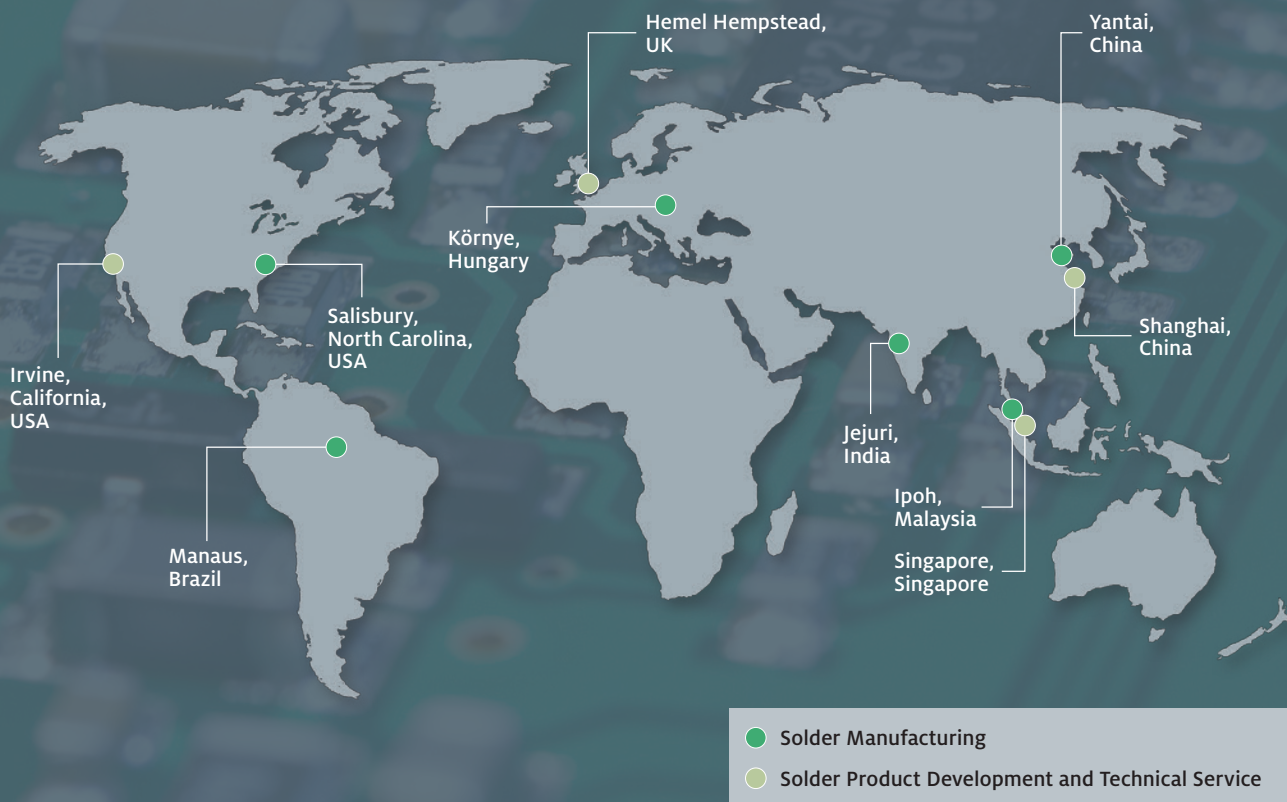


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HENKEL'S GLOBAL SOLDER NETWORK

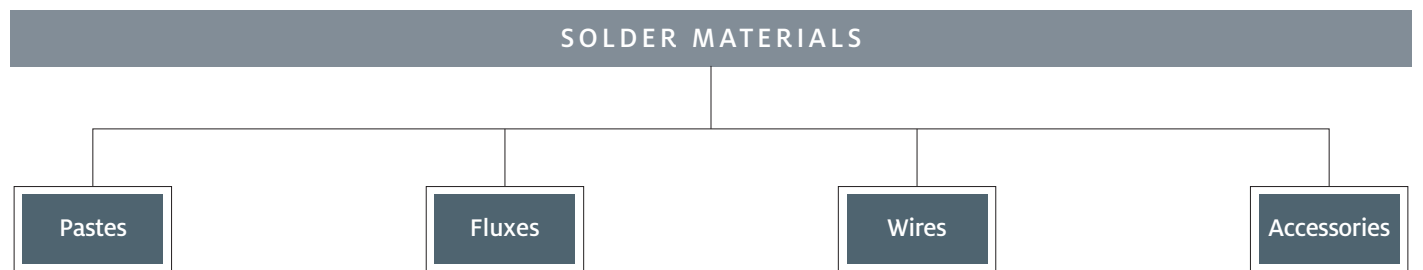
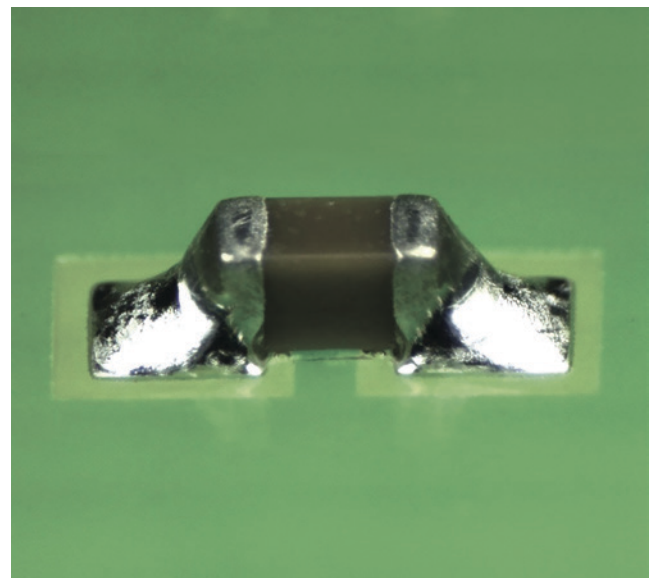




HENKEL'S SOLDER PORTFOLIO

With solder solutions that span diverse applications within numerous market sectors, Henkel is the solder technology market leader. A history of innovative formulations and market firsts – from high-reliability alloys to game-changing, temperature-stable solder pastes – continue to deliver the performance that electronics specialists require for today’s demanding assemblies.

Materials development ingenuity is at the core of every Henkel LOCTITE® solder material – and has been for decades. Our multi-award-winning solder portfolio has earned the praise of industry experts and the trust of our customers. With a broad selection of solder pastes, cored and solid wires, liquid fluxes and multiple alloys, Henkel offers a total solution for current and future solder materials requirements.



ELECTRONICS ASSEMBLY MARKETS

When exceptional solder paste transfer efficiency is required for miniaturized devices within handheld applications, or, when uncompromising reliability and high-temperature stability are non-negotiable for automotive electronics, assembly experts turn to Henkel. Whatever the application – from smartphones to medical devices to LEDs to military/aerospace and more – Henkel’s broad solder portfolio delivers expansive choice and exceptional performance.

MARKET	PASTES	FLUXES	WIRES
Appliances	LOCTITE® HF 212 LOCTITE LF 318	LOCTITE MF 300 LOCTITE MF 390HR	LOCTITE C 400 LOCTITE SWR SAC305
Automotive	LOCTITE HF 212 LOCTITE LF 318	LOCTITE MF 300 LOCTITE MF 390HR	LOCTITE C 400 LOCTITE SWR 90ISC
Computing / Servers	LOCTITE GC 10 LOCTITE HF 108 LOCTITE HF 212	LOCTITE MF 300	LOCTITE C 400
Handheld	LOCTITE GC 10 LOCTITE HF 200 LOCTITE HF 212	LOCTITE MF 300 LOCTITE MF 390HR	LOCTITE C 400 LOCTITE SWR SAC305
LED Lighting	LOCTITE GC 10 LOCTITE HF 212 LOCTITE LF 318	LOCTITE MF 300 LOCTITE MF R301	LOCTITE C 400 LOCTITE SWR 90ISC LOCTITE SWR SAC305
Medical	LOCTITE GC 3W LOCTITE HF 2W LOCTITE LF 318	LOCTITE MF 390HR	LOCTITE C 400 LOCTITE SWR SAC305
Military / Aerospace	LOCTITE GC 3W LOCTITE HF 2W	LOCTITE HYDX-20	LOCTITE HYDX LOCTITE SWR 90ISC LOCTITE SWR SN63
Smart Meters	LOCTITE GC 10 LOCTITE GC 3W LOCTITE HF 2W	LOCTITE HYDX-20 LOCTITE MF 210 LOCTITE MF 300	LOCTITE C 400
Wireless Data Infrastructure	LOCTITE CR 32 LOCTITE HF 212 LOCTITE LF 318	LOCTITE MF 300 LOCTITE MF 390HR LOCTITE MF R301	LOCTITE C 400 LOCTITE SWR SAC305 LOCTITE SWR SN63

