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WOLVERINE JOINING TECHNOLOGIES, LLC.

MATERIAL SAFETY DATA SHEET

Product: ALUMINUM BRAZING FLUX D7

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Common Name : ALUMINUM BRAZING FLUX
Chemical Name : CHEMICAL MIXTURE
Formula : CHEMICAL MIXTURE
Product CAS No.: CHEMICAL MIXTURE
Product Use : Welding/Brazing/Soldering

Supplier : WOLVERINE JOINING TECHNOLOGIES, LLC.
Address : 235 KILVERT STREET
City, St, Zip : WARWICK, RI 02886
Phone : 1-401-739-9550

FOR CHEMICAL EMERGENCY CALL CHEMTREC (24 HOURS):
1-800-424-9300 (US, Canada, Puerto Rico, Virgin Islands)
1-703-527-3887 (Outside Above Area)

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS NO.	% Wt.
ZINC CHLORIDE	7646-85-7	35-55
LITHIUM FLUORIDE	7789-24-4	10-25
POTASSIUM CHLORIDE	7447-40-7	10-25
LITHIUM CHLORIDE	7447-41-8	10-25

INGREDIENT NOTES

NOTE: The percentage by weight values reported for the ingredients in this product represent approximate formulation values.

NOTE: See Section 8 for Exposure Limits and Section 11 for Toxicological Information.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

White paste

Odorless

Flash Point: Not Determined

Chronic overexposure may result in neuromuscular effects, cardiac and thyroid disturbances and kidney damage.

May cause eye and skin burns.

Causes eye and skin irritation.

May cause respiratory tract irritation.

Harmful if swallowed. May cause abdominal pain, nausea, vomiting, diarrhea, blurred vision, muscle tremors, coma and death.

Not a fire or explosion hazard. However, toxic emissions are possible in a fire situation.

ROUTES OF ENTRY

Eyes? YES

Skin? YES

Inhalation? YES

Ingestion? YES

POTENTIAL HEALTH EFFECTS

EYE CONTACT causes irritation and may cause burns and corneal injury.

SKIN CONTACT causes irritation and may cause dermatitis and burns.

INHALATION may cause respiratory tract and mucous membrane irritation. Symptoms include metallic taste, coughing, sore throat, chest pain and labored breathing. Severe exposure may cause bronchospasm and pulmonary edema. Absorption of large amounts may cause systemic poisoning similar to that which occurs with ingestion.

INGESTION is harmful. May cause abdominal pain, nausea, vomiting, diarrhea, metallic taste, excess salivation, blurred vision, muscle tremors, coma and death.

CARCINOGENICITY

NTP? NO

IARC? NO

OSHA? NO

CHRONIC HEALTH HAZARDS

Chronic overexposure to LITHIUM compounds has resulted in neuromuscular effects such as tremors, slow walk, spasms, and hyperactive reflexes. Lithium can also cause kidney damage, cardiac arrhythmias, gastrointestinal disturbances, fatigue, dehydration, weight loss, and thyroid disturbances.

Exposure to FLUORIDES over years may produce mottling of tooth enamel, embrittlement and calcification of bones, and increased calcification of ligaments and vertebrae resulting in spinal stiffness (fluorosis).

Overexposure to ZINC CHLORIDE may result in sensitization dermatitis, pulmonary edema, pulmonary fibrosis and tachypnea.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

May adversely affect existing medical conditions, such as eye, skin, respiratory, kidney, nervous and skeletal disorders.

NOTE: See Section 8 for Exposure Limits, Section 11 for Toxicological Information and Section 12 for Ecological Information.

SECTION 4: FIRST AID MEASURES

EYE CONTACT: Immediately flush eyes with plenty of water for at least 30 minutes. Hold eyelids open during this flushing with water. Call a physician immediately.

SKIN CONTACT: Flush area with water while removing contaminated clothing and shoes. Follow by washing with soap and water. Do not reuse clothing or shoes until cleaned. If irritation persists, get medical attention. Do not apply oils or ointments unless ordered by the physician.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician.

INGESTION: If swallowed, "DO NOT INDUCE VOMITING", give 3-4 glasses of water. Do not give anything by mouth to an unconscious or convulsing person. Get immediate medical attention.

