



**STANNOL**



<b>SOLDER WIRES</b>	<b>SOLDER PASTES</b>	<b>FLUXES</b>	<b>SOLDER BARS</b>
SOLDERING EQUIPMENT	MEASUREMENT AND TESTING SYSTEMS	CONFORMAL COATINGS	ACCESSORIES

# SOLDERING MATERIALS

MAIN CATALOGUE



# SUSTAINABLE MANUFACTURING IS BECOMING AN INCREASING FOCUS FOR THE INDUSTRY

THE ENVIRONMENT IS NO LONGER SEEN AS A NICHE, THE ECOLOGICAL REORIENTATION ENCOMPASSES ALL AREAS OF OUR EVERYDAY LIFE: PERSONAL PURCHASING DECISIONS, SOCIAL VALUES AND CORPORATE STRATEGIES. THIS MEGATREND IS NOT ONLY REORIENTING VALUES IN GLOBAL SOCIETY, IT IS ALSO CHANGING ENTREPRENEURIAL THINKING AND ACTING IN THE INDUSTRY.

Stannol is worldwide the first manufacturer in the field of soldering technology to offer a complete ecological friendly product range: **greenconnect**.

In the past there had been only two criteria to purchase tin: quality and price. Due to the strong demand for raw materials

we can find inhumane working and living conditions in many mining areas. The environment suffers severely from the uncontrolled and partly illegal extraction of raw materials.

## THE HISTORY OF GREENCONNECT

Already in 2015 we launched a solder wire in cooperation with **Fairlötet e.V.**, which is produced without exploitation of people and environmental destruction in the tin exploring countries.

After the great success of this product, we went one step further in 2016 and launched the **FAIRTIN** project. For this project we exclusively use tin from suppliers who, firstly, protect the environment, secondly, fulfil their social responsibility for employees and people on site and, thirdly, act transparently – beyond the legal minimum.

Since 2019 we are not only able to offer fair tin, but also to orientate our complete product range according to ecological aspects. We use the name **GREENCONNECT** as a generic term for all sustainable products. We are currently in the process of continuously expanding this range.

The fact that several large, well-known industrial companies are now purchasing products from us that bear the greenconnect label shows us, that we consider ourselves confirmed with our sustainable orientation.

This includes a flux in which the previous main component isopropanol (IPA) is replaced by bio-ethanol. Bio-ethanol consists of renewable raw materials such as straw and can be produced completely without fossil fuels via a fermentation process. This results in a significantly better CO<sub>2</sub> balance. Extensive tests have proven that a 1:1 exchange is possible without changing the process parameters.

With Stannol's solder pastes, too, sustainable aspects are now in the foreground. A solder paste consists of 90% solder metal powder, which is largely made of tin.

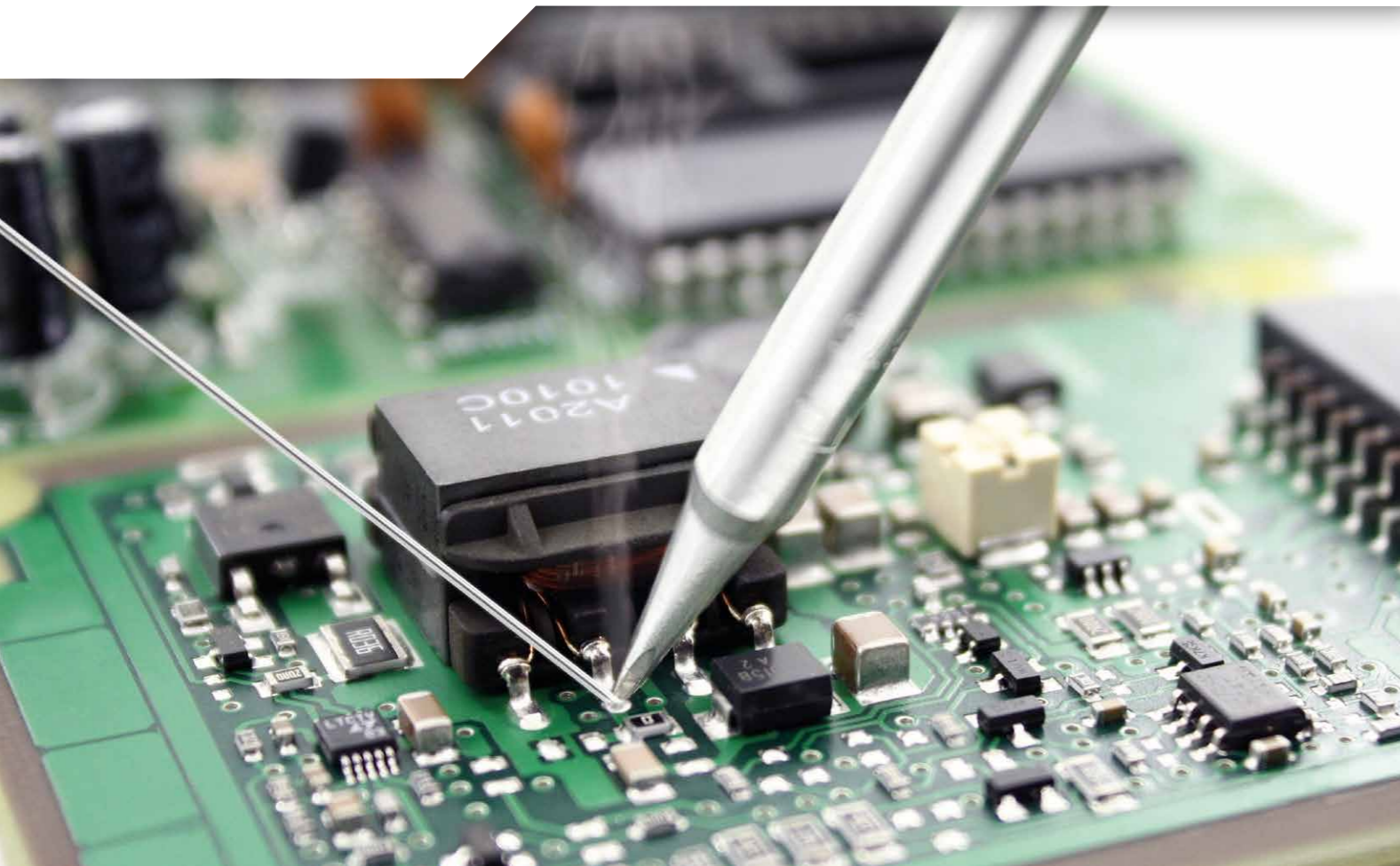
## THE FOUR AREAS OF GREENCONNECT

The new green connect product range will then initially consist of the following four areas:



*"With our new product range, we want to continue the development of sustainability. Also in the matter of microplastics we have asked ourselves: What can Stannol do to reduce its impact further? One answer has been found: We started using some time ago 100 % recycled plastic spools for our lead-free solder wires."* (Marco Dörr, Managing Director of Stannol GmbH & Co. KG)

The high quality demands placed on our own products ensure that all materials can be used in the manufacturing process without costly re-qualification, which enables our customers to provide transparent information about the soldering material used.



# SOLDER WIRES

IN ELECTRONICS, A SOLDER WIRE IS USED TO CONNECT COMPONENTS TO EACH OTHER WITH ELECTRICAL CONDUCTIVITY. HOWEVER, A SOLDER WIRE CAN ALSO BE USED TO FORM A MECHANICAL SOLDER JOINT ON MANY DIFFERENT SOFT SOLDERABLE SURFACES. DUE TO THE MANY DIFFERENT APPLICATIONS AND APPLICATION AREAS, WE PROVIDE A WIDE RANGE OF MANY DIFFERENT SOLDER WIRES.

Solder wires can be flux-cored or solid. A flux is necessary for the soldering process to remove oxides and other impurities and to guarantee a reliable connection. Flux-cored solder wires already contain the correct amount of flux. Different fluxes are used, depending on the soldering task. The selection of a suitable alloy also plays an important role for the solder joint.

For selection of the alloy, please refer to page 7 and 13 of this catalogue. Following we would like to introduce the different types of fluxes, which can be used inside solder wires for different applications. We are pleased to present our complete product overview, available delivery forms such as fluxes, diameters and reel sizes in a personal meeting.