 90ISC high-reliability alloy recommended



SUSTAINABLE AND HALOGEN-FREE

Embraced at the highest levels of Henkel Corporation, sustainability is central to the company’s philosophy. Creating more value for our customers, while reducing our environmental footprint, underpins all of Henkel’s development efforts. This sustainability strategy also extends to our solder program, which is informed by REACH halogen-free initiatives, RoHS compliance and EICC conflict-free tin raw materials sourcing. As one of the few – if not only – solder materials suppliers that is committed to formulating next-generation solder pastes with zero deliberately added halogens, Henkel sets the benchmark for environmental responsibility.



HALOGEN-FREE AND HALIDE-FREE COMPARISON

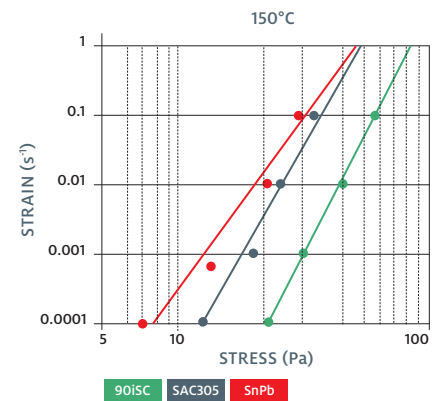
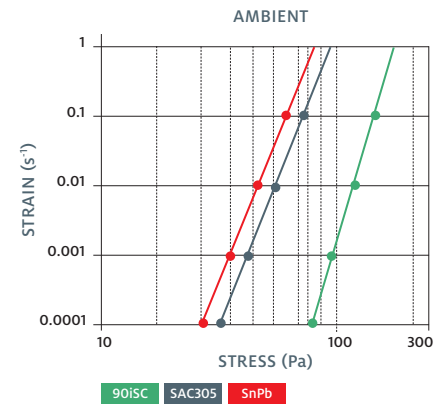
	HALOGEN-FREE		HALIDE-FREE		
Drivers for Classification	REACH Non-Governmental Organizations (NGOs)		High-reliability solder interconnects with international standards		
Definition	No international halogens added to flux Complies with international standards (see below)		No flux corrosivity or dendritic growth detection Specific requirements to give ROL0 classification		
Test Procedures	New O ₂ bond on flux Ion Chromatography (IC) on flux		Well-established quantitative halide test performed by IC		
International Standards	JPCA-ES-01-1999	Bromine < 900 ppm Chlorine < 900 ppm	IPC J-STD-004B, IPC-TM-650	Copper mirror	No penetration
	IEC 61249-2-21	Bromine 900 ppm max. Chlorine 900 ppm max. Total halogens 1,500 ppm max.		Silver chromate	No discoloration
				Fluoride test	No color change
IPC-401B	Bromine 900 ppm max. Chlorine 900 ppm max. Total halogens 1,500 ppm max.	Chloride and bromide	< 0.005%		
		Flux corrosion	No pitting No color change		
		Surface Insulation Resistance (SIR)	No discoloration No dendritic growth No corrosion > 10 ⁸ Ω		

HIGH-RELIABILITY ALLOY

A breakthrough in solder alloy development, Henkel's high-reliability solder alloy, 90iSC, provides outstanding creep resistance by reducing failure rates due to vibration, drops, thermal cycling and thermal shock, 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 Pb-free, RoHS compliant solder alloy. 90iSC has exceptional performance in high-reliability applications. It is compatible with several Pb-free and halogen-free flux systems, ensuring adaptability for customized manufacturing requirements. The alloy is easily integrated into a wide range of flux technologies.

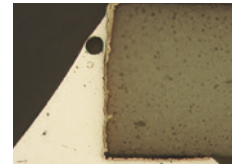
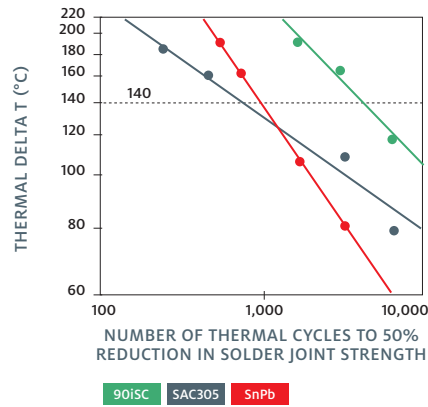
CREEP

FAILURE MECHANISM	HENKEL'S 90iSC SOLUTION ^{[1] [2]}
<ul style="list-style-type: none"> Creep resistance at a specified temperature is directly linked to thermal cycle failure resistance. 	<ul style="list-style-type: none"> 90iSC alloy shows improved creep resistance at ambient temperature over both SAC305 and SnPb (higher stress required to give equivalent creep). 90iSC shows improved creep resistance at 150°C over both SAC305 and SnPb. 90iSC has a similar plastic strain constant at 150°C, when compared to SnPb at 80°C.

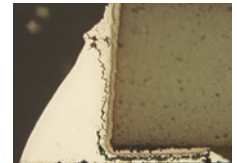


THERMAL CYCLING AND THERMAL SHOCK

FAILURE MECHANISM	HENKEL'S 90iSC SOLUTION ^{[1] [2]}
<ul style="list-style-type: none"> Thermal cycling causes stress to increase within the soldered joint. Stress relief mechanism is crack propagation in the bulk of the solder joint. 	<ul style="list-style-type: none"> 90iSC alloy reduces electrical failures in comparison to SnPb in both -40°C to 150°C and -40°C to 125°C. Under -40°C to 150°C, 90iSC has similar electrical failure levels to SnPb at -40°C to 125°C.
<ul style="list-style-type: none"> Thermal shock testing is a more extreme version of thermal cycling. The failure mechanism is crack propagation in the bulk of the solder joint and occurs earlier. 	<ul style="list-style-type: none"> 90iSC alloy has outperformed SnPb and SAC alloys in thermal shock testing.



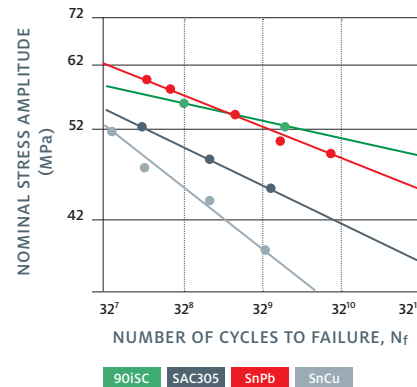
90iSC



SAC305

VIBRATION

FAILURE MECHANISM	HENKEL'S 90iSC SOLUTION ^{[1] [2]}
<ul style="list-style-type: none"> 20% of airborne failures are attributed to vibrational stress^[3]. Failure mechanism is crack propagation along the intermetallic compound (IMC) and in the bulk. SAC alloys have been shown to fail more frequently than SnPb alloys. 	<ul style="list-style-type: none"> 90iSC alloy failure resistance is comparable to SnPb, but significantly better than both SAC305 and SnCu. 90iSC alloy returns the failure resistance performance back to SnPb standards.



