PRODUCT DATA SHEET

Durafuse™ LT*

Low-Temperature Drop Shock Solution

Introduction

Durafuse™ LT is a 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

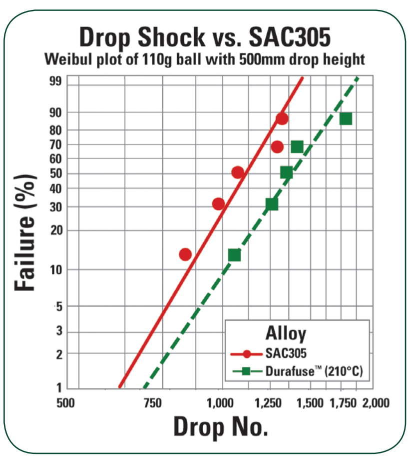
- Excellent drop shock reliability—comparable to SAC
- Reflow below 210°C
- Melting temperature above 180°C
- Good mechanical shear strength up to 150–165°C
- Good thermal and electrical conductivity

Flux Vehicle

Indium5.7LT-1 is an air reflow, halogen-free, no-clean solder paste designed for assembly processes using Bi-based and In-containing low-temperature alloys. This paste is a clear residue product with exceptional wetting capabilities. The low activation temperature and high thermal tolerance of Indium5.7LT-1 enables a fully optimized reflow process.

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
Indium5.7LT-1	Type 4	88.5–90.0%
	Type 5-MC	88.0–88.5%

Indium Corporation manufactures mixed low-oxide spherical powders in the industry standard Types 4 and 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.

Indium5.7LT-1 Industry Standard Test Results and Classification			
Based on the testing required by IPC J-Standard-004B (IPC-TM-650)		Typical Solder Paste Viscosity for Type 4 Low-Temperature Solder (Poise)	1,600kcps
Halogen-free per IEC 61249-2-21, Test Method EN14582	<900ppm Cl <900ppm Br <1,500ppm Total	Conforms with all requirements from J-STD-005 (IPC-TM-650)	

Storage and Handling Procedures

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

Storage Conditions (unopened containers)	Preliminary Shelf Life
<10°C	3 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® 020B-RC, TACFlux® 571HF
- **Liquid Rework Flux**: FP-500

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

*Patent Pending

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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	25–100mm/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	>12 hours (at 30–60% RH and 22–28°C)

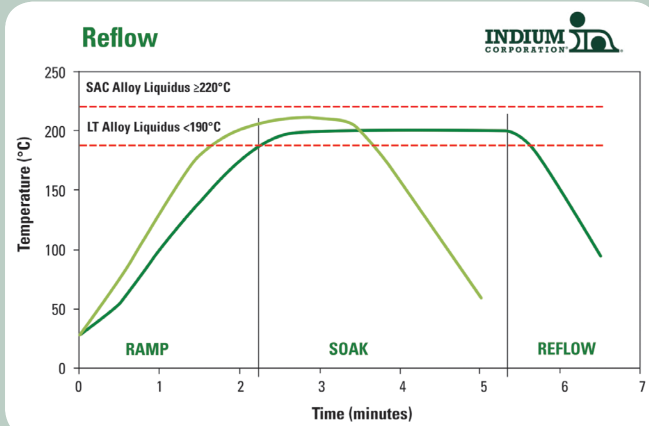
Cleaning

Indium5.7LT-1 is designed for no-clean applications; however, the flux can be removed, if necessary, by using a commercially available flux residue remover.

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** in Indium5.7LT-1. 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.

Heating 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.

Fusion Stage:

A plateau region between low- and high-temperature alloy liquidus temperatures facilitates alloy integration. 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).

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