STANNOL®

Wenn's ums Löten geht
When it's about soldering
Quand il s'agit du soudage

TECHNICAL DATA SHEET

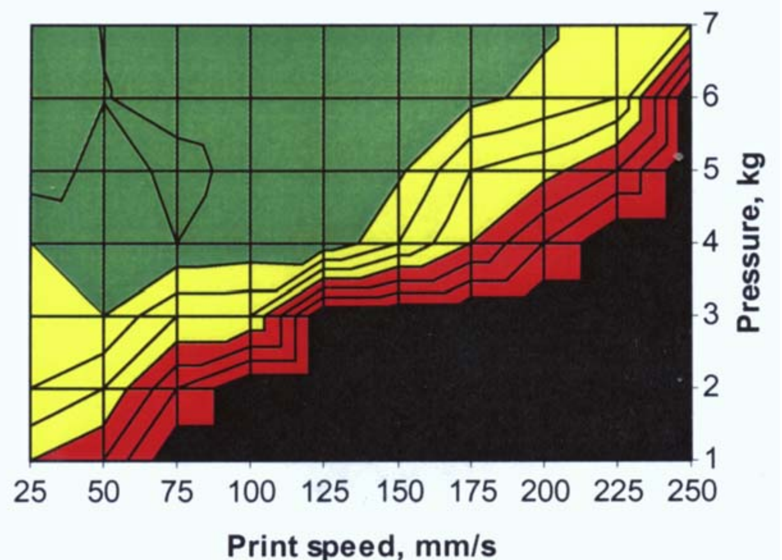
STANNOL® SP310
LEAD-FREE NO-CLEAN SOLDER PASTE

STANNOL® SP310 has been formulated for use with lead-free solders as a No-Clean product for printing and reflow in air and nitrogen. **SP310** lead-free solder paste offers excellent open time and good soldering activity over a wide range of reflow profiles and surface finishes. The SP310 contains a highly active type L flux, which gives an excellent wetting on components, which are difficult to solder.

- ✓ **Especially formulated for lead-free alloys**
- ✓ **Effective over a wide range of printer cycle times and print speed**
- ✓ **Long component tack time**
- ✓ **Resists solder balling**
- ✓ **Excellent slump resistance**
- ✓ **Compatible with a wide range of solderable surfaces**
- ✓ **Effective over a wide range of reflow profiles in air or nitrogen**
- ✓ **Produces safe residues - eliminates the need for cleaning**
- ✓ **Low colour for easy visual inspection**

APPLICATION

STANNOL® SP310 lead-free solder paste is designed for high volume stencil printing applications with component lead pitches down to 0,4mm with AGS (Type3) powder size. Finer pitches may require that the paste is formulated with a finer powder. Conventional metal blade squeegees may be used with a contact angle of 60° and sweep speeds of 25mm sec^{-1} up to 100mm sec^{-1}. The best printing performance will be obtained under these conditions.



SP310 lead-free paste do not require the addition of thinners either before or during use. It is recommended to stir gently for 15 seconds before use.

Reflow Profile: SP310 solder paste has been formulated for lead-free reflow in air and nitrogen over a wide range of temperature profiles. A minimum peak temperature of 230-235°C is required.

Soldering: The flux in **SP310** is formulated to give excellent wetting on all common board and component lead finishes, including OSP copper that may have been passed through multiple reflow processes in air.

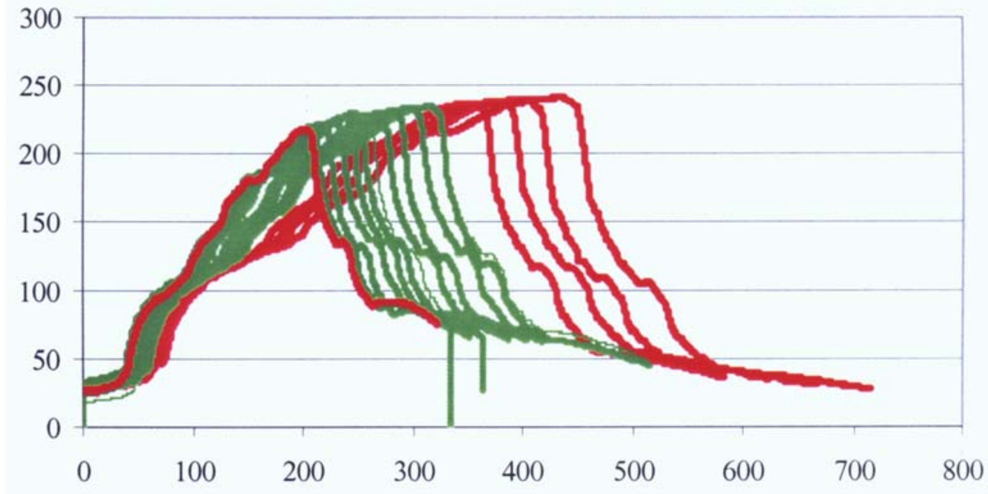
The surface tension of molten lead-free solder alloys is significantly higher than the surface tension for tin/lead alloys. This can reduce the spread of solder during reflow. In some circumstances, this may restrict the areas wetted only to where the paste was printed and corners of copper pads may be visible after reflow. This is a cosmetic effect only and may require review of visual inspection standards used by operators.
If lead-free solder paste is reflowed onto tin/lead board or component lead finishes, the resulting joints may be slightly dull due to the melting range of the alloy. Joints produced from a lead-free alloy solder onto lead-free finishes tend to have a slightly frosted appearance. Also, a lead free solder paste has a very low tendency to solder balling during reflow. The presence of microballs on a finished assembly is therefore a strong indication of a process related problem.