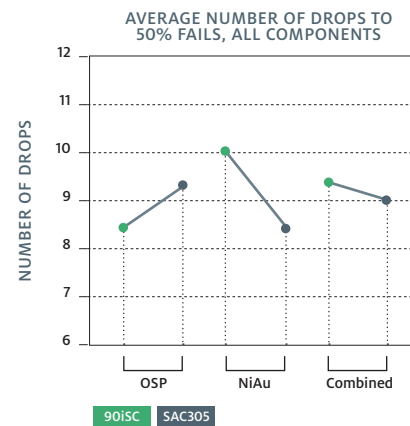
90iSC



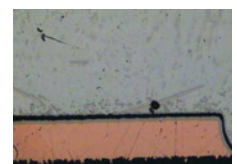
SAC305

DROP TEST

FAILURE MECHANISM	HENKEL'S 90iSC SOLUTION ^{[1] [2]}
<ul style="list-style-type: none"> Drop test resistance should not be compromised. Failure mechanism is crack propagation along or inside the IMC. 	<ul style="list-style-type: none"> 90iSC has reduced ductility over standard alloys. Analysis of customer-specified drop test on two surface finishes, OSP Cu and NiAu: 90iSC gives similar results to SAC305 with the same failure mode.



90iSC



SAC305

^[1] Ratchev, R. (2008). Presentation at LIVE Project Seminar "Material Verhalten von Loten in Mikrobereichen," Berlin.

^[2] Barry, N. (2008). *Lead-free Solders for High-Reliability Applications: High-cycle Fatigue Studies*. University of Birmingham.

^[3] Steinberg, D.S. & Associates. *Designing Electronics for High Vibration and Shock*.

THE GAME CHANGERS



First-ever temperature stable solder pastes



No refrigeration



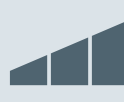
Improved stability



Improved printing



Improved paste management



Improved reflow



Improved cleanability



Improved logistics



Cost savings

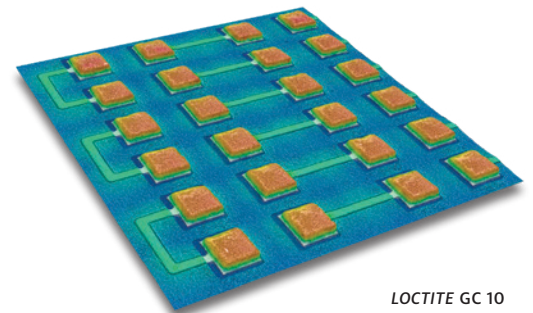
LOCTITE® GC 10 and LOCTITE GC 3W are the game changers. Stability is the difference-maker. Unprecedented performance is the result. Uniquely stable flux chemistry is the basis of all LOCTITE GC materials, and is what delivers cost savings and value at every stage of use. With no refrigeration required, transportation, on-site storage and paste management are simplified. Paste stability translates to 20 percent less material waste, outstanding printing performance, a wide reflow process window and excellent solderability in air. With the ability to qualify a single material for multiple applications and an enviably low defects per million for higher yields, LOCTITE GC materials are upending previous perceptions of solder paste capability.

IMPROVED FLUX STABILITY

LOCTITE GC 10 AFTER
2 MONTHS AT 26.5°C



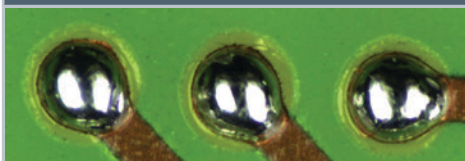
COMPETITOR PASTE AFTER
2 MONTHS AT 26.5°C



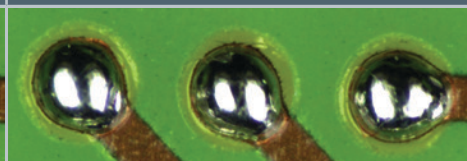
LOCTITE GC 10
Consistent printing performance

REMARKABLE REFLOW STABILITY

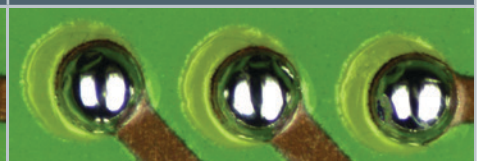
FRESH LOCTITE GC 10



LOCTITE GC 10 AFTER 1 MONTH AT 40°C



LOCTITE GC 10 AFTER 12 MONTHS AT 26.5°C



INDUSTRY VALIDATION

INNOVATION LEADERS

Outstanding products are not the result of luck. The unequalled award wins and customer satisfaction are based on ingenious chemistry formulation. That's why Henkel's solder development program is world-class. Having won countless industry honors, three consecutive NPI awards for different materials – *LOCTITE HF 212*, *LOCTITE GC 10* and *LOCTITE GC 3W* – and realizing rapid market acceptance, Henkel's solder innovation significance is undeniable. With the launch of the GC platform, Henkel has forever changed the game and the way the industry thinks about and uses solder paste. Our customers have an advantage, and they're enthusiastically talking about it.



“Our company has recently entered a field where high-mix, low volume production is the norm and demand is very dynamic. Thanks to *LOCTITE GC 10*'s temperature stability, long shelf life and simplified storage capability, we don't have to worry about the performance of our solder paste being compromised, even when demand levels change.”

Andrew Thiel, Product Development Engineer, Walker Products, Inc.

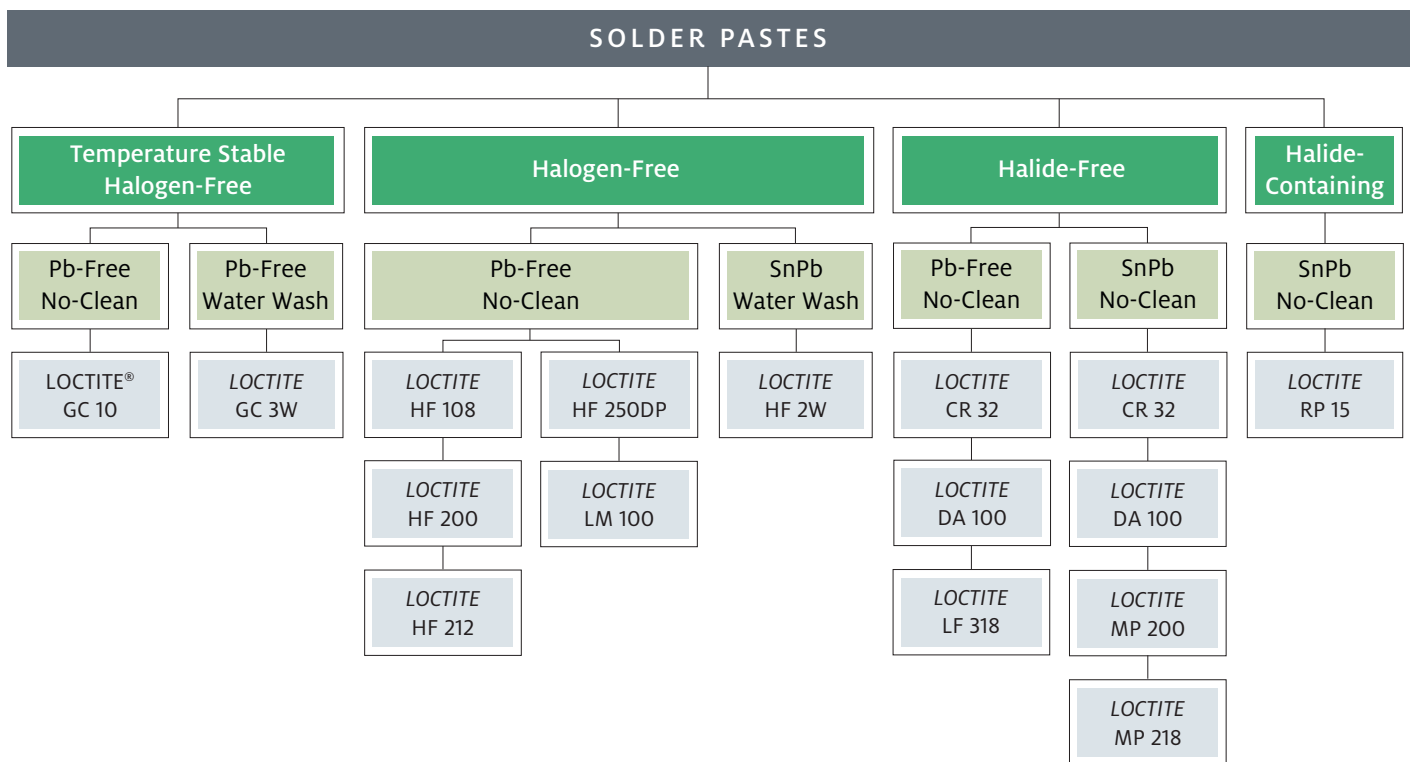
“*LOCTITE GC 10* has completely changed our traditional working models. The paste has given us nothing but perfect, consistent results with no refrigeration. In our evaluation, *LOCTITE GC 10* came out of the jar perfect and the printing results at 60 hours were just as good as they were an hour after opening the jar. It printed and reflowed perfectly and we achieved very close to 100% yield. In addition, we didn't experience any aperture clogging, the stencil cleaned up easily and the paste didn't dry out. The cost savings for our business are substantial and far outweigh any incremental cost differential versus competitive pastes.”

