

## SN100C- Reliable Joints

# Long Service Life Under Conditions of Cyclic Strain



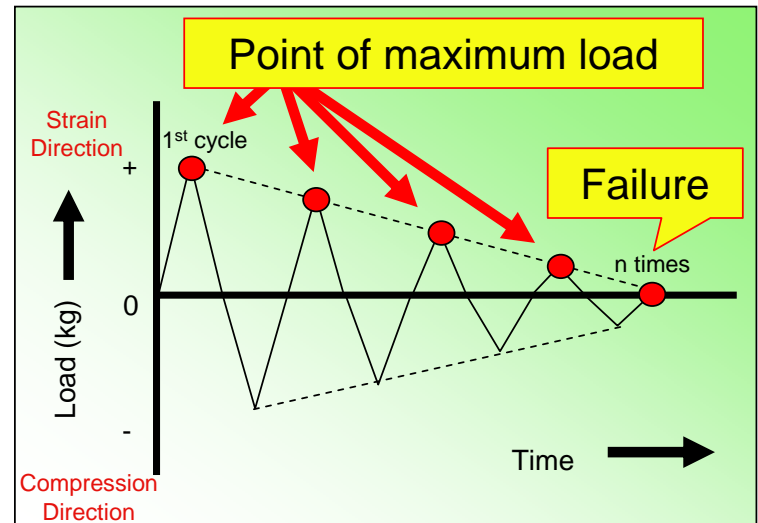
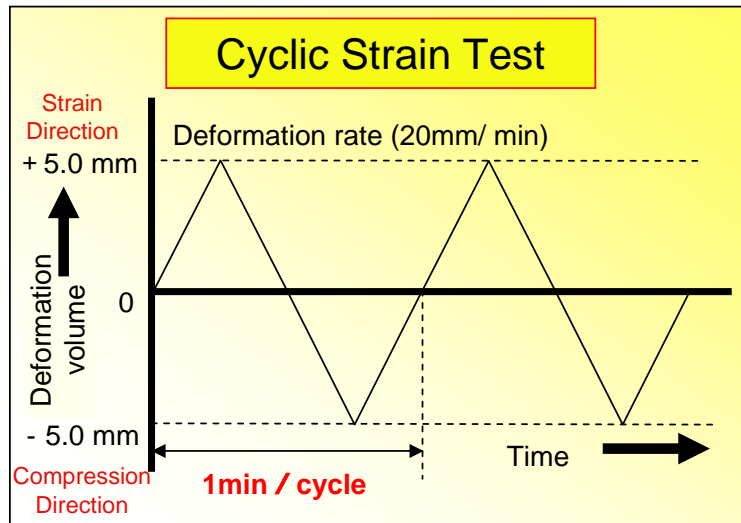
SN100C is an excellent lead-free solder that offers high first pass yield, *reliable joints* and economical operation. We present here a selection of data about cyclic strain.


# Long Service Life Under Conditions of Cyclic Strain

[Test conditions]

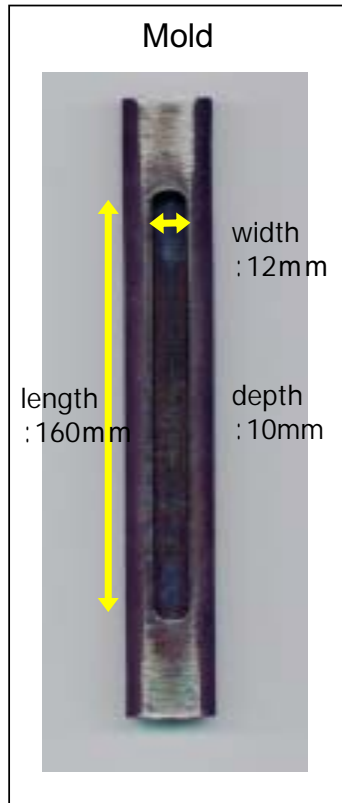
A cast solder bar is clamped in a tensile tester with a distance of 60mm between chucks.

The bar is subject to cyclic strain of  $\pm 5\text{mm}$  at a rate of 20mm/minute and the peak stress in the tensile part of each cycle noted. Cycling continues until fracture occurs and the number of cycles to failure noted.

