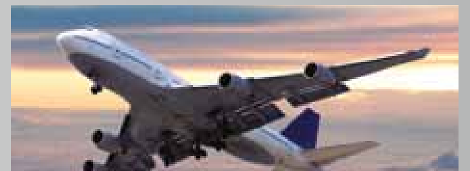
HIGH RELIABILITY PB-FREE SOLDER ALLOY

A breakthrough in solder alloy development, Henkel's highly reliable, lead-free solder alloy, 90iSC, provides superior thermal cycling, thermal shock, vibration, creep resistance while maintaining solderability and void levels over traditional SAC and SnPb solder. Developed with and globally accepted by the automotive industry, 90iSC is the world's leading lead-free, RoHS compliant solder alloy.



HIGH-RELIABILITY ALLOY

Henkel's solder alloy, 90iSC, is the solution to various market segments that require high reliability with RoHS compliance.

FAILURE MECHANISMS	HIGH RELIABILITY ALLOYS VS TRADITIONAL ALLOYS[1][2][3]
Thermal Cycling	• Thermal cycling causes stress to build within the soldered assembly • Stress relief mechanism is crack propagation through the solder joint • 90iSC alloy gives reduced electrical failures in comparison to SnPb in both -40ºC+150ºC and -40ºC+125ºC • Under -40ºC+150ºC, 90iSC has similar electrical failure levels to SnPb at -40ºC+125ºC
Thermal Shock	• Thermal shock testing is a more extreme version of thermal cycling • Failure mechanism is the same as thermal cycling, but failure occurs earlier • 90iSC alloy has outperformed SnPb and SAC alloys in thermal shock testing
Vibration	• 20% of airborne failures are attributed to vibrational stress[4] • SAC alloys have been shown to fail more frequently than SnPb alloys • 90iSC alloy returns the failure resistance performance back to SnPb standards
Drop Test	• Drop test resistance should not be compromised • 90iSC has reduced ductility over standard alloys • 90iSC alloy gives similar results to standard SAC with same failure mode • Failure mechanism is crack propagation along the intermetallic
Creep	• Creep resistance at a specified temperature is directly linked to thermal cycle failure • 90iSC alloy has a similar plastic strain constant at 150ºC when compared to SnPb at 80ºC

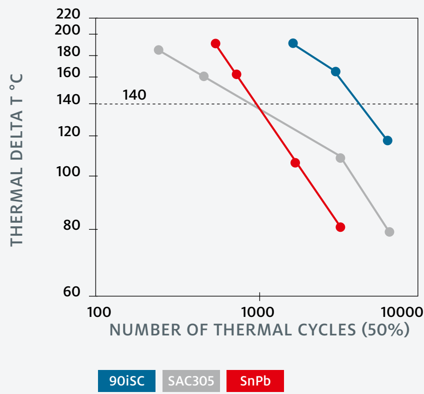
[1] Lead-free Solders for High-Reliability Applications: High-cycle Fatigue Studies, Barry N., University of Birmingham, 2008.
[2] Live project seminar, Ratchev R., Berlin 2008.
[3] Fraunhofer.
[4] Designing Electronics for High Vibration and Shock, Dave S. Steinberg, Steinberg & Associates.

STANDARD ALLOY VS. HIGH RELIABILITY

Thermal Cycling

90iSC alloy gives reduced electrical failures in comparison to SnPb in both -40ºC+150ºC and -40ºC+125ºC.

Under -40ºC+150ºC, 90iSC has similar electrical failure levels to SnPb at -40ºC+125ºC.

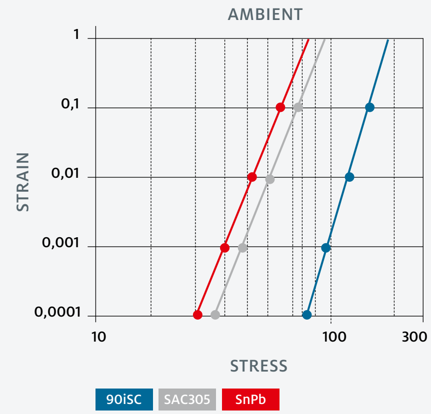


90iSC

SAC305

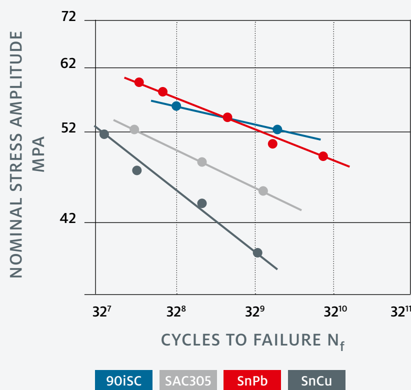
Creep (Ambient)

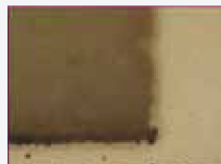
90iSC alloy shows improved creep resistance at ambient temperature over both SAC305 and SnPb (higher stress required to give equivalent creep).



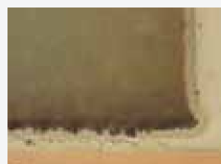
Vibration

The 90iSC alloy failure resistance is comparable to SnPb, but significantly better than both SAC305 and SnCu.





