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 LOW TEMPERATURE ALUMINUM SOLDERING FLUX

Manufacturer - THE ESAB GROUP, INC. Telephone No. - 1-717-637-8911
Website: www.esabna.com 1-800-933-7070

Address - 801 Wilson Avenue Emergency No. - 1-717-637-8911
Hanover, PA 17331 (CHEMTREC) 1-800-424-9300

Product Description: A golden viscous liquid that is used as a flux for the soldering of aluminum and copper.

NOMINAL CHEMICAL COMPOSITION (Wt %)

<table>
<thead>
<tr>
<th>All-State Product Trade Name:</th>
<th>All-State No. 509</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminoethylethanolamine</td>
<td>25-30</td>
<td></td>
</tr>
<tr>
<td>Ammonium Fluoborate</td>
<td>10-18</td>
<td></td>
</tr>
<tr>
<td>Fluoboric Acid</td>
<td>3-8</td>
<td></td>
</tr>
<tr>
<td>Stannous Fluoborate</td>
<td>1-5</td>
<td></td>
</tr>
<tr>
<td>Triethanolamine</td>
<td>34-40</td>
<td></td>
</tr>
<tr>
<td>Zinc Fluoborate</td>
<td>1-5</td>
<td></td>
</tr>
</tbody>
</table>

See Note in Section VI
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.

<table>
<thead>
<tr>
<th>Material</th>
<th>CAS No.</th>
<th>ACGIH TLV TWA (mg/m³)</th>
<th>OSHA - PEL TWA (mg/m³)</th>
<th>STEL (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminoethylethanolamine</td>
<td>(111-41-1)</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>--</td>
</tr>
<tr>
<td>Ammonium Fluoborate</td>
<td>(13826-83-0)</td>
<td>2.5 (as F)</td>
<td>2.5 (as F)</td>
<td>--</td>
</tr>
<tr>
<td>Fluoboric Acid</td>
<td>(16872-11-0)</td>
<td>2.5 (as F)</td>
<td>2.5 (as F)</td>
<td>--</td>
</tr>
<tr>
<td>Stannous Fluoborate</td>
<td>(13814-97-6)</td>
<td>2.5 (Inorganic Compounds, as Sn)</td>
<td>2.5 (Inorganic Compounds, as Sn)</td>
<td>--</td>
</tr>
<tr>
<td>Triethanolamine</td>
<td>(102-71-6)</td>
<td>4.1 (C) 12.4 Skin</td>
<td>Not Listed</td>
<td>--</td>
</tr>
<tr>
<td>Zinc Fluoborate</td>
<td>(13826-88-5)</td>
<td>2.5 (as F)</td>
<td>2.5 (as F)</td>
<td>--</td>
</tr>
</tbody>
</table>

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.

ACGIH 2003 “Guide to Occupational Exposure Values” defines (C) and Skin as follows:

(C) Ceiling “The concentration that shall not be exceeded during any part of the working exposure”

Skin “Danger of cutaneous absorption”

III. Physical Data

<table>
<thead>
<tr>
<th>Physical State:</th>
<th>Gas ( )</th>
<th>Liquid (X)</th>
<th>Solid ( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solubility in Water:</td>
<td>Complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Gravity: (H₂O = 1):</td>
<td>1.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odor and Appearance:</td>
<td>Viscous amber liquid with strong ammonia odor.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IV. Fire & Explosion Hazard

29 CFR 1901.1200: Flammable Liquid

Flash Point: > 275°F (~365°F)

Flammable Limits: LEL 1.6% UEL 10.0%

Extinguishing Media: Dry chemical, carbon dioxide, halogen extinguisher, water, foam, or fog.

Special Fire Fighting Procedures: Full protective equipment required. May release toxic gases and fumes of carbon monoxide, carbon dioxide, ammonia, hydrofluoric acid, boron oxide or fluoride and oxides of nitrogen.

Unusual Fire and Explosion Hazards: Avoid splashing this material and solutions of it onto personnel. Hydrofluoric acid solution may be formed within water runoff.
V. Reactivity Data

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

Conditions to Avoid: Excessive heat; decomposes forming corrosive, skin-penetrating and toxic gases and fumes.

Incompatibility (Materials to Avoid): Strong oxidants, cyanides, sulfides, acids.

Hazardous decomposition products: When heated to decomposition, this product emits very toxic fumes and gases including ammonia, oxides of nitrogen, carbon dioxide and carbon monoxide, zinc oxide, hydrofluoric acid, boron oxides and boron trifluoride. In addition, the solder when heated in contact with this product may emit other toxic fumes. Generally, 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 a worker may be overexposed 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/m³. 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

HAZARD IDENTIFICATION:

All-State No. 509:
DANGER! CORROSIVE LIQUID. CONTACT CAUSES BURNS TO ALL BODY TISSUE. READILY ABSORBED THROUGH THE SKIN. VAPOR AND MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.

