



Hazard Ratings  
4 = Extreme  
3 = High  
2 = Moderate  
1 = Slight  
0 = Insignificant

# Material Safety Data Sheet

(Essentially Similar to U.S. Department of Labor Suggested  
Form For Hazard Communication Compliance)

## I. Product Identification

**Product Type** - ALL-STATE GENERAL PURPOSE AND STAINLESS STEEL SOLDERING FLUXES

**Manufacturer** - THE ESAB GROUP, INC.

**Telephone No.** - 1-717-637-8911

**Website:** [www.esabna.com](http://www.esabna.com)

1-800-933-7070

**Address** - 801 Wilson Avenue  
Hanover, PA 17331

**Emergency No.** - 1-717-637-8911  
(CHEMTREC) 1-800-424-9300

**Product Description:** Liquid solutions and solid suspension (semi-solid paste) consisting of a mixture of acids, halide powders and solvents for use as fluxing agents in soldering.

### APPROXIMATE COMPOSITION (Wt. %)

All-State Product Trade Name	All-State Duzall NCR Paste Flux ❶	All-State Duzall General Purpose Flux ❶	All-State No. 430 Acid Flux ❶
Ammonium Chloride (H <sub>4</sub> NCI)	3-5	7-12	3-5
Glycerine	36-43	<5	--
Hydrochloric Acid	<5	<5	5-11
Hydrobromic Acid	4-8	--	--
Methyl Alcohol	--	<5	2-5
Monoethanolamine	<5	--	--
Polyethylene Glycol	40-51	--	--
Zinc Chloride (ZnCl <sub>2</sub> )	--	35-40	25-30
Water	--	Balance	X
Others*	--	--	X

**Note:** X Indicates material is present.

\* Others, if any, are inert non-hazardous substances claimed as trade secrets.

❶ See Note 1 in Section VI

**THE ESAB GROUP** requests the users of these products to study this Material Safety Data Sheet (MSDS) and the product labels and become fully aware of the product hazards and safety information. To promote the safe use of these products a user should (1) notify and train its employees, agents and contractors concerning the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for these products, and (3) request that such customers notify and train their employees and customers, for these products, of the same product hazards and safety information.

## II. Hazardous Ingredients

**IMPORTANT:** This section covers the materials from which this product is manufactured. The fumes and gases produced during normal use of these products are covered in Section V. The term **HAZARDOUS** should be interpreted as a term required and defined by Laws, Statutes or Regulations, and does not necessarily imply the existence of any hazard when the products are used as directed by **THE ESAB GROUP**.

Material	(CAS No.)	SARA	ACGIH TLV		OSHA - PEL	
			TWA (mg/m <sup>3</sup> )	STEL (mg/m <sup>3</sup> )	TWA (mg/m <sup>3</sup> )	STEL (mg/m <sup>3</sup> )
Ammonium Chloride	(12125-02-9)		10	20	----	----
Glycerine	(56-81-5)		10 (Mist)	----	15 (Total Dust) 5 (Respirable Fraction)	---
Hydrobromic Acid	(10035-10-6)		----	6.8 C (2 ppm)	10 (3 ppm)	---
Hydrochloric Acid	(7647-01-0)	*	----	2.98 C (2 ppm)	--	7 C (5 ppm)
Methyl Alcohol	(67-56-1)	*	262 (200 ppm)	328 C (250 ppm)	260 (200 ppm)	---
Monoethanolamine	(141-43-5)		7.5 (3 ppm)	15 C (6 ppm)	6 (3 ppm)	---
Polyethylene Glycol	(25322-68-3)		10 (Mist) - AIHA WEEL	----	----	---
Zinc Chloride Fume	(7646-85-7)	*	1	2 C	1	----

**NOTE:** In the ingredients table, an asterisk (\*) after the CAS number indicates a toxic chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (SARA) and 40 CFR Part 372.

Some of these products may not contain all of the materials listed. For details of composition, refer to the COMPOSITION TABLE in Section I.

