Heraeus

Product Overview
Heraeus Electronics - Assembly Materials
Automotive & Industrial

Introduction

Whenever you seek materials expertise, Heraeus, as it has done for decades, stands as your guide and partner. With revenues exceeding EUR 22 billion and more than 12,500 employees in more than 120 companies worldwide, Heraeus has stood out for over 160 years as a globally recognized precious metals and materials specialist.

From automotive to applications in industrial, green energy, communication and aerospace electronics – designers of miniaturized systems face the challenge to incorporate expanding functional needs into reduced spaces, combined with the increased reliability requirements.

Heraeus Electronics has been the leading manufacturer of materials for assembly of circuits based on PCBs, ceramic (hybrid, LTCC, DBC) and lead frame substrates.

Throughout the world, Heraeus products are known for their high quality, advanced technology and excellent technical support.

Heraeus supplies a great variety of innovative materials and components of precious metals and other materials, which meet the high requirements of the electronics industry.

Your business will benefit in different ways:

- **Wide range of products**
- **Special high reliability products**
- **High safety of supply due to powder, flux and paste production in different sites, on different continents**
- **Compliance with RoHS regulations**
- **Technical support worldwide**

We work with you

Research and Technology – Heraeus is striving for the continuous implementation of new materials and technologies with focus on increased performance, reliability, robustness and environmental compliance.

Through close cooperation with our customers, suppliers and external technology partners as well as research institutes we ensure to include all major technological trends in our developments. We share our product and technology roadmap with our key customers and encourage open discussion to bring more value to our industries.

Application Technology – this group of specialists is focused on assisting our customer base with application support and process development worldwide.

Our application laboratories in Germany, Singapore and China are equipped with all necessary equipments to provide valuable information. Another key capability is the analytical laboratory with state of the art equipment and tools for failure analysis and in depth material characterization. Whatever the requirements of our customers are, Heraeus has the knowledge, equipment, and analytical capabilities to support. Wherever your needs are, our engineers will come to your place and support you in your environment, fast and reliable.

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Standard Solder Powder

Solder Powder – Standard Alloys

Alloy	Melting temperature [°C]	Powder type and particle size in [µm]			Density	Recommended for		Remark
		3 [25 – 45]	4 [20 – 38]	5 [15 – 25]	[g/m^3]	PCB	ceramic circuits	
Lead-free, SnAg based								
InnoRel Innolot® SnAg3.5Cu0.7Ni0.125Sb1.5Bi3	206 – 218	+	+	0	7,5	+		superior reliability high field operating temperatures
InnoRel HT1 SnAg2.5Cu0.5In2KM 2)	206 – 218	+	0	0	7,4		+	superior reliability high field operating temperatures
Sn96.5Ag3Cu0.5	217	+	+	0	7,4	+		SAC standard alloy
Sn95.5Ag4 Cu0.5	217	+	+	0	7,5	+	+	SAC with higher Ag-content
Sn99Ag0.3Cu0.7	217 – 227	+	0	0	7,3	+		SAC with low Ag-content
Sn96.5Ag3.5	221	+	0	0	7,4	+	+	SnAg eutectic
Lead-free, low melting								
SnBi58	138	+	0	0	8,7	+		low melting without Ag
SnBi57Ag1	139 – 140	+	0	0	8,8	+	+	low melting with Ag
Lead containing								
Sn63Pb37	183	+	+	0	8,8	+		eutectic SnPb
Sn62Pb36Ag2	179	+	+	0	8,8	+	+	eutectic SnPbAg

„+“ standard alloys/powder sizes „0“ available upon request 2) KM = cristall modifier

Heraeus offers a full line of no clean, solvent clean and water soluble pastes for surface mount (component assembly), in a variety of alloys and powder particle sizes. These pastes can be reflowed in standard convection ovens and also in vapour phase, vaccum systems etc. The products are optimized for various manufacturing techniques like printing, dispensing, dipping and jetting.

Solder Pastes: Lead Containing

Solder Pastes – Lead Containing

Paste Series			No Clean		NEW	Water cleanable
	D 377	F381	F917	F10	SOP 91123*	F541
Application						
Printing	+	+	+	+	+	+
Dispensing	+					+
Solder Paste Properties						
Halogen-free	+				++	
J-STD-004 classification	L0	M1	L1	L0	L0	H1
Reflow in air	+	+	+	+	+	+
Reflow in nitrogen	+	+	+	+	+	+
Vapour phase	+		+		+	+
Anti-tombstone alloy	+		+		+	
Superior wetting	+	++	++	+++	+	+
Very clear flux residues	++	++	+	++	+	n/a
Easy cleaning		+	+	+	+	+

* New Pb-containing type 4 platform

Heraeus lead containing solders are available with SnPb37 and SnPb36Ag2. Product range includes also special antitombstone alloys. For special applications e.g. thin Au wire bonding, halogen-free versions are available.

