

Update: 30/04/2020	TECHNICAL DATA SHEET	
Ref: Alloy	LEAD FREE Alloy	
Created on: 03/09/2019	SIA®	



GENERAL CHARACTERISTICS:

Lead-free solder alloy composed of Tin and Bismuth with the addition of components to improve the overall properties of the alloy.

This alloy allows to find the properties and parameters used during production with standard lead alloys such as Sn63Pb37 or Sn60Pb40.

This alloy makes it possible to meet actual challenges by offering a lead-free alloy solution, controlled costs, thermal and mechanical properties comparable to SAC-type solutions and operating cost reductions (reduction of energy bills and limitation of dross formation).

This alloy can be used in all means of production used in electronics: wave, selective wave, SMT soldering...

Conform to RoHS 2011/65/EU directive.

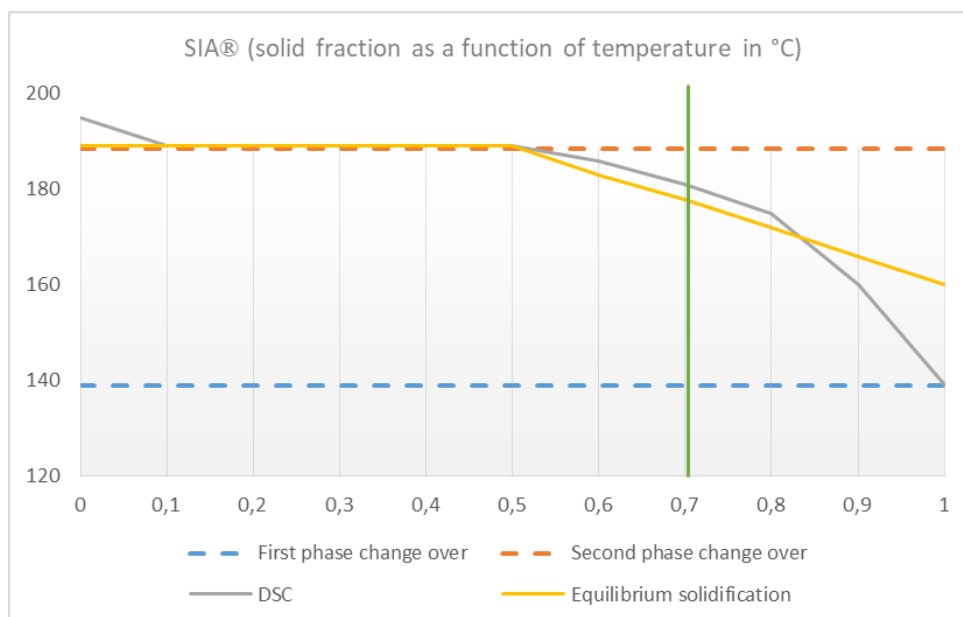
CHEMICAL CHARACTERISTICS:

Amount of Bismuth : 20 to 40 %
Amount of Tin : Rest
Special elements added to improve overall alloy properties
Tin from first melting – Bismuth with high purity

PHYSICAL CHARACTERISTICS:

Melting point (alloy solidification) : 180 °C – 189 °C
Melting point (DSC measurement): 139 °C – 195 °C
Specific weight : 7.9 g/cm³
Working temp. : 230°C to 245 °C (wave soldering)

Explanation of the differences between the DSC values and the « physically » measured values.



The SIA® alloy is solid when the solid fraction has a value greater than 0.7 (i.e. 70%).

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The melting point of the SIA® alloy is therefore lower than the melting point of SAC 305 (217 °C-220 °C) by 25 °C and the melting point of SN100C® (227 °C) by 32 °C.

PHYSICAL PROPERTIES of SIA® (compared to standard lead free alloys):

	SIA®*	SAC 305	SN100C®
Tensile strength (MPa)	85.6	49	36
0.2 % Proof stress (MPa)	61	39	27
Tensile strength at breakage (MPa)	69.6	42	30
Young's modulus (GPa)	33	51	50
Linear expansion coefficient (10 ⁻⁶ .°C ⁻¹) (40 to 100 °C)	21.57	23	24
Linear expansion coefficient (10 ⁻⁶ .°C ⁻¹) (100 °C)	21.02		
Thermal conductivity (W.m ⁻¹ .K ⁻¹)	37.25	58.5	64
Specific heat Cp (J/K.g)	0.206	0.23	0.22

*: All measurements were performed by a qualified external laboratory (SAYENS)



WETTING PROPERTIES of SIA®:

Test performed regarding the IPC J-STD 002.

Solderability Testing Equipment used : **Metronelec Menisco ST 50 Wetting Balance Serial Number 611**