In the table above, "C" indicates "Ceiling Limit."

## III. Physical Data

Boiling Point (°F @ 760 mm Hg)	Duzall General Purpose	~212	Specific Gravity	Duzall General Purpose	1.414
	Duzall NCR Paste	N/E *		Duzall NCR Paste	1.014 - 1.33
	No. 430 Acid	215		No. 430 Acid	1.34
Vapor Density (Air = 1)	Duzall General Purpose	0.48	Vapor Pressure	Duzall General Purpose	6.00
	Duzall NCR Paste	N/E		Duzall NCR Paste	N/E
	No. 430 Acid	0.48		No. 430 Acid	9.72
Percent Volatiles By Volume	Duzall General Purpose	65	Evaporation Rate (butyl Acetate = 1)	Duzall General Purpose	< 1
	Duzall NCR Paste	N/E		Duzall NCR Paste	> 1
	No. 430 Acid	52		No. 430 Acid	< 1
Solubility In Water (Duzall, Duzall Paste & No. 430)	APPRECIABLE		Water Reactive	N/A	
Odor And Appearance	Duzall General Purpose	White to pale yellow liquid with no noticeable odor. Opaque white to yellowish semi-solid paste with no noticeable odor. Clear, water-white liquid with no characteristic odor.			
	Duzall NCR Paste				
	No. 430 Acid				

## IV. Fire & Explosion Hazard

**Flammable/Explosive:** NO (X) YES ( )

**Flash Point:** N/A

**Flammable Limits in Air:** (% by Volume) LEL - N/A UEL - N/A

**Extinguishing Media:** Water, fog, or foam.

**Special Fire Fighting Procedures:** Full protective equipment required. May release zinc oxide and HCl fumes. Toxic metal halide fumes produced.

**Unusual Fire and Explosion Hazards:** Dense smoke may be generated.

**Note:** Welding processes can ignite combustible and flammable materials. See ANSI Z49.1 "Safety in Welding and Cutting" and "Safe Practices" Code: SP, published by the American Welding Society, P. O. Box 351040, Miami, FL 33135, and NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work" published by the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169 for additional fire prevention and protection information.

**Methyl alcohol is a Flammable Liquid:** Can release vapors that form explosive mixtures at temperatures above the flashpoint. Use water spray to keep fire-exposed containers cool. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. May be ignited by heat, sparks, and flame.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water.

## V. Reactivity Data

**Stability:** Stable (X) Unstable ( ) Hazardous polymerization will not occur.

**Conditions to Avoid:** Excessive Heat – Decomposes, forming corrosive skin penetrating toxic gases. Direct sunlight, air, moist air and incompatibles.

**Incompatibility:** (Materials to Avoid): Strong oxidizing agents, strong acids, isocyanates, aliphatic amines, caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide silver salts, potassium chlorate, ammonium nitrate, bromine trifluoride and iodine heptafluoride). Glycerine: can react violently with oxychloride, chromium oxide and alkali hydrides.

**Ammonium Chloride:** Reacts explosively with potassium chlorate or bromine trifluoride, and violently with bromide pentafluoride, ammonium compounds, nitrates, and iodine heptafluoride. Explosive nitrogen trichloride may result from reaction of ammonium chloride and hydrogen cyanide.

**Hydrobromic Acid:** Reacts violently with fluorine gas, ammonia, ozone, ferric oxide, alkalis, metals and strong oxidizing agents.

**Hydrochloric Acid:** Concentrated hydrochloric acid, a strong mineral acid, is incompatible with many substances and highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.

**Hazardous Decomposition Products:** When heated to decomposition, hydrochloric acid emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas. When heated to decomposition, hydrobromic acid may form toxic fumes of bromides. Ammonium chloride may form hydrogen chloride and ammonia. Glycerine may emit carbon monoxide, irritating and toxic fumes and gases, carbon dioxide, and formaldehyde. Polyethylene glycol when heated to decomposition may form carbon dioxide and carbon monoxide. When heated to decomposition, the fumes and vapors that are emitted will be irritating, corrosive and toxic.

