Product Data Sheet

X33F-07i & X33S-07i

August 2007

NO CLEAN LOW RESIDUE FLUXES

Multicore X33F-07i and X33S-07i are low residue, resin and halide free fluxes particularly for use on copper finishes from the pioneers of 'no clean' technology.

- **No visible residues – eliminates cleaning**
- **Promotes through hole filling on bare, passivated and lacquered copper finishes**
- **Formulations for wave, spray and foaming application**
- **Meet Bellcore TR-NWT-000078 Issue 3**
- **IPC classification L3CN**

APPLICATIONS

Recommended for consumer electronics, telecommunications and for professional applications using conventional wave soldering machines or nitrogen inerted units.

RECOMMENDED OPERATING CONDITIONS

The Printed Circuit Board: Multicore X33F-07i and X33S-07i have been formulated to work over a wide range of solder resists and are tolerant of poorly adherent finishes. The solvent system in Multicore X33F-07i and X33S-07i is designed for optimum wetting of surfaces and is not aggressive towards common plastics.

Multicore X33F-07i and X33S-07i are particularly effective on bare, passivated or lacquered (resin coated) copper circuit boards. They may also be used on tin/lead coated boards.

Low residue fluxes generally produce poor through-hole filling, particularly on copper finishes. Multicore X33F-07i and X33S-07i have been especially formulated to overcome this problem.

Machine: When switching to X33F-07i or X33S-07i from any other flux, ensure all fingers, pallets and conveyors are thoroughly cleaned. It is recommended that Multicore MCF800 be used in the finger cleaners.

Fluxing: Multicore **X33S-07i** has been formulated for use in **spray** or **wave fluxers** in the same way as ordinary fluxes on standard wave soldering machines. Multicore **X33F-07i** has been formulated for use in **foaming fluxers**. The upper limit for flux coverage to ensure that soldered PCBs pass cleanliness tests is $25g.m^{-2}$ of circuit. Good soldering can be achieved at half this volume. It is important to remove excess flux from the circuit boards using the standard air knife or brushes supplied on the wave soldering machine. An air pressure of 5-7psi is recommended and the nozzle should be around 2.5cm below the board, angled back at a few degrees to the perpendicular of the plane of the board. This will ensure effective removal of excess flux without transferring droplets to the top of the following board. Sufficient space should be allowed between the foam fluxer and the air knife to prevent the air stream disturbing the foam.

Observing the following instructions will help ensure optimum foaming and soldering results.

1. Use **DRY AIR**.
2. Keep the flux tank **FULL** at all times.
3. The top of the foaming stone should be no more than 2cm below the surface of the liquid flux. A fine foaming stone is preferred and if necessary, raise the level of the stone.
4. The preferred width of the slot (opening) of the foam fluxer is 10mm. If it is wider, add a strip of stainless steel or PVC across it to narrow the opening to 10mm. It is preferable to have a chimney for the foam which tapers towards the top.
5. **DO NOT** use hot fixtures or pallets as these cause the foam to deteriorate and increase losses by evaporation.
6. **DO NOT** use fixtures that have the potential to entrap flux.

Flux Control: Control of the flux concentration is achieved in the normal manner by measuring the temperature and specific gravity of the flux. A nomograph is available to show how these measurements are related to the corrective action needed.

The specific gravities of the flux and thinners are similar and they vary with their water contents. As a result, flux concentration control by measurement of the acid value is more convenient.

Preheating: As X33F-07i and X33S-07i contain more solvent than conventional rosin fluxes, it will be necessary to adjust the preheater setting to remove the additional solvent and to ensure that the flux is properly activated. The optimum preheat temperature and time for a PCB depend 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. Combinations which have given good results are shown below.

CONVEYOR SPEED	Ft min $^{-1}$	3	4	5	6
	m min $^{-1}$	0.91	1.22	1.52	1.83
TOPSIDE PREHEAT	°C	80-100	70-110	70-100	70-100
	°F	176-212	158-230	158-212	158-212

It is advantageous to fit a topside canopy over the preheaters to produce more effective drying and activation. This will allow the use of faster conveyor speeds and improve soldering. At a speed of 5ft/min, a contact length of 1½-2" 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.

