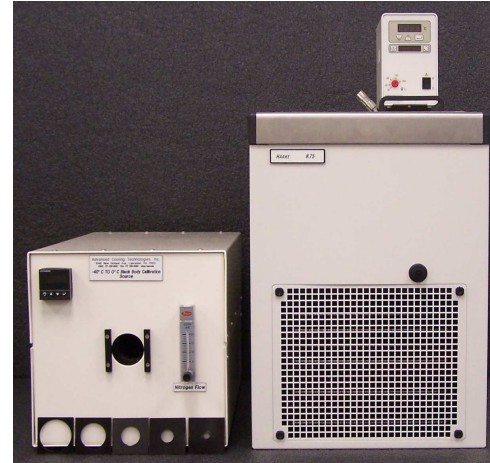


HEAT PIPE BLACKBODY CAVITY

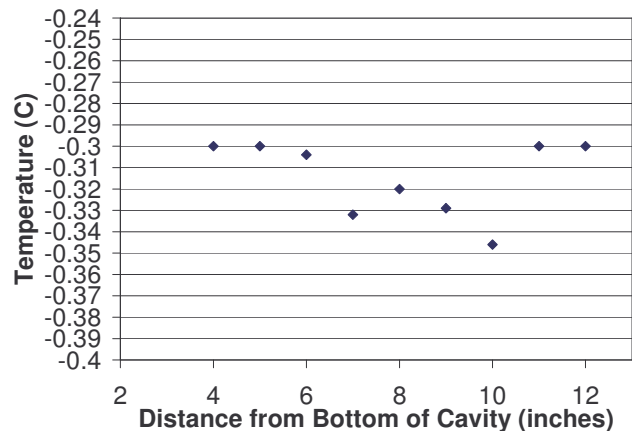
ACT's Heat Pipe Blackbody Cavity (HPBC) is an annular heat pipe with a hemispherical or conical end cap. The heat pipe along with the end cap forms the blackbody cavity. The heat pipe achieves temperature uniformity by continuous evaporation and condensation of a working fluid sealed within the annular space. Since the working fluid is in two-phase equilibrium with its own vapor, all wetted surfaces are isothermal. The temperature uniformity is typically within 0.1°C. See the plot below for a measured temperature profile of an Ammonia HPBC that has a temperature uniformity of within 0.05°C. Also included is the measured temperature stability of this Ammonia HPBC that is within 0.06°C over a 25 minute period.



HPBC with temperature control

Materials of construction are typically Aluminum, Stainless Steel, Monel, Inconel or Haynes, but other materials or coatings are possible. The heat pipe's inner and outer surfaces are typically oxidized to provide high emissivity. The working fluid used depends on the desired operating temperature:

- Ammonia: -60 – 50°C
- Methanol: -20 – 60°C
- Water: 20 – 250°C
- Cesium: 300 – 600°C
- Potassium: 400 – 1,000°C
- Sodium: 500 – 1,100°C



The HPBC is available as a custom designed device, fabricated to specific configuration, containment and temperature requirements. ACT also provides blackbody assemblies including heating/cooling elements and temperature controllers.

Product Benefits:

- Uniform Surface Temperature
- Low Operating Costs
- Passive, Vibration-Free Operation

