Technical Data Sheet

MF300

December 2013

PRODUCT DESCRIPTION

MF300 provides the following product characteristics:

Technology	Liquid flux
Application	Solder flux

MF300 is a low residue, resin and halide-free fluxes, which meets the most demanding legislation on volatile organic compound (VOC) emissions.

FEATURES AND BENEFITS

- Highly effective on low solderability surfaces, e.g. oxidised copper
- Formulated to minimize solder balling
- No cleaning flux
- <1% VOC- meets US air quality legislation
- Non-flammable formulation
- MF300 suitable for foam application only

TYPICAL PROPERTIES

Liquid Flux Typical Properties

J-STD-004 classification	OR M0
EN 29454 classification	2.1.3
Color	Colorless/Yellow
Solids Content, %	4.6
Halide Content, %	Zero
Acid Value, mg KOH, g^{-1}	37
Specific Gravity @ 25°C	1.011
Shelf Life, months	12

DIRECTIONS FOR USE

Application:

MF300 is designed mainly for consumer electronics applications using either conventional or nitrogen inerted wave soldering machines. This flux performs well, even when used on poorly preserved copper substrate. It has been designed to minimize solder balling between adjacent pads.

The Printed Circuit Board:

MF300 has been formulated for high activity on oxidized copper and can be used in conjunction with most commonly used surface preservaitive 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 converyors, so that any possible contamination has been removed. MULTICORE MCF800 Cleaner can be used in the finger cleaners. MF300 is not aggresive towards plastics. However, it may be slightly corrosive towards some metal PCB handling equipment.

Fluxing

MF300 is suitable for use in foaming 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 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. Also there is no requirement for the air to be dry.

Flux Process

1. Keep the flux tank FULL at all times.
2. The top of the foaming stone should be no more than 20mm below the surface of the liquid flux. The level of the stone should be raised if this is not the case.
3. The ideal feed gas flow rate (pressure) is less than that typically used for conventional solvent liquid fluxes and the foam fluxer should taper towards a slot width of 10 to 20mm.
4. DO NOT use fixtures which can entrap the flux. This may lead to random solder bailing caused by the sudden volatilisation of the excess flux upon contact with the solder wave.
5. It is important to remove excess flux from the circuit boards using a standard air knife or brushes on the wave soldering machine.
6. An air pressure of about 5 to 7 mm is recommended and the nozzle should be about 25 mm below the board and angled back at a few degrees to the perpendicular to the plane of the board. This will ensure effective removal of excess flux without blowing flux droplets onto the top of the next board.
7. Ensure the air knife is postioned with the sufficent space between it and the foam fluxer to prevent any direct or reflected air stream from disturbing the foam.

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.

NOTE: MF300 may appear cloudy after being subjected to warm temperature. **This does not affect the performance of the flux.**

This flux should be stored above 10°C, as cold temperatures may cause the solids in the flux to seperate from the solution. Warming to the room temperature and gentle agitation will restore the fluxes to normal.

Preheating

As MF300 contains water, it may 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 (see topside pre-heat table below).

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.

Preheat vs conveyor speed combinations which have given good results are shown below.

Conveyor Speed	
@ 4.2 ft.min^{-1}(1.3 m min^{-1}):	
Topside Preheat Temp, ºC	110
Topside Preheat Temp, ºF	230
@ 4.9 ft.min^{-1}(1.5 m min^{-1}):	
Topside Preheat Temp, ºC	120
Topside Preheat Temp, ºF	248

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.

Wave Soldering:

1. Excess moisture on the PCB during soldering may lead to random solder balling and poor wetting of some solder joints.
2. IT IS IMPORTANT that the flux solvent carrier (water) is fully evaporated and that the PCB appears virtually dry when it reaches the solder wave.
3. At a speed of 1.5 m min^{-1}, a contact length of 38 to 50 mm between the 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.
4. 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.
5. MF300 flux can be used with all standard solder alloys. The recommended maximum solder bath temperature is 260°C. The solder bath temperature can generally be reduced when compared with processes using conventional fluxes. Temperatures as low as 235°C may be used in some situations and this results in imporved soldering and less wastage through solder bath drossing.
6. Dwell time on the wave should be 1.5 to 2.5 seconds.

Cleaning:
For a completely no-clean process, use Multicore 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 Multicore Tip Tinner/Cleaner TTC1 (data sheet available).

Surface Insulation Resistance
MF300 passes the J-STD-004 surface insulation resistance test without cleaning.

Electromigration
MF300 passes the Telcordia (formerly known as Bellcore) GR-78 CORE electromigration test without cleaning.

Corrosion
MF300 passes the IPC-TM-650 copper mirror test (method 2.3.32) when the solids are reconstituted in 2-propanol, as permitted by table 5 of the J-STD-004 protocol

DATA RANGES
The data contained herein may be reported as a typical value and/or a range. Values are based on actual test data and are verified on a periodic basis.

GENERAL INFORMATION
For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).

Not for Product Specifications
The technical information contained herein is intended for reference only. Please contact Henkel Technologies Technical Service for assistance and recommendations on specifications for this product.

Conversions
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
µm / 25.4 = mil
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm² x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

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Reference 0.0