## HALIDE CONTAINING FLUXES FOR SOLDER WIRES

There are two groups of different activation levels to choose from: Halide containing and halide free fluxes for solder wires. The fluxes with higher activity usually contain halides. Stannol provides different halide containing solder wire fluxes which can be used in the electronics industry as No-Clean products.

If clear residues are required, the proven **KRISTALL SERIES** of solder wires from Stannol should be selected. These fluxes have been developed to leave transparent residues on the circuit board.



New in this series will be the **KRISTALL 611**. This new flux is characterized by high activity and at the same time very low flux spitting behaviour, similar to the Trilence series.

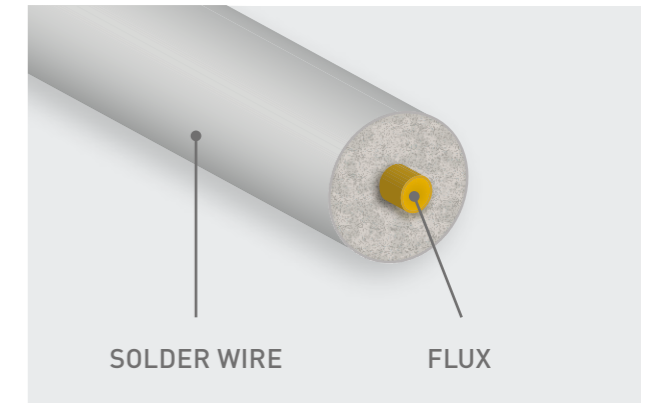
The **KRISTALL 511** flux has a slightly higher activation than the HS10 flux and can be used as an option if transparent residues are required.

The flux **HS10** is a solder wire flux based on rosin which has proven to be successful for decades. Short wetting times on common surfaces are achieved with this flux. This flux is suitable for both manual soldering and robot soldering with fast cycle times.

The **TRILENCE SERIES** has been developed to fulfil the highest requirements. The extremely low tendency to create flux spitting is one of the major advantages, beside the good wetting activity and the transparent, clear residues.



The different behaviour of the residues of lead-free solder wires can be clearly seen on a blank copper surface. The Trilence 3505 features a low spitting behaviour, bright residues and optimum wetting.



An important part of the solder wires is the flux, which is responsible for the removal of oxides from the metal surfaces. The Stannol range of solder wires is manufactured as a standard with one flux core.

Flux type **2630** provides the highest activity of our No-Clean solder wire fluxes. It is used for surfaces with poor solderability and for larger solder areas which may require a higher thermal input to the solder joint.

Stannol made a completely new approach during the development of the solder wire **ALU1** for soldering on aluminium: Non-toxic activators were combined with each other in order to enable a good solder joint and wetting of soft solder on aluminium. The residues are non-corrosive and do not have to be removed.



## HALIDE-FREE SOLDER WIRE FLUXES

Halide-free solder wire fluxes are used if halides are not permitted in the manufacturing process and if higher electrical safety of the residues is required. In comparison with the halide containing fluxes, these fluxes provide lower activity and require good solderable surfaces.



The **KRISTALL 600** solder wire flux is the new halide-free version of the Kristall series from Stannol. Additional to the transparent residues and the good activity this flux has a lower tendency of flux spitting when soldering at high temperatures.

**KRISTALL 400** is the second halide-free version of the Kristall series from Stannol. Characteristic for these fluxes are transparent residues and good activity with which outstanding soldering results can be achieved.

The halide-free wire flux **HF32** combines high activity with good wetting characteristics and low residues on the circuit board in an outstanding way. The HF32 can be used for manual and robot soldering.

## ORGANIC FLUXES FOR SOLDER WIRES

In addition to solder wires for electronics, Stannol also provides flux-cored solder wires with special organic fluxes which have been developed for difficult wettable surfaces. These include either wires with water-washable residues or fluxes, such as **ALU1**, which ensures safe wetting on aluminium.

The **S321** solder wire flux is particularly suitable for soldering metal and sheet metal. Tinned surfaces as well as brass or iron can also be processed well with this solder wire.

The **WS2413** is a new solder wire with water-soluble residues. It was developed for surfaces in electronics that are difficult to solder. Simple and fast wetting, short cycle time and also fast removal of residues are the main features of this wire.

Stannol made a completely new approach during the development of the solder wire **ALU1** for soldering on aluminium: Non-toxic activators were combined with each other in order to enable a good solder joint and wetting of soft solder on aluminium. The residues are non-corrosive and do not have to be removed.

The **TRILENCE 3500** solder wire was developed for challenging soldering applications. The very low flux spitting can considerably reduce the maintenance intervals and thus the downtime of soldering machines. The Trilence 3500 contains a halide- and rosin-free flux which is based on a matrix of synthetic resins. The Trilence 3500 solder wire can be used just like conventional solder wires.

**ZV16** solder wire is certainly one of the most interesting innovations. It is halide-free and based on chemically modified resins. Its good activity is depending on the used combination of different organic acids. Only a relatively low amount of flux content in the wire is required to achieve a good solder joint. The most important property of the rosin-free flux is, that it leaves minor amounts of soft residues after soldering. These residues can be brushed off easily to achieve a clean, residue free solder joint.



## SOLDER WIRE FLUX PROPERTIES

SOLDER WIRE FLUX	FLUX PROPERTIES				LEAD-CONTAINING ALLOYS					FLOWTIN SERIES <sup>(1)</sup> lead-free alloys with micro alloy additions				ECOLOY SERIES <sup>(2)</sup> lead-free alloys without micro alloy additions					SN100C® Sn99,3Cu0,7+Ni6e		
	FLUX CONTENT	HALIDE CONTENT	NO-CLEAN	J-STD-004 / J-STD-004B	S-Sn60Pb40	S-Sn60Pb39Cu1	S-Sn63Pb37	S-Sn62Pb36Ag2	S-Pb93Sn5Ag2	FLOWTIN TSC Sn95,5Ag3,8Cu0,7 + FLOWTIN	FLOWTIN TSC305 Sn96,5Ag3,0Cu0,5 + FLOWTIN	FLOWTIN TSC307 Sn99Ag0,3Cu0,7 + FLOWTIN	FLOWTIN TC Sn99,3Cu0,7 + FLOWTIN	ECOLOY TS S-Sn96Ag4	ECOLOY TSC S-Sn95Ag4Cu1	ECOLOY TSC305 S-Sn96Ag3Cu1	ECOLOY TSC307 S-Sn98Cu1Ag	ECOLOY TC S-Sn99Cu1		ECOLOY TC300 S-Sn97Cu3	
	MELTING RANGE				183-190°C	183-190°C	183°C	179°C	296-301°C	217°C	217-222°C	217-227°C	227°C	221°C	217°C	217-220°C	217-227°C	227°C	227-310°C	227°C	
HALIDE-CONTAINING	Trilence 2708	2.7%	0.8%	•	REM1						•	•									
	Trilence 3505	3.5%	0.5%	•	REL1						•	•									
	Kristall 505	3.0%	0.5%	•	REM1	•															
	Kristall 511	2.7 / 3.0%	1.1%	•	REM1					•	•	•			•	•		•		•	•
	Kristall 611	2.5%	1.1%	•	REM1						•	•									•
	HS10	2.5%	1.0%	•	ROM1	•	•	•	•	•				•	•	•		•	•		
	2630	2.0 / 2.2%	1.7%	•	ROM1		•								•				•		
	Alu 1	3.5%	0.45%		REM1														•		
HALIDE-FREE	HF32 SMD	1.0%	0.0%	•	ROLO	•		•													
	Kristall 400	2.2%	0.0%	•	RELO	•		•	•	•	•			•	•		•	•		•	•
	Kristall 600	2.5%	0.0%	•	RELO						•	•									•
	HF32	3.5%	0.0%	•	ROLO	•	•	•							•				•		
	Trilence 3500	3.5%	0.0%	•	RELO						•	•									
	ZV16	1.6%	0.0%	•	RELO											•					
ORGANIC	S321	2.0%	>5.0%		ORH1	•													•		
	WS2413	2.4%	1.3%		ORH1														•		
Solid					•	•			•	•	•	•	•	•	•	•	•	•	•	•	•



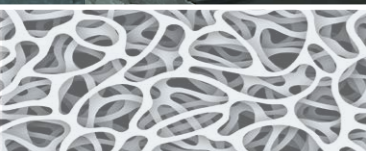

(1) The micro-alloyed FLOWTIN solders have been developed by Stannol to achieve the lowest possible dissolution rate of copper and iron. Depending on the general conditions, an increase in the life time of soldering tips of up to 50% is possible.  
 (2) All ultra pure, lead-free standard alloys are designated as ECOLOY.

