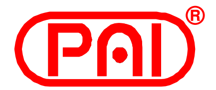
PERSANG ALLOY INDUSTRIES PVT. LTD.



SOLDER PRODUCTS.

TECHNICAL DATA SHEET

SP-604 Pb Free SOLDER STICKS

PRODUCT DESCRIPTION

PAI SP-604 RoHS Compliance Solder Sticks are being formulated with High Virgin Raw Metals Processed in state-of-the-art Vaccualloy Technology that brings world class Quality along. Here, Oxygen interaction with Alloy is Nil and thus, Dross formulation is reduced at PCB Assembly Process. Also an increase flow rate & reduced impurities found. PAI SP-604 Alloy is compatible for a typical range of Flux Application Formulas used in Electronics Industry Today.

STORAGE AND HANDLING

- Do not use Fire near storage area.
- Store in Dry, Cool and Non-Corrosive environment.
- Wear Personal Protective Equipments while Handling.
- Wear Personal Protective Equipments while Processing.

ALLOY COMPOSITION

Sn	Ag	Cu	Ni	Ge	Bi	Zn	Fe	Al	As	Cd
Rem	0.1% - 0.12%	0.5% - 0.7%	0.04% - 0.08%	0.005 - 0.02%	0.10% Max	0.002% Max	0.02% Max	0.002% Max	0.03% Max	0.002% Max

PHYSICAL CHARACTERISTICS OF APPLICATION

Alloy	SnAg0.1Cu0.5Ni0.06Ge0.01
Shape	Rectangular Form
Density	7.4gm/cm³ at 20^{0}C
Melting Temperature	217^{0}C ~219^{0}C.
Package Form	25Kgs
Application	Wave Soldering / HASL Process
Standards Considered	JIS-Z-3282
Shelf Life	10 Years

TECHNICAL SPECIFICATIONS

Technical Factors Recommended	Specifications
Solder Pot Temperature	260°C to 272°C
Dwell Time	3 Sec to 5 Sec
Immersion	0.5% to 0.70% of PWBs Thickness that being Processed
Dross Recovery	Once in Every 8 Hours
Impurities Level Check	In-House Specifications
Cu Content	<1%
Other Factors	Refer Liquid Flux Manufacturer Specifications for desired Yields

Note: The recommendations stated above have been contributed for desired Solder Joints and shall modify if required based on the end user Specifications.

Regd Off & Works:
353, GIDC Estate, Waghodia-391760. Dist : Vadodara.
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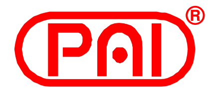


SOLDER PRODUCTS.

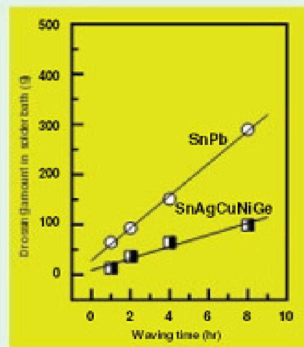
BRIEF REPORT ON SAC+Ni+Ge ALLOY

SnAgCuNiGe

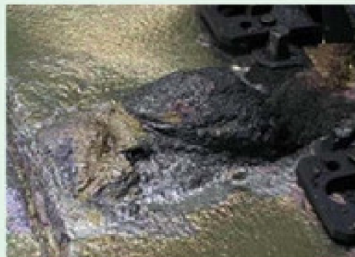
Effect of Germanium

Dross Suppression

Germanium suppresses drossing which is caused by Tin oxidization. In our tests, Fuji's Lead-Free 5-Element Solder resulted in quite small amount of drossing. It is assumed Germanium oxidizes preferentially and creates a stable oxide film which retards oxidization of other metals such as Tin and Copper.



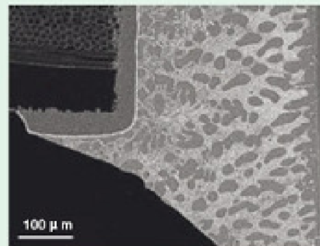
Waving Hours and Drossing by Wave Soldering (80kg solder bath)



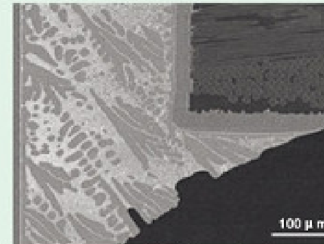
Dross

Suppressing Solidification Cracking

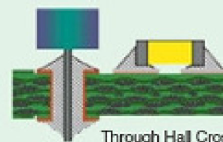
As our Lead-Free Solder including Ni and Ge has fine solidification structure, it has less shrinkage cavities and is structurally stable. Ni-Sn and Cu-Ni-Sn compounds, in the process of soldering, easily formed nucleation and suppressed growth of β-Sn primary crystallization. *2