When soldering, brazing, braze welding and welding, the fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the material being worked, the process, procedures, carrier gas and consumables used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the material being worked (such as paint, plating or galvanizing), the number of metal joining and fume generating operations and the volume of the work area, the quality and amount of ventilation, the position of the worker's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning or painting activities). When the materials are consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the ingredients, plus those from the material being worked and the coatings etc. noted above.

**Reasonably expected decomposition products** from normal use of these products include a complex of the oxides of the materials listed in Section II, as well as carbon monoxide, carbon dioxide, ozone and nitrogen oxides (refer to "Characterization of Arc Welding Fume" available from the American Welding Society). THE GENERAL LIMIT FOR WELDING FUMES is 5 mg/m<sup>3</sup>. The TLV for some of the hazardous airborne ingredients listed in Section II may be exceeded before the general TLV for welding fumes. The only way to determine the true identity of the decomposition products is by sampling and analysis. The composition and quantity of the fumes and gases to which a worker may be overexposed can be determined from a sample obtained from inside the welder's helmet, if worn, or in the worker's breathing zone. See ANSI/AWS F1.5 "Methods for Sampling and Analyzing Gases from Welding and Allied Processes" and ANSI/AWS F1.1 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes", available from the American Welding Society.

## VI. Physical and Health Hazard Data

### **All-State Duzall General Purpose Flux and No. 430 Flux:**

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

### **All-State Duzall NCR Paste Flux:**

DANGER! CORROSIVE. PASTE AND VAPORS CAUSE SEVERE BURNS TO ALL BODY TISSUE. VAPOR IS SEVERELY IRRITATING TO EYES AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED.

**Soldering Fumes and Gases** can be dangerous to your health. Noise can damage hearing. An additional detailed description of the Health and Physical Hazards and their consequences may be found in ESAB's publications F52-529 "Precautions and Safe Practices for Electric Welding and Cutting" and 17982 "Standard for Fire Prevention During Welding, Cutting and Other Hot Work." You may obtain copies from your local supplier or by writing to the address in Section I.

**Route Of Overexposure:** The primary routes of entry of these products are by inhalation, skin contact, and eye contact; ingestion is possible. The primary route of entry of the decomposition products is by inhalation; skin contact, eye contact, and ingestion are possible. When these products are used as recommended by THE ESAB GROUP, and ventilation maintains exposure to the vapors and to the decomposition products below the limits recommended in this section, overexposure is unlikely.

**Effects Of Acute (short-term) Overexposure:** Some toxic gases associated with welding may cause pulmonary edema, asphyxiation, and death. Acute overexposure may include signs and symptoms such as watery eyes, nose and throat irritation, headache, dizziness, difficulty in breathing, frequent coughing, or chest pain. Acute effects of these products are:

**Inhalation:** **Ammonium Chloride** vapors causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

**Methyl Alcohol** if inhaled may cause adverse central nervous system effects including headache, convulsions, and possible death. May cause visual impairment and possible permanent blindness. Causes irritation of the mucous membrane.

**Hydrochloric Acid** is corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.

**Hydrobromic Acid** is corrosive! Inhalation of vapors can cause irritation to the respiratory tract. Symptoms may include sore throat, coughing, shortness of breath, and labored breathing. In severe cases, exposures may result in pulmonary edema and death.

**Glycerin:** Due to its low vapor pressure, inhalation of the vapors at room temperatures is unlikely. Inhalation of mist may cause irritation of respiratory tract.

**Zinc Chloride** vapors are irritating to tissues of the mucous membranes and upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting.

**Eye Contact:** (Direct or as vapor): **Ammonium Chloride vapors** cause irritation redness, and pain.

**Methyl Alcohol** produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. May cause painful sensitization to light.

**Hydrochloric Acid** is corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage and blindness.

**Hydrobromic Acid** is corrosive! Vapors are corrosive to the eyes. Redness, pain, and blurred vision may occur. Splashes may cause severe burns and blindness.