Matthew Polak, Owner, Raven Systems Design, Inc.

SOLDER PASTES



Henkel's commitment to best-in-class solder performance, printability, reflow and reliability is unyielding. This, in combination with our focus on enabling a sustainable future, has led to some of the industry's most advanced formulations. Henkel's halogen-free solder paste materials have set the bar high for environmental compliance. With zero deliberately added halogens and integrating the purest raw materials available, we can assure our customers that Henkel's halogen-free formulations are, indeed, halogen-free. We take our obligation to advanced materials development so seriously that Henkel has pledged to ensure all future solder paste formulations are either halogen-free, temperature stable or both.



TEMPERATURE STABLE, HALOGEN-FREE SOLDER PASTES

PRODUCT	DESCRIPTION	ALLOY	PARTICLE SIZE DISTRIBUTION*	IPC J-STD-004B CLASSIFICATION	OPTIMAL SHELF LIFE
Pb-Free, No-Clean					
<i>LOCTITE</i> GC 10	RoHS-compliant solder paste with excellent resistance in high humidity. Industry leader in paste-transfer efficiency. Improved stability at different storage and operating temperatures, with extended stencil life up to 72 hours and extended abandon time up to 24 hours. Suitable for high-density, small to large boards.	SAC305	Type 3, 4, 5	ROLO	12 months up to 26.5°C
Pb-Free, Water Wash					
<i>LOCTITE</i> GC 3W	RoHS-compliant solder paste with excellent resistance in high humidity. Improved stability at different storage and operating temperatures, with extended stencil life over 24 hours. Suitable for high-density, small to large boards. Residues can be removed with aqueous cleaner followed by deionized water for 5 minutes at 45°C to 60°C.	SAC305	Type 3, 4	ORMO	6 months up to 26.5°C

HALOGEN-FREE SOLDER PASTES

PRODUCT	DESCRIPTION	ALLOY	PARTICLE SIZE DISTRIBUTION*	IPC J-STD-004B CLASSIFICATION	OPTIMAL SHELF LIFE
Pb-Free, No-Clean					
LOCTITE HF 108	High tack, low voiding, RoHS-compliant solder paste designed for medium to large boards. Excellent fine pitch coalescence. Robust reflow process window with exceptional solderability across a wide range of challenging surfaces finishes including immersion Ag and OSP Cu.	SAC305 SAC387	Type 3, 4	ROLO	6 months at 0 – 10°C
LOCTITE HF 200	High tack, low voiding, RoHS-compliant solder paste suitable for high speed printing. Designed for small to medium boards. Excellent fine pitch coalescence. Exceptional solderability in both air and nitrogen across a wide range of challenging surface finishes including OSP Cu.	SAC305 SAC387	Type 4	ROLO	6 months at 0 – 10°C
LOCTITE HF 212	High tack, low voiding, RoHS-compliant solder paste with excellent fine pitch coalescence and extended stencil life and abandon time. Designed for medium to large boards and compatible with many Pb-free alloys.	90iSC SAC0307 SAC305 SAC387	Type 3, 4, 4.5 (4A), 5	ROLO	6 months at 0 – 10°C
LOCTITE HF 250DP	Dispensing grade, low voiding, RoHS-compliant, low metal content solder paste. Exceptional dot-to-dot consistency, colorless residues and high-speed dispense capability with zero slump.	SAC387	Type 5	ROLO	12 months up to -18°C
LOCTITE LM 100	RoHS-compliant solder paste designed for use with low-temperature, Pb-free alloys. Formulated to provide excellent dispensability, printability and solderability in various reflow profiles.	Bi58	Type 2.5 (2A)	ROLO	6 months at 0 – 10°C
SnPb, Water Wash					
LOCTITE HF 2W	Low voiding, REACH-compliant solder paste with excellent resistance to solder balling, humidity and slump. Residues can be removed with aqueous cleaner followed by deionized water in 5 to 15 minutes at 40°C to 60°C.	63S4 Sn63	Type 3, 3C, 4	ORMO	6 months at 0 – 10°C

HALIDE-FREE SOLDER PASTES

PRODUCT	DESCRIPTION	ALLOY	PARTICLE SIZE DISTRIBUTION*	IPC J-STD-004B CLASSIFICATION	OPTIMAL SHELF LIFE
Pb-Free, No-Clean					
LOCTITE CR 32	A modest residue level solder paste with robust flux for printing and reflow. Its noncorrosive residues eliminate the need for cleaning. Excellent resistance to solder balling and suitable for fine pitch, stencil printing applications.	95A	Type 2.5 (2A)	ROLO	6 months at 0 – 10°C
LOCTITE DA 100	Dispensing grade solder paste intended for die attach applications. Provides effective thermal control for copper leadframe power semiconductor devices. Suitable for automotive and consumer packages.	92A	Type 4	ROLO	12 months up to -18°C
LOCTITE LF 318	RoHS-compliant solder paste with pin-testable flux exhibits excellent humidity resistance and ability to resist component movement during high-speed placement.	90iSC SAC305 SAC387	Type 3, 4	ROLO	6 months at 0 – 10°C
SnPb, No-Clean					
LOCTITE CR 32	High Pb solder paste with robust flux for printing and reflow. Its noncorrosive residues eliminate the need for cleaning. Excellent resistance to solder balling and suitable for fine pitch, stencil printing applications.	63S4 Sn62 Sn63	Type 3, 3C	ROLO	6 months at 0 – 10°C
LOCTITE DA 100	Dispensing grade solder paste intended for die attach applications. Provides effective thermal control for copper leadframe power semiconductor devices. Suitable for automotive and consumer packages.	2.5S	Type 3, 4	ROLO	12 months up to -18°C
LOCTITE MP 200	Solder paste designed for high speed printing. Extended printed open time and tack life. Resistant to both hot and cold slump.	63S4 Sn62 Sn63	Type 3, 3C, 4	ROLO	6 months at 0 – 10°C
LOCTITE MP 218	High activity, soft residue, colorless solder paste with pin-testable flux that displays resistance to high temperature and humidity environments. Suitable for a large range of assembly processes, including rheometric pump, ProFlow***, large and high-density.	63S4 Sn62 Sn63	Type 3, 3C, 4	ROLO	6 months at 0 – 10°C

HALIDE-CONTAINING SOLDER PASTE

PRODUCT	DESCRIPTION	ALLOY	PARTICLE SIZE DISTRIBUTION*	IPC J-STD-004B CLASSIFICATION	OPTIMAL SHELF LIFE
SnPb, No-Clean					
LOCTITE RP 15	Solder paste formulated for dispensing or printing and reflow in air, where process yield is critical. Excellent open time and good soldering activity, especially on OSP Cu. Suitable for many board sizes.	63S4 Sn62	Type 3, 3C, 4	ROL1	6 months at 0 – 10°C

