技术数据表（TDS）/ Technical Data Sheet (TDS)

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H004B3 免清洗焊锡膏（ROL1）/ H004B3 No-Clean Solder Paste (ROL1)

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电话 / Tel	0756-8608483
产品名称 / Product Name	H004B3 免清洗焊锡膏 / H004B3 No-Clean Solder Paste
合金成分 / Alloy Composition	Sn63Pb37（共晶锡铅合金）/ Sn63Pb37 (Eutectic Tin-Lead Alloy)
助焊剂分类 / Flux Classification	ROL1（松香基、低活性、含卤素）/ ROL1 (Rosin-based, Low Activity, Halide-containing)
产品类型 / Product Type	免清洗型焊锡膏 / No-Clean Solder Paste
粉末粒度 / Powder Particle Size	Type 3 / Type 4 / Type 5
版本日期 / Version Date	2026年1月 / January 2026

修订记录 / Revision History

版本 / Version	日期 / Date	修订说明 / Revision Description
V1.0	2026年1月 / January 2026	初始发布 / Initial release

一、产品描述 / 1. Product Description

H004B3 是一款基于 Sn63Pb37 共晶合金的免清洗焊锡膏，采用松香基 ROL1 助焊剂体系。ROL1 助焊剂按重量计卤化物含量小于 0.5%，含有微量卤素活性剂以增强润湿性能。相比 ROL0，ROL1 具有更好的氧化膜去除能力和更宽的工艺窗口，是消费电子、通信设备等常规 SMT 应用中最常用的助焊剂等级。

本产品提供 Type 3、Type 4、Type 5 三种粉末粒度规格，可满足从常规间距到超细间距、微型化封装及喷射印刷等不同工艺需求。

H004B3 is a no-clean solder paste based on Sn63Pb37 eutectic alloy, using a rosin-based ROL1 flux system. The ROL1 flux contains less than 0.5% halides by weight and includes a small amount of halide activator to enhance wetting performance. Compared with ROL0, ROL1 provides better oxide removal capability and a wider process window. It is the most commonly used flux classification for general SMT applications such as consumer electronics and communication equipment.

This product is available in Type 3, Type 4, and Type 5 powder particle sizes, meeting various process requirements from standard pitch to ultra-fine pitch, micro-package, and jet printing applications.

二、合金性能 / 2. Alloy Properties

项目 / Item	规格 / Specification	测试方法 / Test Method
合金成分 / Alloy Composition	Sn 63% / Pb 37%（共晶）/ Sn 63% / Pb 37% (Eutectic)	XRF 光谱扫描（快速筛查）；Spark-OES 或 ICP-OES（定量仲裁）/ XRF spectral scanning (rapid screening); Spark-OES or ICP-OES (quantitative arbitration)
成分范围 / Composition Range	Sn 62.5–63.5%，Pb 余量，符合 IPC J-STD-006 / Sn 62.5–63.5%, Pb balance, complies with IPC J-STD-006	XRF / Spark-OES / ICP-OES
熔点 / Melting Point	183°C（共晶）/ 183°C (Eutectic)	差示扫描量热法（DSC）/ Differential Scanning Calorimetry (DSC)
合金密度 / Alloy Density	约 8.40 g/cm³ / Approx. 8.40 g/cm³	阿基米德排水法 / Archimedes method
焊锡膏密度 / Paste Density	约 4.70 g/cm³ / Approx. 4.70 g/cm³	比重杯法 / Specific gravity cup method
电阻率 / Resistivity	约 0.146 μΩ·m / Approx. 0.146 μΩ·m	四探针法，IPC-TM-650 2.5.14 / Four-point probe method, IPC-TM-650 2.5.14
抗拉强度 / Tensile Strength	约 30–48 MPa（视焊点形态和工艺）/ Approx. 30–48 MPa (depending on joint geometry and process)	ASTM E8 拉伸试验 / ASTM E8 tensile test
延伸率 / Elongation	约 20%–30% / Approx. 20%–30%	ASTM E8 拉伸试验 / ASTM E8 tensile test

Sn63Pb37 为共晶合金，具有单一的 183°C 熔点，无固液两相区，焊接过程中凝固迅速、焊点饱满光亮。

Sn63Pb37 is a eutectic alloy with a single melting point of 183°C and no solid-liquid two-phase region. It solidifies rapidly during soldering, producing full and bright solder joints.

