

# ECOREL™ FREE 405Y-21 405Y-21 T4



**HIGH RELIABILITY  
HIGH OPERATING TEMPERATURE**

## BENEFITS

**ECOREL™ FREE 405Y-21** alloy 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.

**ECOREL™ FREE 405Y-21** is a no clean solder paste with high performance chemistry of the **ECOREL™** range assuring that the assembled electronics can reach their best reliability, while exposed to challenging conditions of humidity and temperature.

- Higher mechanical resistance under harsh environment and high operating temperature, above 130°C
- Chemically inert residue, minimizing the risk of corrosion mechanisms and leakage current
- Good compatibility with a large range of conformal coating in the market
- Bono corrosion test compliant

This alloy can be delivered in solder spheres upon request.

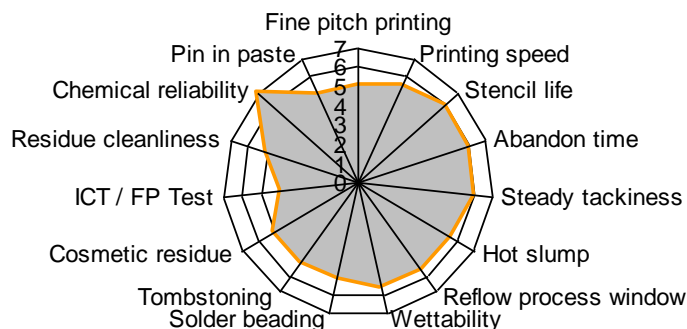
## SPECIFICATIONS

Name	Ecorel™ Free 405Y-21	Ecorel™ Free 405Y-21T4
<b>Alloy</b>	SnAg4,15Cu0,5Ni + dopants	SnAg4,15Cu0,5Ni + dopants
<b>Particle size (microns) / Type</b>	25 - 45 / Type 3	20 - 38 / Type 4
<b>Melting point (°C)</b>	217	217
<b>Metal content (%)</b>	88,5 +/- 0,5	88,5 +/- 0,5
<b>Halogen content</b>	no halogen	no halogen
<b>Viscosity* (Pa.s 20°C)</b> <i>*Brookfield RVT - TF at 5 rpm</i>	750 - 950	850 - 1050
<b>Post reflow residues</b>	approximately 5 % w/w	approximately 5 % w/w

## CHARACTERISTICS

The radar chart below shows the excellent characteristics of **ECOREL™ FREE 405Y-21** including high speed printing, excellent abandon time and good pin in paste performance. During the reflow process, a low solder void percentage is achieved.

Fine particle size distribution of type 4 powder enhances the printing quality.



Standards tests	Results	Procedures
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
Chromate paper	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
Oxygen bomb test	pass	EN 14582
Bono Corrosion test 85°C / 85% HR – 15 days	Pass: FC=1.4%	INVENTEC BRY-MO-058

## PROCESS PARAMETERS

Store at room temperature at least four hours before use.

### Solder paste preparation

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.

### Printing guideline

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

Printing speed: 20 to 150 mm/s (1 to 6 in/s)  
 Minimum pitch: 0,3 mm  
 Pressure depends on printing speed and printing equipment

Typical speed / pressure set up:

Squeegee length	Printing Speed	Pressure Ecorel™ Free 405Y-21	Pressure Ecorel™ Free 405Y-21 T4
250	50 mm/s	5 kg	6 kg
	100 mm/s	7 kg	8 kg
	150 mm/s	9 kg	10 kg

- Stencil life in continuous printing process: > 12hrs
- Abandon time as time between two prints with good re-start > 4hrs
- Steady tackiness > 16hrs