Solder Pastes: Lead-free

Solder Pastes – Lead-free

Paste Series	No Clean						Water cleanable	
	NEW		SolderPro					
	SOP 91123*	SOP 91121	F 640[1]	F 645	F 620	F 169	WL 449	F 541
Application								
Printing	+	+	+	+	+		+	+
Dispensing			+	+		+		
Solder Paste Properties								
Halogen-free	++			+		+	+	
J-STD-004 classification	L0	L0	L0[2]	L0[2]	L1	not tested	M0	H1
Reflow in air	+	+	+	+	+	+	+	+
Reflow in nitrogen	+	+	+	+	+	+	+	+
Vapour phase	+	+	+	+	+		+	+
Superior wetting, also in air	+	+	+		+		+	+
Excellent wetting on Ni, also in air	+	+	++	+			++	
Very clear flux residues	+	+			+		n/a	n/a
Minimizes voiding on BGAs	+	+			+			+
Minimizes voiding in area soldering	+	+	+					+
Easy cleaning with water							++	+

[1] W640 Solder Wire available in different diameters.

[2] Tested per Bellcore GR-78-Core, pass

*New Pb-free type 4 platform

Lead-free pastes are available in a wide range of different SnAgCu alloys and SnAg3.5 eutectic alloy. Product portfolio includes InnoRel series, SolderPro series and low melting pastes.