For further information about the characteristics of the alloys, please visit our homepage [www.STANNOL.de](http://www.STANNOL.de)  
 Additional flux / alloy combinations are also possible, partially on a production-related minimum order quantity - please feel free to contact us!

## STANNOL PRODUCT SELECTOR

You can find a complete product overview with the Stannol product selector, here you also have the possibility to limit the product selection according to various criteria. For this purpose scan the QR-Code or visit us on: [www.stannol.com](http://www.stannol.com)

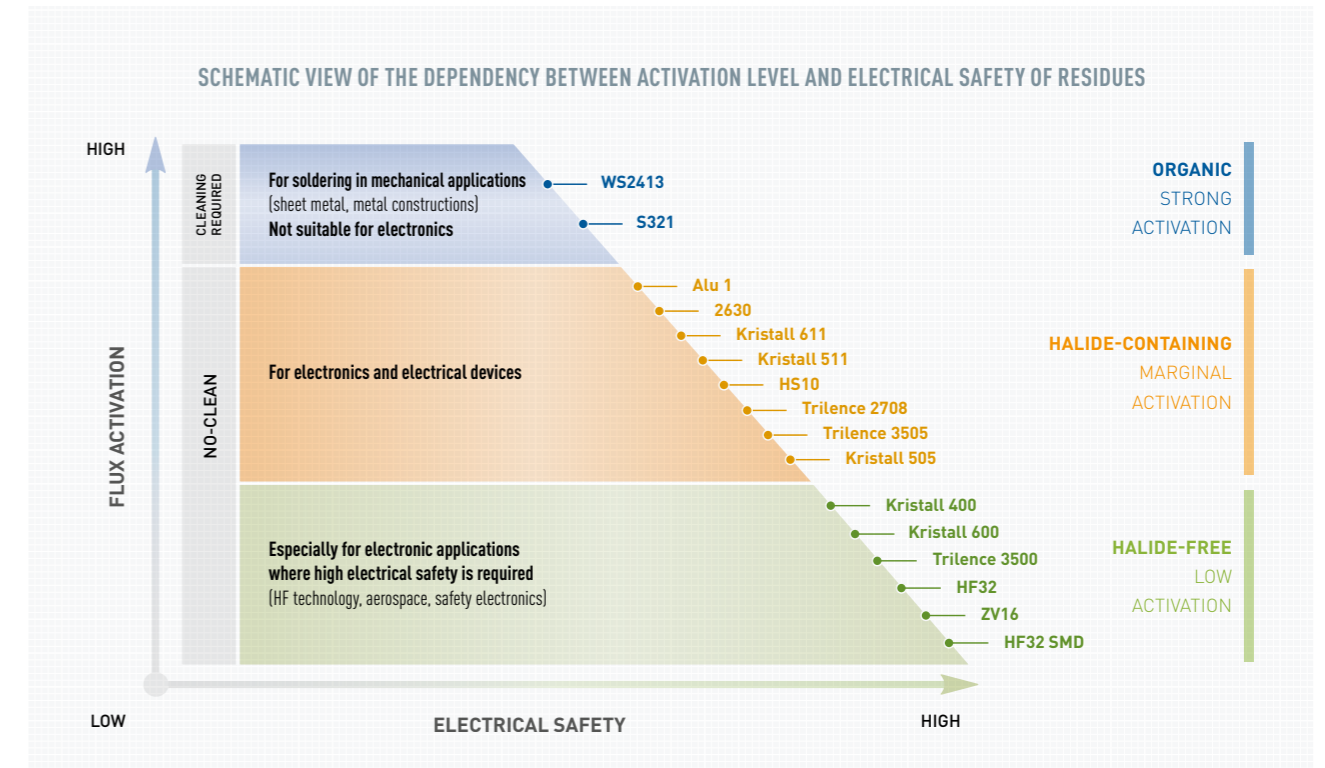
## FLUX CLASSIFICATION ACCORDING TO J-STD 004

INGREDIENTS IN FLUXES	ACTIVITY	MAX. HALIDE CONTENT	CLASSIFICATION	FULL DESIGNATION
 <b>RO ROSIN</b>	Low	0%	L0	ROL0
	Low	<0.5%	L1	ROL1
	Moderate	0%	M0	ROM0
	Moderate	0.5-2.0%	M1	ROM1
	High	0%	H0	ROH0
 <b>RE RESIN</b>	High	>2%	H1	ROH1
	Low	0%	L0	REL0
	Low	<0.5%	L1	REL1
	Moderate	0%	M0	REM0
	Moderate	0.5-2.0%	M1	REM1
 <b>OR ORGANIC</b>	High	0%	H0	REH0
	High	>2%	H1	REH1
	Low	0%	L0	ORL0
	Low	<0.5%	L1	ORL1
	Moderate	0%	M0	ORM0
 <b>IN INORGANIC</b>	Moderate	0.5-2.0%	M1	ORM1
	High	0%	H0	ORH0
	High	>2%	H1	ORH1
	Low	0%	L0	INL0
	Low	<0.5%	L1	INL1
	Moderate	0%	M0	INM0
	Moderate	0.5-2.0%	M1	INM1
	High	0%	H0	INH0
	High	>2%	H1	INH1

## FLUX CLASSIFICATION ACCORDING TO DIN EN 61190-1-1

FLUX CLASSIFICATION	COPPER MIRROR TEST	SILVERCHROMATE PAPER TEST	FLUORIDES BY SPOT TEST	QUANTITATIVE HALIDE CONTENT (CL & BR)	FLUX CORROSION	CONDITIONS FOR PASSING THE 100 MOHM TEST CRITERIA
L0	No signs of breakthrough	Pass	Pass	<0.01	No signs of corrosion	Cleaned or not cleaned
L1		Pass	Pass	<0.5		
M0	Breakthrough in maximum 50% of the area	Pass	Pass	<0.01	No signs of corrosion	Cleaned or not cleaned
M1		Fail	Fail	0.5 - 2.0		
H0	Breakthrough in more than 50% of the area	Pass	Pass	<0.01	Major corrosion can be expected	Cleaned
H1		Fail	Fail	>2.0		

## ACTIVATION MATRIX



In this chart the dependency of the flux activation level to the electrical safety of the flux residues is shown. The lower the flux activation level can be chosen, the higher the electrical safety of the flux residues after soldering can be expected. When using the activated flux Kristall 511 for example, high electrical safety can be achieved after soldering – as a No-Clean flux without a subsequent cleaning process.

## THE STANNOL COLOR CODE

Stannol uses a unique colour code for easy differentiation between the different groups of solder wires. The colour code is based on two parts: The first part is the colour of the reel, the second part is the colour on the label. This ensures an easy error prevention in mixed manufacturing areas.





## SOLDER BARS

SOLDER BARS AND SOLID SOLDER WIRES ARE USED IN DIFFERENT ALLOYS AS BASE AND REFILL SOLDERS FOR WAVE AND SELECTIVE SOLDERING IN ELECTRONICS MANUFACTURING. STANNOL SOLDERS FOR PRINTED CIRCUIT BOARDS ARE PRODUCED FROM VIRGIN METALS ONLY. TO ACHIEVE THE EXPECTED HIGH QUALITY WE ONLY USE TIN WITH A PURITY CONTENT OF AT LEAST 99.9%.

For lead-containing and lead-free applications, Stannol manufactures many different high purity solders for electronics manufacturing. These solders are produced to international standards or with special properties such as minimised dross formation and minimised copper dissolution. The ongoing development of solders for the electronic industry has highest priority at Stannol. We would like to introduce some of these

optimised solders in this catalogue, as well as the most important solders for use in electronics manufacturing.

