



## Lead Free Solder

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A lead free solder, developed at The Ames Laboratory, combines tin, silver and copper in a novel alloy combination that is low melting, applies easily on typical metal joints, and has a reasonable cost. This revolutionary solder alloy replaces many uses of the traditional tin-lead low melting solder, reducing further the number of lead toxicity hazards in our everyday environment. Of several lead-free alternatives, the Ames Laboratory solder alloy formula is now considered a preferred lead-free solder by the worldwide electronics assembly industry and can be found in many new consumer electronic items, including cell phones, TVs, and VCRs.

Initially it was licensed in the late 1990's to a small Iowa-based company, Johnson Manufacturing. To extend the availability of the solder, two other licensees, Multicore Solders of Richardson, Texas (now Henkel Corporation), and Nihon Superior Co. Ltd. of Osaka Japan, were also licensed. A Japanese industry-based consortium set up a voluntary initiative to go lead-free in consumer electronics beginning in 2000, spurring a widespread movement in this direction. Subsequent legislation enacted by the European Union to eliminate most of the lead in consumer goods sold in Europe by July of 2006 resulted in more broad licensing interest. As a result, the technology was licensed to over 65 companies worldwide; that number is down to around 50 companies currently.

Lead free solder represents the most successful technology transfer activity to come out of the Ames Laboratory. The Laboratory and its contractor, Iowa State University, have received over \$20 million in royalty income generated from the multitude of licensees to date. This equates to approximately \$500 - \$750 million in sales worldwide. The technology received an Excellence in Technology Transfer Award from the Federal Laboratory Consortium Mid-Continent Region in 2009 and one of the inventors, Dr. Iver Anderson, was named Iowa Inventor of the Year in 2006.

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For further information on licensing this technology contact: [licensing@iastate.edu](mailto:licensing@iastate.edu)  
For information on technology transfer opportunities or additional technical information on this technology contact: Debra Covey, Assoc. Laboratory Director, [covey@ameslab.gov](mailto:covey@ameslab.gov) or go to [www.ameslab.gov](http://www.ameslab.gov)