



SPHERES

At SPM we have over thirty years knowledge in the manufacture of spheres. We use the highest purity metals for alloying, the highest grade chemicals for manufacturing, the best sorting equipment available and a state of the art inspection system.

Whether your need is for a low temperature sphere to use as a fusible material or a high temperature sphere to use as an electrical contact, SPM is ready to serve you.

If your need is for a few thousand special alloy or for a hundred million BGA spheres, SPM is ready to serve you.

➤ High Temperature Spheres

Spheres of gold, silver, copper, aluminum and brazing alloys can be made from precise pellets or segments to insure exact volume of the final sphere. The spherizing medium used is usually a mixture of salts whose molten temperature coincides with the melting point of the spheres. The salts are subsequently thoroughly removed from the finished spheres which are then screened, rolled, inspected and packaged. The finished spheres can also be solder plated if needed.

➤ Solder Spheres

All solder spheres, from high lead alloys to the “SAC” alloy materials, are produced by forcing the molten solder through a fixed orifice into a “hot zone”. This hot zone can be superheated air or a hot oil mixture. The spheres are then collected, cleaned, screened, rolled, inspected and packaged. The solder spheres can be flux coated if needed.

➤ Screening

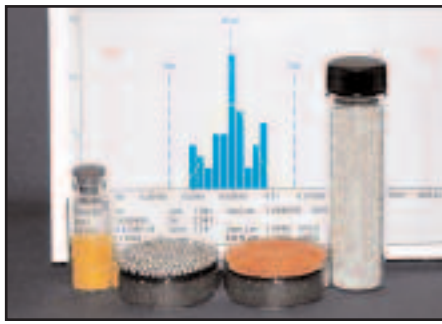
This is a process where spheres are screened to required tolerances and the ones that do not meet the dimensional tolerances are eliminated.

➤ Rolling (Sorting)

The spheres which have passed through screening are then allowed to roll down an inclined plane. Those that are out of round will fall off the side of the incline plane. Only the spheres that are round are collected.

➤ Size Measurement

SPM uses a computer controlled three axis optical measuring system to insure perfect quality. Sphericity is automatically calculated and histograms generated.



SPHERES



TECHNICAL DATA OF PB-FREE SOLDERS FOR SPHERES

| Solder | Melting Temp. (°C) | Density (g/cm ³) | Electric Conductivity (% IACS) | Thermal Conductivity (W/m K) | TCE (µm/m K) | Resistivity (n Ohm m) | Modulus of Elasticity (GPa) | Hardness (VHN) | Tensile Strength (MPa) |
|------------------|--------------------|------------------------------|--------------------------------|------------------------------|--------------|-----------------------|-----------------------------|----------------|------------------------|
| 52In-48Sn | 118 | 7.30 | 11.7 | 34.0 | 24.0 | 150.0 | 21.7 | 4.5 BHN | 11.9 |
| 58Bi-42Sn | 138 | 8.56 | 4.5 | 19.0 | 14.0 | 350.0 | 42.0 | | 55.0 |
| 95.5Sn-4Ag-0.5Cu | 217-219 | 7.43 | 13.0 | | 148 | 130.0 | 43.1 | 15.05 | 48.0 |
| 96.5Sn-3Ag-0.5Cu | 217-220 | 7.43 | 13.0 | | 148 | 130.0 | 43.1 | 15.05 | 48.0 |
| 96.5Sn-3.5Ag | 221 | 7.36 | 16.0 | 33.0 | 21.0 | 125.0 | 50.0 | 13.9 | 38.0 |
| 85Sn-15Ag | 221-345 | 7.79 | 10.5 | | | | | | 40.4 |
| 99.3Sn-0.7Cu | 227 | 7.31 | 13.0 | | | 125.5 | | | 20.0 |
| 90Sn-10Cu | 227-450 | 7.47 | | | | | | | 37.0 |
| 65Sn-25Ag-10Sb | 230-273 | 7.80 | | 55 | 36.0 | | | | 116.9 |
| Sn | 232 | 7.30 | 15.6 | 62.8 | 19.9 | 110.0 | 44.3 | 10.5 | 21.4 |
| 95Sn-5Sb | 235-240 | 7.25 | 11.9 | 28.0 | 31.0 | | | 13.7BHN | 40.7 |
| 87.5Sn-12.5Sb | 240-267 | 6.69 | 10.7 | | | | | | 65.4 |
| 80Au-20Sn | 280 | 14.5 | 7.7 | 57.0 | 16.0 | 160.0 | 59 | | 276 |
| 88Au-12Ge | 356 | 14.7 | 11.4 | 44.0 | 13.0 | | 69 | | 185 |
| 97Au-3Si | 370 | 15.4 | | 27 | 12 | | 83.0 | | 254.9 |

SPHERE TOLERANCE

Sphericity ± 10% Typical

| Sphere Diameter | Typical Tolerance (Better tolerances available) |
|-----------------|--|
| .001" - .005" | ± .0002 |
| .006" - .010" | ± .0003 |
| .011" - .015" | ± .0005 |
| .016" - .030" | ± .001 |
| .031" - .040" | ± .0015 |
| .041" - .050" | ± .002 |
| .051" and up | ± .003 or more |

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