We would be pleased to present our complete portfolio, including optional special alloys and special dimensions, during a personal meeting.

## ECOLOY – LEAD-FREE SOLDERS BY STANNOL

Lead-free solders, based on pure tin with an addition of silver and/or copper, are suitable for all lead-free applications in electronics manufacturing.

For the production of electronics, **ECOLOY TSC** alloys (Tin, Silver, Copper) are a reliable lead-free option. TSC alloys are available in different compositions and vary by the ratio of tin, silver and copper. The eutectic alloy TSC with Sn95.5Ag3.8Cu0.7 should be highlighted due to its low melting point of 217°C and excellent wetting properties.

The alloy **TSC305** (Sn96.5Ag3.0Cu0.5) with a lower silver content has become an industrial standard alloy over the last years. Lower silver reduces the price and a lower content ensures less maintenance.

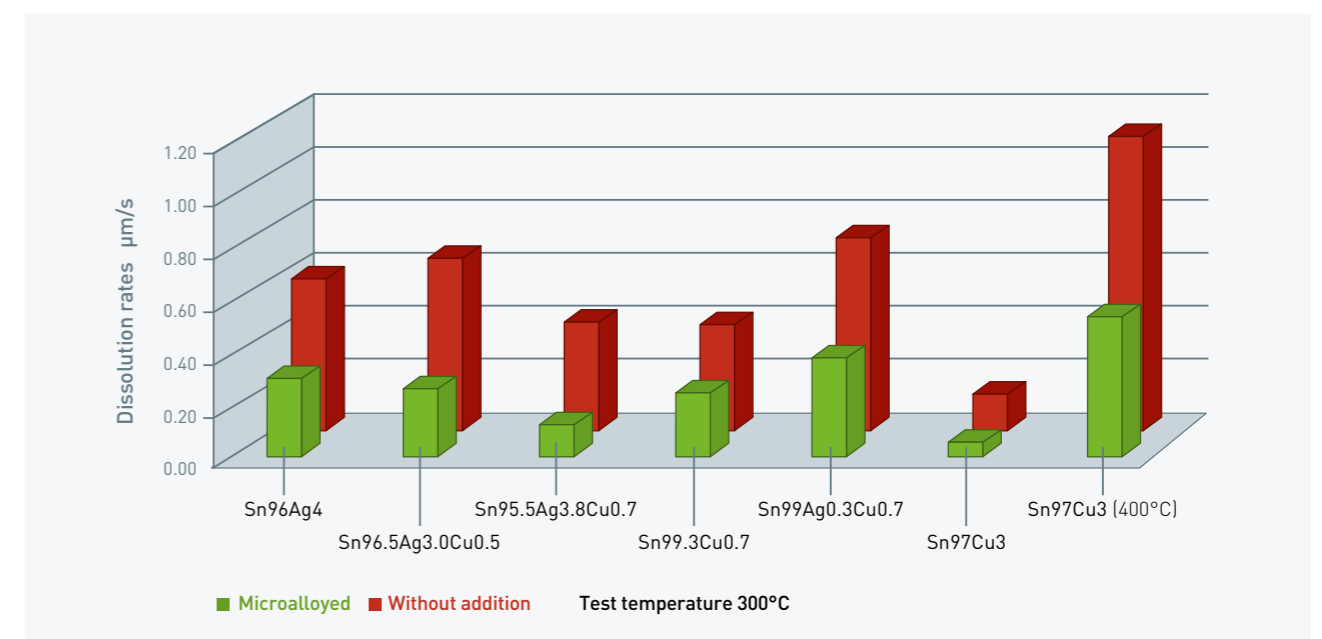
Even more favourable is the alloy **TSC0307**, which has a composition of 99% tin and only 0.3% silver and 0.7% copper. Up to 90% of the expensive silver can be reduced, although the properties are virtually the same during the soldering process.

The **TC** alloy (S-Sn99.3Cu0.7) is a lead-free solder, which replaces eutectic or almost eutectic tin-lead alloys at the lowest possible cost. The main advantage of the product is that it contains no silver, which leads to extensive cost savings, as well as a defined melting point of 227°C and good wetting properties.

## FLOWTIN – DEVELOPED BY STANNOL

For manufacturing sites where a low dissolution rate of copper and iron is an important issue for a reliable soldering process, microalloyed solders have been developed in our laboratory. Due to the addition of small amounts of metal dopants like Co and Ni, the solders have a considerably lower copper and iron dissolution. This results in less control and maintenance of the

soldering equipment. **FLOWTIN** solders by Stannol are patent pending. FLOWTIN solders show a finer grain structure which leads to an optimised shiny surface of the solder joint. This is an additional advantage compared to conventional lead-free solders.



Different dissolution rates in comparison

## SN100C® – SILVER-FREE INDUSTRIAL STANDARD

SN100C® is another silver-free microalloyed solder with unique properties. Due to its acceptance and usage in many thousand different wave- and selective soldering equipment, it has become a worldwide accepted industrial standard. It is also well established solder for HASL-equipment in the PCB manufacturing. Based on S99.3Cu0.7 with additions of Ni and Ge this solder has economic advantages due to the missing expensive silver. The addition of nickel and germanium ensures a highly reduced dissolution rate of copper. Additionally the dross formation is much lower than with standard solders.

### SOLDER ANALYSIS

We offer our customers the option of a periodic monitoring of the solder quality and composition of their soldering machines. This analysis and evaluation of impurities is performed in our laboratory. Further details can be found on our website: [www.stannol.de/en/service/test-analysis-service/](http://www.stannol.de/en/service/test-analysis-service/)



### FAIRTIN VERSION

All available alloys in our range of bar and solid solders are also available as Fairtin versions.



This alloy is worldwide patented by the company NIHON SUPERIOR (e.g. patent no. EP0985486) and licensed by Stannol. Therefore we can offer our customers SN100C® and its variations in the expected Stannol quality! Different solder wires are available in SN100C® to ensure our customers the usage of one alloy all over the whole manufacturing process.

### SOLID SOLDER WIRE

Solid solder wires are used, e.g. for the refill of solder baths in selective solder machines. Stannol offers all common alloys, diameters and reel sizes.

### RECYCLING

Used solder and dross contain valuable metals. Stannol offers an appropriate recycling with financial compensation calculated according to the current metal prices of the LME (London Metal Exchange). All solders must be sorted by type (lead containing and lead-free solders) for remuneration purposes. We provide appropriate material containers free of charge.

Further details about this process can be found on our website: [www.stannol.de/en/service/environment-disposal/](http://www.stannol.de/en/service/environment-disposal/)