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 AWS “Safety and Health Fact Sheet No. 24” and 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 of the ESAB publications from your local supplier or by writing to the address in Section I.

Route of Overexposure: The most significant routes for overexposure for this product are inhalation of fumes and gases generated during use and contact with skin and eyes. Ingestion is 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 to the gases, fumes, and dusts may include irritation of the eyes, lungs, nose and throat. Some toxic gases associated with welding/brazing 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 this product are:

Inhalation: Highly irritating to respiratory system. Coughing and sneezing. Existing lung disorders will be aggravated. Inhalation may yield chills, labored breathing, fevers and unproductive cough. The fluoride ion may cause hypocalcemia – calcium deficiency in the blood that can result in muscle cramps. Inflammation and necrosis of mucous membranes. Do not aspirate into lungs.

Eye Contact: Strong irritation to eyes, tearing, burns of eye surfaces, corrosive to eyes. May cause blindness!

Skin Contact: Causes severe dermatitis, burns and pustular psoriasis; corrosive to skin; readily absorbed through the skin; aggravates existing disorders; may cause hypocalcemia.

Ingestion: Can cause damage to digestive system. Corrosive to mucous membranes. May cause salivation, nausea, vomiting, diarrhea and abdominal pain. Fluoride ion can reduce serum calcium levels, possibly causing fatal hypocalcemia. Systematic toxicity and shock.
Pre-existing Medical Conditions Aggravated by Overexposure: Individuals with allergies or impaired respiratory function may have symptoms worsened by exposure to welding/brazing 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 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 skin over-exposure to this product during soldering operations may produce dermatitis; repeated skin contact may causes allergy-like symptoms (i.e., rashes, welts). Chronic ingestion and inhalation may result in damage to the kidneys and liver, cause occupational asthma, coughing, nausea, and erythema. Chronic fluoride absorption can result in osseous fluorosis, increased radiographic density of the bones and mottling of the teeth.

Exposure limits for the ingredients are listed in Section II. The ACGIH and the 1989 OSHA TWA for welding fume is 5 mg/m³. At times, the limit for a particular hazardous chemical is reached before the limit for welding fumes. TLV-TWA’s should be used as a guide in the control of health hazards and not as firm lines between safe and excessive concentrations. As noted in Section V, the fume from welding and allied processes is a mixture of many components. Therefore, a statutory computation of the equivalent exposure is required. The equivalent exposure value for the welding, brazing and soldering fume mixture shall always be less than one. When these products are used as recommended by THE ESAB GROUP, and the preventive measures taught in this MSDS are followed, overexposure to hazardous substances will not occur.

Emergency First Aid Measures: ALWAYS CONTACT PHYSICIAN OR POISON CONTROL CENTER IN CASE OF MEDICAL EMERGENCY

**Eye Contact:** First check the victim for contact lenses and remove if present. **Immediately!** Flush eyes with plenty of water or normal saline solution for at least 20 minutes to remove all residue; simultaneously seek medical attention. **Blindness may result!** Hydrofluoric acid possible.

**Skin Contact:** Promptly flush with water to remove all residue. Gently wash all affected skin areas thoroughly with soap and water. Consult a physician, hospital or poison control center even if no symptoms develop. **Material is corrosive.** Hydrofluoric acid possible.

**Inhalation:** Remove to fresh air. If fumes, vapors or dusts are inhaled, call a physician. **Over-inhalation may be harmful.**

**Ingestion:** Call a physician or your Poison Control Center IMMEDIATELY! Advise of Section II. **Corrosive to mucous membranes.** May contain corrosive hydrofluoric acid solution.

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

Triethanolamine IARC-3—unclassifiable as to carcinogenicity in humans.

**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. For this product the respirator must be equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO₂) with dust/mist filter.

**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. When handling this product, wear splash proof safety goggles.

**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. Use full protective equipment normally used in soldering operation so as to prevent any contact. Chemical and acid impervious gloves recommended. Review operations to avoid

**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. Wash the contaminated surfaces with soap and water; flush area to chemical sewer. Prevent direct contact to skin, eyes and clothing. 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.

**Special Storage and Handling Considerations:** Store this product in a cool, dry location away from direct sunlight, sources of intense heat, or where freezing is possible. The product should not be stored in glass other silicate-based containers. Keep containers tightly closed when not in use. Inspect all containers before storage to ensure they are properly labeled and not damaged

**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. Remove and professionally clean contaminated clothing before reuse.

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.