

Thermal Conductance at Liquid Helium Temperatures

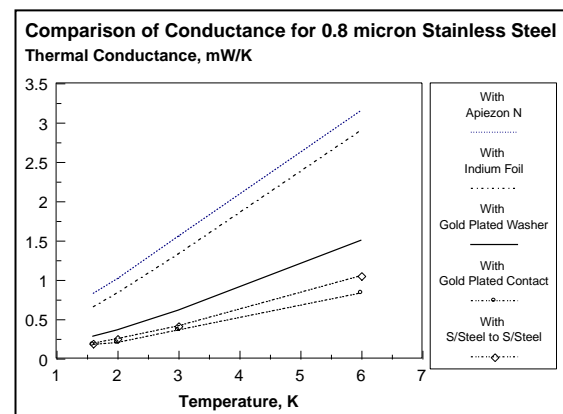
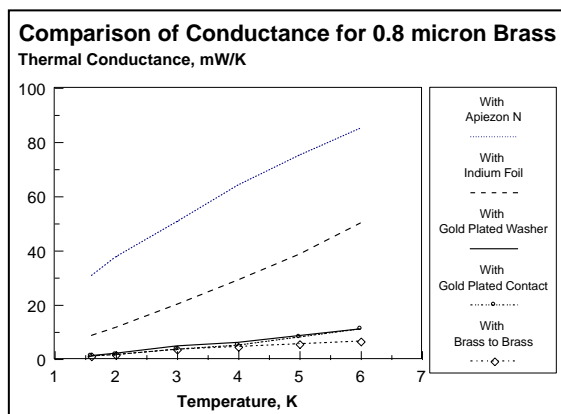
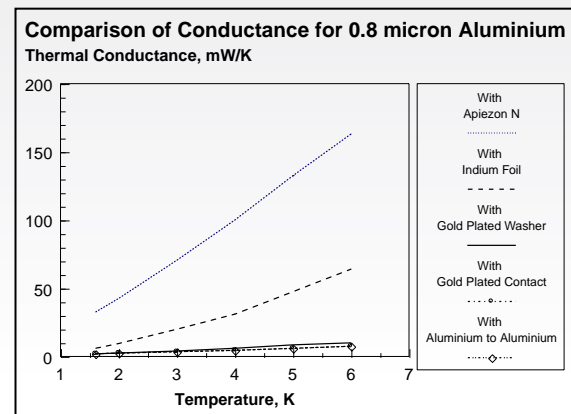
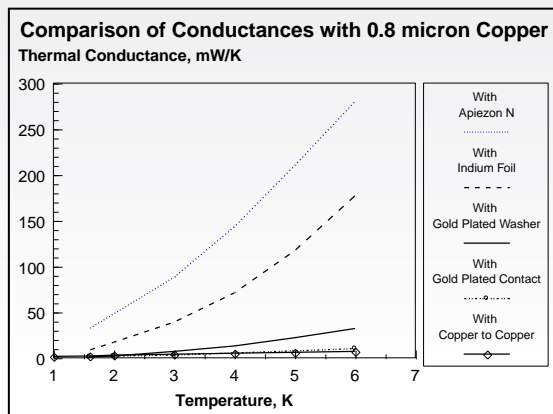
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Work carried out at the NASA - Ames Research Centre at Moffett Field, California, USA in association with Trans Bay Electronics has shown that pressed metallic contacts augmented with Indium Foil or Apiezon N grease show an improvement in terms of thermal conductance ranging from a factor of three for Stainless Steel to one order of magnitude for Copper contacts, over a temperature range of 1.6 - 6.0°K¹.

Further examination of the data produced by this work shows that there are significant advantages in terms of thermal conductance with the use of Apiezon N grease in these contacts over the use of Indium foil or Gold plating.

The four graphs below compare the conductance obtained from contacts of Copper, Aluminium, Brass and Stainless Steel, all with 0.8 µm finished surfaces and at an applied force of 670 Newtons. The contacts were made using uncoated metal, Gold plated metal, and with the contacts augmented individually with a Gold plated Aluminium washer, Indium Foil and Apiezon N grease.

It can be seen that the use of Apiezon N grease provides greatly improved conductance over the uncoated contacts. Further a significant improvement in thermal conductance over Gold plating and Indium was realised with Apiezon N grease in the case of the Aluminium, Brass and Copper contacts.

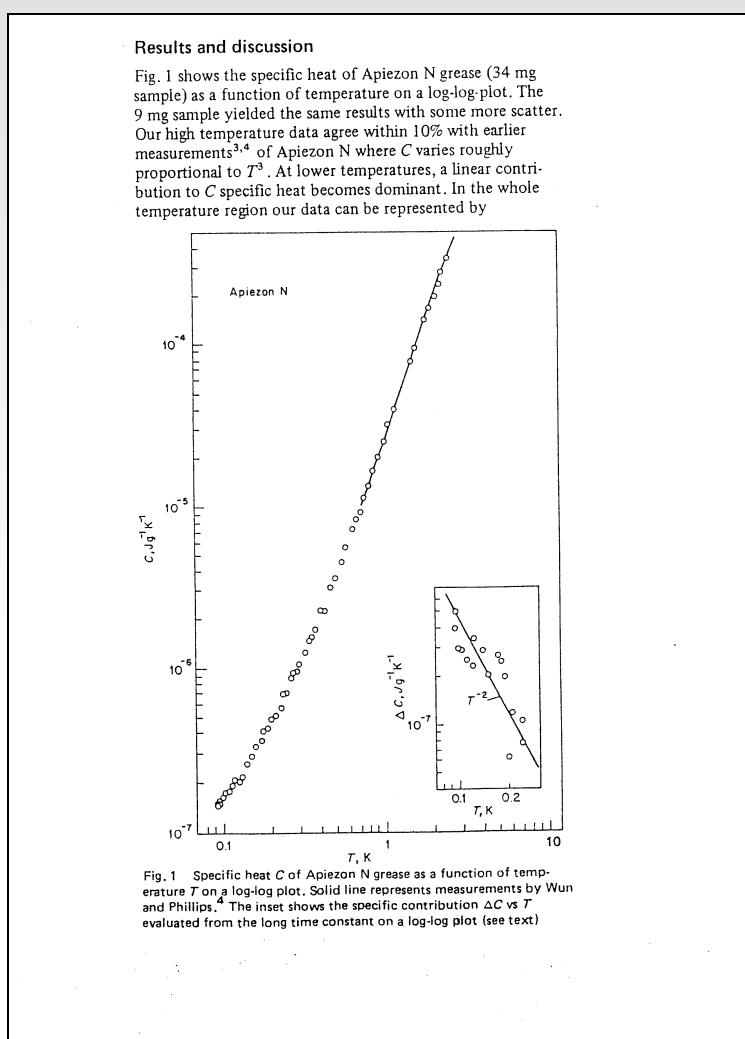


Specific Heat at Very Low Temperatures

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Apiezon N grease is widely used to provide thermal contact in low temperature research.

The Specific Heat of Apiezon N grease is shown on a log-log plot below as a function of temperature, T , as determined by Wun and Phillips² and extended by Schink and Lohneysen³.



- 1 Thermal conductance of metallic contacts augmented with Indium foil or Apiezon N grease at liquid Helium temperatures, J.Salerno, P.Kittel, A.L.Spivak - Cryogenics 1994, Volume 34, Number 8.
- 2 M. Wun and N.E. Phillips, Cryogenics 15 (1975) 36
- 3 Specific Heat of Apiezon N grease at very low temperatures, Schink H.J. and Lohneysen H.V. Cryogenics 1981

Copies of these papers are available on request.