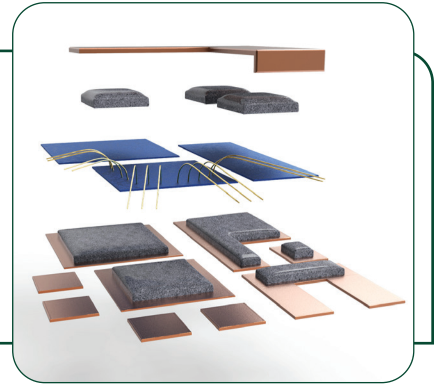
PRODUCT DATA SHEET

# Durafuse® HT

## High-Temperature Pb-Free Solder Paste



## Introduction

**Durafuse® HT** has been designed as a Pb-free solder paste intended as a "drop-in" alternative to traditional high-Pb die-attach solders that require a re-melting temperature that is sufficiently above the PCBA reflow temperatures of up to 260°C. The mixed alloy system allows for shear strength >15MPa, even at temperatures around 280°C and has outstanding thermal cycling properties. Both the electrical and thermal properties of **Durafuse® HT** have been shown to be equal to or better than high-Pb solder.

## Features

- "Drop-in" replacement to high-Pb solder
- Pb-free (lead-free)
- Electrical and thermal properties ≥ high-Pb
- Shear strength >15MPa at 280°C

## Alloys

Indium Corporation manufactures high-quality, low-oxide, spherical powders. Standard powder size for **Durafuse® HT** is Type 4 (25–38µm) classification per IPC J-STD-005.

## Flux Vehicle

Indium7.28 is a versatile, halogen-free flux system, capable of handling the high process temperatures needed for die-attach application. Flux residues can be removed with readily available cleaning solvents. Contact Indium Corporation's technical support for advice or recommendations.

## Standard Product Configuration

| Flux | Metal Load | Application | Packaging |
|---|---|---|---|
| 7.28 | 84% | Dispensing | 100g/syringe |
| | 88% | Printing | 250g/jar |

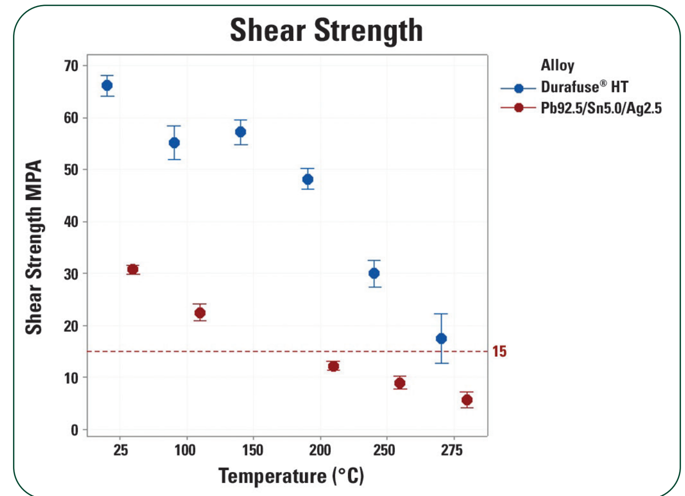
Other packaging options may be available upon request.

## Target Application

**Durafuse® HT** is intended for die-attach and clip-attach applications for discrete power devices and SMD multi-chip module power devices.

## High-Temperature Shear Strength

**Durafuse® HT** maintains shear strength >15MPa, even at temperatures around 280°C, outperforming high-Pb solder.




## Product Characteristics

| Test | Result |
|---|---|
| **J-STD-004 (IPC-TM-650)** | |
| Flux Type (per J-STD-004A) | ROL0 |
| Presence of Halide | 0% |
| Fluoride Spot Test | Pass |
| SIR | Pass (after cleaning) |

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

| Test | Result |
|---|---|
| **J-STD-005 (IPC-TM-650)** | |
| Typical Solder Paste Viscosity (Type 4, 88%) Malcolm (5min/10rpm) | 920 poise |
| Wetting Test | Pass |
| Slump Test | Pass |
| Solder Ball Test | Pass |
| Tack (typical) | 45 grams |

