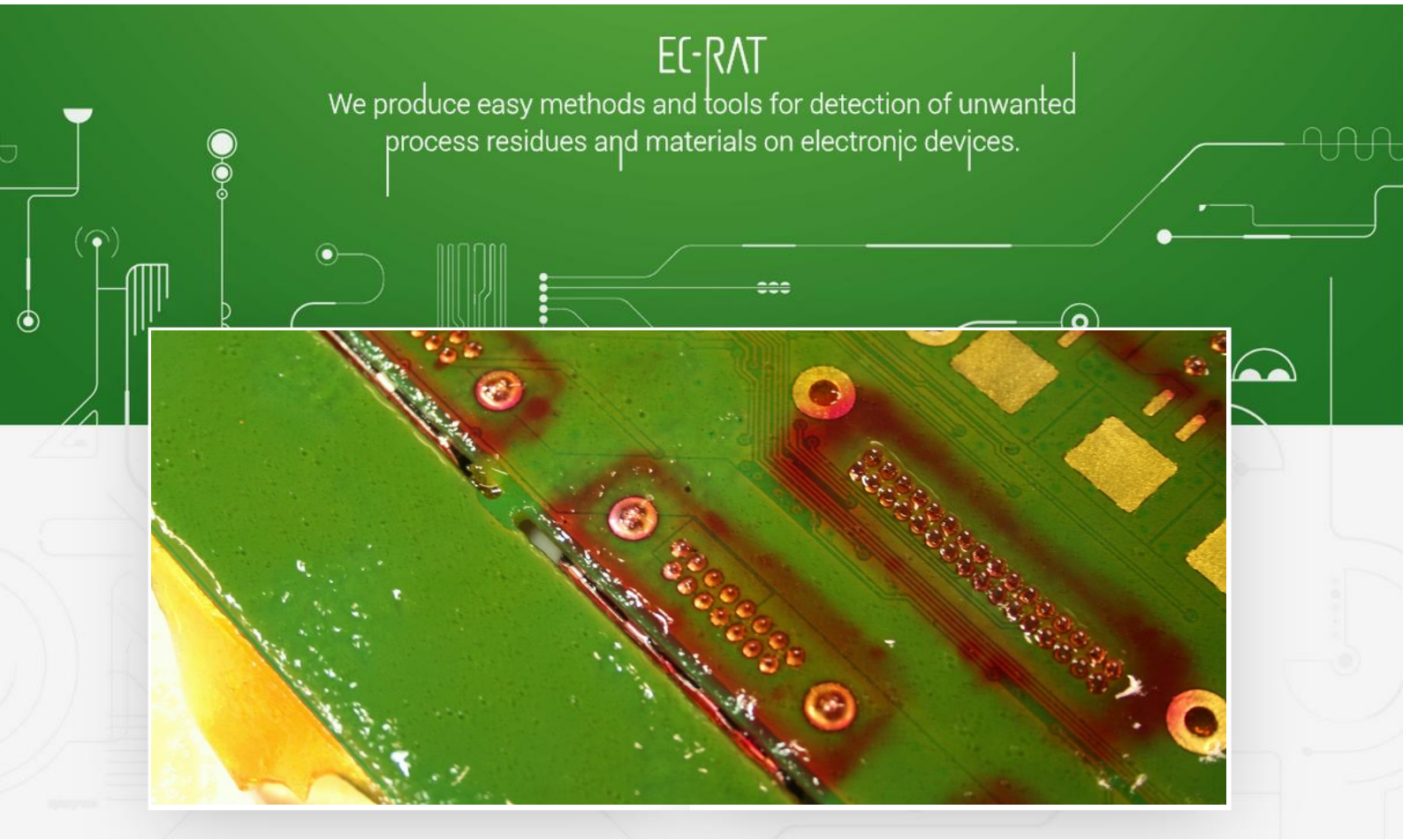
Residues RAT

APPLICATION AND ANALYSIS MANUAL



www.ec-rat.com

Glossary:		
	Flux residues	Compounds remaining after soldering process
	PCBA	Printed circuit board assembly
	SIR	Surface insulation resistance

Part I: Content of the text-kit

1 bottle containing Residues Rat gel

2 trigger-sprays for spray application of gel

3 pipettes for manual application of gel

1 pair of gloves for personal protection

1 detailed application and analysis manual

1 short application manual

1 Materials Safety Data Sheet (MSDS)

Part II: Where and when to use Residues Rat?

The presence of flux residues left on Printed Circuit Board Assemblies (PCBAs) can cause various reliability problems with regard to applications in various climatic conditions. These are among others: (i) surface insulation resistance, (ii) corrosion on the PCBA surface, and (iii) problems for application of conformal coating. The amount of flux residue that can be allowed on the PCBA with regard to (i), (ii) and (iii) varies based on the PCBA class, required impedance levels, coated or non-coated, and user environment.