SECTION 5: FIRE-FIGHTING MEASURES

Flash Point: Not Determined
Auto-Ignition: Not Determined
LEL: Not Determined
UEL: Not Determined

NFPA HAZARD CLASSIFICATION

Health: 3 Flammable: 0 Reactivity: 0

HMIS HAZARD CLASSIFICATION

Health: 3* Flammable: 0 Reactivity: 0 Special: C

* Indicates the possibility of chronic health effects. See Chronic Health Hazards in Section 3 for more information.

EXTINGUISHING MEDIA

Use water spray, dry chemical, alcohol foam, or carbon dioxide. Use water to keep fire-exposed containers cool.

SPECIAL FIRE FIGHTING PROCEDURES

Wear NIOSH/MSHA approved positive-pressure self-contained breathing apparatus and protective clothing as specified in 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Not a fire or explosion hazard. However, toxic emissions are possible in a fire situation.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Contain spillage, soak up with inert absorbent and scoop into container for disposal. Notification of the National Response Center (800/424-8802) may be required. Refer to EPA, DOT and applicable state and local regulations for current response information.

It is recommended that each user establish a spill prevention, control and countermeasure plan (SPCC). Such plan should include procedures applicable to proper storage, control and clean-up of spills, including reuse or disposal as appropriate (see Section 13: Disposal Considerations).

****NOTE**** In the event of an accidental release of this material, the above procedures should be followed. Additionally, proper exposure controls and personal protection equipment should be used (see Section 8: Exposure Control/Personal Protection), and disposal of the material should be in accordance with Section 13: Disposal Considerations.

SECTION 7: HANDLING AND STORAGE

Wash thoroughly after handling.
Store in tightly closed container.
Store in a cool, dry location away from incompatible materials.

Avoid contact with any dusts, mists or fumes resulting from the use of this product.

Do not eat, drink, or smoke in work area.

Use with adequate ventilation.

Provide a safety shower and eye wash close to where this material is being used.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS

INGREDIENT	PEL-OSHA	TLV-ACGIH
ZINC CHLORIDE CAS NO.: 7646-85-7	1 mg/m3 (Fume)	1 mg/m3 (Fume) 2 mg/m3 (Fume) STEL
LITHIUM FLUORIDE CAS NO.: 7789-24-4	2.5 mg/m3 (as F)	2.5 mg/m3 (as F)
POTASSIUM CHLORIDE CAS NO.: 7447-40-7	None Established	None Established
LITHIUM CHLORIDE CAS NO.: 7447-41-8	None Established	None Established

Unless otherwise noted, all values are reported as 8-hour Time-Weighted Averages (TWAs) and total dust (particulates only). All ACGIH TLVs refer to the 1998 Standards. All OSHA PELs refer to 29 CFR Part 1910 Air Contaminants: Final Rule, January 19, 1989.

RESPIRATORY PROTECTION

If dust or fume is generated, a NIOSH/MSHA approved respirator may be necessary. Follow all requirements for respiratory programs and selection set forth in the OSHA regulations (29 CFR 1910.139).

VENTILATION

General; local exhaust ventilation as necessary to control any air contaminants to within their PELs or TLVs during the use of this product.

PROTECTIVE EQUIPMENT

Chemical goggles.

Rubber or neoprene gloves.

Body protection as necessary to prevent skin contact.

Refer to ANSI/ASC Z49.1-94 (Safety in Welding, Cutting and Allied Processes), published by the American Welding Society, for further information on the selection of personal protective equipment.

PERSONNEL SAMPLING PROCEDURE

For FLUORIDE COMPOUNDS: Refer to NIOSH Manual of Analytical Methods (NMAM), 4th Edition, Methods 7902, 7906.

For ZINC COMPOUNDS: Refer to NIOSH Manual of Analytical Methods (NMAM), 4th Edition, Method 7030.

For ZINC CHLORIDE: Refer to OSHA Analytical Method ID 121.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: White paste
Odor: Odorless
Boiling Point: 100 °C
Specific Gravity (H2O=1): Not Determined
Melting Point: Not Determined
Vapor Pressure (mm Hg): Not Determined
Vapor Density (Air=1): Not Determined
Evaporation Rate: < 0.1
% Solubility In Water: Soluble
pH: Not Determined

SECTION 10: STABILITY AND REACTIVITY

Stability: Generally considered stable.
Avoid: None expected.

INCOMPATIBILITY (Materials to Avoid)

Strong acids, combustible materials and alkalies.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS

Thermal decomposition may produce fluoride fumes, chlorine, halogenated compounds, and oxides of zinc.

