightly onto knob so its inner teeth securely engage knob.
4. Turn knob back and forth several times to make sure stop functions properly.
5. When all settings are made, replace the cover.

## CHECKOUT

Put the system into operation and observe each function through at least one complete cycle. Be sure the control operates as intended.

# MATERIAL SAFETY DATA SHEET

## Section 1. Product And Company Identification

Product Name: Heat Conductive Compound

MSDS ID: DS9021

Synonyms: MS1699

Product Use: Heat conductive material used to enhance contact and heat transfer in temperature sensor applications.

Manufacturer: Resideo Technologies Inc., 1985 Douglas Drive North, Minneapolis, MN 55422.

Date Released: October 8, 1999

Customer Response Center: 800-328-5111

Emergency Telephone Information: 888-809-3787

NFPA Ratings:

Health 0; Flammability 1; Reactivity 0; Personal Protection B

## Section 2. Composition, Information on Ingredients

Ingredient	CAS Number	Percent	PEL	TVL
#2 Lithium Complex Grease (70%):				
Mineral Oil	64742-65-0	35-50	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>
Mineral Oil	64742-62-7	20-25	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>
Lithium Hydrostearate/Sebacate Complex	68815-49-6	4-9	—	—
Zinc Alkyldithiophosphate	68649-42-3	0-2	—	—
Aluminum Paste (30%):				
Aluminum, as Al	7429-90-5	20-25	15 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>
Aliphatic Petroleum Distillates	8052-41-3	10-15	2900 mg/m <sup>3</sup>	525 mg/m <sup>3</sup>
Stearic Acid	57-11-4	1-2	—	—
Aromatic Petroleum Distillates	64742-95-6	1-2	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>

Additional Information: Part No. 120650 (0.5 oz tube); Part No. 107408 (4 oz can); Part No. 197007 (5 gallon container). May also contain minute amounts of lithium and molybdenum lubricant compounds.

## Section 3. Hazard Identification

### Acute Health Effects:

Skin: Excessive contact may cause skin irritation and dermatitis.

Eye: Direct contact with eye will cause irritation.

Inhalation: No adverse effects are expected.

Ingestion: Ingestion of product may cause nausea, vomiting and diarrhea.

### Chronic Health Effects:

Existing skin rash or dermatitis may be aggravated by repeated contact.

OSHA Hazard Classifications: None.

Carcinogenicity: Not considered to be a carcinogen by either OSHA, NTP, IARC, or ACGIH.

## Section 4. First Aid Measures

Eye Contact: Flush eyes with water for 15 minutes. Remove any contact lenses and continue to flush. Obtain medical attention if irritation develops and persists.

Skin Contact: Remove excess with cloth or paper. Wash thoroughly with mild soap and water. Obtain medical attention if irritation develops and persists.

Ingestion: Contact physician or local poison control center *immediately*.

Inhalation: Remove patient to fresh air and obtain medical attention if symptoms develop.

## Section 5. Fire Fighting Measures

Material Flash Point: > 383°F (195°C). Will burn if exposed to flame.

Extinguishing Media: Carbon dioxide, dry chemical or foam.

Special Fire Fighting Procedures: None.

Explosion Hazards: None. Aluminum powder can react with water to release flammable hydrogen gas. In the form of this product, this reaction is not expected.

## Section 6. Accidental Release Measures

Scrape up and dispose of as solid waste in accordance with state and federal regulations.



## Section 7. Handling and Storage

Store in dry place. Keep container closed when not in use.

## Section 8. Exposure Controls and Personal Protection.

Ventilation: No special ventilation is required when working with this product.

Respiratory Protection: None required.

Eye Protection: Not normally required. However, use chemical safety goggles or faceshield if potential for eye contact exists, especially if material is heated.

Hand/Clothing Protection: Not normally required. Protective gloves and clothing are recommended, as material is difficult to remove from skin and clothing.

Other Protective Equipment: None required.

## Section 9. Physical and Chemical Properties

Appearance/Odor: Aluminum color, semi-solid material, pleasant odor.

Solubility in Water: Negligible.

Specific Gravity: 0.86.

## Section 10. Stability and Reactivity

Stability: Stable.

Reactivity: Hazardous polymerization will not occur.

Incompatibilities: Strong oxidizing agents and halogens.

Hazardous Decomposition Products: Carbon dioxide, carbon monoxide.

## Section 11. Toxicology Information.

No data available.

## Section 12. Ecological Information

Chemical Fate Information: Hydrocarbon components will biodegrade in soil; relatively persistent in water.

## Section 13. Disposal Consideration

Dispose of as solid waste in accordance with local, state and federal regulations.

## Section 14. Transportation Information

DOT Classification: Not classified as hazardous.

## Section 15. Regulatory Information

SARA Title III Supplier Notification: Include in Section 311/312 inventory reports if amounts exceed 10,000 pounds. Aluminum compounds are subject to the reporting requirements under Section 313 of Emergency Planning and Community Right-To-Know Act of 1986 (40 CFR 372). Ingredients listed in TSCA Inventory.

## Section 16. Other Information

This information is furnished without warranty, expressed or implied, except that it is accurate to the best of our knowledge.







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