



SOLDERING

# ECOREL™ FREE 405Y-21

SAC405 SOLDER PASTE  
NO CLEAN SMT PRINTING PROCESS  
GREAT THERMAL CYCLING PERFORMANCE

## BENEFITS

ECOREL FREE 405Y-21 is a no-clean solder paste developed with the reliable chemistry of the ECOREL™ range, helping to assure a robust assembly process. The paste is suitable for reflow in convection ovens (nitrogen recommended), vapor phase or conduction ovens.

The alloy used in ECOREL FREE 405Y-21, contains some dopants which participate to the reinforcement of the interdendritic zone by a finer dispersion of precipitates, to ensure a better resistance to thermocycling for higher operating temperatures (more than 130°C/266°F).

PERFORMANCE	<ul style="list-style-type: none"> <li>Robust assembly for a stable process</li> <li>Low residue spreading</li> <li>Improved thermal cycling performance compared to SAC305</li> </ul>
COST	<ul style="list-style-type: none"> <li>Minimizes line-down time &amp; the need for re-work</li> <li>Maximizes throughput</li> </ul>
HSE	<ul style="list-style-type: none"> <li>Lead Free</li> <li>No halogen</li> <li>Free of CMR containing substances</li> </ul>

## FEATURES

### STANDARD OPTIONS

SPECIFICATIONS	ECOREL FREE 405Y-21
Alloy	Sn95,5Ag4Cu0,5
Melting point (°C/°F)	217°C/422°F
Metal content (%)	88.5 +/-0,5
Post reflow residues	Approximately 5% by w/w
Halogen content	No Halogen
Powder size	20-38 microns / Type 4
Spiral pump* Viscosity (Pa.s 25°C)	Typical 165

\*The equipment used to test spiral pump viscosity is Malcom at a 10 rpm rotation speed.

## CHARACTERISTICS

CHARACTERISTICS	VALUES	
Flux Classification	ROLO	ANSI/J-STD-004
	113	ISO 9454
Solder balling test	Pass	ANSI/J-STD-005
Copper mirror	Pass	ANSI/J-STD-004
Copper corrosion	Pass	ANSI/J-STD-004
SIR (IPC)	Pass	ANSI/J-STD-004
SIR (Bellcore)	Pass	Bellcore
Electromigration (IPC / Bellcore)	Pass	ANSI/J-STD-004 / Bellcore
Bonotest 85°C/85% HR – 15 days	Pass FC=1.4%	INVENTEC BRY-MO-058

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## PROCESS RECOMMENDATION

The best process will depend on factors such as operating conditions, equipment, board or component design. Our team is ready to advise you.

### SOLDER PASTE PREPARATION

- Put the paste at room temperature for at least 4 hours prior to use.
- Before printing, it is essential to properly mix the solder paste, either manually with a spatula or by doing several preliminary prints on the stencil.
- Automatic solder paste mixing is neither required nor advised.

### PRINTING GUIDELINE

Apply the solder paste to the stencil to form a roll of 1 to 2 cm in diameter all along the squeegee or around 100g per 10 cm of squeegee length. This way, the solder paste will roll easily under the squeegees to offer excellent printing quality.

PARAMETER	REMARK
Printing speed	Minimum 20 to maximum 150 mm/s (1 to 6 inch/s) Maximum depends on printer capabilities
Minimum pitch	0.4 mm for Type 4 powder
Pressure	Guideline value for a 250 mm squeegee is 7 Kg at 100 mm/s Actual value depends on equipment, printing speed and squeegee length
Stencil life in continuous printing process	>12 hours
Abandon time between prints	>4 hours
Steady tackiness	>16 hours

Squeegee length	Printing Speed	Pressure
250mm	50mm/sec	6kg
100mm/sec	8kg	
150mm/sec	10kg	

### REFLOW GUIDELINE

Although this paste performs very well under air, a nitrogen atmosphere will even more improve the wettability whereas achieving even a larger reflow process window.

Linear preheating ramp rate is recommended, however high-density boards may require a soak zone during preheating to stabilize the temperature over the circuit board before peak reflow.

REFLOW STEPS	REMARKS
Preheating ramp rate with linear preheating	0.7 to 1.2°C/s (33 to 34°F/s) ( according to the circuit board size and density
Preheating steps in case of preheating soak zone	<ul style="list-style-type: none"> <li>From 20 to 150°C (68 to 302°F): ramp rate 1 to 2°C/s</li> <li>Soak zone between 150 to 180°C (302 to 356°F): 30-140s reflow (typical soak 45-90s)</li> <li>From 170°C (380°F) to liquidus 1 to 2°C/s</li> </ul>
Peak ramp rate	1 to 2 °C/s
Peak temperature	235 to 250°C (455 to 582°F) / 240 to 245°C (464 to 473°F) is optimum The paste can stand a temperature higher than 250°C (482°F), but it is not recommended to preserve component integrity
Time above liquidus	45 to 100s - 55 to 70s typical
Cooling ramp rate	1.8 to 7°C/s

## CLEANING POST SOLDERING

This product is a no-clean solder paste, so cleaning is not required to meet IPC standards. The chemistry is specially designed so that any remaining flux residue is chemically inert and will not impact your assembled board or packaging under normal conditions. However, when cleaning is desired or required (e.g. high reliability assembly or to improved conformal coating adhesion), the flux residue can be easily removed with INVENTEC’s own formulated flux cleaners.