## COMPOSITION OF SOLDERS

ALLOY NAME	ALLOY NUMBER <sup>2</sup>	ALLOY COMPOSITION	INTERNAL NAME <small>Tin Silver Copper Bismuth</small>	ROHS	MELTING POINT MELTING RANGE <small>(approximate values)</small>	FAIRTIN
Sn99.9 <sup>1</sup>	---	Sn99.9	ECOLOY T	lead-free	232°C	•
S-Sn99.3Cu0.7 <sup>2</sup>	401	Sn99.3Cu0.7	ECOLOY TC	lead-free	227°C	•
S-Sn97Cu3 <sup>2</sup>	402	Sn97Cu3	ECOLOY TC300	lead-free	227–310°C	•
S-Sn96.3Ag3.7 <sup>2</sup>	701	Sn96.3Ag3.7	ECOLOY TS	lead-free	221°C	•
S-Sn95.5Ag3.8Cu0.7 <sup>2</sup>	713	Sn95.5Ag3.8Cu0.7	ECOLOY TSC	lead-free	217°C	•
S-Sn96.5Ag3.0Cu0.5 <sup>2</sup>	711	Sn96.5Ag3.0Cu0.5	ECOLOY TSC305	lead-free	217–220°C	•
Sn97.1Ag2.6Cu0.3 <sup>3</sup>	---	Sn97.1Ag2.6Cu0.3	ECOLOY TSC263	lead-free	217–224°C	•
S-Sn99Cu0.7Ag0.3 <sup>2</sup>	501	Sn99Cu0.7Ag0.3	ECOLOY TSC0307	lead-free	217–227°C	•
S-Bi58Sn42 <sup>2</sup>	301	Bi58Sn42	ECOLOY TB	lead-free	139°C	•
Bi57Sn42Ag1 <sup>3</sup>	---	Bi57Sn42Ag1	ECOLOY TBS	lead-free	139–142°C	•
FLOWTIN Sn99.3Cu0.7 <sup>4</sup>	---	Sn99.3Cu0.7 + FLOWTIN	FLOWTIN TC	lead-free	227°C	•
FLOWTIN Sn99.6Cu0.4 <sup>4</sup>	---	Sn99.6Cu0.4 + FLOWTIN	FLOWTIN TC04	lead-free	227°C	•
FLOWTIN Sn97Cu3 <sup>4</sup>	---	Sn97Cu3 + FLOWTIN	FLOWTIN TC300	lead-free	227–310°C	•
FLOWTIN Sn96Ag4 <sup>4</sup>	---	Sn96Ag4 + FLOWTIN	FLOWTIN TS	lead-free	221°C	•
FLOWTIN Sn95.5Ag3.8Cu0.7 <sup>4</sup>	---	Sn95.5Ag3.8Cu0.7 + FLOWTIN	FLOWTIN TSC	lead-free	217°C	•
FLOWTIN Sn96.5Ag3.0Cu0.5 <sup>4</sup>	---	Sn96.5Ag3.0Cu0.5 + FLOWTIN	FLOWTIN TSC305	lead-free	217–220°C	•
FLOWTIN Sn97.1Ag2.6Cu0.3 <sup>4</sup>	---	Sn97.1Ag2.6Cu0.3 + FLOWTIN	FLOWTIN TSC263	lead-free	217–224°C	•
FLOWTIN Sn98.5Ag0.8Cu0.7 <sup>4</sup>	---	Sn98.5Ag0.8Cu0.7 + FLOWTIN	FLOWTIN TSC0807	lead-free	217–226°C	•
FLOWTIN Sn99Ag0.3Cu0.7 <sup>4</sup>	---	Sn99Ag0.3Cu0.7 + FLOWTIN	FLOWTIN TSC0307	lead-free	217–227°C	•
FLOWTIN+ Sn99.3Cu0.7 <sup>5</sup>	---	Sn99.3Cu0.7 + FLOWTIN+	FLOWTIN+ TC	lead-free	227°C	•
TSCX0307 <sup>3</sup>	---	Sn99Ag0.3Cu0.7+X	TSCX0307	lead-free	217–227°C	•
SN100C <sup>6</sup>	403	Sn99.3Cu0.7NiGe	SN100C	lead-free	227°C	•
SN100Ce <sup>6</sup>	---	Sn99.9NiGe	SN100Ce	lead-free	227–232°C	•
SN100CS <sup>6</sup>	---	Sn99.3Cu0.7NiGe	SN100CS	lead-free	227°C	•
SN100CeS <sup>6</sup>	---	Sn99.9NiGe	SN100CeS	lead-free	227–232°C	•
SN100CS+ <sup>6</sup>	---	Sn99.3Cu0.7NiGe	SN100CS+	lead-free	227°C	•
SN100CeS+ <sup>6</sup>	---	Sn99.9NiGe	SN100CeS+	lead-free	227–232°C	•
S-Sn63Pb37E <sup>3</sup>	102 <sup>3</sup>	Sn63Pb37	STANNOLOY SN63	lead-containing	183°C	•
S-Sn63Pb37E <sup>3</sup>	102 <sup>3</sup>	Sn63Pb37	STRATOLOY SN63	lead-containing	183°C	•
Sn63Pb37 <sup>3</sup>	---	Sn63Pb37P	WSL3 SN63	lead-containing	183°C	•
S-Sn62Pb36Ag2 <sup>2</sup>	171	Sn62Pb36Ag2	SN62	lead-containing	179°C	•
S-Sn60Pb40 <sup>2</sup>	103	Sn60Pb40	SN60	lead-containing	183–190°C	•
S-Pb93Sn5Ag2 <sup>2</sup>	191	Pb93Sn5Ag2	HMP (high melting point)	lead-containing	296–301°C	•

<sup>1</sup> According to DIN EN 61190-1-3 | <sup>2</sup> According to ISO EN 9453:2014 | <sup>3</sup> According to ISO EN 9453:2014 and internal specification based on ISO EN 9453:2014 | <sup>4</sup> Analogous to ISO EN 9453:2014 or internal specification + FLOWTIN addition | <sup>5</sup> Analogous to ISO EN 9453:2014 or internal specification + FLOWTIN and desoxidation addition

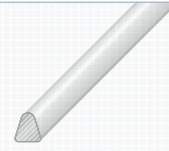

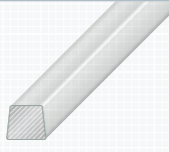

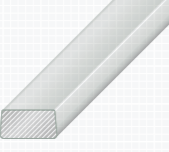

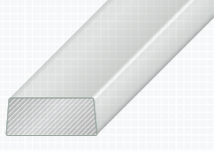

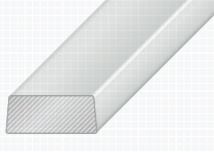

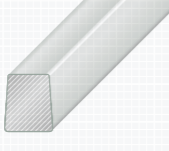
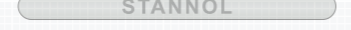
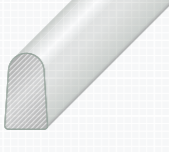

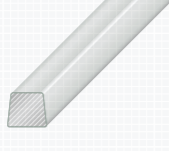

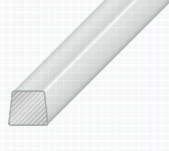

<sup>6</sup> Variations in the SN100C® solders are mainly based on different Ni and Ge contents. Further details can be found in the technical datasheet or you may ask our team of application engineers about the best option for your application.

All the above mentioned lead-free alloys are available as copper-free versions, too. The copper-free versions can be required to maintain the copper content or reduce higher copper contents during the usage of the solder in the soldering equipment. The above listed alloys represent only a small selection; other alloys are available on request. Some alloys are subject to production-related MOQs.

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## AVAILABLE DELIVERY FORMS OF STANNOL SOLDER

<b>TRIANGULAR BAR<sup>1</sup></b> Dimensions (LxWxH) 443 x 11.5 x 14.5 mm approx. 0.36 kg <sup>2</sup> bei Sn99Cu1		
<b>FORMBLOCK 330<sup>1</sup></b> (kg-Stange) Dimensions (LxWxH) 328 x 20 x 20 mm approx. 1 kg <sup>2</sup> bei Sn63Pb37		
<b>FORMBLOCK 325 E</b> Dimensions (LxWxH) 325 x 30 x 15 mm approx. 0.88 kg <sup>2</sup> bei SN100C®		
<b>FORMBLOCK NR. 7<sup>1</sup></b> Dimensions (LxWxH) 540 x 48 x 20 mm approx. 3.7 kg <sup>2</sup> bei Sn63Pb37		
<b>FORMBLOCK NR. 8</b> Dimensions (LxWxH) 540 x 48 x 20 mm approx. 3.7 kg <sup>2</sup> bei Sn63Pb37		
<b>FORMBLOCK 300</b> (Poka Yoke) Dimensions (LxWxH) 300 x 25 x 28.5 mm approx. 1.6 kg <sup>2</sup> bei Sn63Pb37		
<b>FORMBLOCK 300 LF</b> (Poka Yoke) Dimensions (LxWxH) 300 x 22 x 40 mm approx. 1.6 kg <sup>2</sup> bei Sn99Cu1		
<b>FORMBLOCK 160 E</b> Dimensions (LxWxH) 164 x 24 x 20 mm approx. 0.54 kg <sup>2</sup> bei Sn63Pb37		
<b>FORMBLOCK 330 E</b> Dimensions (LxWxH) 330 x 21 x 20 mm approx. 1 kg <sup>2</sup> bei Sn96.5Ag3.5		

Other sizes and delivery forms are available upon request. The dimensions specified in the catalogue may vary due to production techniques.

