# Sn100e No Clean Solder Wire
# 49500 Technical Data Sheet



## Description

The 49500 *Sn100e No Clean Solder Wire* is an electronic grade solder wire. It uses a high-purity, eutectic tin/copper/cobalt alloy, which is complemented with a no clean, synthetically refined, splatter-proof, resin flux core. The 49500 solder meets J-STD-004B, ASTM B 32, and exceeds J-STD-006C specifications.

This solder is a great lead-free alternative to leaded solders. It generally provides better wetting, contact angle, flow, and visual appearance than typical Sn63/Pb37 no clean solders, while still delivering excellent performance characteristics. It offers superior solder penetration into plated through holes and surface mount interconnects. Further, it is a suitable replacement for SAC305 solder since the 49500 forms brighter, shinier, and less grainy joints. Furthermore, it is less expensive.

The 49500 solders achieve a consistent solder and flux percentage through a state-of-the-art, extrusion, wire-drawing machine. This machine continually monitors the wire to prevent voids and ensure consistency, providing a top-grade solder wire.

## Benefits & Features

- **Eutectic alloy**
  (liquidus = solidus temperature)
- **Alloy exceeds J-STD-006C and meets ASTM B 32 purity requirements**
- **Flux meets J-STD-004B**
- **Spreads like rosin activated flux**
- **Virtually non-splattering**
- **Non-corrosive**
- **Non-conductive**
- **Halide free**

**COMPLIANCE**
✓ Dobb Frank (DRC conflict free)
✓ REACH (compliant)
✓ RoHS (compliant)

## Wire Size Availability

| *Cat No.* | *Std. Wire Gauge* | *Diameter* | | *Packaging* | *Size* |
|---|---|---|---|---|---|
| 49500 | 21 | 0.81 mm | 0.032 in | Spool | 1 lb |

## General Flux Parameters

| *Properties* | *Value* |
|---|---|
| Residue Removal | Not required |
| Flux Percentage | 3.3% |
| Flux Feature | Wets and spreads like a RA type flux and virtually non-splattering. |
| Shelf Life | 5 y |

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## Flux Core Properties

The synthetically refined resin wets and spreads like a RA flux. This no clean flux is virtually non-splattering. It gives rise to a hard, non-conductive, and non-corrosive residue.

| *Physical Properties* | *Method* | *Value* |
|---|---|---|
| Flux Classification | J-STD-004B<br>EN29454-1 | REL0<br>Type 1.1.3 |
| Flux Type | | Resin |
| Flux Activity | | Low |
| Halides %(wt) | | <0.05% |
| Solid Flux Color | Visual | Lightly opaque |
| Softening Point of Flux Extract | | 24 °C [75 °F] |
| Acid Number (mgKOH/g sample) | IPC-TM-650 2.3.13 | 190–210 |
| Copper Mirror | IPC-TM-650 2.3.32 | No removal |
| Silver Chromate—Chlorides + Bromides | IPC-TM-650 2.3.33 | Pass |
| Solder Spread | IPC-TM-650 2.4.46 | 130 $mm^2$ |
| Flux Residue Dryness | IPC-TM-650 2.4.47 | Pass |
| Spitting of Flux-Cored Wire Solder | IPC-TM-650 2.4.48 | 0.30% |
| Corrosion Test | IPC-TM-650 2.6.15 | Non-corrosive |
| Surface Insulation Resistance (SIR) | IPC-TM-650 2.6.3.3 | $2.3 \times 10^{11}$ Ω |
| Bellcore (Telecordia) | Bellcore GR-78-CORE 13.1.3 | $6.1 \times 10^{11}$ Ω |
| Electromigration | Bellcore GR-78-CORE 13.1.4 | Pass |
| Post Reflow Residue | TGA Analysis | 55% |
| Cleaning Requirements | — | Optional |

## Sn100e Alloy Typical Literature Properties

| *Physical Properties* | *Value* [a)] |
|---|---|
| Color | Silvery-white metal |
| Density @26 °C [78 °F] | 7.4 $g/cm^3$ |
| Tensile Strength | 28 $N/mm^2$ [4 100 $lb/in^2$] |
| Elongation | 27% |
| Shear Strength | ~20 $N/mm^2$ [~2 900 $lb/in^2$] |

| *Electrical Properties* | *Value* |
|---|---|
| Volume Resistivity | 12.3 μΩ·cm |
| Electrical Conductivity [b)] | 15% IACS |

a) $N/mm^2$ = mPa; $lb/in^2$ = psi;
b) International Annealed Copper Standard: 100% give $5.8 \times 10^7$ S/m.