## Reflow guideline

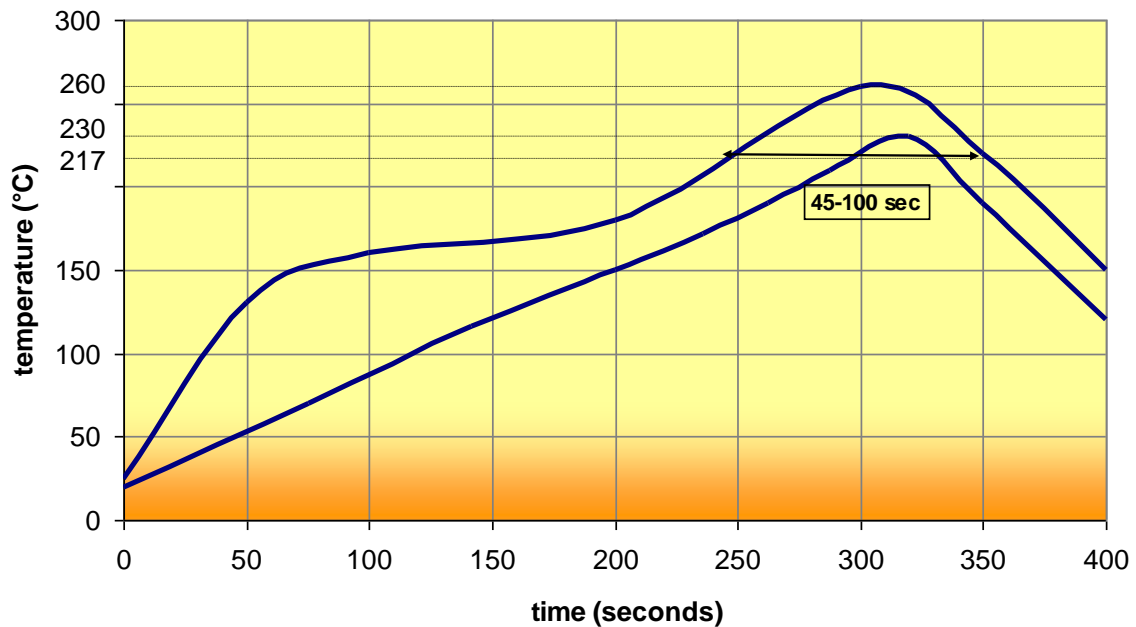
This paste can be processed under air or nitrogen.

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

<b>Preheating ramp rate with linear preheating</b>	0.7 to 1.2°C/s according the circuit board size and density
<b>Preheating steps in case of preheating soak zone</b>	- From 20 to 150°C: ramp rate 1 to 2°C/s - soak zone between 150 to 180°C for 60 to 140s - from 170°C to liquidus 1 to 2°C/s
<b>Peak ramp rate</b>	1 to 2°C/s
<b>Peak temperature</b>	235 to 250°C (240 to 245°C is optimum) The paste can stand a temperature higher than 250°C, but it is not recommended in order to preserve component integrity
<b>Time above liquidus</b>	45 to 100s (55 to 70s typical)
<b>Cooling ramp rate</b>	1.8 to 7°C/s (studies have demonstrated 1.8 to 2.2°C/s allows homogeneous joint structure and reduce surface cracks formation)

### Examples of reflow profiles Ecorel™ FREE 405Y-21:

- With linear preheating
- With soak zone



## Cleaning

After soldering, the remaining flux residue does not have to be removed by a cleaning operation as it is chemically inert.

When cleaning is required (e.g. high reliability assembly, improved conformal coating adhesion), the residue left after reflow can be easily removed with a large range of cleaning solutions, such as detergents, hydrocarbonated solvents or halogenated solvents, including the INVENTEC cleaning range solutions.

In the table below is a quick reference about INVENTEC PCBA defluxing solutions.

ECOREL™ FREE 405Y-21 shows excellent cleanability with solvent based cleaning process.

PROCESS Type	ECOREL™ FREE 405Y-21	INVENTEC PCBA Defluxing solutions
Manual	Good	Topklean™ EL10F/ Topklean™ EL60/ Quicksolv™ DEF90 EL
Aqueous system (Immersion or spray)	Good	Promoclean™ DISPER 605 and DISPER 607
Co-solvent system	Preferred	Topklean™ EL 20 series
Under vacuum system	Good	Topklean™ EL 20D
Mono-solvent (Azeotropic)	Preferred	Promosolv™ 70ES

## 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 vertical position, tip downwards.

Jars	250g or 500g	12 months
Cartridges	600g or 1200g	9 months

## HSE

No issues when used as recommended.

Please refer to Material Safety Data Sheet before use.

INVENTEC Material Safety Data sheets can be found at [www.quickfds.com](http://www.quickfds.com)

**Although the conformity to ROHS 2011/65/UE applies EQUIPMENT put on the market and not a component in particular, we warranty that this product contains less than 0.1% of mercury, lead, chromium VI, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) and less than 0.01% for the cadmium, in accordance with the decision of The European Commission dated 18/08/2005, fixing the maximal concentration values.**

*This data is based on information that the manufacturer believe to be reliable and offered in good faith. In no event will INVENTEC 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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