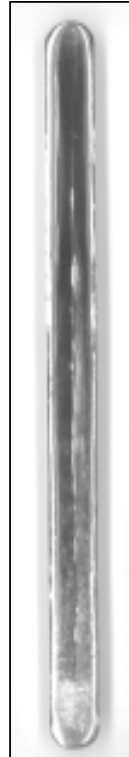


 We assess the ductility of the solder by measuring the load required to achieve repeated cycles of 5mm tensile and compressive strain at the rate of 20mm/minute until the point of failure.

## Manufacturing Test Piece



SN100C



Sn-3.0Ag-0.5Cu

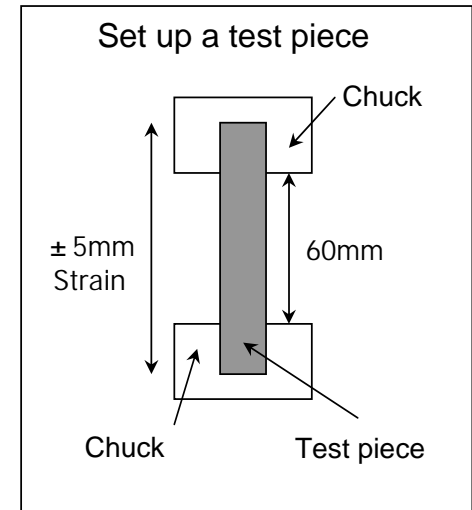


Sn-37Pb



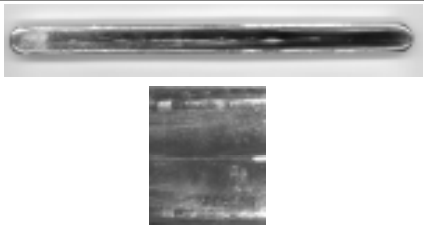
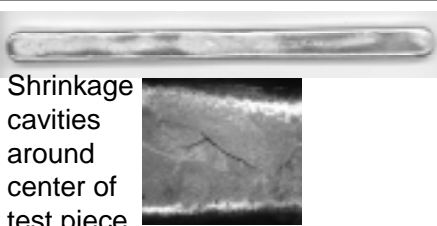
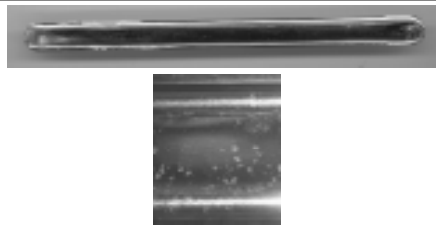
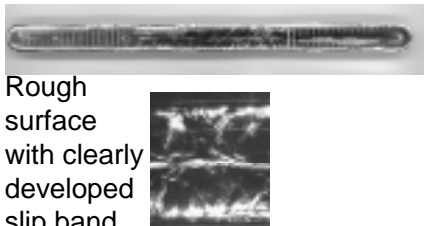
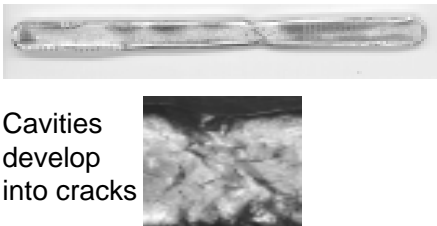
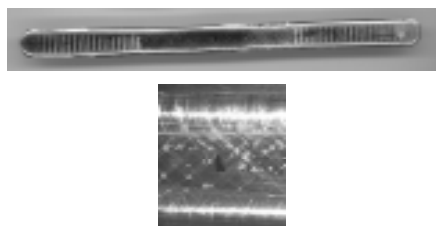
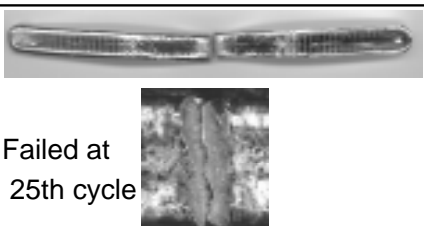
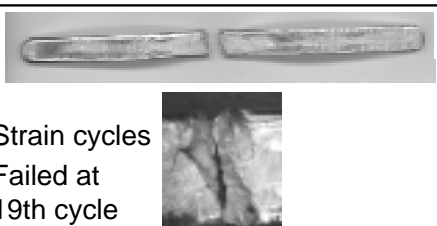
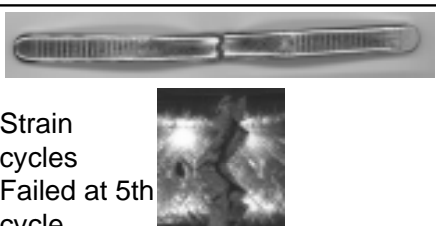
【Method of manufacturing】

Cut the solder bar into pieces 7x20x50mm. Melt and mix thoroughly to ensure complete solution. Then pour the molten solder into a mold.