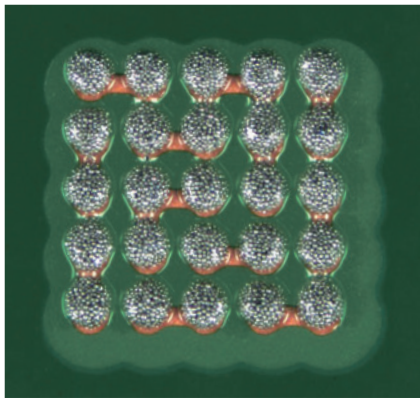
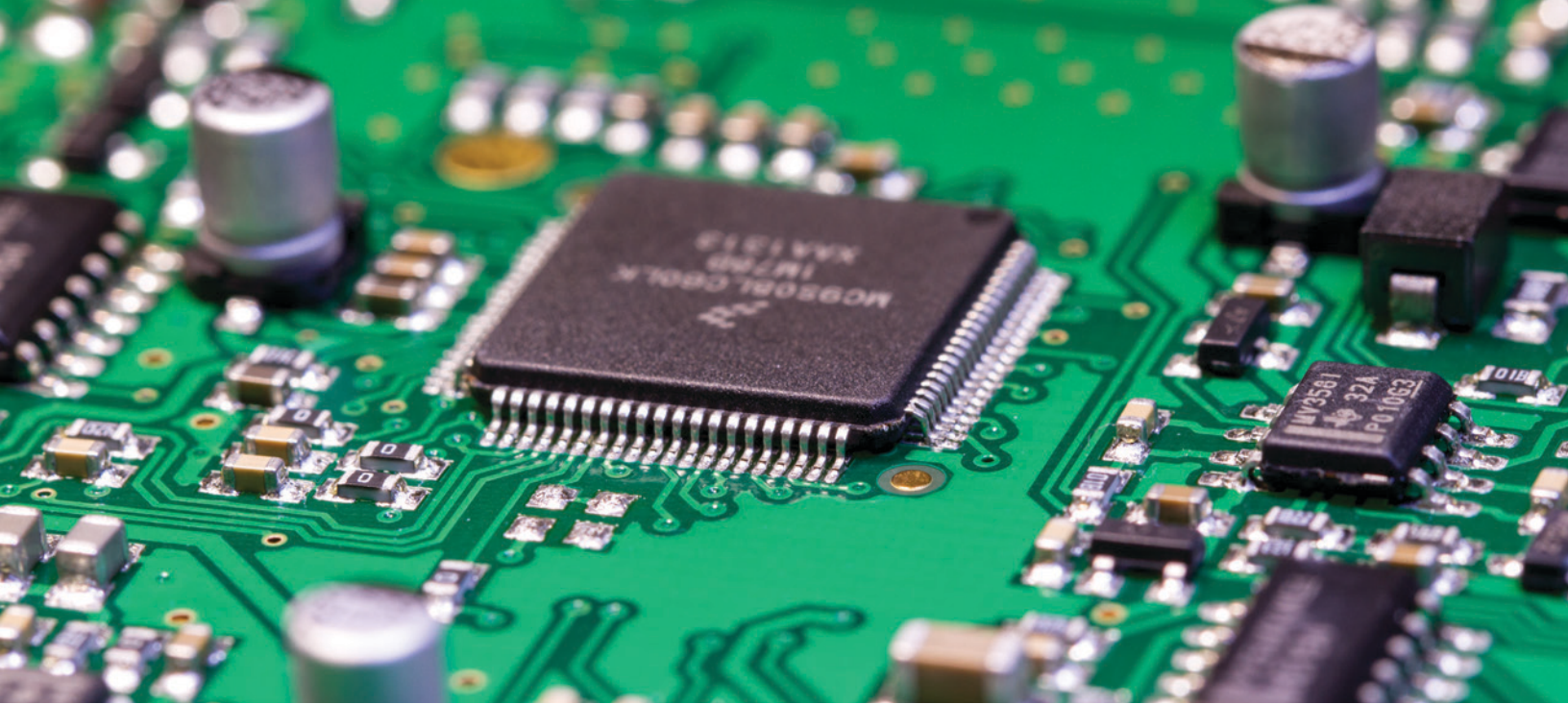
*See page 13 for particle size distribution powder sizes.

Other particle sizes and/or alloys are available upon request.

** ProFlow® is a trademark of ASM Assembly Systems Weymouth Ltd.

SOLDER PASTE REFLOW PROPERTIES

PRODUCT	SUITABLE ATMOSPHERE	ALLOY	MELTING POINT (°C)	TIME ABOVE LIQUIDUS, LINEAR (SECONDS)	TIME ABOVE LIQUIDUS, SOAK (SECONDS)	SOAK TEMPERATURE (°C)	SOAK TIME (SECONDS)
LOCTITE CR 32	Air and nitrogen	63S4	179 – 183	20 – 60	20 – 60	120 – 160	60 – 120
		95A	236 – 240	30 – 60	30 – 60	180 – 200	30 – 45
		Sn62	179	20 – 60	20 – 60	120 – 160	60 – 120
		Sn63	183				
LOCTITE DA 100	Any inert atmosphere	2.5S	287 – 296	20 – 60	N/A	N/A	N/A
		92A	235 – 243				
LOCTITE GC 10	Designed for air; Suitable with nitrogen	SAC305	217	37 – 105	37 – 105	150 – 200	60 – 200
LOCTITE GC 3W	Designed for air; Suitable with nitrogen	SAC305	217	20 – 65	20 – 78	140 – 170	90 – 180
LOCTITE HF 108	Air and nitrogen	SAC305	217	18 – 90	14 – 51	150 – 170	30 – 120
		SAC387					
LOCTITE HF 200	Air and nitrogen	SAC305	217	30 – 45	30 – 45	130 – 165	60 – 120
		SAC387					
LOCTITE HF 212	Air and nitrogen	90iSC	205 – 218	15 – 99	20 – 78	161 – 179	34 – 115
		SAC0307	217 – 226	30 – 60	N/A	N/A	N/A
		SAC305	217	15 – 99	20 – 78	161 – 179	34 – 115
		SAC387					
LOCTITE HF 250DP	Nitrogen	SAC387	217	15 – 99	20 – 78	161 – 179	34 – 115
LOCTITE HF 2W	Air and nitrogen	63S4	179 – 183	15 – 60	30 – 90	120 – 150	30 – 90
		Sn63	183				
LOCTITE LF 318	Air and nitrogen	90iSC	205 – 218	11.5 – 171	11.5 – 119	140 – 170	90 – 240
		SAC305	217	20 – 130	20 – 78	140 – 170	90 – 180
		SAC387					
LOCTITE LM 100	Air and nitrogen	Bi58	138	30 – 60	30 – 60	100 – 120	45 – 70
LOCTITE MP 200	Air and nitrogen	63S4	179 – 183	30 – 75	30 – 75	130 – 165	30 – 120
		Sn62	179				
		Sn63	183				
LOCTITE MP 218	Air and nitrogen	63S4	179 – 183	30 – 75	30 – 75	130 – 165	30 – 120
		Sn62	179				
		Sn63	183				
LOCTITE RP 15	Air and nitrogen	63S4	179 – 183	30 – 60	30 – 60	120 – 150	60 – 120
		Sn62	179				



SOLDER POWDER PARTICLE SIZE DISTRIBUTION

POWDER DESCRIPTION	HENKEL DESCRIPTION	PARTICLE SIZE DISTRIBUTION (µm)
Type 2.5 (2A)	AAS	38 – 53
Type 3	AGS	20 – 45
Type 3C	ACP	15 – 45
Type 4	DAP	25 – 38
Type 4.5 (4A)	DAP+	20 – 32
Type 5	KBP	10 – 25
Type 6	LAW	5 – 15

FLUX IDENTIFICATION, COMPOSITION AND ACTIVITY LEVELS

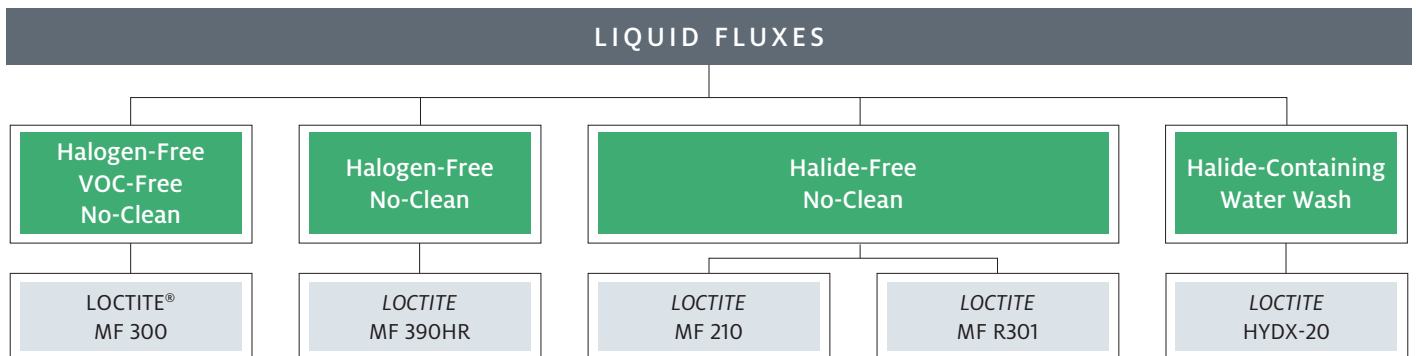
FLUX INGREDIENT	FLUX ACTIVITY	HALIDE CONTENT (% BY WEIGHT)	CLASSIFICATION	FLUX DESIGNATOR
Rosin (RO)	Low	0	L0	ROLO
		< 0.5	L1	ROL1
	Moderate	0	M0	ROM0
		0.5 – 2.0	M1	ROH0
	High	0	H0	ROH0
		> 2.0	H1	ROH1
Resin (RE)	Low	0	L0	RELO
		< 0.5	L1	REL1
	Moderate	0	M0	REMO
		0.5 – 2.0	M1	REM1
	High	0	H0	REHO
		> 2.0	H1	REH1

