



HIGH SPEED® and KLEANROL® *Soldering and Tinning Fluxes*

Zaclon, Inc. produces several fluxes for use in a wide range of industrial soldering and tinning operations. HIGH SPEED* Flux 50 (Regular), HIGH SPEED* Flux 50 (Special) and High Speed LFS Solution are clear, colorless to slightly colored and odorless water solutions of zinc chloride and ammonium chloride; specific gravity approximately 1.5 to 1.8 at 60 F (15.6 C) freezing point below -50 F (-45.6 C). KLEANROL* Flux Crystal is a white crystalline powder blend of zinc chloride and ammonium chloride with a relatively low melting temperature -- about 450 F (232 C). KLEANROL Flux Solution is a clear, colorless, and odorless water solution of zinc chloride and ammonium chloride; with a specific gravity of approximately 1.4. Melting temperature after drying is the same as KLEANROL Crystal.

APPLICATIONS

LIQUID FLUXES

As the name implies the HIGH SPEED flux is a fast acting product. HIGH SPEED Special Flux is preferred for use on automatic tin plate machines or other operations where maximum flux activity is needed.

In hand dip tinning, tinning of dairy equipment, refrigerator trays, automobile radiators, tinned wire goods, etc., either flux can be used satisfactorily. Less fuming accompanies the use of the HIGH SPEED Regular flux and its use may be preferred under conditions where improved fume control is desired.

HIGH SPEED fluxes are also used in the manufacture of terne plate, tinplate, and for hot dip lead coating of steel. In terne plating, as in the case of hot dip tinning, the choice of flux depends on the type of surface being cleaned and the speed of the coating operation.

KLEANROL flux solution is used where additional requirements are needed for oxide removal from steel substrates.

* Reg. U.S. Pat. & T.M. Off., Zaclon, Inc.

NOTICE: ***HIGH SPEED and KLEANROL Fluxes cause skin and eye burns. Inhalation of dust, fumes or mist may cause lung injury. See PERSONAL SAFETY AND FIRST AID***

SOLID FLUX

KLEANROL flux is well suited for use as a protective flux over a soldering bath, such as is used in mechanical soldering, to prevent air oxidation and scum formation.

This use is especially important in the manufacture of tinned containers where a mechanical roll is dipped into the bath for feeding the solder to an object passing slightly above the surface of the bath.

THE SOLDERING PROCESS**METAL PREPARATION**

The strength of the soldered joint depends on the adhesion of the solder to the metal being joined. In order to secure good adhesion, the surfaces of the metal and of the solder must be cleaned of oxides, dirt, grease, etc. In some cases chemical or mechanical cleaning methods are employed; however, the cleaning is usually accomplished by a soldering flux selected to meet the requirements of the job.

FLUXING

The fluxes used for most soft soldering are solutions or pastes that contain zinc chloride and other active fluxing agents.

The flux solution is applied to the work by dipping, spraying, or brushing, depending on the type of article being soldered and the techniques of the operator. For articles with numerous joints to be soldered, such as automobile radiators, the assembled articles are dipped into the flux bath to cover thoroughly all surfaces before soldering by means of sweating or dipping into a bath of molten solder. For soldering by wiping, by use of blow torch or soldering bit, the flux is usually applied by brushing.

When the flux is applied, it covers the metal surface, and the solvent holding the flux material is evaporated by the heat of the soldering operation, leaving a layer of the solid flux on the article. This film of flux acts as a protective layer that prevents further oxidation. At the soldering temperature the flux melts and partially decomposes with the liberation of hydrochloric acid. This developed acidity enables the flux to dissolve the oxides from the surfaces of the solder and the article.

During the soldering operation, the molten flux helps the solder flow and spread over the metal, and continues to protect both the article and the molten solder from oxidation while hot.

Following the soldering operation, any flux remaining on the joint should be removed by water rinse, or in more particular instances, by treatment with a dilute acid such as 1-5% sulfuric or hydrochloric followed by a thorough water rinse. For fine work, it may be desirable to neutralize the small amount of acid liberated from the flux by adding a small amount of an alkali such as lime, soda ash, or sodium bicarbonate to the rinse water.

For certain applications, such as in soldering special electrical apparatus, all corrosive residues must be avoided; for such purposes, noncorrosive-type fluxes such as alcohol-

rosin, tallow, and other proprietary products are used. Further information on fluxes for this type of work can be obtained from suppliers of such formulations.

THE TINNING PROCESS

METAL PREPARATION

If degreasing the article to be tinned is necessary, it is usually accomplished by a hot alkaline solution followed by a water rinse. Vapor degreasing, using an organic solvent, is sometimes employed in the removal of heavy, nonsaponifiable oils.

The article is pickled in an acid solution (usually 10-15% hydrochloric acid, although a few tanners may prefer 8-12% sulfuric acid), water rinsed, and if not to be tinned immediately, is stored in a very dilute (about 0.5%) solution of hydrochloric acid. Iron castings usually require mechanical cleaning such as sand blasting or a pickle in hydrochloric acid to assure a uniformly clean sand-free surface.

PREFLUXING

Prefluxing consists of immersing articles in a flux solution after pickling and thoroughly rinsing. This operation removes any surface oxides formed after pickling, and provides a protective film capable of retarding oxidation of the surface.

The usual prefluxing solution is either HIGH SPEED Regular, HIGH SPEED Special or KLEANROL solution. These may be used as received, but more frequently are mixed with water to obtain a concentration in the gravity range of 15 Bé to 30 Bé.

