



Honeywell
Die Attach Solder

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WIRE AND PREFORMS

OVERVIEW

Honeywell Electronic Materials is an industry leader in the production of a wide range of die attach products including eutectic and soft solder in a variety of forms.



BENEFITS

- Full range of lead and lead-free alloys
- Open tool list and custom capability
- Multiple format capability (preform, wire)
- Industry leader in solder systems

NOTES:

ALLOYS

Die attach solders are available in a wide variety of alloys as listed in the companion document *Solder and Braze Alloys*. Alloy selection is based upon melting point, wettability to specific substrates, and mechanical and electrical characteristics. Although thousands of alloy compositions can be made, a relatively small number of alloys provide all the characteristics usually required in electronic applications. Eutectic gold systems include pure Au, Au-Sn, Au-Si, and Au-Ge alloys. Where a gold system is not required, soft solder compositions are preferred due to the much lower cost. The most popular of these are in the following systems: Pb-Sn-Ag, Pb-Sn, Pb-In-Ag, Sn-Ag, Sn-Sb, Sn-Ag-Sb, and Bi-Ag-X. To assist the industry in meeting RoHS and other legislation Honeywell has developed a series of Pb-free alloys that are designed to withstand board level reflow at 250°C. Honeywell can manufacture numerous binary through quaternary systems when specified by the customer.

Production uniformity is assured through precise control of incoming material purity, alloying parameters and thermal and mechanical treatment. Products are available in both 99.99% (49) and 99.999% (59) purity. Most soft solder die attach products are of the 49 purity due to an optimal combination of performance and cost while the 59 purity products are normally only specified for the higher performance applications where Au eutectic alloys are required.

Dimensional Tolerances

Dimensional tolerances depend upon both the final dimensions of the product and the alloy. However, the diameter of wire and thickness of preforms are often controlled to within ± 0.001 " (25.4mm) or $\pm 15\%$ of the final dimension, whichever is smaller. Tool and die sets are both produced and maintained in-house with unmatched precision for production of preforms. This means that routine tolerances are ± 0.0005 " (12.7mm) and tolerances as low as ± 0.0001 " (2.54mm) when required for specialty products.

Footnotes:

1. The standard HEM list of elements is Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Ge, Hg, In, Mg, Mn, Mo, Ni, Pb, Pd, Pt, Sb, Si, Sn, Sr, Te, Ti, Tl, V, Zn, and Zr. If one or more these elements are major constituents in the material then they will be reported as major constituents rather than as impurities.

2. Harder alloys can be thinner while softer alloys can be thicker. However, in all cases the length, width, and wall width for a window or washer must be significantly greater than the thickness of the preform.

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The fractions of major constituents are determined by atomic absorption (AA) while Inductively Coupled Plasma (ICP) is used to determine the impurity concentrations of 35 elements¹ for 49 purity products. Glow discharge mass spectrometry (GDMS) is available upon request.

After casting, solder wire is extruded to a diameter which results in a very homogeneous product that is quite cost effective. Preforms are rolled to final thickness after casting, which once again results in a very homogeneous product due to the cold work involved in the approximate one-thousand-fold decrease in the thickness.

FORMS

Wire is the most common and economical form of soft solder for die attach. It normally ranges from 0.010" (0.254mm) to 0.050" (1.27mm) in diameter. Wire is coiled on either 6" (15.24cm) or 4" (10.16cm) diameter spools in lengths ranging from 50' (15.2m) to 450' (137m) depending upon the spool size, wire size, and alloy.

Preforms are punched from a thin strip of either soft solder or Au eutectic solder that can range in thickness from as little as 0.001" (0.00254mm) to as much as 0.040" (1.016mm) depending upon the alloy.² Over 1200 tools are available in disks, squares, rectangles, washers, and windows. Preforms are typically packaged in jars that are backfilled with argon, but special packing can be developed to meet customer requirements.

Technical Data

In addition to the data contained in the companion document *Solder and Braze Alloys*, technical data sheets are available for many of the most popular alloys. These data sheets include information on typical analyses, melting and freezing behavior, coefficient of thermal expansion, thermal conductivity, and mechanical properties such as modulus, Poisson's ratio, and strength. Please contact your Honeywell Electronic Materials representative to obtain the required sheets.



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