Residues Rat test kit allows detection of the level of problematic acid content in the flux residue by application of a gel and observation of the local change in colour. The product can be used for the following applications:

- To detect wave solder flux residue at localized areas of the PCBAs and approximate amount
- Optimization of use of flux type, amount of application, or thermal profile to get minimum residue – e.g. use of low solid content or high solid content flux

- Optimization of selective wave soldering, hand soldering, or re-work areas for detection of flux residue or minimizing residues
- Optimization of flux residue levels on PCBAs meant for conformal coating
- To detect possible release of carboxylic acids from re-flow residue after exposure to humidity (refer to re-flow flux residue test procedure for more details)

The EC-RAT kit is not useful for flux systems which are based only on halogen activators like chloride.

Required items for testing:

- PCBA for testing
- Residues-Rat kit and accessories
- Suitable heating source for melting gel (to approximately 80 °C) (not included in the kit) – A microwave is most suitable and fast, however a water bath can also be used

Remarks for testing of re-flow soldered PCBAs

Due to the fact, that a solder-paste is used in re-flow soldering the nature of flux residues on a reflow soldered PCBAs are significantly different from wave soldered PCBAs. Residues on re-flow soldered PCBAs are more concealed/encapsulated (hidden under a polymer like film) which means that acidic residues from re-flow soldering will not immediately interact with external environment.

However, during exposure to humidity the re-flow solder flux residue can open up its structure and thereby release acidic residues. It is reported in the literature that the Surface Insulation Resistance (SIR) of re-flow soldered PCBAs initially show a stable acceptable value, however with time significant reduction in SIR can potentially take place due to release of acid component. It can thus be relevant to test the re-flow PCBAs for any harmful flux residue before and after exposure to humidity. This can be done in a climatic chamber at saturated humidity and elevated temperature.

Whereas no addition preconditioning is required for testing for wave solder flux residue including selective wave soldering, hand soldering, or re-worked area.

Part III: Preparation procedure

Step 1: Heating of the gel

Heating of the gel can be done either using a MICROWAVE or HOT WATER BATH. The gel needs to be fully melted before application as this will ensure clear dispensing. *Microwaving is the recommended easy and fast method*.

MICROWAVING: It is recommended to microwave/heat in steps instead of continuously. IT IS IMPORTANT TO REMOVE THE CAP BEFORE HEATING. In between the heating steps e.g. 30 seconds, you may need to agitate mixing of the gel by shaking the bottle. USE THE GLOVES, bottle gets hot. Use the gel when it reaches homogeneous consistence. If you are re-melting a used gel within short time, less heating time is needed.

HOT WATER BATH: Immerse the bottle until its neck in a hot water bath at 90-95 °C. Use intermittent shaking until the gel is fully melted.

Step 2: Application of gel onto a PCBA

Dispensing of the gel to the PCBA can be done either using the SPRAY NOZZLE or the PIPETTE. SPRAY NOZZLE is recommended for overall application on a PCBA, while use PIPETTE if only a localized area needs to be tested. Optimum layer thickness of gel after application is about 0.5 – 1mm.

SPRAY NOZZLES and PIPETTES are meant for one time use. If you would like to re-use for left over gel, please remember to clean it with DI water immediately after use.

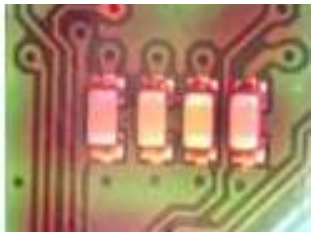
Step 3: Analysis of gel on a PCBA

Appearance of colour on the PCBA should be analysed maximum 2 minutes after the application of gel. Compare the intensity of colour together with the spread out with the colour code chart provided with this product. More details on interpretation please refer to page 4.

SPECIAL REMARKS/DISPOSAL: The gel can be removed by peeling or scrubbing followed by cleaning with warm water if needed. However, we recommend that the PCBA is not used after the Residues Rat test and EC-RAT Aps is not liable for the PCBA functionality after testing. Gel product is safe to be disposed in the bin. It is a green product and bio-degradable. Only originally sealed EC-RAT product will guarantee reliable test results.

PART IV: Assessment of the test results

Compare the appearance and spreading of colour on the PCBA with the colour chart below, which indicates a colour shade and examples from PCBA surfaces deliberately contaminated with adipic acid. Take notice that the levels only refer to the active component in the flux and that they are only estimations and can vary from flux system to flux-system.

Through hole pins	Row of capacitors	Amount of adipic acid lef on surface [µg/cm^2]
		**0-5**
		**5-20**
		**>20**

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PART IV: Product liability

EC-RAT ApS assumes no liability for:

- any misuse of EC-RAT products
- any use not in accordance with the instructions in the manual
- any wrongful interpretation of the results by the user

EC-RAT ApS recommends that the Residues Rat test should be regarded as a destructive test. Therefore, EC-RAT ApS assumes no liability for:

- Changes in functionality of PCBAs that have been exposed to Residues Rat
- Lack of functionality of PCBAs that have been exposed to Residues Rat

EC-RAT ApS cannot be held responsible for any harm or loss experienced by the user/buyer physically, mentally or economically – during or after – the use of Residues Rat.

The Residues Rat kit is only intended to be a screening test and should not be used as – or regarded as – a replacement for tests according to relevant international standards.