**Zinc Chloride** may cause redness, pain, and blurred vision. Splashes from solutions may cause eye damage and blindness.

**Skin Contact:** **Ammonium Chloride** causes irritation to skin. Symptoms include redness, itching, and pain.

**Methyl Alcohol** causes moderate skin irritation. May be absorbed through the skin in harmful amounts. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.

**Hydrochloric Acid** is corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.

**Hydrobromic Acid** is corrosive! Can cause discoloration, pain and serious skin burns.

**Zinc Chloride** may cause severe irritation, skin burns and ulcerations. Solutions are corrosive. Symptoms include redness and pain.

**Ingestion:**

**Ammonium Chloride** causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.

**Methyl Alcohol** may be fatal or cause blindness if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause systemic toxicity with acidosis. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause cardiopulmonary system effects.

**Hydrochloric Acid** is corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea. Ingestion may be fatal.

**Hydrobromic Acid** is a poison! Highly corrosive. Sore throat, abdominal pain, nausea, vomiting and diarrhea may occur. Vomiting may produce a severe lung hazard. Estimated fatal dose: 1 ml.

**Zinc Chloride** is toxic. May cause irritation or corrosion to the gastrointestinal tract with abdominal pain, nausea, and vomiting. May cause delayed death occurring from strictures of the esophagus and pylorus.

**Pre-existing Medical Conditions Aggravated by Overexposure:** Individuals with allergies or impaired respiratory function may have symptoms worsened by exposure to soldering fumes; however, such reaction cannot be predicted due to the variation in composition and quantity of the decomposition products. These products may cause aggravation to pre-existing heart, liver, kidney, skin, lung, and eye disorders.

**Effects of chronic (long-term) overexposure** to air contaminants may lead to their accumulation in the lungs, a condition which may be seen as dense areas on chest X-rays. The severity of the change is proportional to the length of the exposure. The changes seen are not necessarily associated with symptoms or signs of reduced lung function or disease. In addition, the changes on X-rays may be caused by non-work factors such as smoking, etc. Long term exposure to welding and allied processes gases, dusts and fumes may contribute to pulmonary irritation or pneumoconiosis. Chronic exposure to glycerin may cause kidney injury. Repeated skin contact with zinc chloride can cause varying degrees of problems ranging from dermatitis to ulcerations; repeated inhalation can cause occupational asthma. Prolonged or repeated skin exposure to methyl alcohol may cause dermatitis; chronic inhalation and ingestion may be fatal, cause blindness, central nervous system depression, collapse, unconsciousness, coma and possible death due to respiratory failure. May cause cardiopulmonary system effects. Chronic exposure may also cause reproductive disorders and teratogenic effects. Laboratory experiments have resulted in mutagenic effects. Prolonged exposure may cause liver, kidney, and heart damage. Long-term exposure to concentrated hydrochloric acid vapors may cause erosion of teeth. Long-term exposures seldom occur due to the corrosive properties of the acid. Prolonged or repeated exposure to hydrobromic acid vapors may cause skin and respiratory tract irritation. Varying degrees of problems ranging from dermatitis to ulcerations. Repeated inhalation can cause occupational asthma.

**Emergency First Aid Measures:** In case of emergency, call for medical aid.

**Eye Contact:** With eyelids retracted, flush eyes with plenty of water for at least 15 minutes to remove all residue. Get medical attention immediately.

**Skin Contact:** Get medical attention immediately. In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Copiously apply polyethyleneglycol 400 to the affected area. If contact is with paste product, remove paste with paper or cloth. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Inhalation:** Remove to fresh air. Obtain medical assistance immediately. Advise physicians of ingredients listed in Section II. If breathing has stopped, perform artificial respiration. Administer oxygen if available.

**Ingestion:** Immediately consult a physician. Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Carcinogenic Assessment (NTP Annual Report, IARC Monographs, Other):**

**Hydrochloric Acid:** IARC 3 unclassifiable as to Carcinogenicity in Humans; TLV-A4 not classified as a Human Carcinogen: agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of lack of data.