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| *Thermal Properties* | *Value* |
|---|---|
| Melting Point, Solidus | 228 °C [442 °F] |
| Melting Point, Liquidus | 228 °C [442 °F] |
| Tip Temperature Upper Limit | Do not exceed 425 °C [800 °F] |
| Coefficient of Thermal Expansion (CTE) c) | 23.5 ppm/°C |
| Thermal Conductivity | 82 W/(m·K) |
| Specific Heat Capacity | 294 J/(kg·K) |

*NOTE:* This table present typical literature values for Sn99.5/Cu0.5/Co alloys.
c) CTE for pure tin; unit conversions: ppm/°C = μm/(m·K) = in/in/°C × $10^{-6}$ = unit/unit/°C × $10^{-6}$

## Solder Alloy Composition

| *Properties* | *Value* |
|---|---|
| *MAIN INGREDIENTS* | *COMPOSITION* |
| Sn | 99.3 to 99.7% |
| Cu | 0.49 to 0.51% |
| Co | <0.1% |

| *Properties* | *J-STD-006C* | *49500 Values* |
|---|---|---|
| *IMPURITIES* a) | *REQUIREMENTS* | *SPECIFICATIONS* |
| Sb | ≤0.20% Max | ≤0.025% Max |
| Ag | ≤0.10% Max | ≤0.001% Max |
| Bi | ≤0.10% Max | ≤0.01% Max |
| In | ≤0.10% Max | ≤0.01% Max |
| Pb | ≤0.10% Max | ≤0.05% Max |
| Au | ≤0.05% Max | ≤0.0002% Max |
| As | ≤0.03% Max | ≤0.0035% Max |
| Fe | ≤0.02% Max | ≤0.005% Max |
| Ni | ≤0.01% Max | ≤0.006% Max |
| Al | ≤0.005% Max | ≤0.001% Max |
| Zn | ≤0.003% Max | ≤0.001% Max |
| Cd | ≤0.002% Max | ≤0.001% Max |

a) Exceeds the requirements of J-STD-006C and meets ASTM B 32.

## Storage

Protect from direct heat or sunlight. Keep at around between 18 to 27 °C [65 to 80 °F].

## Cleaning

The flux residue does not need to be removed for typical applications. If removal is desired, a solvent system like the *MG 4140* can be used. For best results, warm the cleaning solution to about 40 °C [104 °F].

## Health and Safety

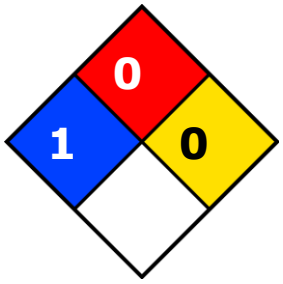
Please see the 49500 **Safety Data Sheet** (SDS) for more details on transportation, storage, handling and other security guidelines.

***Health and Safety:*** Avoid breathing fumes. Wash hands thoroughly after use. Do not ingest.

**HMIS® RATING**

| | |
|---|---|
| **HEALTH:** | * 1 |
| **FLAMMABILITY:** | 0 |
| **PHYSICAL HAZARD:** | 0 |
| **PERSONAL PROTECTION:** | |

**NFPA® 704 CODES**




*Approximate HMIS and NFPA Risk Ratings Legend*:
0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

## Soldering Instructions

**To achieve best hand-soldering results**

1. Set the tip temperature between 370–425 °C [700–800 °F].
2. Place the solder tip in contact with the joint connection (lead/pad surface) at an angle of around 50° to heat the parts to be soldered.
3. While the soldering tip is applied, touch the solder wire to the opposite side of the soldering joint, not to the soldering tip.
4. Immediately after the solder has flowed around the whole heated connection, remove the solder wire and remove soldering tip from connection.

**TIP!** Do not move the connection while the solder is cooling.

**WARNING!** Avoid putting too much or too little solder.

**ATTENTION!** To avoid damage, do not overheat electrical component.

## Packaging and Supporting Products

| *Cat. No.* | *Form* | *Package* | *Net Weight* | |
|---|---|---|---|---|
| **49500-454G** | Solid wire | Spool | 454 g | 1.0 lb |

## Technical Support

Contact us regarding any questions, improvement suggestions, or problems with this product. Application notes, instructions, and FAQs are located at www.mgchemicals.com.

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