159HF Water Soluble Liquid Flux

Introduction

159HF is an excellent water-soluble liquid flux for selective soldering, wave soldering, and rework / touch-up operations. 159HF is a high activity flux with neutral pH which works well with surfaces that are difficult to solder. 159HF is compatible with spray, foaming, and drop-jet type flux systems. 159HF is formulated to eliminate potential clogging of drop-jet flux systems. 159HF works well with leaded and Pb-free alloys. It is also halide and halogen free and contains no intentionally added halogens (zero halogen). 159HF has been formulated for ease of washing.

Attributes

- High activity, neutral pH water soluble flux for wave, selective, and rework / touch-up soldering.
- Eliminates the risk of clogging drop-jet flux systems.
- Works well for Sn63/Pb37, SAC305 and SN100C alloys.
- Easy to wash off with D.I. water after multiple soldering cycles and long hold times.
- Halide and halogen free (zero halogen).

Liquid Flux Packaging	Part Number	Net Volume
Jug	159HFU	1 gallon
Pail	159HFP	5 gallons
Drum	159HFD	55 gallons

Compatible Products

FT-100 Flux Thinner.

Storage and Handling

- Shelf life is 3 years when the unopened flux is stored between 50 to 90 °F (10 and 32 °C).
- Keep the flux sealed in the original container to limit evaporation of solvent and minimize the risk of contamination.
- When storing used flux, do not mix it into the container with the new (fresh) flux.

Process Parameters

The process parameters shown below are simply guidelines. The optimal parameters may be different based upon your equipment, circuit boards, components, and process.

Flux Parameters	Guideline
Specific gravity (SG)	0.85 to 0.88 g/cc
Amount of flux (Foaming)	800 - 1500 µg / in^2 of dried flux 4.80 - 9.10 mg / in^2 of wet flux
Amount of flux (Spray)	500 - 1500 µg / in^2 of dried flux

	3.00 - 9.10 mg / in^2 of wet flux

Coverage of flux should be uniform over the entire fluxed area. Penetration of flux through the circuit board holes can be checked using paper or cardboard on top of the circuit board run through the fluxer. Inspect the paper or cardboard for uniform wetness at each hole. Adjust the flux system if necessary.

Wave Solder Parameters	Sn63/Pb37	SN100C or SAC305
Immersion depth in wave	½ to ⅔ of the board thickness	½ to ⅔ of the board thickness
Top side preheat temperature	80 to 100 °C	90 to 120 °C
Bottom side preheat temperature	25 to 35 °C higher than the top side	25 to 35 °C higher than the top side
Preheat ramp rate maximum	2 °C / second maximum	2 °C / second maximum
Conveyor speed	4 to 6 ft/min (1.2 - 1.8 m/min)	3 to 6 ft/min (0.9 - 1.8 m/min)
Contact time in wave	2 to 4 seconds	3 to 6 seconds
Solder pot temperature	230 to 260 °C	250 to 275 °C

Selective Solder Parameters	Sn63/Pb37	SN100C or SAC305
Top side preheat temperature	80 to 100 °C	90 to 120 °C
Bottom side preheat temperature	25 to 35 °C higher than the top side	25 to 35 °C higher than the top side
Preheat ramp rate maximum	2 °C / second maximum	2 °C / second maximum
Movement rate while soldering	5 to 15 in/min	5 to 15 in/min
Contact time	1 to 3 seconds	1 to 4 seconds
Solder pot temperature	280 to 310 °C	290 to 320 °C

Flux Control

Solvents will evaporate out of the flux over time and the solvents should be replaced through analysis and additions of FT-100 Flux Thinner. 159HF flux is best controlled through specific gravity analysis using the procedure below. The flux should be tested and thinned approximately once every 2 to 4 hours of operation (foaming systems), or once every 20 to 24 hours of operation (spray systems).

1. Measure the specific gravity of the flux at 68 - 72 °F.
2. Calculation for the addition of FT-100:
   FT-100 add (% vol) = [(SG - 0.88) / (SG - 0.786)] x 100%

Maintain the specific gravity between 0.85 to 0.88 through additions of FT-100. For example, if the specific gravity is 0.89 then the amount of FT-100 required would be 9.6% by volume. If the flux sump holds 20 gallons, then an addition of 1.9 gallons of FT-100 would reduce the specific gravity from 0.89 to 0.88.

In recirculating flux equipment, the flux will accumulate contaminates and debris over time. Spent flux should be replaced after approximately 40 hours of use. The equipment, foam stone and sump should be cleaned with flux thinner before adding new (fresh) flux.

During extended shut down periods such as nights and weekends, the flux should be removed from the machine and stored in a sealed container. The air stone should be immersed in flux thinner during the shut-down period. Pumps and tubing should be flushed with flux thinner during the shut-down period.

Cleaning

Raw flux can be removed from circuit boards and equipment using flux thinner. 159HF flux residues are corrosive and must be removed using a suitable wash process. It is recommended to remove 159HF flux residues within 4 hours after soldering using D.I. water heated to 100 - 180 °F in standard washing equipment. It is possible to wash away 159HF flux residues after multiple heat cycles followed by a 24 hour hold time, although this is not recommended.

Safety

Wear chemically resistant gloves and safety glasses when handling liquid flux. Avoid breathing fumes, especially during heating of the flux. 159HF contains a flammable solvent with a flashpoint of 55 °F (13 °C). Keep the flux away from open flames and other ignition sources. Follow the guidelines in the Safety Data Sheet (SDS). Follow the guidelines in the Safety Data Sheet (SDS).

J-STD-004D Flux Standard	Test Method	Result
J-STD-004 classification	J-STD-004 methods	ORH0
Visual appearance	Visual	Light amber to yellow
Solids content (Non-volatile)	IPC 2.3.34	15.0 to 18.0% wt
pH (100%)	Internal	7.0 to 8.5
Specific gravity	ASTM D-1298	0.85 to 0.88 g/cc
Halide ion content (Br^-, Cl^-, F^-, I^-)	IPC 2.3.28.1	0.0 % wt
Halogen content (Br and Cl)	EN 14582, IPC 2.3.28.1	0.0 % wt
Halide by silver chromate	IPC 2.3.33	No halides detected
Fluoride by spot test	IPC 2.3.35.1	None detected
Copper mirror	IPC 2.3.32	High activity
Copper corrosion	IPC 2.6.15	Corrosion present
Surface Insulation Resistance (SIR) Comb-up	IPC 2.6.3.7	Pass
Surface Insulation Resistance (SIR) Comb-down	IPC 2.6.3.7	Pass
Electro Chemical Migration (ECM)	IPC 2.6.14.1	Pass