MF 220

MF 220 is a water-based low residue, resin and halogen-free flux which meets the most demanding legislation on volatile organic compound (VOC) emissions. MF 220 is designed mainly for consumer electronics applications using either conventional or nitrogen inerted wave soldering machines. The flux performs well, even when used on poorly preserved copper substrate. It has been designed to minimise solder balling between adjacent pads. MF 220 liquid flux is designed for application by spray fluxer.

FEATURES AND BENEFITS

- Halogen-free flux, with no intentionally added halogen
- Halogen-free flux, passes IC with pre-treatment as per IPC-TM-650, EN14582
- Water-based VOC free flux
- Meets US air quality legislation
- Non-flammable formulation
- Formulated to minimize solder balling
- Residues easily removed where required
- Highly effective on difficult to solder surfaces
- Ideal for PTH and SMD applications
- Suitable for spray application

TYPICAL PROPERTIES

Property	Value
Acid Value (mgKOH/g)	37
Halide Content (%)	Zero
Solids Content (%)	4.6
Specific Gravity (@25°C)	1.011
Colour (1)	Colourless

(1) Some yellowing of the flux may occur during storage or prolonged exposure to light. This does not affect performance

Reliability:

Test	Specification	Test Method	Results
Copper Mirror Corrosion	IPC/J-STD-004A	2.3.32D	Pass*
Chlorides & Bromides	IPC/J-STD-004A	2.3.33	Pass
Surface Insulation Resistance (SIR) (without cleaning)	IPC/J-STD-004A	2.6.3.7	Pass
Electromigration (ECM) (without cleaning)	Telcordia GR-78-Core	13.1.4	Pass
Halogen Content (Pre-treatment EN14582, 2.3.28.1)	IPC/J-STD-004B	2.3.34	Pass
Flux Activity Classification (without cleaning)	IPC/J-STD-004A ISO 9454		ORM0 2.2.3

* when the solids are reconstituted in 2-propanol, as permitted by Table 5 of the J-STD-004 protocol

RECOMMENDED OPERATING CONDITIONS

The Printed Circuit Board:
MF 220 has been formulated for high activity on oxidized copper and can be used in conjunction with most commonly used surface preservative materials. It is, however, recommended that process compatibility testing be performed. Testing during the development of this flux confirms good PTH penetration and therefore good topside fillet formation.

Machine Preparation:
Ensure the soldering machine is thoroughly cleaned, including all fingers, pallets and conveyors, so that any possible contamination has been removed. Where possible a new foam stone should be used to ensure not cross contamination. MCF 800 Cleaner can be used in the finger cleaning system. MF 220 is not known to be aggressive towards plastics, however, it may be slightly corrosive towards some metal PCB handling equipment.

Fluxing:
MF 220 is designed for use in spray applications. The upper limit for flux coverage to ensure that soldered PCBs pass cleanliness tests is 40g m^{-2} of circuit. It is formulated to have the same foaming properties as conventional alcohol based low solids liquid fluxes. As it is water based, the foam is therefore less prone to destabilisation through evaporative loss and contact with hot fixtures or pallets. There is no requirement for the air to be dry. **DO NOT** use fixtures that have the potential to entrap flux. This may lead to random solder balling caused by the sudden volatilisation of the trapped flux upon contact with the solder wave. It is important not to deposit excess flux on the circuit boards and to avoid over-spraying on to the topside of the board.

Flux Control:
Being a water-based material, loss of solvent by evaporation is minimal and moisture absorption does not occur. Flux density measurements do not give a reliable guide to flux activity levels, therefore flux concentration control by measurement of acid value is recommended. If thinning is required, the use of deionised water is recommended.

Preheating:
As MF 220 is water based, it will be necessary to adjust the preheater setting to ensure the water is sufficiently evaporated prior to the PCB entering the solder wave, and to ensure that the flux has reached the required activation temperature. The optimum preheat temperature and time for a PCB depends on its design and the thermal mass of the components but the cycle should be sufficient to ensure that the flux coating is not visibly wet when it contacts the wave. Fitting a topside canopy over the preheater/s can help to produce more effective drying and activation. This will allow the use of faster conveyor speeds and improve soldering. It is recommended to use a temperature profiling system to measure preheat and peak temperatures during set up of the wave soldering machine. This is also recommended for consistent process monitoring. Combinations which have given good results are shown below.

Conveyor Speed	Topside Preheat Temperature	
	°C	°F
1.2m min^{-1} (4ft min^{-1})	110	230
1.5m min^{-1} (5ft min^{-1})	120	248

Wave Soldering:
Excess moisture on the PCB during soldering may lead to random solder balling and poor wetting of some solder joints.
IT IS IMPORTANT that the flux solvent carrier is fully evaporated and that the PCB appears virtually dry when it reaches the solder wave.
At a speed of 1.5 m min^{-1} (5ft min^{-1}) a contact length of 38 to 50 mm between the solder wave and the PCB is recommended. At lower speeds, this contact length should be reduced. Very slow speeds through the solder wave may produce dull solder joints.
It is recommended to use a temperature profiling system to measure preheat and peak temperatures during set up of the wave soldering machine and for consistent process monitoring.
MF 220 flux can be used with all standard solder alloys. The recommended maximum solder bath temperature is 250°C for leaded alloys. Temperatures as high as 275 to 280°C may be necessary for some lead-free alloys. Temperatures as low as 235°C in tin-lead soldering and 245°C in lead free may be used in some situations and this results in improved soldering and less wastage through dross formation. Dwell time on the wave should be 0.5-1.0 seconds (chip wave) and 2.0-3.0 seconds (laminar wave). Conveyor speed for dual wave systems should be at least 1.2 m min^{-1}.
IT IS IMPORTANT that flux solvent be removed by the preheat and that the **PCB IS NOT WET** when it reaches the solder wave.

Cleaning:
MF 220 is designed as a no-clean flux, however some applications may require board cleaning for which MCF 800 cleaner may be used. Boards soldered with MF 220 flux pass MIL-P-28809A ionic contamination test without cleaning provided excess flux is not applied and a clean system and components are used. It is recommended that the soldering system itself be tested for cleanliness using an un-fluxed board passed over the soldering machine. Suppliers should be requested to supply clean components and clean boards.
For a completely no-clean process, use HARIMA no-clean cored solder wire and/or no clean solder paste. These products also generate low levels of VOC emissions due to their low flux content and heat stable resins. Soldering iron tips should be kept clean with TTC-LF Tip Tinner/Cleaner (data sheet available).

Storage:
It is recommended to store MF 220 in a dry environment at room temperature. This flux should be stored above 10°C, as cold temperatures may cause the solids in the flux to separate from the solution. Warming to room temperature and gentle agitation will restore the flux to normal. MF 220 may appear cloudy after being subjected to elevated storage temperatures. **This does not affect the performance of the flux.**

Shelf Life:
Provided MF 220 is stored as recommended above a shelf life of 2 years can be expected.

GENERAL INFORMATION
For safe handling information on this product consult the relevant Safety Data Sheet (SDS)

Disclaimer

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