**Zinc Chloride:** EPA-D not Classifiable as to Human Carcinogenicity. Inadequate human and animal evidence of carcinogenicity or no data are available.

ⓘ **WARNING:** This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code §25249.5 et seq.)

## VII. Precautions for Safe Handling and Use/Applicable Control Measures

Read and understand the manufacturer's instructions and the precautionary label on this product. See American National Standard Z-49.1, "Safety in Welding and Cutting," published by the American Welding Society, P. O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29 C.F.R. 1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more detail on many of the following:

**Ventilation:** Use enough ventilation, local exhaust at the source, or both, to keep the exposure within legal limits. In the worker's breathing zone and the general area, the fumes and gases must be kept below the TLVs and the *equivalent exposure* must compute to less than one. Train the operator to keep his head out the fumes.

**Respiratory Protection:** Use respirable fume respirator or air supplied respirator when welding in confined spaces or where local exhaust or ventilation does not keep exposure below the TLVs. Where respiratory protection is necessary, OSHA mandates that NIOSH and Mine Safety and Health Administration (MSHA) approved respiratory protection must be used. The selection of the appropriate respiratory protection (dust respirator, etc.) should be based on the actual or potential airborne contaminants and their concentrations present.

**Respiratory Protection:** In case of high vapor concentration, wear self-contained breathing apparatus.

**Eye Protection:** Wear protective eyewear compliant with ANSI Z87.1 shade 3 or higher. As a rule, start with a shade that is too dark (shade 6 or higher) to see the work zone and progress to a shade that gives a sufficient view (shade 3 to 5). Provide protective screens and chemical tight safety goggles to protect others in the area. Do NOT wear contact lenses. Readily available eye baths are recommended in areas where operations may produce fumes and dusts.

**Protective Clothing and Equipment:** Wear hand, head and body protection that help to prevent injury from heat, infrared and ultraviolet radiation, and sparks as well as skin contact with the flux. At minimum, rubber gloves, eyewear, respirator, arm protectors, protective footwear, aprons, hats, and dark clothing must be considered.

**Hygienic Work Practices:** Avoid contact to eyes, skin, and mucous membranes. Avoid inhalation of vapors. Wash thoroughly after handling. Do not eat, drink, or smoke in vicinity of use or storage. Otherwise follow the standards of good industrial hygiene practices.

**Steps to be taken if material is spilled or released:** Prevent product from getting into water or sewer systems. Absorb with absorbent material (i.e. sawdust, sand, diatomaceous earth). Collect in separate containers. Keep containers closed and dispose of as recommended. Avoid skin contact. Provide ventilation and exhaust at the spill site to keep exposure below the TLVs.

**Waste Disposal Method:** Dispose of in accordance with all local, state, and federal regulations. Precautions to be taken in handling and storage: Avoid contact to the eyes, skin, and mucous membranes. Wash hands thoroughly after handling to remove all residue. Store material in sealed container in extremely dry, cool and, well ventilated area, away from sources of ignition and moisture.

**Other Precautions and/or Special Hazards:** Do not breathe fumes. Remove and professionally wash contaminated clothing before re-use. Existing lung disorders will have increased toxic susceptibility.

**Toxic Substances Control Act:** All active components of this compound are listed within the TSCA inventory.

**Hazard Communication Program:** Hazardous warnings and training requirements as mandated for corrosive material.

**State Right-To-Know Programs: Pennsylvania:** As currently manufactured, these materials contain zinc chloride, ammonium chloride, methanol, hydrochloric acid, or hydrobromic acid which are listed in the PA Code Title 34, Hazardous Substance List.

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The opinions expressed in this MSDS are those of qualified experts within THE ESAB GROUP. We believe that the information contained herein is current as of the date of this MSDS. Since the use of this information and these opinions and the conditions of use of these products are not within the control of THE ESAB GROUP, it is the user's obligation to determine the conditions of safe use of these products.