The performance of three alloys, SN100C, Sn-3.0Ag-0.5Cu, and Sn-37Pb are compared .

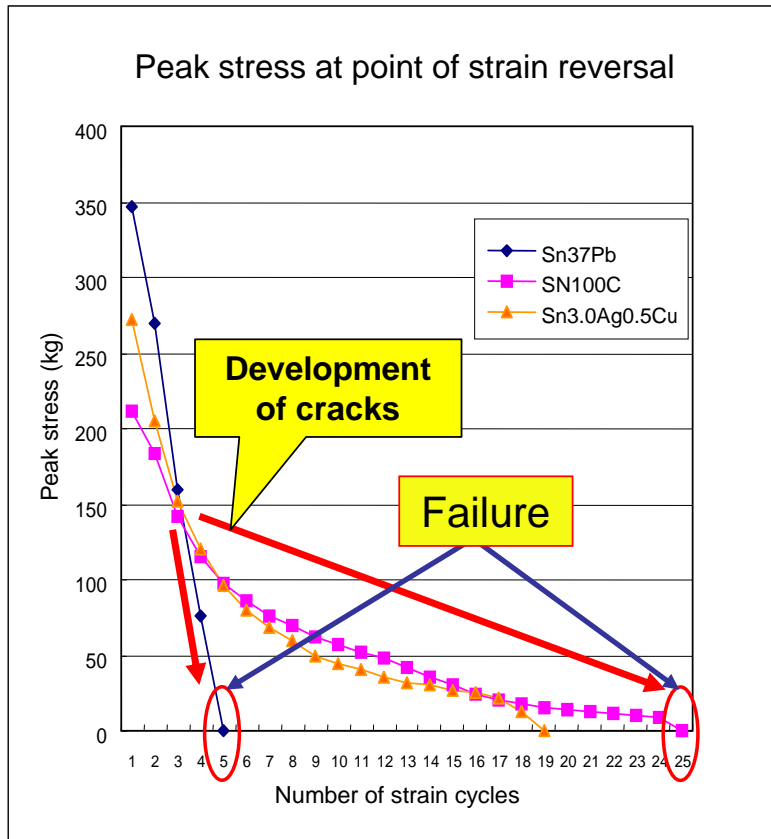
## Whole Picture

Material	SN100C	Sn-3.0Ag-0.5Cu	Sn-37Pb
<b>Early Stage</b>		Shrinkage cavities around center of test piece 	
<b>After 1st Elongation</b>	Rough surface with clearly developed slip band 	Cavities develop into cracks 	
<b>At Time of failure</b>	Failed at 25th cycle 	Strain cycles Failed at 19th cycle 	Strain cycles Failed at 5th cycle 



In the first cycle of strain slip bands appear on the surface of the SN100C. In the Sn-3.0Ag-0.5Cu cracks start to propagate from the shrinkage cavities. The surface of the Sn-37Pb remains smooth but cracks start to appear.

# Until Failure



**[Test Result]**

**1 . Load required for first tensile strain**

SN100C < Sn-3.0Ag-0.5Cu < Sn-37Pb  
(212kg) (272kg) (347kg)

**SN100C is the softest alloy.**

**2 . Cycles to Failure**

Sn-37Pb < Sn-3.0Ag-0.5Cu < SN100C  
(5times) (19times) (25times)

**SN100C has the longest service life under these condition of cyclic strain**

SN100C	Sn3.0Ag0.5Cu	Sn37Pb
25	19	5

**➔ Although initially requiring a lower load to achieve the 5mm strain SN100C shows greater capacity for accommodating cyclic strain than Sn-37Pb and Sn-3.0Ag-0.5Cu. SN100C survives five times as many strain cycles as Sn-37Pb before failure.**