<sup>1</sup> Preferred bar form / <sup>2</sup> Average weight of the specified alloy.

## SELECTIVE STARTER KIT

The Selective Starter Kit contains perfectly matched products for time-saving and easy setup and reliable operation of all selective soldering systems for lead-free soldering processes.

The selective soldering kit was assembled with decades of experience in selective soldering processes, partly with specially developed products, partly with proven fluxes, taking into account the most common system technology and nozzle configurations.

The use of high-purity metals manufactured from primary melt according to ISO 9453:2014 or similar ensures compatibility with all upstream and downstream soldering processes. The use of high-purity raw materials will also have a positive effect on throughput and the minimization of soldering defects.

The **EF350** flux, with its proven use in the automotive sector, is an ideal selective flux, for safe solder joint formation in combination with electrically highly safe residues. In addition to its very wide process window in preheating, it also offers low residues levels and considerably minimizes the cleaning effort.

Wetting or non-wetting soldering nozzles contaminated with metal oxides, which negatively influence the controlled flow behaviour at the nozzle, are quickly cleaned by the **Select Clean 50** cleaning medium. Application from a cartridge ensures low consumption and good removal of oxides. The optimum flow characteristics of the solder are thus quickly restored.

## AVAILABLE ALLOYS FOR SELECTIVE STARTER KIT

<b>LEAD-FREE (ECOLOY SERIES)</b>	ECOLOY TSC305	<b>LEAD-FREE MICRO ALLOY</b>	Flowtin TSC305	<b>LEAD-FREE MICRO ALLOY</b>	SN100C™
<b>Composition</b>	S-Sn96,5Ag3Cu0,5	<b>Composition</b>	S-Sn96,5Ag3Cu0,5*	<b>Composition</b>	Sn99,3Cu0,7NiGe
<b>Melting point °C</b>	217-220 °C	<b>Melting point °C</b>	217-220 °C	<b>Melting point °C</b>	227 °C

\* According to ISO 9453:2014 or internal specifications, additionally doped with micro alloy additives <0.05%.

## THE SELECTIVE STARTER KIT INCLUDES

- » **10 kg lead-free solder in triangular rods** (various alloys available)
- » **1 litre EF350 selective flux**
- » **1 x 4 kg spool with massive solder wire**, for refilling the selective solder bath in the chosen alloy, 2.0mm diameter
- » **2 cartridges Stannol Select Clean 50** nozzle conditioning paste
- » **dispenser box Cleaning cloths** for maintenance and cleaning of the soldering system
- » **collecting bin** for professional disposal/return of solder waste
- » **application-technical consultation on site**, for the common determination of the optimal soldering parameters







# SOLDER PASTES

BOTH LEADED AND LEAD-FREE SOLDER PASTES ARE USED IN ELECTRONICS – FOR REFLOW SOLDERING AND REWORK SOLDERING PROCESSES.

Stannol supplies both lead containing and lead-free solder pastes in various particle sizes and packaging (e.g. jars and cartridges) for a wide range of application. We offer eutectic silver containing, low-silver and silver-free solder pastes specifically developed for lead-free applications.

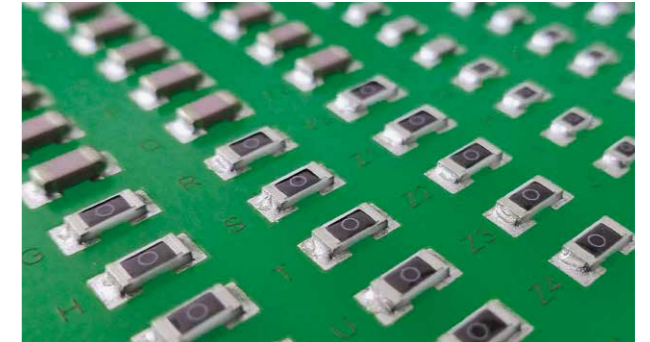
This part of our catalogue features some popular solder pastes, as well as several new developments for use in SMT manufacturing. Please do not hesitate to contact us for further details about additional solder pastes from our portfolio.

## LEAD-FREE SOLDER PASTES



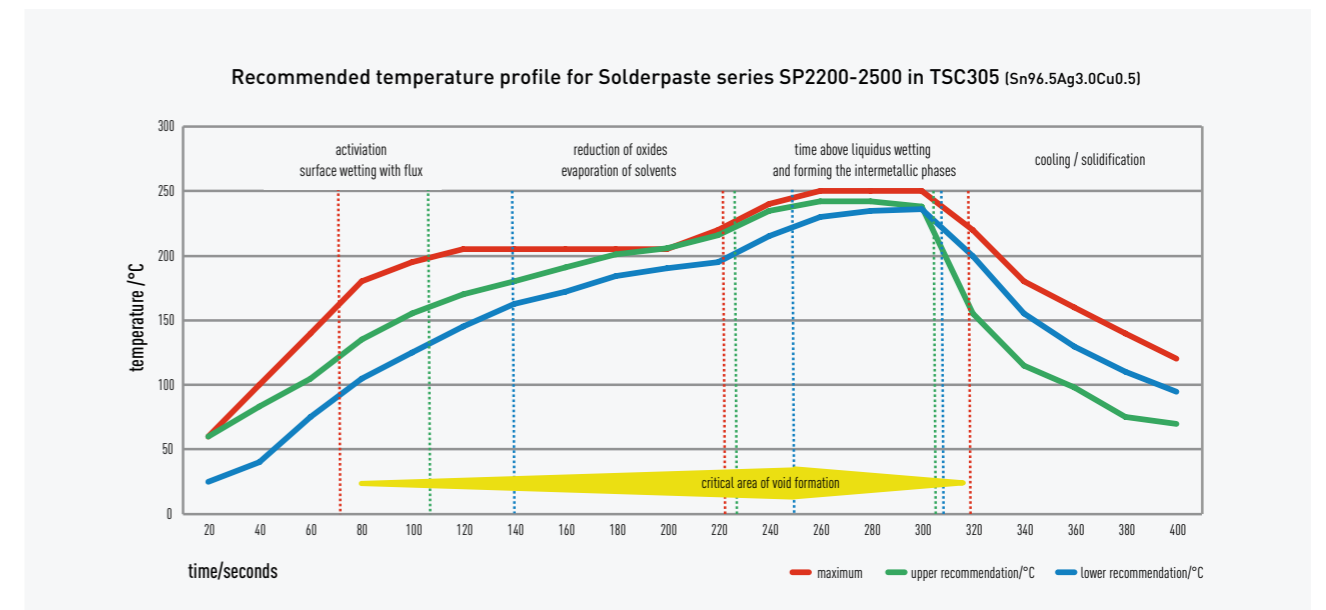
The No-Clean solder pastes **SP2100** and **SP2200** are developed for use with lead-free alloys in stencil printing. In addition to the long open time, even after long printer down times, both pastes immediately show a perfect print definition. Due to activation as a type L1 flux, SP2100 solder paste is more suitable for use on surfaces that are difficult to solder. This paste achieves good wetting and soldering results.

The No-Clean SP2200 solder paste, by contrast, is activated as type L0. This activation ensures good wetting combined with a high level of electrical safety on all surfaces used in electronics today. Both solder pastes leave only small amounts of residues after the reflow process, which are bright and transparent and do not have to be removed.



Minimal amount of residues at highest electrical safety are the highlights of our latest and future oriented paste generations.

## IDEAL TEMPERATURE PROFILES FOR REFLOW SOLDERING



The integration of new solder pastes in established manufacturing processes is usually quite easy and simple. Some cases may require minor modifications to the reflow profile due to board and component configuration. This will ensure the highest possible performance of the flux formulation at minimal adjustments. Easy basic setting can start with 25K above liquidus for 40-60 seconds as the average process window. This is still respecting the sensitivity of the majority of components.

Following the special conditions in vapour phase equipment, critical components or circuit boards could require a faster or linear profile instead. Please do not hesitate to contact our technical specialists for personal support and optimization purposes.

