PRODUCT DATA SHEET

Durafuse® LT with Indium3.2HF

Low-Temperature Drop Shock Solution

Introduction

Durafuse® LT is a patented novel solder paste mixed-alloy system for low-temperature reflow processes which require high drop shock reliability. **Durafuse® LT** is made up of a low-melting In-containing alloy and higher-melting SAC alloy. The SnInAg alloy initiates joint fusion while the SAC alloy provides enhanced strength and durability. **Durafuse® LT** is ideal for high-reliability applications, which utilize thermally sensitive components.

Features

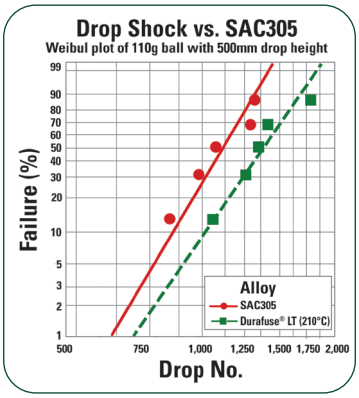
- Excellent drop shock reliability—comparable to SAC
- Reflow below 210°C
- Melting temperature above 180°C
- Good mechanical shear strength up to 150–165°C
- Good thermal and electrical conductivity

Flux Vehicle

Indium3.2HF is a halogen-free, water-soluble solder paste. This product formulation offers consistent, repeatable printing performance combined with a long stencil life and sufficient tack strength to handle the challenges of today's high-speed as well as high-mix surface mount lines. In addition, this solder paste offers superb wetting to various Pb-free metallizations and has exceptional low-voiding performance on fine-pitch components, including BGAs and CSPs. Please contact Technical Support for assistance.

Key Applications

Low-temperature solders reduce warpage of thermally sensitive components by reducing peak reflow temperature; however, standard Bi-based low-temperature alloys are unable to withstand even moderate drop shock. **Durafuse® LT** is a low-temperature Pb-free solder capable of reducing peak reflow temperature by 40°C relative to SAC305, with drop shock reliability two orders of magnitude greater than standard low-temperature alloys.



Durafuse® LT samples in the chart (left) experienced a peak reflow temperature of 210°C and demonstrated drop shock resilience similar to that of SAC305.

Standard Product Specifications

Flux	Mesh Size	Printing Metal Load
Indium3.2HF	Type 4	88.5%
	Type 5-MC	88.0%

Indium Corporation manufactures mixed low-oxide spherical powders in the industry standard Type 4 and Type 5-MC mesh sizes. Other non-standard mesh sizes are available upon request. The weight ratio of the flux/vehicle to the solder powder is referred to as the metal load and is typically in the range of 83–92% for standard compositions.

Industry Standard Test Results and Classification			
Flux Type Classification	ORH0	Typical Viscosity for SAC305 Type 4 Solder Paste (Poise)	TBD
Based on the testing required by IPC J-STD-004B			
Halogen-free per IEC 61249-2-21, Test Method EN14582	<900ppm Cl <900ppm Br <1,500ppm Total	Conforms with all requirements from J-STD-005A	

All information is for reference only. Not to be used as incoming product specifications.

Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. Solder paste packaged in syringes and cartridges should be stored tip down.

Packaging	Storage Conditions (unopened containers)	Shelf Life
Syringe	<-10°C	6 months
Jar/Cartridge	<10°C	6 months

Solder paste should be allowed to reach ambient working temperature prior to use. Generally, paste should be removed from refrigeration at least 2 hours before use. Actual time to reach thermal equilibrium will vary with container size. Paste temperature should be verified before use. Jars and cartridges should be labeled with date and time of opening.

Packaging

Standard packaging for **Durafuse® LT** is 500g jars and 600g cartridges. Other packaging options may be available upon request.

Complementary Products

- **Rework Flux**: TACFlux® 032HF
- **Flux Pen**: FP-300
- **Cored Wire**: CW-301
- **Wave Flux**: 1095-NF

Note: Other products may be applicable. Please consult one of Indium Corporation's Technical Support Engineers.