Polymerization: Polymerization is not expected to occur.
Avoid: Not applicable.

SECTION 11: TOXICOLOGICAL INFORMATION

CHEMICAL NAME	% Wt.	LD50	LC50
ZINC CHLORIDE CAS NO.: 7646-85-7	35-55	350 mg/kg RAT, oral	Not Available
LITHIUM FLUORIDE CAS NO.: 7789-24-4	10-25	Not Available	Not Available
POTASSIUM CHLORIDE CAS NO.: 7447-40-7	10-25	2600 mg/kg RAT, oral	Not Available
LITHIUM CHLORIDE CAS NO.: 7447-41-8	10-25	526 mg/kg RAT, oral	Not Available

NOTE: See Sections 3, 8 and 12 for additional information.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY

No data available.

ENVIRONMENTAL FATE

No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

US EPA Waste Number: Not Regulated

Federal, state and local disposal laws and regulations will determine the proper waste disposal/recycling/reclamation procedure. All waste materials should be reviewed to determine the applicable hazards (testing may be necessary). Disposal requirements are dependent on the hazard classification and will vary by location and the type of disposal selected.

****NOTE**** Chemical additions, processing or otherwise altering this material may make the waste management information presented above incomplete, inaccurate or otherwise inappropriate.

As local regulations may vary; all waste must be disposed/recycled/reclaimed in accordance with federal, state, and local environmental control regulations.

SECTION 14: TRANSPORT INFORMATION

INTERNATIONAL

UN Number: UN1840

UNITED STATES

EPA Waste Number: Not Regulated

DOT Classification: 8 Corrosive material

DOT Proper Shipping Name: Zinc chloride, solution, Class 8, UN #1840,
PG III

Packing Group: III

CANADA

PIN Number: UN1840

TDG Class: 8 Corrosive material

EC

DGL: Corrosive substance

SECTION 15: REGULATORY INFORMATION

US FEDERAL REGULATIONS

TSCA: IN TSCA

SARA 311 AND 312 HAZARD CATEGORIES

IMMEDIATE (Acute) Health Hazard: YES

DELAYED (Chronic) Health Hazard: YES

FIRE Hazard: NO

REACTIVITY Hazard: NO

Sudden Release of PRESSURE: NO

SARA SECTION 313 NOTIFICATION

This product contains a toxic chemical (or chemicals) subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

CHEMICAL NAME	CAS Number	% Wt.
ZINC CHLORIDE	7646-85-7	35-55

OZONE DEPLETING SUBSTANCES (ODS)

This product neither contains nor is manufactured with an ozone depleting substance subject to the labeling requirements of the Clean Air Act Amendments 1990 and 40 CFR Part 82.

VOLATILE ORGANIC COMPOUNDS (VOC)

Not Determined

US STATE REGULATIONS

VOLATILE ORGANIC COMPOUND (CARB): Not Determined

CANADIAN REGULATIONS

"This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations."

DSL/NDSL: DSL

WHMIS Classification: Class D Division 2 Subdivision B
Class E

EUROPEAN REGULATIONS

EINECS: Yes

OTHER REGULATIONS

MITI (Japan): Yes

AICS (Australia): Yes

SECTION 16: OTHER INFORMATION

REVISIONS

Revision Number: 4

PREPARATION INFORMATION

Prepared By: Wolverine Joining Technologies, and Wolverine Tube Inc.
Corporate Environmental, Health and Safety Group.

Phone Number/Address: See Section 1

This Material Data Sheet is offered pursuant to OSHA's Hazard Communication Standard (29 CFR 1910.1200). Other government regulations must be reviewed for applicability to these products. The information in this Material Safety Data Sheet should be provided to all who will use, handle, store, transport, or otherwise be exposed to this product. This information has been prepared for the guidance of plant engineering, operations, and management and for persons working with or handling these products. The information presented in the MSDS is premised upon proper handling and anticipated uses and is for the material without chemical additions/alterations. We believe this information to be reliable and up-to-date as of the date of publication, but make no warranty that it is. Additionally, if this Material Safety Data Sheet is more than three years old, please contact the supplier at the phone number listed in Section 1 to make certain that this sheet is the most current. Copyright Wolverine Joining Technologies, LLC. License granted to make unlimited copies for internal use only.