FLUX INGREDIENT	FLUX ACTIVITY	HALIDE CONTENT (% BY WEIGHT)	CLASSIFICATION	FLUX DESIGNATOR
Organic (OR)	Low	0	L0	ORLO
		< 0.5	L1	ORL1
	Moderate	0	M0	ORM0
		0.5 – 2.0	M1	ORM1
	High	0	H0	ORH0
		> 2.0	H1	ORH1
Inorganic (IN)	Low	0	L0	INL0
		< 0.5	L1	INL1
	Moderate	0	M0	INM0
		0.5 – 2.0	M1	INM1
	High	0	H0	INH0
		> 2.0	H1	INH1

LIQUID FLUXES



Henkel has developed a variety of liquid flux formulations to facilitate Pb-free and SnPb wave soldering processes, rework operations and laser soldering. No-clean, low-residue, VOC-free, halide-free and halogen-free flux formulas provide manufacturers with several options for specific manufacturing requirements, delivering high-performance, defect-free soldering and excellent throughput. Henkel's liquid flux technologies are environmentally responsible and align with sustainable manufacturing approaches.



LIQUID FLUXES

PRODUCT	DESCRIPTION	SOLID CONTENT (% BY WEIGHT)	ACID VALUE (mg KOH/g)	APPLICATION	IPC J-STD-004B CLASSIFICATION
Halogen-Free, VOC-Free, No-Clean					
<i>LOCTITE</i> MF 300	General-purpose, resin-free, water-based flux with a special formulation designed to minimize solder balling. Compatible with Pb-free and SnPb wave solder processes.	4.6	37.0	Spray/Foam	ORM0
Halogen-Free, No-Clean					
<i>LOCTITE</i> MF 390HR	Liquid flux designed for exceptional through-hole fill and recommended for automotive electronics and general electrical soldering applications. Compatible with Pb-free and SnPb wave solder processes.	6.0	20 – 25	Spray/Foam	ROLO
Halide-Free, No-Clean					
<i>LOCTITE</i> MF 210	Resin-free flux designed to solder onto surfaces known to have poor solderability. Recommended for consumer electronics and general soldering applications where high throughput is required. Compatible with Pb-free and SnPb wave solder processes.	2.9	22.5	Spray/Foam	ORM0
<i>LOCTITE</i> MF R301	Higher solids flux for better wetting on reduced solderability surfaces and to minimize bridging on complex geometries. Fully Pb-free and dual wave compatible. Solvent-based flux may be thinned with IPA. Compatible with Pb-free and SnPb wave solder processes.	6.0	40.0	Spray/Foam	ROM0
Halide-Containing, Water Wash					
<i>LOCTITE</i> HYDX-20	Water-soluble flux formulated for use on electronic assemblies. Residues are designed to be cleaned with deionized water. HYDX-20 will solder onto copper, brass, nickel and mild steel efficiently. Compatible with Pb-free and SnPb wave solder processes.	20.0	24.0	Spray/Foam	ORH1

ALLOYS

The breadth of Henkel's line of solder alloys is unmatched, providing customers with expansive options to address specific process and product conditions. From traditional SnPb to Pb-free and high-reliability Pb-free, our alloy portfolio delivers solutions for numerous applications.