## NEW SOLDER PASTE SP2600

The main drivers to develop the **SP2600** have been the requirement to significantly reduce if not eliminating voiding and avoid solder balling. Even with large area paste deposits or thermal pad bonding the SP2600 proves significant characteristics to exceed the IPC defaults as well as a comfortable process window.

The halogen free formulation of the RELO flux convinces in oxygen or nitrogen atmosphere with an uncompromising wetting and printability. To address the enhanced challenges in fine pitch soldering the SP2600 is available in T3 and T4 powder size. Operators with enhanced optical expectations will be more than satisfied with the improved transparency of the residues. To be used in soak and linear profiles our new solder paste is equally effective.

It is available in TSC305 and silver reduced alloys. SP2600 is qualified for the usage in ramp and linear profiles, but for void reduction we recommend to use a ramp profile with highest possible ramp and peak temperature not exceeding 245°C.



The solder paste SP2600 ensures even with the low activation with a proper wetting activity. It shows low voiding and low solder beading.

## LEAD CONTAINING SOLDER PASTES

**SP1100** and **SP1200** solder pastes are only available with lead containing alloys. These pastes are distinguished by their classification and hence by their different wetting behaviour. While the SP1100 as a highly activated ROM1 solder paste can also achieve good soldering results on surfaces that are difficult to solder, the SP1200 as a ROL1 solder paste is designed for showing best results on good solderable surfaces. The residues of these two No-Clean solder pastes do not have to be removed.

The additional lead containing solder paste, **SP15 63S4** allows us to offer solutions to eliminate tombstones. By using combinations of alloys and powder particle sizes in this solder paste, different approaches are selected in order to reduce the number of raised components. The choice of solder paste is only one aspect of removing defects. Layout of the stencil, the pad geometry, solder paste quantity and other manufacturing parameters are just as important to reduce tombstones. Nevertheless, the use of a suitable solder paste can support the safe overall reduction of defects, especially at increasingly smaller components.

## SOLDER PASTE FOR DISPENSING

For dispensing applications we offer the **SP651M** solder paste in the lead-free alloy TSC305 (Sn96.5Ag3.0Cu0.5) as a standard product. This solder paste has been designed for reliable automatic dispensing processes with inner dispensing needle diameters down to 0.4mm in particle size 3. The flux medium

is classified as ROL0 according to J-STD-004. It is a Halide-Zero formulation and shows a good process window due to its well-balanced activity. This solder paste leaves only minor amounts of clear and transparent residues.

## SOLDER PASTES WITH LOW MELTING POINT ALLOYS

The No-Clean solder paste Stannol **SP3000** in the alloy Bi57Sn42Ag1 is a lead-free low temperature solder paste. It is used in applications that require lower peak reflow temperatures. Today, lead-free alloys with a high tin content such as TSC305 (Sn96.5Ag3.0Cu0.5, 221-223°C) are mostly used. This lead-free alloy requires processing temperatures 30-40K higher than those of Pb-containing solders. Not all components in the soldering process can withstand these soldering temperatures without damage. There are also newer applications e.g. in the LED sector (optoelectronics), which require reduced maximum soldering temperatures.

The alloy Bi57Sn42Ag1 used in this solder paste has a melting range of around 140°C and can therefore be processed safely and reliably with a maximum reflow temperature of 170-180°C. Due to the silver content of 1%, this alloy has a considerably increased long-term reliability compared to the eutectic BiSn alloy. Further advantages are lower temperatures in the reflow oven, reduced wear of the equipment, reduced energy costs.

The SP3000 is not part of our standard scope of delivery. If you are interested in this solder paste, please contact us.

## SOLDER PASTES OVERVIEW

NAME	ALLOY	CLASS <sup>1</sup>	MELTING RANGE	PARTICLE SIZE	METAL CONTENT	APPLICATION	PACKAGING SIZES <sup>3</sup>	ART.-NO.	GREEN-CONNECT
SP15	Sn62,8Pb36,8Ag0,4 <sup>2</sup>	ROL1	179-183°C	3/5 (10-45 µm)	89.5%	Stencil printing	500 g jar	690015	
SP15	Sn62,8Pb36,8Ag0,4 <sup>2</sup>	ROL1	179-183°C	3/5 (10-45 µm)	89.5%	Stencil printing	12 oz Semco	690017	
SP1100	Sn62Pb36Ag2	ROM1	179°C	3 (25-45 µm)	90%	Stencil printing	500 g jar	691100	
SP1200	Sn62Pb36Ag2	REL1	179°C	3 (25-45 µm)	90%	Stencil printing	500 g jar	691200	
SP2100	Sn95,5Ag4Cu0,5	REL1	217-223°C	3 (25-45 µm)	88%	Stencil printing	500 g jar	692100	
SP2100	Sn95,5Ag4Cu0,5	REL1	217-223°C	4 (20-38 µm)	88%	Stencil printing	500 g jar	692150	
SP2200	Sn95,5Ag4Cu0,5	RELO	217-223°C	3 (25-45 µm)	89%	Stencil printing	500 g jar	692200	
SP2200	Sn96,5Ag3Cu0,5	RELO	217-220°C	3 (25-45 µm)	89%	Stencil printing	500 g jar	692210	
SP2200	Sn96,5Ag3Cu0,5	RELO	217-220°C	3 (25-45 µm)	89%	Stencil printing	1200 g Semco	692212	
SP2200	Sn96,5Ag3Cu0,5	RELO	217-220°C	3 (25-45 µm)	89%	Stencil printing	600 g Semco	692215	
SP2200	Sn99Ag0,3Cu0,7	RELO	217-227°C	3 (25-45 µm)	89%	Stencil printing	500 g jar	692220	
SP2200	Sn99Ag0,3Cu0,7	RELO	217-227°C	4 (20-38 µm)	89%	Stencil printing	500 g jar	692225	
SP2200	Sn96,5Ag3Cu0,5	RELO	217-220°C	4 (20-38 µm)	89%	Stencil printing	500 g jar	692250	•
SP2300	Sn96,5Ag3Cu0,5 <sup>4</sup>	RELO	217-220°C	5 (15-25 µm)	89%	Stencil printing	500 g jar		
SP2500	Sn96,5Ag3Cu0,5 <sup>4</sup>	RELO	217-220°C	3 (25-45 µm)	89%	Stencil printing	500 g jar	692500	
SP2500	Sn99Ag0,3Cu0,7	RELO	217-227°C	3 (25-45 µm)	89%	Stencil printing	500 g jar	692520	
SP2500	Sn96,5Ag3Cu0,5 <sup>4</sup>	RELO	217-220°C	4 (20-38 µm)	89%	Stencil printing	500 g jar	692550	

SOLDER PASTE FOR DISPENSING									
SP651M	Sn96.5Ag3.0Cu0.5	ROLO	217-220°C	3 (25-45 µm)	84%	autom. dispensing	75 g / 30 cm <sup>3</sup> cartridge	690102	

<sup>1</sup> According to J-STD-004 | <sup>2</sup> Optimized against Tombstone-Effect | <sup>3</sup> Other packaging sizes are available on request | <sup>4</sup> Anti-Voiding formulation.

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# FLUXES

FOR SOFT-SOLDERING IN THE ELECTRONICS MANUFACTURING, A FLUX IS USED IN ORDER TO SAFELY REMOVE OXIDES AND OTHER CONTAMINANTS FROM THE COMPONENTS AND THE PCBs. THIS ENABLES A RELIABLE SOLDER CONNECTION.

The right choice of flux for wave and selective solder processes in electronics manufacturing is determined by different factors. What is essential in one manufacturing environment may be of much less importance in another. Our fluxes are just as multifaceted as our customers' requirements. Be it a water-based or a conventional solvent-based flux, with or without resin, with or without certain substances due to special

material combinations. Since 1879 the range of available fluxes for reliable soldering has constantly grown in line with the growing requirements. We would like to present you in the following few pages some of our most successful flux products. Many other special fluxes from our portfolio can be demonstrated on a one-on-one basis.

## FLUX EF350 BIO



The halogen-free activated no-clean flux **EF350 BIO** guarantees an excellent wetting ability on different surfaces (e.g. OSP, Ni/Au, HAL, chem. Sn and chem. Ag) both with lead-free and lead-containing solder alloys.