**From One Engineer To Another®**

Form No. 100025 (A4) R0

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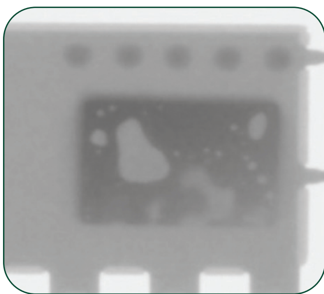
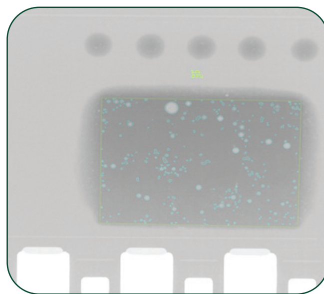
## High-Temperature Pb-Free Solder Paste

## Metallization Compatibility and Ni Leaching

**Durafuse® HT** works with most common die metallization schemes (e.g., Ti/NiV/Ag); however, attention should be paid to the layer thicknesses. NiV layers should be a minimum of 350nm to reduce the risk of Ni fully leaching into the solder which can result in de-wetting and large voids. Harsh reflow conditions such as long TALs and high peak temperature can also accelerate Ni leaching. Indium Corporation's experienced technical support team can advise on metallization compatibility and process conditions.

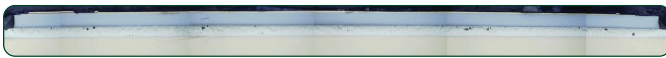


*200nm NiV: Large voids due to Ni leaching and de-wetting.*



*500nm NiV: Very low-voiding.*

*0.2µm Ni – cross section of the voids revealed Ni leaching and interfacial de-wetting.*



*0.5µm Ni – cross section revealed Ni remaining at the interface with continuous IMC.*

## Storage and Handling Procedure

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

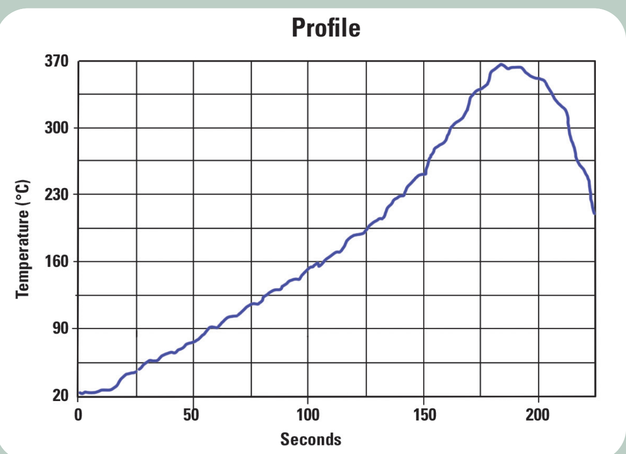
| Packaging | Storage Temperature | Shelf Life |
|---|---|---|
| Syringe | <-10°C | 6 months |
| Jar | <0° | |

## Recommended Printer Operation

| | |
|---|---|
| Solder Paste Bead Size | 20–30mm in diameter |
| Print Speed | 25–100mm/second |
| Squeegee Pressure | 0.02–0.03kg/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 |

## Reflow

**Recommended Profile:**




The profile above is designed for use with **Durafuse® HT** in a nitrogen atmosphere or forming gas (<100ppm $O_2$). Recommended peak temperature is 350–385°C. It can serve as a general guideline for establishing a profile for your process and should be regarded as a typical example. Adjustments to this profile may be necessary based on assembly size, thermal density, and other factors.

## Cleaning

**Durafuse® HT** is designed to be cleaned using standard cleaning chemistries. Indium Corporation's Technical Support Engineers can recommend appropriate cleaning materials from leading suppliers that are suitable for the application.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*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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