SOLDER ALLOY PROPERTIES

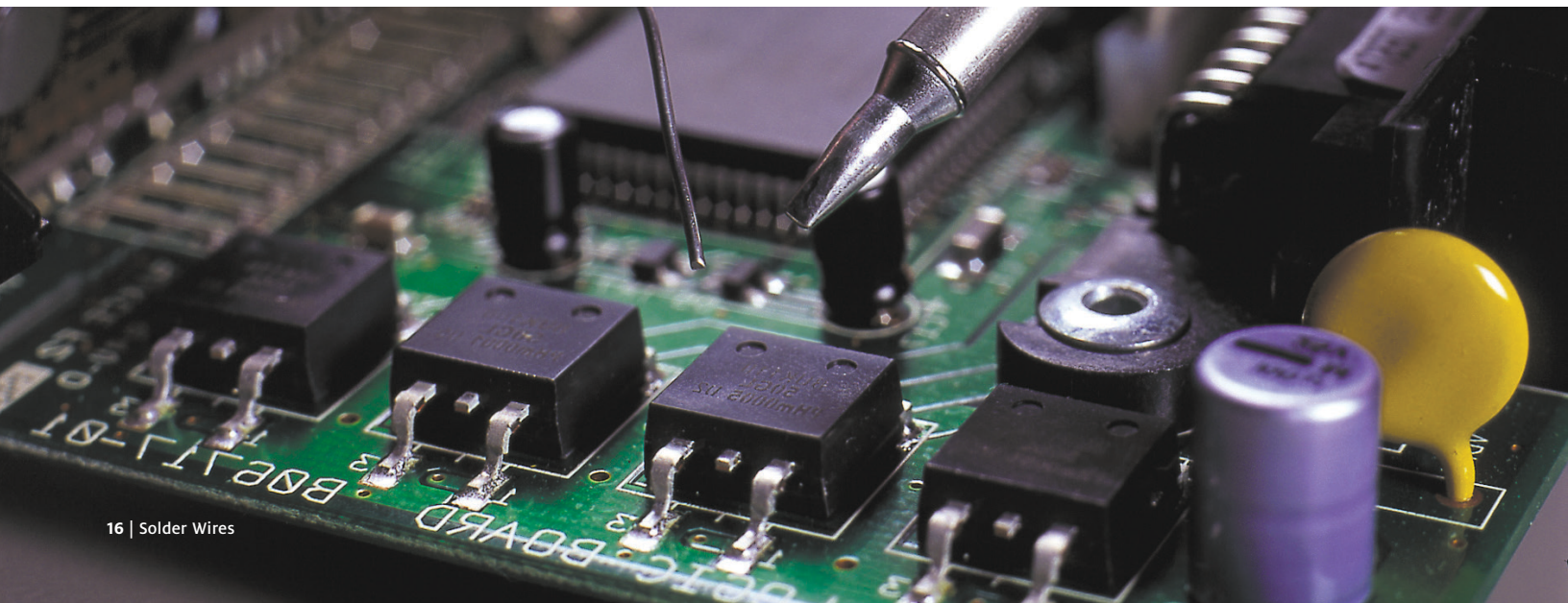
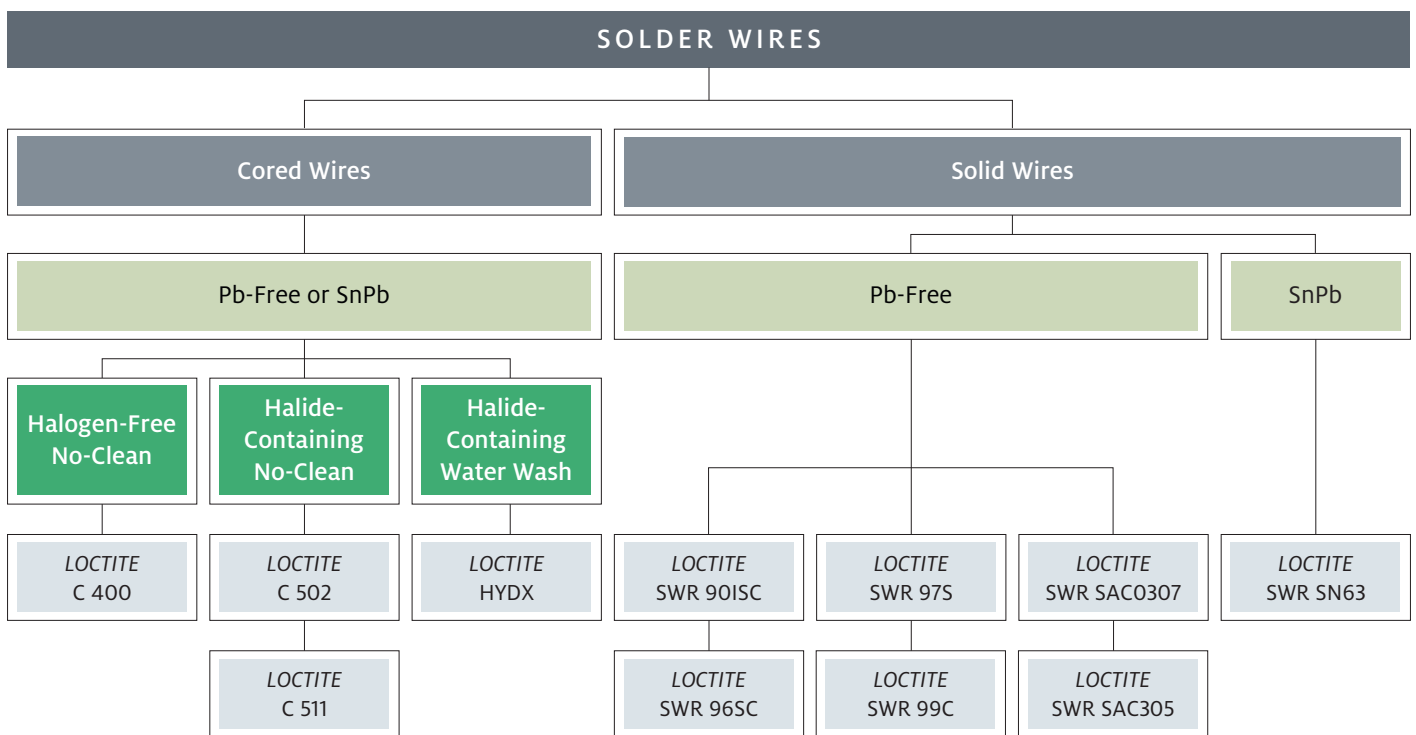
HENKEL CODE	ALLOY	MELTING POINT (°C)	DENSITY (g/cm ³)	ELECTRICAL RESISTIVITY (μΩ-m)	THERMAL CONDUCTIVITY (W/m-K)
2.5S	Pb92.5/Sn05/Ag2.5	287 – 296	11.02	0.2	44
63S4 (Anti-Tombstoning)	Sn62.8/Pb36.8/Ag0.4	179 – 183	8.4	0.150	50
90iSC (High-Reliability)	SAC387/Bi3/Sb1.5/Ni0.02	209 – 217	7.38	0.132	58
92A	Sn91.5/Sb8.5	235 – 243	7.25	0.145	28
95A	Sn95/Sb5	236 - 240	7.25	0.145	28
97S	Sn97/Ag3	221 – 230	7.5	0.118	58
99C	Sn99.3/Cu0.7	227	7.31	0.126	66
Bi58	Sn42/Bi58	138	8.56	0.383	19
SAC0307	Sn99/0.7Cu/0.3Ag	217 – 228	7.33	0.15	64
SAC305 (Formerly 97SC)	SAC305 or Sn96.5/Ag3.0/Cu0.5	217	7.38	0.132	58
SAC387 (Formerly 96SC)	SAC387 or Sn95.5/Ag3.8/Cu0.7	217	7.44	0.132	60
Sn60	Sn60/Pb40	183 – 188	8.5	0.153	49
Sn62	Sn62/Pb36/Ag2	179	8.4	0.150	50
Sn63	Sn63/Pb37	183	8.4	0.145	50

SOLDER ALLOY FORM AVAILABILITY

HENKEL CODE	ALLOY	ROHS COMPLIANT	PASTE	CORED WIRE	SOLID WIRE
2.5S	Pb92.5/Sn05/Ag2.5	NO	YES	NO	NO
63S4 (Anti-Tombstoning)	Sn62.8/Pb36.8/Ag0.4	NO	YES	NO	NO
90iSC (High-Reliability)	SAC387/Bi3/Sb1.5/Ni0.02	YES	YES	YES	YES
92A	Sn91.5/Sb8.5	YES	YES	NO	NO
95A	Sn95/Sb5	YES	YES	YES	NO
97S	Sn97/Ag3	YES	NO	NO	YES
99C	Sn99.3/Cu0.7	YES	NO	YES	YES
Bi58	Sn42/Bi58	YES	YES	NO	NO
SAC0307	Sn99/0.7Cu/0.3Ag	YES	YES	YES	YES
SAC305 (Formerly 97SC)	SAC305 or Sn96.5/Ag3.0/Cu0.5	YES	YES	YES	YES
SAC387 (Formerly 96SC)	SAC387 or Sn95.5/Ag3.8/Cu0.7	YES	YES	YES	YES
Sn60	Sn60/Pb40	NO	NO	YES	NO
Sn62	Sn62/Pb36/Ag2	NO	YES	YES	NO
Sn63	Sn63/Pb37	NO	YES	YES	YES

SOLDER WIRES

Available in both solid and cored versions, Henkel's LOCTITE® brand solder wire products have been enabling rework and hand soldering operations for decades. Award-winning multiple flux core technology in our cored wire options distributes flux evenly throughout the solder wire, offering fast wetting and high solder joint reliability. LOCTITE cored wire is available in Pb-free, SnPb and halogen-free formulas. For assemblers who prefer a non-cored option for selective soldering applications, LOCTITE solid wire products are offered in both Pb-free and SnPb options.



CORED WIRES

PRODUCT	DESCRIPTION	APPROXIMATE FLUX CONTENT (% BY WEIGHT)	DIAMETER RANGE (mm)	ALLOY Pb-FREE	ALLOY SnPb	IPC J-STD-004B CLASSIFICATION
Halogen-Free, No-Clean						
<i>LOCTITE</i> C 400	Clear residue, cored solder wire with increased flux content for improved wetting on challenging surfaces. Features the award-winning multiple flux core technology that ensures consistent distribution of flux throughout the solder wire. Suitable for manual and robotic soldering.	2.2	0.38 – 1.63	90iSC 99C SAC305 SAC387	Sn60 Sn62 Sn63	ROLO
Halide-Containing, No-Clean						
<i>LOCTITE</i> C 502	Clear residue, cored solder wire with medium activity flux with good wetting on difficult substrates.	2.7	0.25 – 1.63	99C SAC305 SAC387	Sn60 Sn62 Sn63	ROM1
<i>LOCTITE</i> C 511	Amber residue, heat stable, cored solder wire. Good wetting on difficult substrates.	2.7	0.38 – 1.63	99C SAC305 SAC387	Sn60 Sn62 Sn63	ROM1
Halide-Containing, Water Wash						
<i>LOCTITE</i> HYDX	High activity, flux-cored solder wire with excellent wetting on difficult substrates.	2.0	0.38 – 1.63	99C SAC305 SAC387	Sn60 Sn62 Sn63	ORH1

CORED WIRE OPTIONS

Flux content is dependent on alloy, diameter and number of cores.

NUMBER OF CORES	FLUX CONTENT (% BY WEIGHT)
1	0.5% – 1.0%*
2	1.0% – 1.2%
3	1.0% – 2.5%
4	2.0% – 2.7%
5	1.7% – 3.0%



*Other flux content is available upon request.