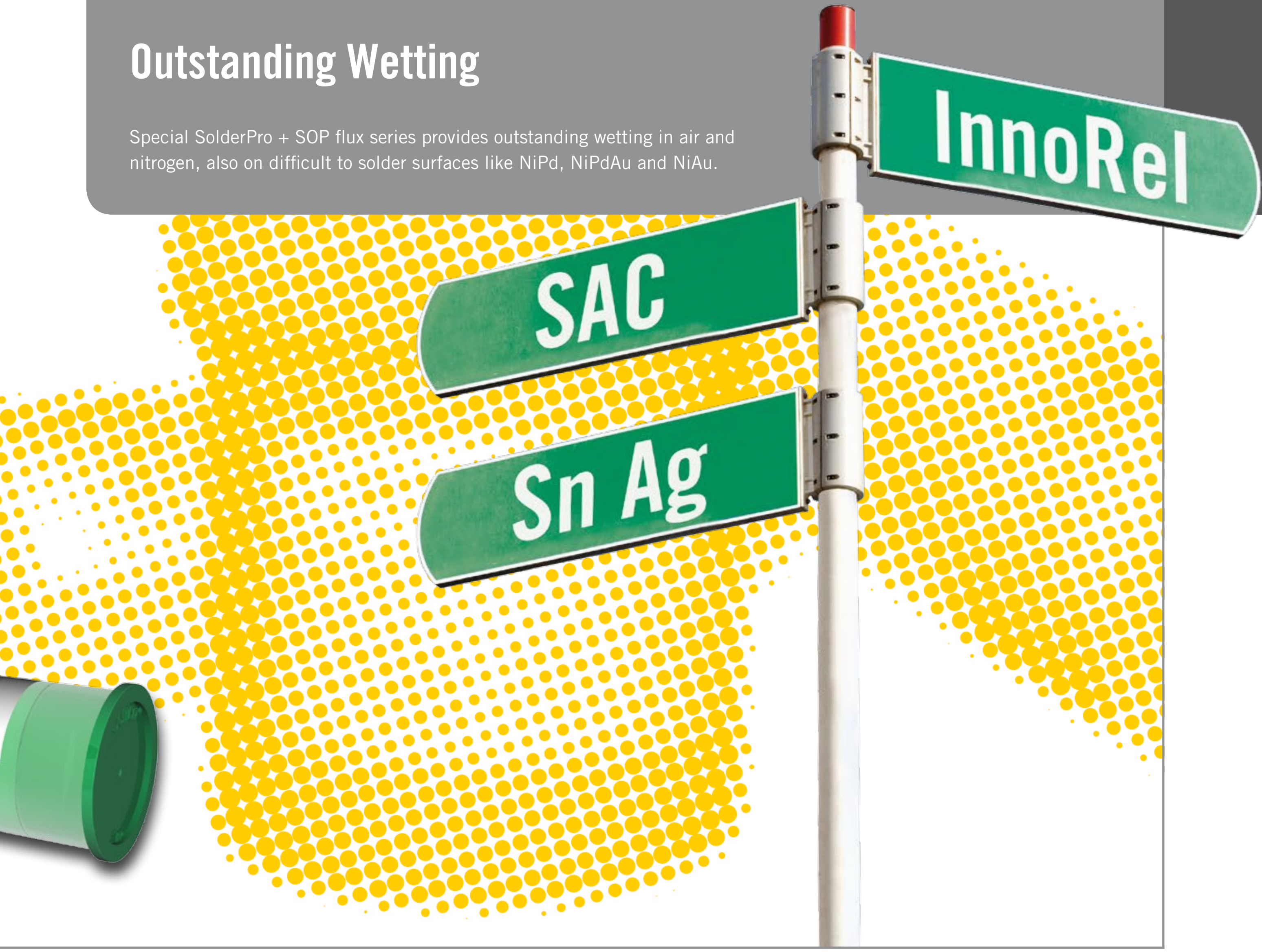
InnoRel - High Reliability Products

High Reliability

InnoRel series are high reliability lead-free alloys for applications on epoxy based PCBs and on ceramic sustrates. InnoRel with the Innolot® alloy SnAg3.5Cu0.7Ni0.12Sb1.5Bi3 is recommended for PCBs, for ceramics e.g. hybrids, LTCC or DBC we recommend InnoRel with the HT1 alloy SnAg2.5Cu0.5In2 (SnAgCuIn plus cristall modifier).

Outstanding Wetting

Special SolderPro + SOP flux series provides outstanding wetting in air and nitrogen, also on difficult to solder surfaces like NiPd, NiPdAu and NiAu.



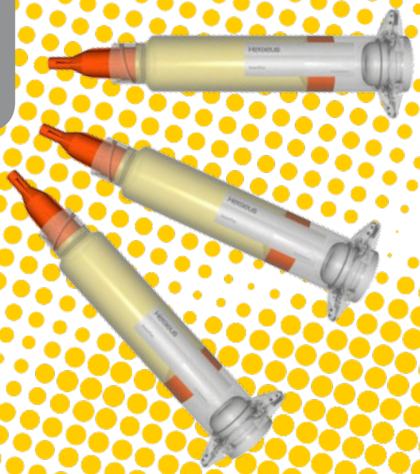
Fluxes

Solder Fluxes for Rework, Power Electronics and Flip Chip Attach

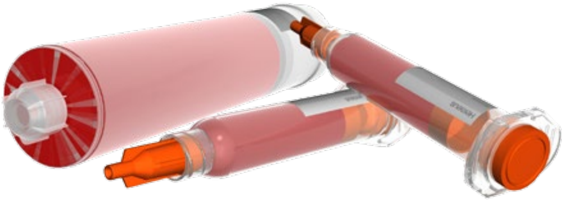
Flux	No Clean					Water cleanable	
	NC 5070	SF36	SF64	SURF 20	TF 38	TFD 54	WSD 3810-CFF
Application							
Rework- manual, cartridge	+	+	+		+	+	+
Rework -manual, pen				+			
Power Electronics -prinintg							
Flip Chip, Dip fluxer	+				+		+
Flux Properties							
Halogen-free	+	+	+	+	+		+
Paste or gel	+	+	+		+	+	+
Liquid				+			
J-STD-004 classification	LO	LO	LO[1]	LO	LO	H1	H0
Color of flux residues	Clear	Clear	Clear	Clear	Extremely Clear	n/a	n/a
Compatible with underfill, e.g. flip chip/CSP on PCB					+		
Solids Content	60	50	60	2.2	18	n/a	n/a
Superior wetting	+	+	++		+	+	++
Tackiness	++	+	+		+		++

[1] Tested per Bellcore GR-78-Core, pass

Heraeus offers special paste, or gel and liquid fluxes for rework purposes. These fluxes allow for excellent wetting and leave minimal, non tacky flux residues.