三、焊锡膏物理性能 / 3. Solder Paste Physical Properties

项目 / Item	规格 / Specification	测试方法 / Test Method
金属含量 / Metal Content	90% ± 0.5%（重量比）/ 90% ± 0.5% (by weight)	J-STD-005 / IPC-TM-650 2.3.34
粉末粒度 Type 3 / Powder Size Type 3	25–45 μm	J-STD-005 / IPC-TM-650 2.2.14
粉末粒度 Type 4 / Powder Size Type 4	20–38 μm	J-STD-005 / IPC-TM-650 2.2.14
粉末粒度 Type 5 / Powder Size Type 5	15–25 μm	J-STD-005 / IPC-TM-650 2.2.14

项目 / Item	规格 / Specification	测试方法 / Test Method
粘度 / Viscosity	160 ± 20 Pa·s	IPC-TM-650 2.4.34（T型转子法，25°C，10 rpm）/ IPC-TM-650 2.4.34 (T-spindle, 25°C, 10 rpm)
外观 / Appearance	灰色膏状，无异物 / Gray paste, no foreign matter	目视检查 / Visual inspection
粘性保持时间 / Tack Retention Time	≥ 10 小时 / ≥ 10 hours	IPC-TM-650 2.4.44（Tack Test）/ IPC-TM-650 2.4.44 (Tack Test)
塌陷性 / Slump	通过 / Pass	J-STD-005 / IPC-TM-650 2.4.35（冷塌/热塌）/ J-STD-005 / IPC-TM-650 2.4.35 (cold/hot slump)
锡球测试 / Solder Ball Test	通过 / Pass	J-STD-005 / IPC-TM-650 2.4.43
润湿性 / Wetting	通过 / Pass	IPC-TM-650 2.4.45

Type 5 粉末说明 / Type 5 Powder Description

Type 5 粉末粒径为 15–25 μm，适用于超细间距（< 0.4 mm）印刷场景，如 0201/01005 元件、micro-BGA、PoP、SiP 等微型化封装。推荐钢网开孔 ≥ 125 μm（5 mil），配合 0.06–0.10 mm 薄钢网使用。Type 5 尤其适用于喷射印刷（Jet Printing）工艺，该工艺要求粉末粒径小于 30 μm。由于 Type 5 粉末比表面积大，助焊剂与合金粉末的界面反应更活跃，H004B3 的 ROL1 活性体系在此条件下可提供更稳定的润湿保障。

Type 5 powder has a particle size of 15–25 μm, suitable for ultra-fine pitch (< 0.4 mm) printing applications such as 0201/01005 components, micro-BGA, PoP, SiP, and other micro-package assemblies. Recommended stencil aperture is ≥ 125 μm (5 mil), used with a thin stencil of 0.06–0.10 mm. Type 5 is especially suitable for jet printing, which requires powder particle size less than 30 μm. Due to the large specific surface area of Type 5 powder, the interfacial reaction between flux and alloy powder is more active. The ROL1 activator system of H004B3 provides more stable wetting assurance under these conditions.

四、助焊剂特性（ROL1）/ 4. Flux Properties (ROL1)

项目 / Item	规格/结果 / Specification/Result	测试方法 / Test Method
助焊剂分类 / Flux Classification	ROL1	IPC J-STD-004B
卤化物含量 / Halide Content	< 0.5%（重量比）/ < 0.5% (by weight)	IPC J-STD-004B（银铬酸盐指示剂法）/ IPC J-STD-004B (silver chromate indicator method)
助焊剂含量 / Flux Content	10% ± 0.5%	J-STD-005 / IPC-TM-650 2.3.34.1
铜镜测试 / Copper Mirror Test	通过 / Pass	IPC-TM-650 2.3.32（铜镜腐蚀试验）/ IPC-TM-650 2.3.32 (copper mirror corrosion test)

项目 / Item	规格/结果 / Specification/Result	测试方法 / Test Method
表面绝缘电阻 / Surface Insulation Resistance	所有测试模板 > 100 MΩ / All test patterns > 100 MΩ	IPC-TM-650 2.6.3.7（SIR测试）/ IPC-TM-650 2.6.3.7 (SIR test)
残留物 / Residue	少量，透明或微黄，多数可免清洗 / Small amount, transparent or slightly yellow, mostly no-clean	目视检查 / Visual inspection

ROL1 中的微量卤素活性剂可有效去除焊接表面的氧化膜，提供比 ROL0 更快的润湿速度和更宽的工艺窗口。在正常工艺条件下，残留物满足免清洗要求，无需额外清洗。

The trace halide activator in ROL1 effectively removes oxide films from soldering surfaces, providing faster wetting speed and a wider process window than ROL0. Under normal process conditions, the residue meets no-clean requirements without additional cleaning.

