NC164 No Clean Liquid Flux

Introduction

NC164 is a low activity, low-solids, no-clean liquid flux for selective and wave solder applications. NC164 contains no rosin, halides or halogens and has a solids content of about 3.6%, which reduces the potential for clogging of drop-jet flux systems. NC164 is also compatible with spray and foaming type flux systems. NC164 works well with leaded and Pb-free alloys due to greater heat stability.

Attributes

- Excellent liquid flux for wave and selective soldering and touch up or rework.
- Low solids content (3.6% wt) which leaves little residue.
- Works well for Sn63/Pb37, SAC305 and SN100C alloys.
- Halide and halogen free (zero-halogen) flux which may lead to improved reliability.

Compatible Products

FT-100 Flux Thinner.
TK-100 Titration Kit.
NC601 No Clean Cored Solder Wire.
NC32 No Clean Gel Flux.

Storage and Handling

- 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)	0.79 to 0.85 g/cc
Acid number	33 - 43 mg KOH / gram flux
Amount of flux (Foaming)	800 - 1500 µg / in^2 of dried flux 22.2 – 41.7 mg / in^2 of wet flux
Amount of flux (Spray)	500 - 1500 µg / in^2 of dried flux 13.9 – 41.7 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. NC164 flux is best controlled through an acid number titration 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. Pipette 5.0 mL of flux into a titration flask.
2. Add 40 - 50 mL of D.I. water or IPA and mix.
3. Add 2 - 3 drops of phenolphthalein indicator solution and mix.
4. Titrate to the faint pink endpoint using 0.1 N sodium hydroxide or 0.1 N potassium hydroxide solution.
5. Calculation for acid number:
   Acid number (mg KOH/g flux) = (mLs of 0.1N NaOH or KOH used) x 1.34

Maintain the acid number between 36 and 40 mg KOH / g flux. An addition of 3% by volume FT-100 will reduce the acid number by 1.0. For example, if the flux sump contains 20 gallons of flux, then an addition of 0.65 gallons of FT-100 will reduce the acid number by 1.0. Contact FCT Assembly for details on our TK-100 Titration Kit which can be used to perform acid number titrations.

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 FT-100 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 FT-100 Flux Thinner. After heating, no-clean flux residues are designed to be "safe" and do not need to be removed from the circuit board. NC164 flux residues are also safe in raw (unheated) state. If removal of the flux residues is desired, then a commercial cleaning agent should be used. Several commercial cleaning agents have been tested and found to be effective. Please contact your cleaning chemical supplier for details.

Safety

Wear chemically resistant gloves and safety glasses when handling liquid flux. Avoid breathing fumes, especially during heating of the flux. NC164 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).

J-STD-004D Flux Standard	Test Method	Result
J-STD-004 classification	J-STD-004 methods	ORL0
Visual appearance	Visual	Clear to faint amber
Solids content	IPC 2.3.34	3.4 to 3.8% wt.
Acid value	IPC 2.3.13	36 to 40 mg KOH / gram flux
Specific gravity	ASTM D-1298	0.80 to 0.84 g/cc
Halide ion content (Br^-, Cl^-, F^-, I^-)	IPC 2.3.28.1	0.0% by wt.
Halogen content (Br and Cl)	EN 14582, IPC 2.3.28.1	0.0% by 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	Low activity
Copper corrosion	IPC 2.6.15	No corrosion
Surface Insulation Resistance (SIR) Comb-up	IPC 2.6.3.7	Pass > 1.00E+09 ohms
Surface Insulation Resistance (SIR) Comb-down	IPC 2.6.3.7	Pass > 1.00E+09 ohms
Electro Chemical Migration (ECM)	IPC 2.6.14.1	Pass