SMT Adhesives



SMT Adhesives

Type of Adhesive [1]	PD 955 PY	PD 955 PRM	PD 955 M	PD 977	PD 205A-Jet	PD 208 PR	PD 208 M
Application method							
Stencil printing	++	++		+		++	
Dispensing [2]			++	+	++[3]		++
Pin-transfer		+					
Process							
Very high green strength	++	+				+	
AOI (automatical optic inspection)		+	+	+	+	+	+
Lead-free soldering	++	++	+	+	+	++	+
Good adhesion with difficult-to-glue components	++	++	++	+	+	++	++
Low temperature curing				+			
Easy cleaning of stencils	+	+				+	
Recommended for BGA/CSP … corner bonding			+	++			
Physical properties							
Halogen-free [4]						+	+
Colour	yellow	pink	red	red	red	orange	red

[1] The most suitable products for the particular application method are indicated with "++".

[2] For critical glass diodes, PD 860002 SPA is recommended.

[3] Recommended for dispensing with Jet-Dispenser (e.g. Asymtek, Mydata)

[4] Acc. to IEC 61249-2-21

SMT adhesives are used for fixing of components during wave soldering. Also, in double sided reflow, SMT adhesives help to fix large components.
In addition SMT Adhesives can be used for fixing of grid array components e.g. BGA's/CSP. This application is also called BGA corner bonding.

Heraeus adhesives are suitable for all common application methods e.g. printing, dispensing, pin transfer and jetting. They are supplied in a big variety of cartridges for all common machines.

Products for Power Electronics

Solder Pastes for Power Electronic Circuits

Series	No Clean				Water cleanable
	F360	CS 530 PE	F 645	F 640	WL449
Process					
Vacuum soldering	+	++	+		+
Nitrogen soldering, no vacuum			+	++	
Recommended for ceramic substrates	++	++	++	++	++
Recommended for lead frames			++		
Properties					
Halogen zero	++	++	++		++
J-STD-004 classification	LO	LO	LO	LO	MO
Printing speed for large areas	+	++	++	++	++
Superior wetting	0	+	++	++	+
Excellent wetting on Ni			+	++	+
Very clear flux residues / less residues	+	++	+	+	+
Easy cleaning with DI water					++
Easy cleaning with different agents	+	+ (alkaline)	+	+	++

Power electronics is used for applications which include high current, high voltage and highest reliability requirements. Typical applications are alternative drive concepts like hybrid, electric and fuel cell cars and green energy manufacturing e.g. windmills and solar plants.

Other applications include e-bikes and scooters, electrics power steering, start stop systems and control units for high power electric drives, e.g. in escalators.

Power electronics is typically built on ceramic substrates (DBC) or on lead frames. Heraeus produces special lead-free solder pastes optimized for printing of large surfaces and for minimizing voids when reflowed in vacuum or in normal atmosphere.

The innovative interconnection material mAgic sinter materials enable best performance regarding thermal and electrical conductivity and considerable improved thermal resistance in power cycling compared to solder materials. In addition it is completely lead-free and can replace high lead solder which are still often used in discrete packages and also in power electronics.

For more information on sinter products please see brochure

mAgic
Microbond Silver Interconnect

Application and R&D Center for Power Electronics

Heraeus has established a new Application and R&D Center for Power Electronics that includes a state of the art clean room and ESD laboratory.

With this Heraeus offers a unique advantage for customers as it covers the full production and testing process for power electronics. Using the latest equipment Heraeus is able to assemble prototypes and to test modules according to latest standards or customer requirements.

The customer benefit is a partnership exchange on a high level of process and development capability.

Abstract of Processing Capability:

- Vacuum reflow process
- Screen printing
- Mounting, placement and dispensing
- Sintering
- Wire bonding

Abstract of Testing and Analysis Capability:

- Scanning acoustic microscopy
- Laser Flash
- Electrical testing
- Environmental test
- Endurance tests

With Heraeus´ decades of experience in electronics industry and with the establishment of the new Application Center customers will get pre tested material sets for power electronic applications.

Heraeus Electronics, the R&D partner

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The data given here is valid. We reserve the right to make technical alterations.

Heraeus Electronics
Heraeus Deutschland GmbH & Co. KG
Heraeusstraße 12-14
63450 Hanau, Germany
www.heraeus-electronics.com

Americas
Phone +1 610 825 6050
electronics.americas@heraeus.com

Asia Pacific
Phone +65 6571 7677
electronics.apac@heraeus.com

China
Phone +86 21 3357 5457
electronics.china@heraeus.com

Europe, Middle East and Africa
Phone +49 6181 35 3069
+49 6181 35 3627
electronics.emea@heraeus.com