Residues: The residues from **SP310** solder paste are intended to be left on completed assemblies without cleaning. However if cleaning is required, good results are likely to be achieved with popular cleaning materials (like the **STANNOL Flux-Ex 500** or **STANNOL Flux-Ex 200/B**) and effective process equipment. It is always advisable to evaluate the compatibility of cleaning material and cleaning process.

STANNOL GmbH
Oskarstraße 3-7 42283 Wuppertal Tel.:+49(0)202-585-0 Telefax: +49(0)202-585111 E-Mail: info@stannol.de Web: www.stannol.de

Recommendations for generating an appropriate reflow profile for use with lead free TSC alloy:

Recommended average	Upper limit
1. Heat up with 1-2K sec^{-1} up to 120-160°C	Heat up with not more than 2K sec^{-1}
2. Keep temperature stable at 120-160°C for 60-90sec (if necessary)	No ramp at temperatures above >160-170°C
3. Heat up with 1-2K sec^{-1} up to 230-260°C	Heat up with not more than 2K sec^{-1}
4. Keep temperature at 230-260°C for app. 30-60sec	Keep temperature not longer than 90sec above liquidus



GENERAL PROPERTIES

Solder Powder: ECOLOY® TSC (SnAg3.8Cu0.7) solder powders for **STANNOL® SP310** solder paste are produced by atomising alloys conforming to the purity requirements of related alloys in J-STD-006 and EN29453.

Solder Paste Medium: STANNOL® SP310 contains a stable resin system and includes solvents with high boiling ranges. The flux has been formulated to meet the requirements of the IPC type L specification.

Solder Paste: The properties of a solder paste depend on the metal content, the solder alloy and the solder powder particle size range. In general terms increasing metal content reduces the tendency to slump, and reduces the tack life of the solder paste, while the solder balling performances improves.

Typical properties of selected **SP310** solder paste are as follows:

Test	Specification	Result
Copper Plate Corrosion	IPC-SF-818	pass
Copper Mirror Corrosion	IPC-SF-818	pass
Surface Insulation Resistance [without cleaning]	IPC-SP-819 J-STD-004 Bellcore GR-78 Core	pass pass pass
Electromigration [without cleaning]	Bellcore TR-NWT-000078	pass
Flux Activity Classification [without cleaning]	IPC-SF-818 J-STD-004 EN 29454	LR3CN R0 L0 1.1.2.

Full details of test methods are available on request.

Solder paste	STANNOL® SP310 TSC-88-3-640
Alloy	Sn95,5 Ag3,8 Cu0,7
Metal content, %	88
Solder powder, µm	25-45
Viscosity measured at 25°C Brookfield, cP [1] Malcolm , p [2] Thixotropic Index, TI [3]	 640.000 1300 0,61
Slump, [4] IIW Method, mm 1 hr, room temp. 0.7mm pads 1.5mm pads	 0,2 0,2
80°C, 20 mins 0.7mm pads 1.5mm pads	 0,2 0,2
Tack [5] Initial tack force, gmm^{-2} Peak tack force, gmm^{-2} Useful open time, h	 1,3 1,5 24

[1] Measured at 25°C, TF spindle at 5rpm after 2 minutes
[2] Measured at 25°C, and a shear rate of $6s^{-1}$
[3] TI = log [viscosity at $1.8s^{-1}$/Viscosity at$18s^{-1}$]
[4] The slump data is expressed as the min spacing between pads of the size shown that does not allow bridging
[5] Tack data is derived from comparative laboratory tests and do not necessarily relate directly to a particular user's conditions

PACKAGING

STANNOL® SP310 are supplied in:

- 500g plastic jars with an air seal insert
- 650g /1200g Semco cartridges.

Other forms of packaging are available on request.

Shelf Life: Providing **SP310** solder pastes are stored at 5-10°C tightly sealed in the original container, a minimum shelf life of 6 months can be expected. Air shipment is recommended to minimise the time the containers are exposed to higher temperatures. **SP310** solder pastes have been formulated to reduce separation on storage to a minimum. Should it occur, gentle stirring for 15 seconds will return the products to their correct rheological performance.

HEALTH AND SAFETY

Users should refer to the Health and Safety information relevant to specific **STANNOL® SP310** solder pastes products before use. The MSDS is available upon request.

Our technical applications information, both written and oral, is given without engagement, regardless of whether this is provided from our offices, by one of our representatives, or any third party, and does not free our customers from their own tests of our products for their suitability for the intended processes and purposes. Should any liability nevertheless arise on our part, then we will only be liable for compensation to the same extent as for defects in quality.
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STANNOL GmbH
Oskarstraße 3-7 42283 Wuppertal Tel.:+49(0)202-585-0 Telefax: +49(0)202-585111 E-Mail: info@stannol.de Web: www.stannol.de