TOP FLUXING

The article is introduced into the tinning bath through a layer of molten flux floating on the molten tin. Tin pot temperatures are maintained in the range of 575-625 F (302-329 C). The top flux is confined to a definite area, usually one end of the tinning pot, by a dam or flux box.

Top fluxing further cleans the article as well as acting as a preheater and drier to prevent spattering of the molten tin. It also acts as a blanket to preserve the heat of the molten tin and to provide a scum-free surface by preventing oxidation of the tin surface.

The top flux is prepared by melting KLEANROL flux crystal on the surface of the molten tin bath. If desired, it can also be prepared simply by pouring the liquid flux on the molten tin bath. Either Zaclon HIGH SPEED Regular or HIGH SPEED Special may be used for this purpose, and it is usually used full strength. Further additions of flux solution to the top flux may be required from time to time; however, the flux solution carried on the surface of the article from the preflux tank is generally sufficient to maintain an adequate top flux layer of 1/4 to 1/2 inch in depth. After remaining in the tinning bath for a short time (1 to 3 minutes), the article is withdrawn from the bath through a clean tin surface. To obtain a bright, smooth coating, the article may be passed through a second molten tin bath held at a temperature of 470-500 F (243-260 C), on which a shallow layer of tallow or palm oil is floated. After draining, the material is quenched in a kerosene bath (Caution: FIRE HAZARD INVOLVED) or water bath covered with a deep layer of kerosene. The oil is

removed by a suitable solvent or by rubbing with sawdust or bran, if a smooth, lustrous finish is desired.

Essentially the same operations are followed in the manufacture of terne plate, where steel is coated with a lead alloy containing from 10% to 25% tin. The flux is floated on the surface of the molten metal and the work is passed through it into the metal and emerges through a clean terne surface.

Lead coatings are applied in the same manner. To increase the adhesion of lead to a steel base, small additions (2% or 5%) of an alloying metal, such as tin or antimony, are customarily added to the lead melt.

STORAGE AND HANDLING

Drums of HIGH SPEED or KLEANROL Flux solutions should be stored out of sun and away from heat. Keep drum plug at the top to prevent leakage and never use air pressure to empty drum.

KLEANROL Crystal Flux should be stored as to avoid moisture pickup. The containers should be kept tightly closed in a dry place. Any inventory turnover rate of two to three months is recommended to minimize caking.

Spills and leaks should be flushed to a chemical sewer with plenty of water. Waste disposal should be in accordance with Federal, State and local regulations.

MATERIALS OF CONSTRUCTION

Unheated HIGH SPEED and KLEANROL Flux solutions slowly corrode steel. Rubber-lined steel tanks or fiber glass reinforced polyester tanks are recommended for storage. Dilute solutions of these fluxes can be prepared, stored, transported or used in rubber-lined, or nickel-copper alloy tanks. *Do not* use iron piping.

Molten KLEANROL Crystal Flux may be handled in steel pots; although recommended materials of construction are Type 309 stainless steel, or boiler plate with a 20% cladding of Grade L (carbon-free) nickel.

PERSONAL SAFETY AND FIRST AID

HEALTH HAZARDS

These zinc chloride-based fluxes are acidic materials and can cause burns to the skin and eyes. Inhalation of dust, fumes or mist may cause injury to the respiratory tract.

The U.S. Department of Labor (OSHA) has ruled that an employee's exposure to zinc chloride fumes in any 8-hour work shift of a 40-hour week shall not exceed a time-weight average of 1 mg per cubic meter of air (29 CFR 1910.1000 Air Contaminants).¹

SAFETY PRECAUTIONS

Do not get HIGH SPEED or KLEANROL Fluxes in eyes, on skin or on clothing. Avoid inhaling dust, fumes, or mist. Use with adequate ventilation. Wash thoroughly after handling.

Wear chemical splash goggles and rubber gloves to minimize exposure of eyes and skin. Additional protective equipment, such as transparent face shield, rubber gauntlets, rubber pants and jacket and rubber shoes may be desirable where there is high probability of contact with concentrated solutions of these zinc chloride based fluxes.

FIRST AID

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse.

If inhaled, remove to fresh air immediately. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

If swallowed, administer large quantities of water or milk. Call a physician. *Do not induce vomiting.* Never give anything by mouth to an unconscious person.

SHIPPING CONTAINERS

Zaclon ships HIGH SPEED 50 (Regular and Special) and KLEANROL flux solutions in 30 gallon (385 lb/175 kg net) and 55 gallon (675 lb/307 kg net) polyethylene drums. HIGH SPEED and KLEANROL solutions are also available in tank car or tank truck quantities. HIGH SPEED LFS Solution is available in tank truck quantities.

KLEANROL Flux Crystal is packaged in 50 lb/22.7 kg net and 475 lb/215.5 kg net steel drums.

HIGH SPEED flux is regulated as a hazardous substance, ORM-E, by the Department of Transportation when shipped via tank truck, tank car or portable tanks containing more than 1,000 pounds and as an ORM-B when shipped via air. HIGH SPEED flux is not regulated by the DOT when shipped via surface transportation in drums. KLEANROL flux is not regulated by the DOT as a hazardous material.

¹ Due to changing government regulations such as those of the Dept. of Trans., Dept. of Labor, U. S. Environmental Protection Agency and the Food and Drug Admin., references herein to government requirements may be superseded. Each user should consult and follow the current government regulations, such as Hazard Classifications, Labeling, Food Use Clearances, Worker Exposure Limitations and Waste Disposal Procedures for the up-to-date requirements for the products described in this literature.

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