



**STANNOL**<sup>®</sup>

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

## Technical Data Sheet

# STANNOL ECOLOY<sup>®</sup> TSC

## Lead-Free Alloys for Electronics

### The best lead-free alternative

- Proven in production use for electronics manufacturing
- Lowest melting point of all suitable high-tin alloys
- Eutectic alloy (no melting range)
- Enhanced wetting characteristics

### Applications

STANNOL<sup>®</sup> ECOLOY TSC alloys are designed to substitute the use of tin-lead alloys in all assembly operations of electronics manufacturing. Where lead has already been eliminated from PCBs and component surfaces, a complete lead-free process for manufacturing can be installed, using STANNOL<sup>®</sup> ECOLOY<sup>®</sup> TSC.

Some adjustments have to be made on production equipment, e.g. setting of temperature profiles in the reflow equipment. The properties of the resulting solder joints will perform as well as tin/lead solder joints or even better in all respects.

Use of STANNOL<sup>®</sup> ECOLOY TSC alloys eliminate disposal of toxic lead containing waste and dross.

### Product Range

STANNOL<sup>®</sup> ECOLOY<sup>®</sup> TSC are lead-free ternary alloys from tin/silver/copper to replace eutectic or near eutectic tin-lead or tin-lead-silver alloys.

STANNOL<sup>®</sup> ECOLOY<sup>®</sup> TSC is supplied as solid solder for use in wave soldering equipment, as solid and flux cored solder wire or as solder powder in solder paste for screen printing and stencilling applications to meet all customers' specific needs.

### Technical Data of ECOLOY<sup>®</sup> TSC

Alloy Composition: Silver = 3,8%(+/-0,2), Copper = 0,5% - 0,7%(+/-0,1), Tin = remainder

Element	Mass %
Zinc (Zn)	<0,001
Aluminium (Al)	<0,001
Cadmium (Cd)	<0,002
Gold (Au)	<0,005
Nickel (Ni)	<0,007
Iron (Fe)	<0,02
Arsenic (As)	<0,03

Element	Mass %
Indium (In)	<0,03
Lead (Pb)	<0,1
Antimony (Sb)	<0,1
Bismuth (Bi)	<0,1
Others	<0,2

**STANNOL<sup>®</sup> ECOLOY<sup>®</sup> TSC is supplied with Cu-content of 0,7% (TSC)  
or 0,5% (TSC0,5).**

The above values are typical and represent no form of specification. The Data Sheet serves for information purposes. Any verbal or written advise is not binding for the company, whether such information originates from the company offices or from a sales representative. This is also in respect of any protection rights of third parties, and does not release the customer from the responsibility of verifying the products of the company for suitability of use for the intended process or purpose. Should any liability on the part of the company arise, the company will only indemnify for loss or damage to the same extent as for defects in quality.



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Physical and mechanical properties of lead-free ECOLOY® alloys compared with S-Sn63Pb37:

Properties	STANNOL® ECOLOY® TSC	Sn63Pb37	Sn96Ag4 ECOLOY® TS	Sn99Cu1 ECOLOY® TC
Melting point, °C	217	183	221	227
Electrical Conductivity, %IACS	13	11,9	14	-
Electrical Resistivity, µW cm	13	14,5	12,3	-
Brinell Hardness, HB	15	17	15	-
Density, g mm <sup>-3</sup>	7,5	8,4	7,5	7,3
Tensile strength, (20°C) N mm <sup>-2</sup> at 0,004 s <sup>-1</sup> strain rate	48	40	58	-
Joint shear strength N mm <sup>-2</sup> at 0,1mm <sup>-1</sup> , 20°C N mm <sup>-2</sup> at 0,1mm <sup>-1</sup> , 100°C	27 17	23 14	27 17	23 16
Creep strength* N mm <sup>-2</sup> 20°C N mm <sup>-2</sup> 100°C	13,0 5,0	3,3 1,0	13,7 5,0	8,6 2,1

\*shear stress for 10<sup>3</sup> hours to failure

## Recommended operating conditions:

### Wave soldering

#### STANNOL® ECOLOY® TSC0,5

Low copper content for wave applications is preferred because of copper leaching from the PCB. The copper content will rise automatically, therefore extended life-time of the solder bath is expected.

The use of **ECOLOY® TSC0,5** for solder bath application requires operating temperatures of approx. 260 to 280°C. It is necessary to find out the optimum temperatures, which can differ depending on the type of PCB and the types of components. The use of nitrogen as a protecting atmosphere is advantageous allowing to open the process window. The wetting of the solder and the separation of wave and joint will be easier. No excess solder will be left. Dross formation is considerably reduced.

### Liquid flux for wave soldering

In principle common liquid fluxes can be used for lead-free wave soldering. Adjustment of solid content may be necessary. Increased preheat and solder pot temperature requires better heat resistant and temperature stable flux formulation which can be achieved with an increased solid content. A complete ecological solution can be installed using VOC-free fluxes, e.g. **STANNOL® WF300S**. Water based fluxes require proper adjustment of the process conditions.

### Rework and manual soldering

**STANNOL® ECOLOY® TSC** is available as solder wire to complete all soldering processes which are possible on a PCB to avoid having different solder alloys on one board. Only one unique solder alloy guarantees similar properties of all solder joints.

Solid solder as well as flux cored solder are available. Flux formulations and flux content adjusted for a lead-free process provide easy soldering in post production soldering and repair.

Components which are not available with lead-free coated pins can be soldered, but dependent on the lead content it is possible that the melting range starts at 179°C, which is the solidus of the tin-lead-silver alloy system.

## Health and Safety

Information on health and safety and disposal are provided by our EU-MSDS which is available on request.

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