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WOLVERINE JOINING TECHNOLOGIES, LLC.

MATERIAL SAFETY DATA SHEET

Product: GENERAL PURPOSE LIQUID SOLDERING FLUX

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Common Name : GENERAL PURPOSE LIQUID SOLDERING 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	35-45
AMMONIUM CHLORIDE	12125-02-9	4-7
ETHANOLAMINE	141-43-5	2-4
HYDROCHLORIC ACID	7647-01-0	2-4
GLYCERINE	56-81-5	2-5

INGREDIENT NOTES

NOTE: The percentage by weight values reported for the ingredients in this product represent approximate formulation values. See Section 8 for Exposure Limits and Section 11 for Toxicological Information.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Clear pale yellow liquid

Odorless

Flash Point: Not Applicable

May cause burns.
Causes severe eye, skin and respiratory tract irritation.
May cause allergic skin reaction.
Harmful if swallowed.
Overexposure may cause kidney and liver damage.
Not a fire or explosion hazard. Product will emit toxic and corrosive gases on thermal decomposition.

ROUTES OF ENTRY

Eyes? YES Skin? YES Inhalation? YES Ingestion? YES

POTENTIAL HEALTH EFFECTS

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

SKIN CONTACT causes severe irritation. Prolonged contact may cause burns, dermatitis and allergic reactions.

INHALATION of vapors or mists is severely irritating to the respiratory tract and can cause burning sensation, coughing, wheezing, bronchitis, pneumonitis and pulmonary edema. May cause allergic respiratory reactions.

INGESTION is harmful. Can cause severe irritation and possible burns to mucous membranes. May cause severe abdominal pain, vomiting and diarrhea.

CARCINOGENICITY

NTP? NO IARC? NO OSHA? NO

Do not use SODIUM NITRITE or other NITROSATING AGENTS in formulations containing this product. Suspected carcinogenic NITROSAMINES could be formed.

CHRONIC HEALTH HAZARDS

Overexposure to ZINC CHLORIDE may result in sensitization dermatitis.

Prolonged or repeated overexposure may cause lung, liver and kidney damage.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

May aggravate existing respiratory and/or skin ailments.

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 with plenty of water. If irritation persists, call a 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 Applicable
Auto-Ignition: Not Applicable
LEL: Not Applicable
UEL: Not Applicable

NFPA HAZARD CLASSIFICATION

Health: 3 Flammable: 0 Reactivity: 0

HMIS HAZARD CLASSIFICATION

Health: 3* Flammable: 0 Reactivity: 0

*** 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. Product will emit toxic and corrosive gases on thermal decomposition.

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.
Keep container closed.
Store away from incompatible materials.

Avoid breathing vapors or mists.

Avoid contact with eyes, skin and clothing.

Use with adequate ventilation.

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
AMMONIUM CHLORIDE CAS NO.: 12125-02-9	None Established	10 mg/m3 (Fume) 20 mg/m3 (Fume) STEL
ETHANOLAMINE CAS NO.: 141-43-5	3 ppm 6 ppm STEL	3 ppm 6 ppm STEL
HYDROCHLORIC ACID CAS NO.: 7647-01-0	5 ppm Ceiling	5 ppm Ceiling

GLYCERINE		
CAS NO.: 56-81-5	**15 mg/m3 (Mist, total dust) 5 mg/m3 (Mist, respirable fraction)**	**10 mg/m3 (Mist, total dust)**

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 there is a potential to exceed the TLV, NIOSH/MSHA approved respiratory protection is required. For airborne levels up to 10 times the appropriate TLV's, an air purifying acid gas cartridge respirator would be suitable. If used in a manner that generates a mist, a dust/mist cartridge as well as the acid gas cartridge would be necessary. Above 10 times the TLV, an air supplied full facepiece respirator would be required. If respiratory protection is used, follow all the requirements for respirator programs 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 CHLORIDE: Refer to NIOSH Manual of Analytical Methods, 2ND Edition, Volume 1, Method 115.
For ZINC COMPOUNDS: Refer to NIOSH Manual of Analytical Methods (NMAM), 4th Edition, Method 7030.
For ETHANOLAMINE: Refer to NIOSH Manual of Analytical Methods (NMAM), 4th Edition, Method 2007.
For ZINC CHLORIDE: Refer to OSHA Analytical Method ID121.
For AMMONIUM CHLORIDE: Refer to OSHA Analytical Method ID188.
For HYDROCHLORIC ACID: Refer to NIOSH Manual of Analytical Method (NMAM), 4th Edition, Method 7903.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear pale yellow liquid
Odor: Odorless
Boiling Point: 101.7 °C
Specific Gravity (H2O=1): 1.38
Melting Point: 147.4 °C
Vapor Pressure (mm Hg): 5.24 mm Hg at 20°C
Vapor Density (Air=1): 0.54
Evaporation Rate: <1 % Solubility In Water: 100 % pH: 0.9

SECTION 10: STABILITY AND REACTIVITY

Stability: Generally considered stable.
Avoid: Not applicable.

INCOMPATIBILITY (Materials to Avoid) Amines, oxidizers, strong acids or bases.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS
Hydrogen chloride, zinc oxides, ammonia, and oxides of nitrogen and carbon.

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	35-45	350 mg/kg RAT Oral	Not Available
AMMONIUM CHLORIDE CAS NO.: 12125-02-9	4-7	1650 mg/kg RAT oral	Not Available
ETHANOLAMINE CAS NO.: 141-43-5	2-4	2,050 mg/kg RAT Oral	Not Available
HYDROCHLORIC ACID CAS NO.: 7647-01-0	2-4	900 mg/kg RABBIT,oral	1,108 ppm/1 hr MOUSE
GLYCERINE CAS NO.: 56-81-5	2-5	27,000 mg/kg RABBIT, 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: D002

Federal, state and local disposal laws and regulations will determine the proper waste disposal/recycling/reclamation procedure.
All waste material should be reviewed to determine the applicable hazards (testing may be necessary). Any waste solution with a pH of <="2" or>=12.5 is considered a hazardous waste under EPA hazardous waste regulations. 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: UN3264

UNITED STATES

EPA Waste Number: D002
DOT Classification: 8 Corrosive material
DOT Proper Shipping Name: Corrosive liquid, acidic, inorganic, n.o.s. (Zinc Chloride, Hydrochloric Acid), Class 8, UN #3264, PG II (NOTE: 4 oz. & 16 oz. package sizes qualify for Consumer Commodity, ORM-D)
Packing Group: II

CANADA
PIN Number: UN3264
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	35-45
AMMONIUM CHLORIDE	12125-02-9	4-7
HYDROCHLORIC ACID	7647-01-0	2-4

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)

None

US STATE REGULATIONS

VOLATILE ORGANIC COMPOUND (CARB): Not Determined

CANADIAN 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: 9
This MSDS has been revised in the following section(s):

SECTION 11: TOXICOLOGICAL INFORMATION
SECTION 14: TRANSPORT INFORMATION
SECTION 15: REGULATORY INFORMATION
LABEL COPY
MFG NAME

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 CRF 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.