It is particularly useful when setting up a machine to measure the preheat using a temperature profile system.

IT IS IMPORTANT that flux solvent be removed by the preheat and that the PCB **IS NOT WET** when it reaches the solder wave.

Solders: Multicore X33F-07i and X33S-07i fluxes can be used with all standard solder alloys. The recommended maximum solder bath temperature is 260°C (500°F). The solder bath temperature can generally be reduced compared with processes using conventional fluxes. Temperatures as low as 235°C (455°F) may be used in some situations and this results in improved soldering and less wastage through drossing. Dwell time on the wave should be 1.5-2.5 seconds. Conveyor speed for dual wave systems should be at least 4ft/min.

To complete your no-clean assembly, use the compatible Multicore Cored Solder Wire and Solder Paste. Soldering iron tips should be kept clean with Multicore Tip Tinner/Cleaner.

Cleaning: Multicore X33F-07i and X33S-07i fluxes properly applied and processed leave no discernible residues without cleaning.

It is recommended that the soldering system itself to tested for cleanliness using an unfluxed board passed over the soldering machine. Suppliers should be requested to supply clean components and clean boards. Special applications may have regulations insisting on board cleaning and in such cases Multicore MCF800 may be used. This is free of ozone depleting chemicals and may also be used to remove any small accumulation of flux solids that might develop on parts of the soldering machine after prolonged use. Machine contamination will in any case be much less than with conventional rosin fluxes. Unlike water soluble fluxes, Multicore X33F-07i and X33S-07i fluxes are not corrosive towards PCB handling equipment.

TECHNICAL SPECIFICATION

The following table contains typical product data. A full description of test methods and detailed test results are available on request.

General Properties	X33F-07i	X33S-07i
IPC classification	L3CN	
Colour	Colourless	
Smell	Alcoholic	
Solids content	2.9%	
Halide content	Zero	
Acid value (on liquid) mg KOH/g	19	
Specific gravity at 25°C (77°F)	0.79	
Flash point (Abel)	12°C (53°F)	
Thinners	PC70i	

SPECIAL PROPERTIES

Boards soldered with Multicore X33F-07i and X33S-07i fluxes pass MIL-P-28809A ionic contamination test without cleaning provided excess flux is not applied and a clean system and components are used.

Multicore X33F-07i and X33S-07i fluxes pass the following corrosion tests:

USA Copper Mirror Test per MIL-F-14256D

UK Ministry of Defence DTD 599A

USA Bellcore TR-NWT-000078

IPC-SF-818 Flux Class 3

BS5625 Flux Class 4

Surface Insulation Resistance

Multicore X33F-07i and X33S-07i liquid fluxes gave the **PASS** results shown in the following table during surface insulation resistance tests.

Surface Insulation Resistance Measurements on Uncleaned Soldered Combs						
Specification	Temp °C	Ageing Conditions			Test Voltage V	Typical SIR ohms
		Relative Humidity %	Time hr	Voltage V		
Bellcore TR-NWT-000078 Issue 3	35	85	96	50	100	**X33F-07i** 1.6×10^{11}
						X33S-07i 5.2×10^{11}
IPC-SF-818 Class 3	85	85	168	50	100	**X33F-07i** 9.6×10^{9}
						X33S-07i 2.2×10^{9}

Electromigration

Multicore X33F-07i and X33S-07i **PASS** the electromigration test requirements of Bellcore TR-NWT-000078 at 10V bias for 500 hr at 85°C and 85% RH.

Through-Hole Solder Penetration

Resin coated copper boards soldered in air.

Flux	% pth fill	
	As received	Oxidised boards
X33S-07i	98.4	95.6
Low resin LSF	93.6	48.6
Resin-free LSF	46.0	36.0

GENERAL INFORMATION

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

Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

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