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Printing

Stencil Design:

Electroformed and laser cut/electropolished stencils produce the best printing characteristics among stencil types. Stencil aperture design is a crucial step in optimizing the print process. The following are a few general recommendations:

- Discrete components—A 10–20% reduction of stencil aperture has significantly reduced or eliminated the occurrence of mid-chip solder beads. The "home plate" design is a common method for achieving this reduction.
- Fine-pitch components—A surface area reduction is recommended for apertures of 20mil pitch and finer. This reduction will help minimize solder balling and bridging that can lead to electrical shorts. The amount of reduction necessary is process-dependent (5–15% is common).
- A minimum aspect ratio of 1:5 is suggested for adequate release of solder paste from stencil apertures. The aspect ratio is defined as the width of the aperture divided by the thickness of the stencil.

Printer Operation:

The following are general recommendations for stencil printer optimization. Adjustments may be necessary based on specific process requirements:

Solder Paste Bead Size	20–25mm in diameter
Print Speed	25–150mm/second
Squeegee Pressure	0.018–0.027kg/mm of blade length
Underside Stencil Wipe	Start at once per every 5 prints and decrease frequency until optimum value is reached
Solder Paste Stencil Life	>8 hours at 30–60% RH and 22–28°C

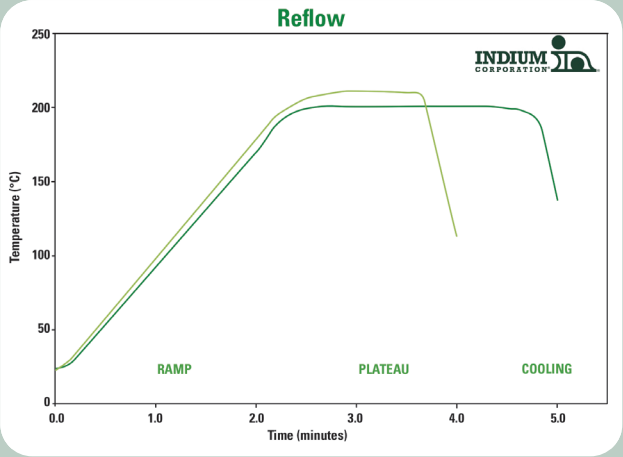
Cleaning

Residue Removal: Indium3.2HF flux residues are water-soluble and best removed by an inline or batch type cleaning process using spray pressure and heated DI water. A spray pressure of 60psi and a DI water temperature of 55°C can be used as a starting point. The optimal spray pressure and temperature are a function of board size, complexity, and the efficiency of the cleaning equipment and should be optimized accordingly. We recommend cleaning the flux residue 12 hours (or sooner) after reflow for optimal test performance.

Stencil Cleaning is best performed using an automated stencil cleaning system for both stencil and misprint cleaning to prevent extraneous solder balls. Most commercially available stencil cleaning formulations including isopropyl alcohol (IPA) work well.

Reflow

Recommended Profile:



This profile is designed for use with **Durafuse® LT** (Indium3.2HF). This can be used as a general guideline in establishing a reflow profile for **Durafuse® LT** Solder Paste. Deviations from these recommendations are acceptable, and may be necessary, based on specific process requirements.

Ramp Stage:

A linear ramp rate of 1–2°C/second allows gradual evaporation of volatile flux constituents and prevents defects such as solder balling/beading and bridging as a result of hot slump. It also prevents unnecessary depletion of fluxing capacity.

Soak Stage:

A plateau region between low- and high-temperature alloy liquidus temperatures facilitates alloy fusion. Peak reflow temperature between 200–210°C is ideal to form an optimally fused solder joint. Peak temperatures below 200°C may fail to capture the full drop shock capability of **Durafuse® LT**.

Cooling Stage:

A rapid cool down is desired to form a fine-grain structure. Slow cooling will form a large-grain structure, which typically exhibits poor fatigue resistance. The acceptable cooling range is 0.5–6.0°C/second (2–6°C/second is ideal).

All of Indium Corporation's solder paste and preform manufacturing facilities are IATF 16949:2016 certified.
Indium Corporation is an ISO 9001:2015 registered company.

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