In case of 5-Element Solder



Example of Shrinkage Cavity



Through Hall Cross-Section

Characteristics of Lead-Free 5-Element Solder (internal research)

benefits	metallic characteristics	by effect of
Improvement of Soldering Joint	Superior wettability	Ag, Ge
	Reduces shrinkage cavity	Ag, Ni, Ge
	Suppresses Cu-erosion	Ni
Superior in Mechanical Characteristics & Reliability	Thermally resistant	Ni
	Textually dense	Ag, Ni, Ge
Reducing Running Cost	Suppresses drossing	Ge

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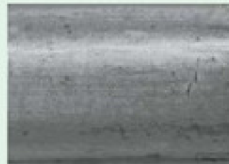
Fuji`s Lead-Free & 5-Element Solder

Characteristics and Effects of Metals

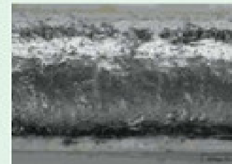
Fuji`s Lead-Free 5-Element Solder consists of Tin (Sn), Silver (Ag), Copper (Cu), Nickel (Ni) and Germanium (Ge) and has good properties such as high solderbility and thermal stability which are especially effected by Silver, Nickel and Germanium.

Protecting Copper Erosion

Fuji's Lead-Free 5-Element Solder reduces Copper Erosion and loss of Copper electrode of printed circuit boards due to Ni addition. And it also suppresses increasing Copper concentration in a solder bath which is caused by the Erosion. It is assumed Nickel forms(Cu, Ni)$_6$Sn$_5$ Intermetallic layers and restrains such erosion.



In Case of 5-Element Solder

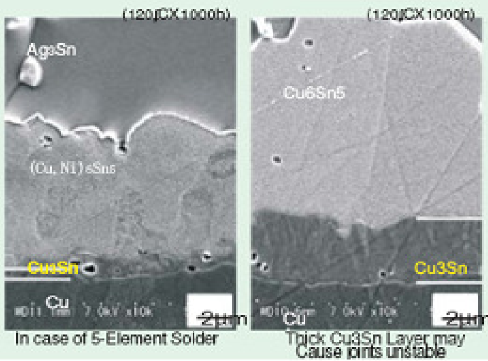


Cu Lead with Erosion

Effect of Nickel

Joint Reliability

Growth of reacting layers on a joint is suppressed by Nickel in the 5-Element Solder alloy, which is regarded to improve property of soldered joints. It is assumed formation of stable and thin inter-metallic compounds of (Cu, Ni)$_6$Sn$_5$ suppress growth of Cu$_3$Sn layers on the interfacial layer.



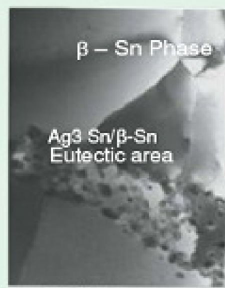
In case of 5-Element Solder

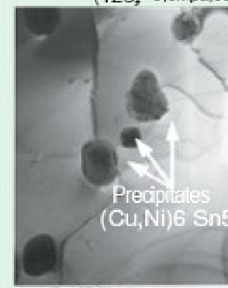
Thick Cu3Sn Layer may Cause joints unstable

Improvement of Thermal Fatigue Characteristics

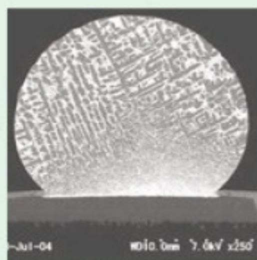
Nickel has high melting temperature and thermal stability. In this regard the Lead-Free 5-Element Solder has higher thermal stability and longer creep property under the actual circumstances such as low-stressed at high temperature for a long period. Such property is due to finely dispersed precipitates which include Nickel. *2 *3

(125℃,5Mpa,550h)

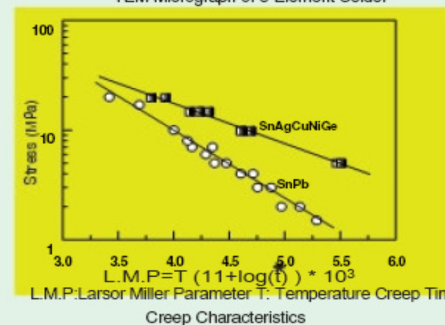




TEM Micrograph of 5-Element Solder



Cross-Section of 5-Element Solder BGA



L.M.P:Larsor Miller Parameter T: Temperature Creep Time

Creep Characteristics

For more details, please visit Our Website at www.persangalloy.com or write to us.

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