*Inventec has over 60 years’ experience in high-tech cleaning for aqueous and solvent based systems. Our solder materials are aligned with our cleaning solutions, which guarantees excellent cleaning.*

PROCESS TYPE	PCBA DEFLUXING SOLUTIONS
Manual	Quicksolv™ DEF90, Quicksolv™ DEF70, Promoclean™ TP61
Aqueous (Immersion or spray)	Promoclean™ DISPER 607, Promoclean™ DISPER 707, Promoclean™ DISPER 800
Co-solvent	Topklean™ EL 80 + Promosolv™ rinsing solvents
Mono-solvent (vapor phase)	Promosolv™ 70ES, Promosolv™ 70IS

Other products available, depending on specific customer requirements. Check also our maintenance cleaning solutions.

## PACKAGING, STORAGE & SHELF LIFE

- To ensure the best product performance, the recommended storage temperature range is from 0°C to 10°C.
- For an optimal preservation, store cartridges in a vertical position, tip downwards.
- Shelf-life is 12 months for jar packaging & 9 months for cartridges.

### AVAILABLE PACKAGING



JAR  
500g

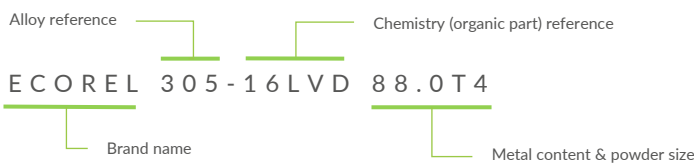


CARTRIDGE  
1400g

\*Syringes only available for dispensing options

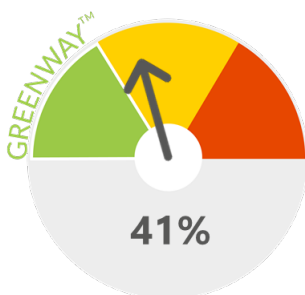
### PRODUCT ARTICLE CODIFICATION

Below example as a reference



## HEALTH, SAFETY & ENVIRONMENT

ECOREL FREE 405Y-21 is **NOT** a **GREENWAY** product. Although fully in line with safety & environmental regulations, this product doesn’t match our strict criteria to be labelled as a Greenway product. More info on our Greenway concept via this [link](#).



### LOOKING FOR A MORE SUSTAINABLE SOLUTION?

#### GREENWAY ALTERNATIVE

- We currently don’t have a Greenway alternative but our target is to develop one in the near future. In case you want us to prioritize the development of a Greenway alternative, do not hesitate to contact us.

In accordance with the Annex II of Directive 2011/65/UE (RoHS), including its amendments, we certify that this product does not contains quantities above 0.1% of Hg, Pb, Cr VI, PBB, PBDE, DEHP, BBP, DBP, DIBP and above 0.01% of Cd. . INVENTEC PERFORMANCE CHEMICALS also fulfils its direct obligations under the REACH and Conflict Mineral regulations.

Please refer always to the Safety Data Sheet (SDS or MSDS) prior to use. Our SDS can be downloaded at [www.quickfds.com](http://www.quickfds.com). We will request to provide your email address, so we can automatically send you a new version of the SDS when a future update would occur.

## TECHNICAL SUPPORT & FREE-OF-CHARGE TESTING

Inventec has a worldwide dedicated Technical Support team to help you along the different stages of our cooperation.

Depending on your request, we provide online or onsite support

- to select the right product based on your specific needs
- to assist you in your product qualification process
- to guide you with the initial set up of you process at all your worldwide manufacturing facilities
- to provide fast response on technical issues which could occur at any time during mass production.

When prior cleaning is required, customers are also welcome in our CLEANING CENTERS to see the process in action and to get convinced by our solutions. We cover water and solvent based processes.

Inventec is unique in the world by developing not only soldering materials but also cleaning and coating solutions. These materials are very closely linked with each other from a process point of view. Talking to our Technical Team, who understands very well these 3 different product groups, will help you greatly to overcome technical challenges within your overall process.

Contact our technical support via [contact@inventec.dehon.com](mailto:contact@inventec.dehon.com) or your local sales representative.

## ABOUT INVENTEC

Inventec is a global provider of SOLDERING, CLEANING, COATING, COOLING materials for Electronic, Semiconductor and Industrial applications. For over 60 years we have shown leadership in innovation by putting HEALTH IMPACT, SUSTAINABILITY and RELIABILITY at the core of our product development.

With ISO 9001 & 14001 production sites in France, Switzerland, USA, Mexico, Malaysia and China we can guarantee a smooth and cost-effective supply chain.

We supply to many industries but the excellent performance of our products in applications which demand high reliability, leads us to focus especially on the AUTOMOTIVE, AEROSPACE, SEMICONDUCTOR, ENERGY and MEDICAL industry.

[www.inventec.dehon.com](http://www.inventec.dehon.com)



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*This data is based on information that the manufacturer believes to be reliable and offered in good faith. In no event will INVENTEC PERFORMANCE CHEMICALS be responsible for special, incidental and consequential damages. The user is responsible to the Administrative Authorities (regulations for the protection of the Environment) for the conformity of his installation.*

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