ECOREL™ FREE 105-21

LOW SILVER/ HIGH RELIABILITY HALOGEN FREE SOLDER PASTE

FEATURES

ECOREL™ FREE 105-21 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 that the assembled electronics can reach their best reliability, while exposed to tough conditions of humidity and temperature.

- The flux residues remaining on the PCB after soldering are chemically inert. It passes the Bono corrosion test. This is a key attribute to control the risk for electrochemical migration (ECM)
- Multiple reflow cycles without graping even on very small deposits.
- Low solder void percentage

Compared to no-silver alloy solder pastes like SnCu0.7, **ECOREL™ FREE 105-21** 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.

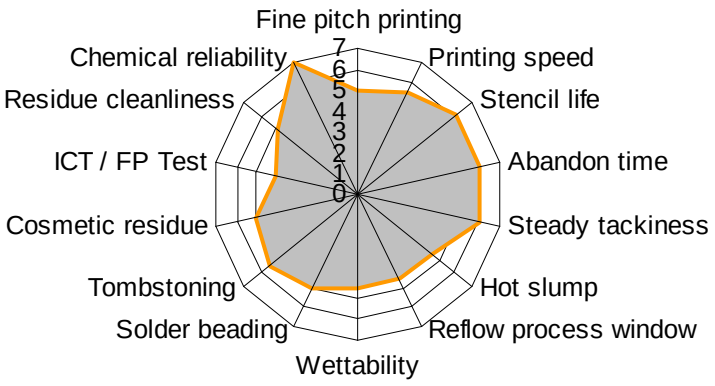
SPECIFICATIONS

Alloy	Sn98.5Ag1Cu0.5Ni
Powder size distribution (microns)	25 - 45
Melting point (°C)	217 - 227
Metal content (%)	88,5 ± 0,5
Halogen content	No Halogen
Viscosity* (Pa.s 20°C) **Brookfield RVT - TF at 5 rpm*	750 - 950
Post reflow residues	approximately 5% by w/w

CHARACTERISTICS

The radar chart below shows the excellent printing capabilities of **ECOREL™ FREE 105-21** which allow 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.

- 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
- Stencil life: more than 12 hr – continuous printing process
- Abandon time: more than 4 hr – time between 2 prints with good restart (0.4mm pitch)
- Steady tackiness: more than 16 hr
- High Performances : pin paste process



FUNCTIONAL TESTS	Results	Procedures
Flux Classification	ROL0	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
Surface Insulation Resistance Ohms	pass	ANSI/J-STD-004
After 7 days		
85°C - 85 % RH - 50 Volts	> 10^{10}	
25°C - 65 % RH	> 10^{12}	
Bono Corrosion test 85°C / 85% HR – 15 days	Pass: FC=1.4%	INVENTEC MO.SB.10029

PACKAGING TYPE

Jars	250g or 500g
Cartridges	600g or 1200g
Proflow cassette	

STORAGE & SHELF LIFE

To ensure the best product performance, the recommended storage temperature range is from 5°C to 10°C. A shelf life of 12 months is achieved under these conditions. For cartridges and cassettes, the shelf life is 9 months.
For an optimal preservation, store cartridges in vertical position, tip downwards.

PROCESS PARAMETERS

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 2 cm of diameter all along the squeegee. This way, the solder paste will roll easily under the squeegees to offer excellent printing quality.

Printing speed:	20 to 150 mm/sec.
Minimum pitch:	0.3 mm
Pressure	depends on printing speed

Squeegee length	Printing Speed	Pressure
250	50 mm/sec	5 Kg
250	100 mm/sec	7 Kg
250	150 mm/sec	9 Kg

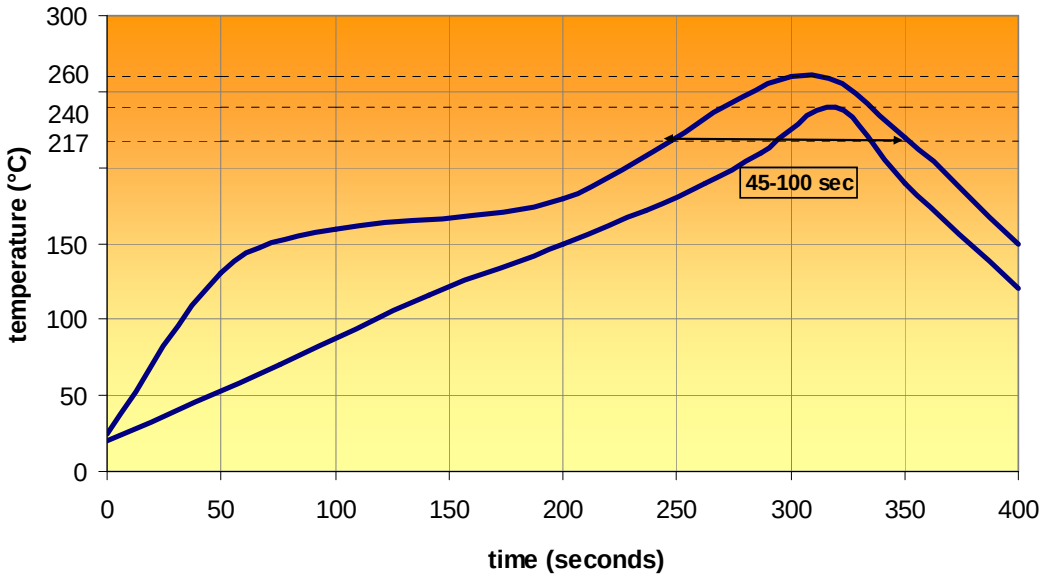
Reflow guideline

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

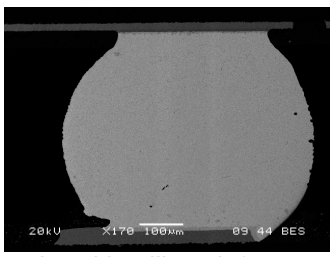
Preheating ramp rate with linear preheating	0.7 to 1.2°C/s according the circuit board size and density
Preheating steps in case of preheating soak zone	- From 20 to 150°C: ramp rate 1 to 2°C/s - soak zone between 150 to 180°C for 60 to 140s - from 170°C to liquidus 1 to 2°C/s
Peak ramp rate	1 to 2°C/s
Peak temperature	240 to 255°C It is recommended to verify components heat resistance to preserve their integrity
Time above liquidus	45 to 100s (55 to 70s typical)
Cooling ramp rate	1.8 to 4°C/s

Examples of reflow profiles ECOREL™ FREE 105-21

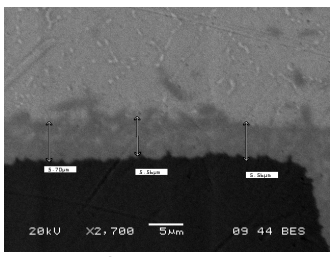
- With linear preheat
- With soak zone



Examples of solder joints with ECOREL™ FREE 105-21 in BGA components



No head in pillow defects



Improved IMC

CLEANING

After soldering, the flux residue remaining of **ECOREL™ FREE 105-21** 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 605 and DISPER 607
Novec™ HFE + Co-solvent	Topklean™ EL 20A and EL 20R
Under Vacuum System	Topklean™ EL 20D
Azeotropic Solvent	Promosolv™ 70ES

HSE

No issues when used as recommended.
INVENTEC Material Safety Data sheets can be found at www.quickfds.com

Please refer to Material Safety Data Sheet before use.

Although the conformity to ROHS 2002/95CE 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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