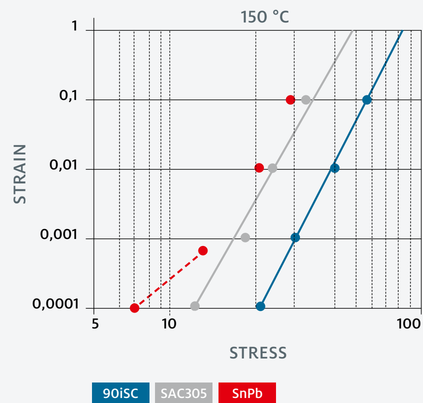
90iSC



SAC305

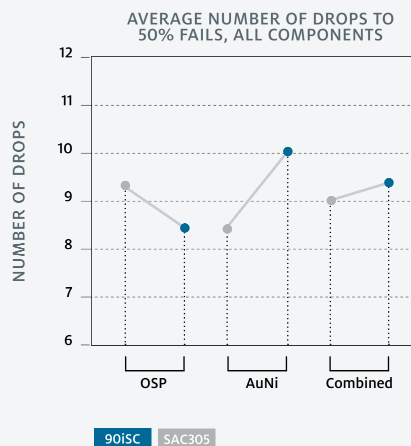
Creep (150°C)

90iSC alloy shows improved creep resistance at 150°C temperature over both SAC305 and SnPb.

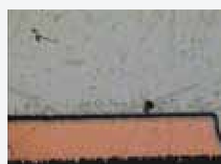


Drop Test

Drop test analysis on two surface finishes, OSP and AuNi. 90iSC alloy gives similar results to standard SAC305.*



90iSC



SAC305

*Customer specified drop test.

HIGH RELIABILITY SOLDER PASTES

90iSC has exceptional performance in high-reliability applications. It is compatible with several lead-free and halogen-free flux systems, ensuring adaptability for customized manufacturing requirements. The alloy is easily integrated into LOCTITE MULTICORE HF 200, LOCTITE MULTICORE HF 212, LOCTITE MULTICORE HF 250DP and LOCTITE MULTICORE LF 318 flux technologies.

FLUX TECHNOLOGY		ELECTRONICS ASSEMBLY MARKET	ROHS COMPLIANT		APPLICATION	
			High Reliability Pb-free Solder Alloy (90iSC)	Industry Pb-free Standard Solder Alloy (SAC305)	Printing	Dispensing
Halogen-Free	LOCTITE MULTICORE HF 200	Handheld computing	•	•	•	
	LOCTITE MULTICORE HF 212	Appliances Aerospace Automotive Medical Lighting Displays Solar Wireless Datacom Infrastructure	•	•	•	
	LOCTITE MULTICORE HF 250DP *		•	•		•
Halide-Free	LOCTITE MULTICORE LF 318		•	•	•	•

Halogen-Free

PRODUCT	DESCRIPTION	ALLOY	METAL LOADING (% WEIGHT)	PARTICLE SIZE DISTRIBUTION	IPC TACK (g/mm^2)	APPLICATION	IPC/J-STD-004B CLASSIFICATION
LOCTITE MULTICORE HF 200	A halogen-free, no clean, high tack, low voiding Pb-free solder paste. Suitable for high speed printing demands. Designed for small-medium size boards. Excellent abandon time and stencil work-life. Excellent fine pitch coalescence. Exceptional solderability in both air and nitrogen across a wide range of challenging surface finishes including OSP copper.	90iSC (Hi-Rel)** 96SC (SAC387) 97SC (SAC305)	88.5	AGS (type 3) DAP (type 4) DAP+ (type 4.5)	2.7	Printing 50 -140mms^{-1}	ROL0
LOCTITE MULTICORE HF 212	A halogen-free, no clean, high tack, low voiding Pb-free solder paste. Designed for medium-large size boards. Excellent abandon time and stencil work-life. Excellent fine pitch coalescence. Exceptional solderability in both air and nitrogen across a wide range of challenging surface finishes including OSP copper. Optimize for long soak reflow.	90iSC (Hi-Rel)** 97SC (SAC305)	88.5	AGS (type 3) DAP (type 4)	3.0	Printing 40 -120mms^{-1}	ROL0
LOCTITE MULTICORE HF 250DP	A halogen-free, no clean, type 5, low voiding Pb-free solder dispensing paste. A dispensing solution for all halogen-free requirements.	96SC (SAC387)	84	KBP (type 5)	0.8	Dispensing Gauge 23-27	ROL0

Halide-Free

PRODUCT	DESCRIPTION	ALLOY	METAL LOADING (% WEIGHT)	PARTICLE SIZE DISTRIBUTION	IPC TACK (g/mm^2)	APPLICATION	IPC/J-STD-004B CLASSIFICATION
LOCTITE MULTICORE LF 318	A halide-free, no-clean, Pb-free solder paste that has excellent humidity resistance and a broad process window for both reflow and printing. Ability to resist component movement during high-speed placement, long printer abandon times and excellent solderability over a wide range of reflow profiles in air and nitrogen reflow ovens and across a wide range of surface finishes.	90iSC (Hi-Rel)** 96SC (SAC387) 97SC (SAC305)	88.5 84	AGS (type 3)	1.8	Printing 25-150mms^{-1} Dispensing Gauge 23	ROL0

*All Electronics Assembly Market
** High Reliability.

Across the Board, Around the Globe.
www.henkel.com/electronics

Henkel Electronic Materials LLC
14000 Jamboree Road
Irvine, CA 92606
1.714.368.8000
1.800.562.8483

Henkel Electronic Materials (Belgium) N.V.
Nijverheidsstraat 7 B-2260
Westerlo, Belgium
Tel: +32.1457.5611
Fax: +32.1458.5530

Henkel Asia
332 Meigui South Road
WaiGaoQiao FTZ
Shanghai 200131 China
+86.21.3898.4800

Except as otherwise noted, all marks used are trademarks and/or registered trademarks of Henkel and/or its affiliates in the U.S. and elsewhere.
© Henkel Corporation, 2013. All rights reserved. 9879/LT-6649 (2/13)