EF350 BIO is a flux with an extremely wide process window. It can be used universally for wave soldering as well as for

selective soldering due to its very good activity. This product is suitable for use in spray fluxers, micro drop fluxers, dipping processes and several other methods.

By using bio-ethanol in this version of the EF350, manufactured from straw with energy from renewable resources, the CO<sub>2</sub> footprint is reduced by 70-90% compared to the conventional IPA-based flux version.

## EF-SERIES OF LIQUID FLUXES

The **EF-SERIES** covers many of the manufacturing industry's requirements for liquid soldering fluxes by providing versatility and a large application area. The EF series has been developed for application with modern spray fluxing systems. Since the series encompasses fluxes with different activation strengths, it gives you the chance to select the optimum activation according to soldering and reliability requirements. While e.g. low activation may be selected for a full nitrogen tunnel wave soldering system, soldering with older equipment and on difficult surfaces requires a higher activation level.

Apart from the activity and the resulting soldering performance, the reliability of No-Clean fluxes and their residues after soldering are important factors for the selection of the right flux for the production process.

While the EF series is completely Halide Zero designed, it offers types with or without resin, with only traces of activator, up to broadband fluxes that fulfil all the requirements of current electronics manufacturing systems.

All of these fluxes ensure a high to very high degree of electrical safety with varying but low amounts of residues on soldered printed circuit boards.

In comparison with **EF330** the flux **EF350** with its small addition of resin raises the insulation resistance of the flux residues and concurrently reduces the formation of solder beads. The good activation of the flux EF350 provides a wide process window and can therefore obtain good results also in a selective soldering process.

The **EF200** and **EF210** show less activation and are well suited for soldering in nitrogen atmosphere as well as on some air soldering equipment, where they leave less residues on the PCBs due to their lower amount of solids.

The version **EF270F** was optimised for application with foam fluxing units. It contains well-balanced additives, which ensure a proper foam formation over a long time. This results in a perfect thin layer of flux and a safe application prior to a good wetting and safe formation of the solder joints.

During the development of the newest member of the EF series, the **EF250**, the reduction of flux residues in the soldering equipment and on the PCBs was one of the main goals while maintaining the very good wetting properties, known from the EF series of fluxes. Reduction of equipment cleaning and maintenance was achieved with the EF250 flux. The PCBs leave the soldering process in a very clean condition; the very low amount of flux residues passes all international test standards.



All common Stannol No-Clean fluxes with small amounts of solids can be applied reproducibly in minor amounts with every common spray method on the market.

## SPECIAL FLUXES

The **500-6B** is an active flux with high priority on the electrical safety of its residues. The solids contain activators and a high amount of rosin. This results in a higher residue level after soldering, but this is often accepted due to its very high electrical safety and insulation resistance. The flux 500-6B can be applied with all commonly installed fluxing systems.

The flux **500-17/1** can be perfectly used for pre-tinning of enameled copper wires at higher temperatures as well as different other delicate soldering applications. It has been developed especially for dip soldering and its high amount of solids ensures that there is always enough active flux left at the component to be soldered, even at elevated preheat temperatures or high temperatures of a dip-solder bath. There is enough activity to achieve an even pre-tinning and good soldering results.

## SEMI-AQUEOUS FLUXES

Some slightly older soldering equipment is not well equipped in preheating for the use of VOC-free fluxes. The heat transfer rate or the length of some equipment is not high or long enough. What to do if you need to reduce your VOC emissions? The usage of semi-aqueous fluxes might be an option. With this family of fluxes the VOC emissions can be reduced up to 50% and your existing equipment can be further used. Lower flash points for easier transport and storage may also apply on some of these fluxes. They are all based on resin- and halide-free formulations.

Already some years in our product range of the semi-aqueous fluxes the **HW139** with 2.5% solids had proven his wide process window, easy application and good soldering results in many different applications.

As the newest development in this segment of fluxes we introduce the **HW240**, which differs from the other ones due to its unique activation system. This ensures good soldering results combined with very low amounts of residues.

## WATER-BASED FLUXES

The flux **WF300** is available in spraying and foaming variations. With a comparatively high solid content for a spray flux, the applicable flux volume can be reduced considerably and still results in reliable soldering. Therefore you can reduce the required amount of energy for drying the board prior to soldering as well as the volume of required flux.

**WF130** and **WF131** are our newest water based ORL0 flux developments. They both come with perfect soldering results and leave very small amounts of electrical safe residues combined with extremely low corrosive potential. These both water based flux are true halogen "Zero" fluxes and contain no VOCs. Due to the very low corrosive potential these both can be classified as L0, not often seen with water based fluxes.

Main difference of the WF131 is a further reduction in residue level, with a very minor compromise of a slightly smaller process window. Introducing water-based fluxes requires a comprehensive assessment of the application. Our application specialists will gladly support you and provide expert advice on site.



## FLUX FOR SELECTIVE SOLDERING

Today's selective soldering processes places special demands on the flux required. Of course, it is often the case that a flux developed for wave soldering also works on selective soldering systems. But does it meet the growing demands? The **SF1000** from the Stannol SF series of fluxes for safe selective solde-

ring is the next flux which has been adapted to these special requirements. Large process window, technical purity, lower thermal stress with highest electrical safety were the keywords in the development - this was successfully implemented with the alcohol-based SF1000.

## OVERVIEW

	FLUX	DIN EN ISO 9454-2	J-STD-004 J-STD-004B	APPLICATION METHOD*	VOC CONTENT	SOLID CONTENT %	APPLICATION	GREEN-CONNECT
EF-SERIES	EF200	2.2.3.A	ORL0	S	High	2.0	Wave, Selective	
	EF210	2.2.3.A	ORL0	S	High	2.1	Wave, Selective	
	EF250	2.2.3.A	ORL0	S	High	2.5	Wave, Selective	
	EF270	2.2.3.A	ORL0	S	High	2.7	Wave, Selective	
	EF270F	2.2.3.A	ORL0	SF	High	2.7	Wave, Selective	
	EF330	2.2.3.A	ORL0	S	High	3.3	Wave, Selective	
	EF350	2.2.3.A	ORL0	S	High	3.5	Wave, Selective	
	EF350 Bio	2.2.3.A	ORL0	S	High	3.5	Wave, Selective	•
WATER-BASED	WF130	2.1.3.A	ORL0	S	Free	3.0	Wave, Selective	•
	WF131	2.1.3.A	ORL0	S	Free	2.6	Wave, Selective	•
	WF300F	2.1.3.A	ORM0	F	Free	4.6	Wave	•
	WF300S	2.1.3.A	ORM0	S	Free	4.6	Wave	•
SPECIAL FLUX	SF1000	2.1.3.A	ORL0	S	High	2.5	Selective, Wave	
	500-6B	1.1.3.A	ROL0	S, F, D, B	High	6.0	Wave, Selective	
	500-17-1	1.1.3.A	ROL0	S, F, D, B	High	15.0	Dipping	
	500-3431BF	2.2.3.A	ORL0	S	High	4.4	Wave	
	900-7-1H	2.1.2.A	ORM1	S	High	1.7	Dipping	
	HW139	2.2.3.A	ORM0	S	Low	2.5	Wave, Selective	
	HW240	2.2.3.A	ORL0	S, F	Low	2.4	Wave, Selective	
	X33-08i	2.2.3.A	ORL0	S	High	2.0	Wave, Selective	
	L2	2.2.3.A	OR L0	S, F, D, B	High	2.0	Wave, Selective	
	P770	2.2.3.A	OR L0	S, F	High	2.3	Wave, Selective	
P981	1.2.3.A	RE L0	S, F	High	2.7	Wave, Selective		

\*Application methods: S spraying / F foaming / D dipping / B brushing

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# STANNOL

# greenconnect

responsible soldering products

## THE WORLDWIDE 1<sup>ST</sup> GREEN PRODUCT LINE

With the permanently growing range of GREENCONNECT products STANNOL offers you as the first solder manufacturer worldwide, a complete green product line.

For more sustainability!



SOLDER WIRES



FLUXES



SOLDERING STATIONS



SOLDER PASTES



ACCESSORIES



SOLDER BARS

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# STANNOL

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