五、应用指南 / 5. Application Guide

- **适用工艺：**模板印刷、点胶、喷射印刷
- **推荐钢网厚度：**
  - Type 3 / Type 4：0.08–0.15 mm
  - Type 5：0.06–0.10 mm
- **回流曲线：**建议峰值温度 210–230°C，高于液相线（183°C）以上 30–60 秒。参考标准：IPC-TM-650 2.4.45（润湿测试）
- **适用场景：**消费电子、通信设备、计算机及外设等常规 SMT 组装；Type 5 适用于微型化封装、SiP 及喷射印刷工艺
- **混合组装：**适用于 SMT + 通孔混合工艺
- **Applicable Processes:** Stencil printing, dispensing, jet printing
- **Recommended Stencil Thickness:**
  - Type 3 / Type 4: 0.08–0.15 mm
  - Type 5: 0.06–0.10 mm
- **Reflow Profile:** Recommended peak temperature 210–230°C, 30–60 seconds above liquidus (183°C). Reference standard: IPC-TM-650 2.4.45 (wetting test)
- **Application Scenarios:** General SMT assembly for consumer electronics, communication equipment, computers and peripherals; Type 5 is suitable for micro-package, SiP, and jet printing processes
- **Mixed Assembly:** Suitable for SMT + through-hole mixed processes

六、包装与储存 / 6. Packaging and Storage

项目 / Item	规格 / Specification
包装规格 / Packaging	500 g 罐装 / 注射器装 / 定制 / 500 g jar / syringe / custom
储存条件 / Storage Conditions	2–10°C 冷藏，密封保存 / Refrigerated at 2–10°C, sealed

项目 / Item	规格 / Specification
保质期 / Shelf Life	自生产日期起 6 个月（未开封，冷藏）/ 6 months from date of manufacture (unopened, refrigerated)
回温要求 / Thawing Requirement	使用前在室温下回温 ≥ 2 小时，禁止开盖加热 / Thaw at room temperature for ≥ 2 hours before use; do not open and heat

七、安全与法规 / 7. Safety and Regulations

- 含铅产品，操作时须佩戴防护手套及护目镜，避免皮肤直接接触。
- 废弃焊锡膏及残留物应按当地含铅废弃物法规处置。
- 符合 RoHS 豁免条款（铅在焊料中的使用豁免）。
- Lead-containing product. Wear protective gloves and goggles during handling. Avoid direct skin contact.
- Waste solder paste and residues shall be disposed of in accordance with local lead-containing waste regulations.
- Complies with RoHS exemption (lead in solder exemption).

附录：引用标准清单 / Appendix: List of Referenced Standards

标准编号 / Standard No.	标准名称 / Standard Name	用途 / Application
IPC J-STD-005	焊锡膏技术要求 / Requirements for Solder Pastes	粉末粒度分级、金属含量、塌陷、锡球等 / Powder size classification, metal content, slump, solder ball, etc.
IPC J-STD-004B	助焊剂技术要求 / Requirements for Soldering Fluxes	助焊剂分类、卤化物含量 / Flux classification, halide content
IPC J-STD-006	电子焊接用焊料合金技术要求 / Requirements for Electronic Grade Solder Alloys	合金成分范围及杂质要求 / Alloy composition range and impurity requirements
IPC-TM-650 2.2.14	焊料粉末粒径分布——显微镜测量法 / Solder Powder Particle Size Distribution – Microscope Measurement	粉末粒度测试 / Powder size test
IPC-TM-650 2.3.34	焊锡膏金属含量测定 / Metal Content of Solder Paste	金属含量测试 / Metal content test
IPC-TM-650 2.3.34.1	焊锡膏助焊剂含量测定 / Flux Content of Solder Paste	助焊剂含量测试 / Flux content test
IPC-TM-650 2.3.32	铜镜腐蚀试验 / Copper Mirror Corrosion Test	助焊剂腐蚀性测试 / Flux corrosivity test
IPC-TM-650 2.4.34	焊锡膏粘度——T型转子法 / Viscosity of Solder Paste – T-Spindle Method	粘度测试 / Viscosity test
IPC-TM-650 2.4.35	焊锡膏塌落测试 / Slump Test of Solder Paste	冷塌/热塌测试 / Cold/hot slump test
IPC-TM-650 2.4.43	焊锡膏锡球测试 / Solder Ball Test of Solder Paste	锡球/飞珠测试 / Solder ball / beading test
IPC-TM-650 2.4.44	焊锡膏粘性测试 / Tack Test of Solder Paste	粘性保持力测试 / Tack retention test
IPC-TM-650 2.4.45	焊锡膏润湿测试 / Wetting Test of Solder Paste	润湿性能测试 / Wetting performance test
IPC-TM-650 2.5.14	电阻率测试 / Resistivity Test	合金电阻率测试 / Alloy resistivity test
IPC-TM-650 2.6.3.7	表面绝缘电阻测试 / Surface Insulation Resistance Test	SIR测试 / SIR test
ASTM E8	金属材料拉伸试验方法 / Standard Test Methods for Tension Testing of Metallic Materials	抗拉强度/延伸率测试 / Tensile strength / elongation test

以上数据为典型值，实际使用中应根据具体工艺条件进行优化。建议用户在使用前进行小批量试产验证。

The above data are typical values and should be optimized according to specific process conditions in actual use. Users are advised to conduct small-batch trial production verification before use.

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