LOCTITE® Multicore®

Product Data Sheet
R41-01i
July 2002

NO CLEAN FLUX

Multicore R41-01i is a rosin based no clean flux from the pioneers of "no clean" technology for surfaces with poor solderability.

- **Fast soldering on conventional leaded and SMD components – no bridges or icicles**
- **No cleaning – reduces costs and eliminates CFC usage**
- **Minimal residues to interfere with ATE probes without cleaning**
- **Compatible with rosin based surface preservatives**

APPLICATIONS

Recommended for consumer electronics and general electrical soldering applications.

RECOMMENDED OPERATING CONDITIONS

The Printed Circuit Board: Multicore R41-01i is recommended for use on clean copper or tin-lead coated PCBs. It will solder satisfactorily over most rosin-based preservatives. It is recommended that the rosin based preservative be applied no longer than 3 months before soldering, since the period of protection is limited dependent on storage conditions.

Multicore R41-01i has been formulated to work over a wide range of solder resists.

Machine Preparation: When switching to R41-01i from any other flux, ensure all fingers, pallets and conveyors are thoroughly cleaned.

It is recommended that Multicore Prozone Plus Solvent Cleaner be used in the finger cleaners.

Fluxing: Multicore R41-01i has been formulated for use in foam, spray or wave fluxers in the same way as ordinary fluxes on standard wave soldering machines. 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 about 5 – 7psi is recommended and the nozzle should be about 25mm 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 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 and problems are encountered, 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.

Preheating: As R41-01i contains more solvent than conventional fluxes, it will be necessary to increase 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 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.

Conditions will vary from one machine to another but the following settings were found to give good results on a number of systems:

CONVEYOR SPEED	Ft min^{-1}	3	4	5
	m min^{-1}	0.91	1.22	1.52
TOPSIDE PREHEAT	°C	80 – 85	85 - 90	95 - 100
	°F	176 – 185	185 - 194	203 - 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 1.5m.min^{-1}, a contact length of 38 – 50mm 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 R41-01i flux can be used with all 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 1.2m.min^{-1} .

To complete your no-clean assembly, use the compatible Multicore Cored Solder Wire and Solder Paste. Soldering iron tips should be kept clean with Mutlicore Tip Tinner/Cleaner TTC1 (data sheet available).

Cleaning: Special applications may have regulations insisting on board cleaning and in such cases Multicore PC85 Biodegradable Saponifier or Multicore Prozone Plus Solvent Cleaner should be used. These are economic cleaners which are free from CFC compounds and may 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 R41-01i flux is not corrosive towards PCB handling equipment.

TECHNICAL SPECIFICATION

A full description of test methods and detailed test results are available on request. The results below are typical, a full specification is available on request.

General Properties	R41-01i
Colour	Pale straw
Smell	Alcoholic
Solids content	4.7% w/w
Halide content (as % chloride on total)	0.013
Acid value (on liquid) mg KOH/g	21
Specific gravity at 25°C (77°F)	0.800
Flash point (Abel)	12°C (53°F)
Thinners	Pc70i
IPC classification	LR3CN

SPECIAL PROPERTIES

Boards soldered with Multicore R41-01i flux pass MIL-P-28809A ionic contamination test without cleaning provided excess flux is not applied and a clean system and components are used.

Multicore R41-01i flux passes the following corrosion tests:

USA Copper Mirror Test per MIL-F-14256D
UK Ministry of Defence DTD 599A
USA Bellcore TR-TSY-000078
IPC-SF-818
BS 5625

Surface Insulation Resistance

Multicore R41-01i liquid flux gave the PASS results shown in the table below during surface insulation resistance tests.

Surface Insulation Resistance Measurements on Uncleaned Soldered Combs						
Specification	Ageing Conditions				Test Voltage V	Typical SIR ohms
	Temp °C	Relative Humidity %	Time h	Voltage V		
Bellocre TR-NWT-000078	35	85	96	50	100	$4.3x10^{11}$
IPC-SF-818	85	85	168	50	100	$4.1x10^{10}$
JIS-Z-3197	40	90	96	None	500	$1.7x10^{11}$

Electromigration

Multicore R41-01i liquid flux gave the PASS results shown in the following table during electromigration testing to Bellcore TR-NWT-000078 at 10V bias for 500h at 85°C and 85% RH.

Bellcore TR-NWT-000078 Issue 3 Electromigration test results on uncleaned combs		
Test conditions	85°C, 85% RH	
Test time, h	96	500
Bias, V (DC)	No bias	10
Surface insulation resistance, ohms	$1.3X10^{10}$	$2.0x10^{10}$
Unfluxed control, ohms	$9.1x10^{9}$	$1.8x10^{10}$

HEALTH AND SAFETY

WARNING: The following information is for guidance only and users must refer to the Material Safety Data Sheets relevant to Multicore R41-01i liquid flux before use.

Fumes/Vapours and Precautions: Avoid inhalation of solvent vapours and the flux fumes given off at soldering temperatures. Multicore R41-01i liquid flux must always be used in well ventilated areas. Suitable local exhaust ventilation should be used to extract solvent vapours and flux fumes away from the operators.

Protection and Hygiene: Suitable protective clothing should be worn to prevent the material from coming into contact with the skin and eyes. If the material comes into contact with the skin, the affected area should be cleaned with a proprietary hand cleanser followed by washing with soap and water. If the material comes into contact with the eyes, they should be irrigated thoroughly with running water for at least 10 minutes and medical attention sought. Eating and drinking should not be permitted in the working area and hands should be washed thoroughly with soap and warm water before eating.

Fire Hazards and Precautions: Multicore R41-01i liquid flux contains a highly flammable solvent with a flashpoint of 12°C (53°F). The material must not be used near naked flames or non-flameproof electrical equipment. Smoking must not be permitted in the working are. Carbon dioxide, alcohol resistant foam or dry powder extinguishers should be used if the material catches fire.

Spillage and Waste Disposal: Spillage of the materials should be mopped up with sand or sawdust. Waste material should be stored in closed containers and disposed of in accordance with local regulations.

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, **Loctite Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loctite Corporation's products. Loctite 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 Loctite 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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