Calculated uncertainty 0.00215 mN/mm

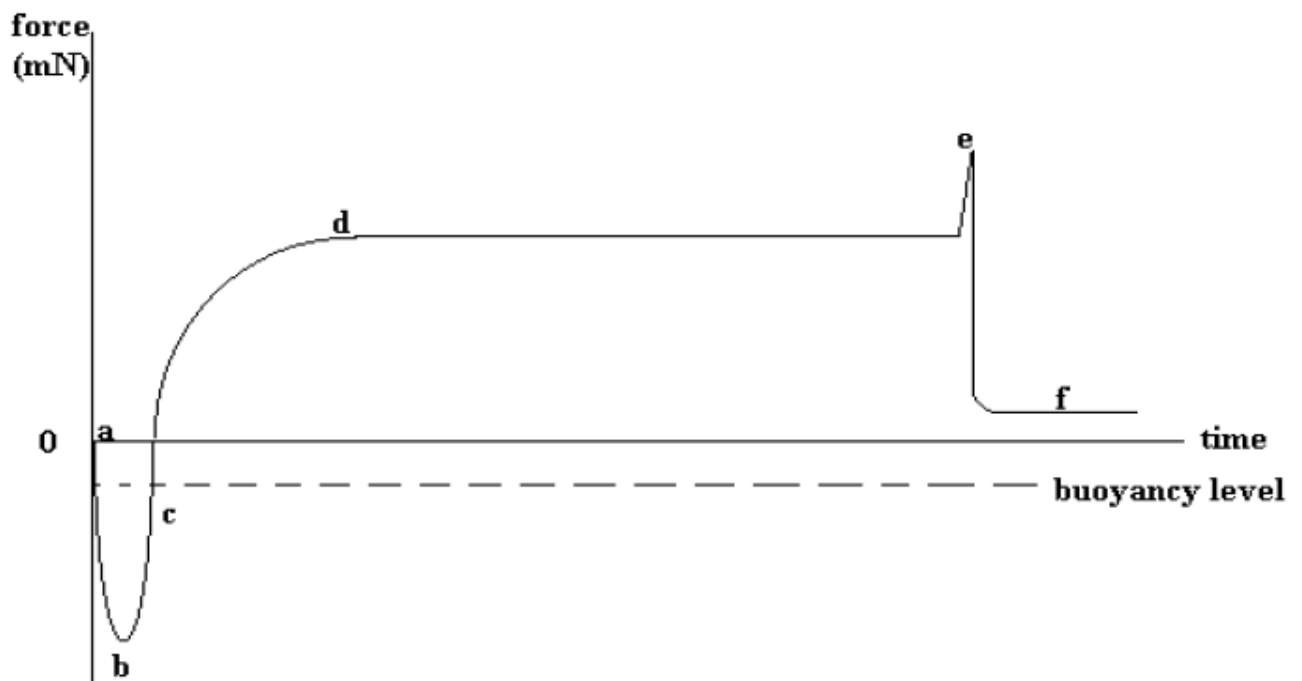
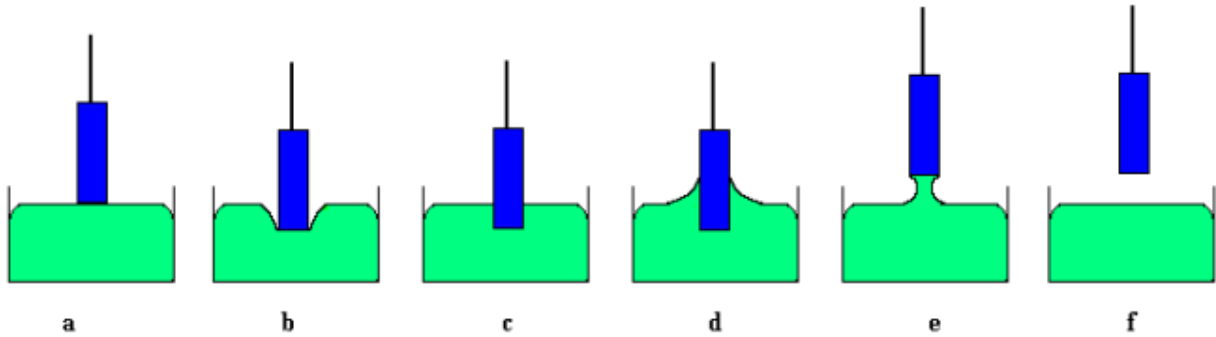
Alloy temperature of the bath : **245 °C.**

Test Flux Used : **IPC J-STD Test flux # 2**

Coupon : **Copper.**

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The Wetting Curve



- a) Sample reach the surface of the Solder Bath
- b) Sample at end of Immersion depth - (buoyancy)
- c) Forces at Equilibrium
- d) Maximum Wetting force
- e) Sample lift out of the solder bath
- f) Sample is out of the solder bath

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Results :

Sample	Time to cross zero in seconds	Force in mN/mm at 2 seconds	Force in mN/mm at 5 seconds	Force in mN/mm at 10 seconds	Pass/ Fail per IPC JSTD 002E
RA coupon tested with SIA®	0.298	0.23	0.24	0.24	PASS

Table of average values

Test realized by the following external laboratory :

S T & S Group. Testing & Analysis
Blair Park, 108 Rosedale Ave. Richmond KY 40475
Ph:859-353-5914 E-mail: jobrien@standsgroup.com
Website: www.standsgroup.com



PACKAGING / STORAGE:

Shape : Extruded Bars, Ingots, Sticks, Solid wires in dedicated packaging.
Other packaging : On request
Storage : In original packaging at room temperature away from inclemencies for 24 months.

SAFETY:

Material Safety Data Sheet available on request. Please consult it before use.

ADDITIONAL INFORMATION:

Our manufacturing processes have been subjected to FMECA analysis (equivalent of AMDEC in France). Quality Certificate available on request.



We cannot anticipate any and all conditions and situations under which the information and our products or the combination of both with others will be used. We do not assume any liability in the safety and suitability of our products alone or in combination with others. Users must make their own tests to determine the safety and suitability of each product used alone or with other products for their own use. Except any previous written agreement, our products are sold without guarantee and customers must assume all liability for any loss or damage suffered by themselves or by third parties, either from handling or use of our products alone or with others. In case of any difference or variation seen during the use of the products we request that you contact our technical department.