

# ECOREL™ FREE 105-16 T4



## Low silver / low voiding Halogen free solder paste

### BENEFITS

**ECOREL™ FREE 105-16 T4** is a No Clean solder paste combining the metallurgical properties and cost benefits of a low silver alloy with high performance chemistry of the Ecorel™ range assuring a robust assembly process for high volume electronics.

The fine particle size distribution of its type 4 powder enhances the printing quality for small apertures.

- Very Low solder void percentage
- Excellent visual solder joint cosmetics/ transparent residues even after multiple reflow cycles
- High first pass yield testability in ICT
- Very good wetting in different board finishes including OSP.

Compared to no-silver alloy solder pastes like SnCu0.7, **ECOREL™ FREE 105-16 T4** exhibits better wetting due to the presence of silver, and a higher reliability, tensile strength and creep characteristics improvements due to the addition of nickel.

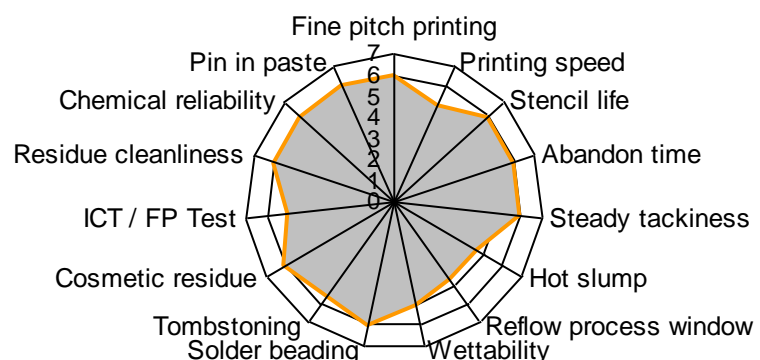
### SPECIFICATIONS

Alloy	SnAg1Cu0.5Ni
Particle size (microns) / Type	20 – 38 / Type 4
Melting point (°C)	217 - 227
Metal content (%)	88 +/- 0.5
Halogen content	No Halogen
Viscosity* (Pa.s 20°C) <i>*Brookfield RVT - TF at 5 rpm</i>	800 – 1000
Post reflow residues	Approximately 5% by w/w

### CHARACTERISTICS

The radar chart below shows the excellent printing capabilities of **ECOREL™ FREE 105-16 T4** which allows for high speed printing, excellent abandon time, and long, steady tackiness. Its large process window allows for good soldering of medium and large boards with a wide range of component sizes.

- High performance in pin in paste process
- Improved drop shock test performance of SAC105 alloy vs. traditional SAC alloys
- Long soak and pasty range during reflow helps to reduce tombstoning defects
- Low HIP defect rate in BGA components



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

## 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 150mm/s (1 to 6in/s)
Minimum pitch:	0.3mm
Pressure	depends on printing speed and printing equipment

Typical speed / pressure set up:

Squeegee length	Printing Speed	Pressure
250	50 mm/s	4Kg
	100 mm/s	6Kg
	150 mm/s	8Kg

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

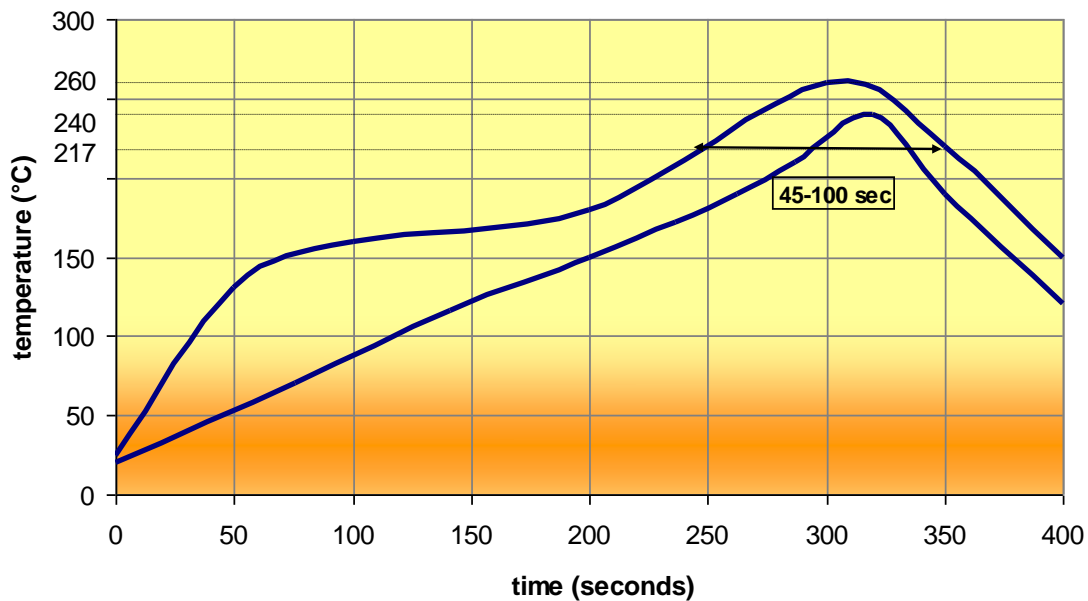
## Reflow guideline

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

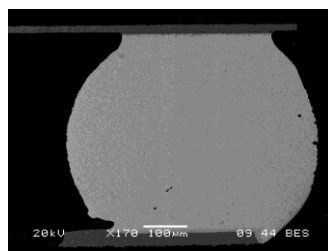
<b>Preheating ramp rate with linear preheating</b>	0.7 to 1.2°C/s according the circuit board size and density
<b>Preheating steps in case of preheating soak zone</b>	- From 20 to 150°C: ramp rate 1 to 2°C/s - soak zone between 150 to 180°C for 60 to 140s - from 170°C to liquidus 1 to 2°C/s
<b>Peak ramp rate</b>	1 to 2°C/s
<b>Peak temperature</b>	240 to 255°C The paste can stand a temperature higher than 255°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 4°C/s

## Examples of reflow profiles Ecorel™ FREE 105-16 T4

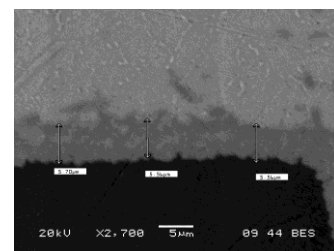
- With linear preheating
- With soak zone



## Examples of solder joints with Ecorel™ FREE 105-16 T4 in BGA components



No head in pillow defects



Improved IMC

## Cleaning

After soldering, the flux residue remaining of **ECOREL™ FREE 105-16 T4** does not have to be removed by a cleaning operation as it is chemically inert. However, if cleaning is required, the residue left after reflow can be easily removed if needed with a large range of cleaning solutions, such as detergents, hydro-carbonated solvents or halogenated solvents, all included in the INVENTEC cleaning range. This is also a best practice for a robust adhesion if conformal coating is to be applied on the board. In the table below is a quick reference about INVENTEC PCBA defluxing solutions.

PROCESS Type	INVENTEC PCBA Defluxing solutions
Manual	Topklean™ EL10F/ Topklean™ EL60/ Quicksolv™ DEF90 EL
Aqueous System (Immersion or spray)	Promoclean™ DISPER 607
Novac™ HFE + Co-solvent	Topklean™ EL 20A and EL 20R
Under Vacuum System	Topklean™ EL 20D
Azeotropic Solvent	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 and syringes in vertical position, tip downwards.

Jars	250g or 500g	12 months
Cartridges	600g or 1200g	9 months
Proflow cassettes	750g	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 2011/65UE 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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