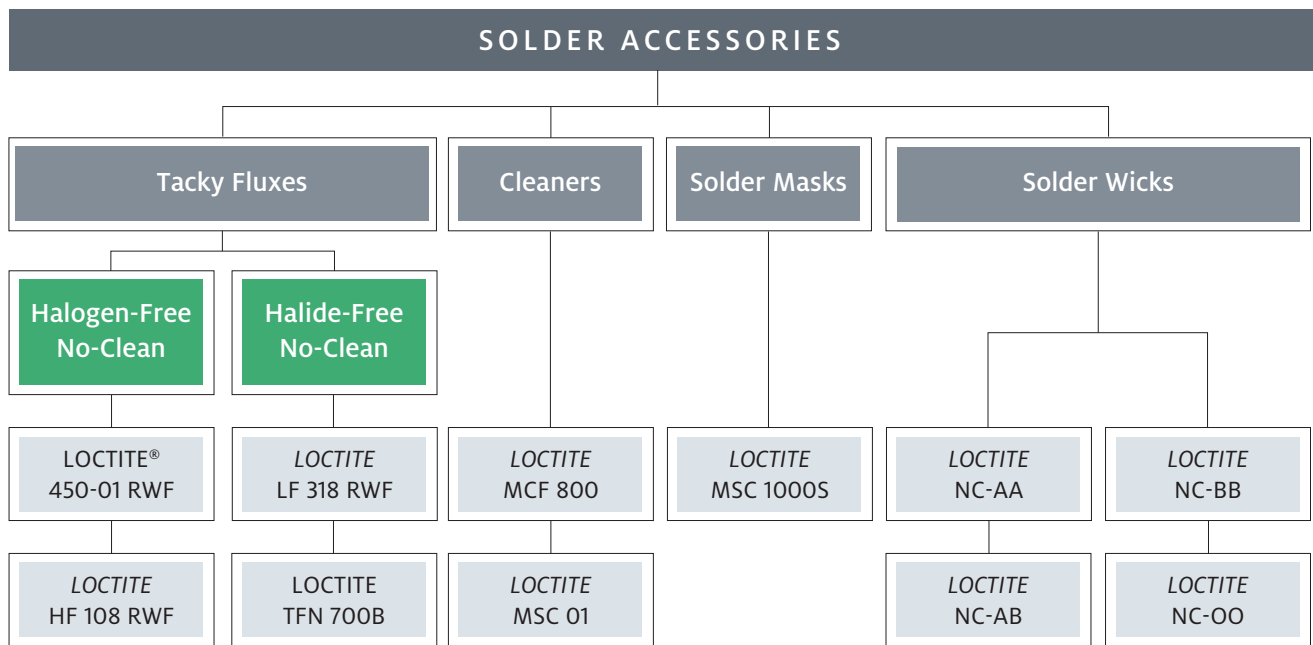
SOLID WIRES

PRODUCT	ALLOY	SILVER CONTENT (% BY WEIGHT)	DIAMETER* (mm)	ROHS COMPLIANT
Pb-Free				
<i>LOCTITE</i> SWR 90iSC	90iSC	3.8	3	Yes
<i>LOCTITE</i> SWR 96SC	SAC387	3.8	3	Yes
<i>LOCTITE</i> SWR 97S	97S	3.0	3	Yes
<i>LOCTITE</i> SWR 99C	99C	0	3	Yes
<i>LOCTITE</i> SWR SAC0307	SAC0307	0.3	3	Yes
<i>LOCTITE</i> SWR SAC305	SAC305	3.0	3	Yes
SnPb				
<i>LOCTITE</i> SWR SN63	Sn63	0	3	No

*Other diameters for certain products are available upon request.

SOLDER ACCESSORIES

Because even the best soldering processes may result in some rework, Henkel has designed a suite of solder accessories and cleaners to make solder joint rework fast and reliable. From desoldering wicks to solder masks to residue-removing cleaners, Henkel's rework solutions help preserve valuable components for re-use.



TACKY FLUXES

PRODUCT	DESCRIPTION	SOLID CONTENT (% BY WEIGHT)	ACID VALUE (mg KOH/g)	APPLICATION	IPC J-STD-004B CLASSIFICATION
Halogen-Free, No-Clean					
LOCTITE® 450-01 RWF	Tacky flux designed for use in a wide range of electronics assembly and rework processes.	43	68	Dispensing	ROLO
LOCTITE HF 108 RWF	Low-voiding rework flux. Suitable for traditional rework, laser and selective soldering. It can be dispensed, printed or dipped.	66	130	Dispensing	ROLO
Halide-Free, No-Clean					
LOCTITE LF 318 RWF	Tacky flux designed for use in a wide range of electronic assembly and Pb-free rework processes. Suitable for dispensing and doctor blading. Sufficient activity to deal with difficult surface finishes.	N/A	107	Dispensing	ROLO
LOCTITE TFN 700B	Newtonian tacky flux for PoP Pb-free applications. Ideally suited for dip-transfer process.	75	90	Dispensing	ROLO

CLEANERS

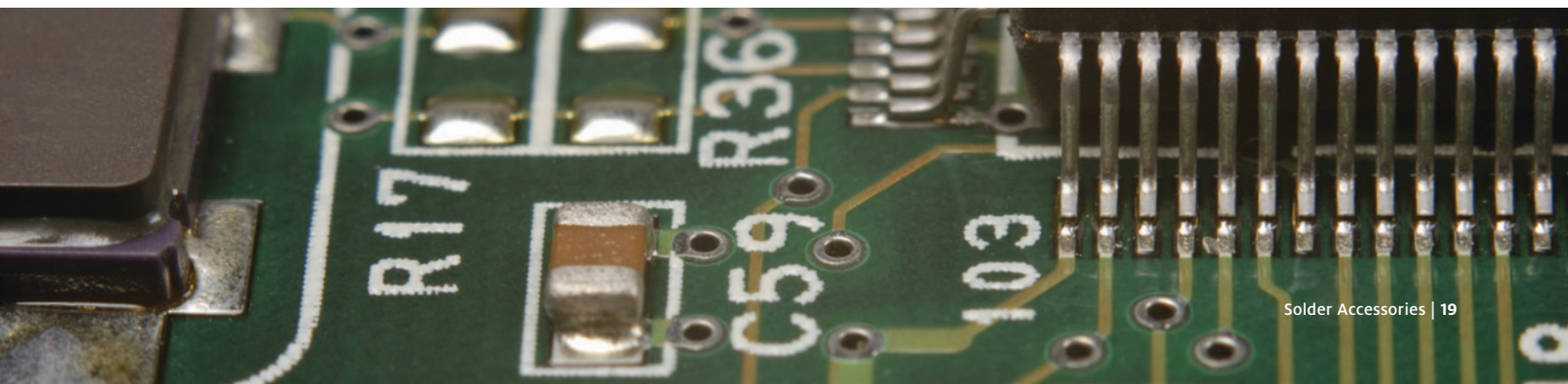
PRODUCT	DESCRIPTION	FLASH POINT (°C)	BOILING POINT (°C)	APPLICATION
LOCTITE MCF 800	Designed for the effective removal of all types of soldering process residues from circuit boards, screens, fixtures and equipment. Flash point of 105°C makes it ideal for use in heated cleaning systems.	105	225	Batch cleaning of post-soldering residues
LOCTITE MSC 01	Designed for the stencil cleaning and hand cleaning of process soldering residues. A highly effective cleaner that dries rapidly (fast evaporation).	40	N/A	Stencil and rework cleaner

SOLDER MASKS

PRODUCT	DESCRIPTION	DRY TIME
LOCTITE MSC 1000S	Peelable temporary solder mask for preventing solder being applied in areas where not required in a wave soldering process. Can be applied by hand, brush, stencil or pneumatic dispense applications. Remove after soldering by simply peeling the mask off the substrate.	2 hours at 25°C or 40 minutes at 80°C

SOLDER WICKS

PRODUCT	APPROXIMATE WIDTH	DESCRIPTION
LOCTITE NC-OO	0.89 mm (0.035 in.) ± 10%	No-clean desoldering wick is designed for static-free desoldering applications and repair of PC boards, without the need for subsequent residue removal. Henkel desoldering wick is a copper braid which is flux coated using a specially formulated halogen-free, no-clean flux for improved wicking. It will not lose its efficiency even after prolonged storage in humid conditions. It is made to remain flexible and will not flake.
LOCTITE NC-AA	1.42 mm (0.056 in.) ± 10%	
LOCTITE NC-AB	1.88 mm (0.074 in.) ± 10%	
LOCTITE NC-BB	2.59 mm (0.102 in.) ± 10%	





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