PRESSURE VESSEL AND TEMPERATURE CONTROL

In the prototype gauge the pressure sensors were contained in a pressure vessel which was physically separate from the reference capacitor enclosure. This prototype gauge was designed to obtain a sensitivity and hopefully a stability of 1/5 psi, which therefore required a temperature control on both the pressure vessel and the reference capacitor enclosure of better than 1/5 millidegree. Since this was to be a dynamic system some means had to be provided for dissipating the heat associated with increasing the pressure in the pressure vessel. This could have been achieved rather easily by immersing the pressure vessel in a controlled temperature oil bath which would automatically remove the excess heat and retain temperature equilibrium. Unfortunately it is quite difficult in a circulating oil bath to obtain a temperature stability of 1/5 millidegree. With a circulating water bath this degree of temperature control could be achieved more easily due to the lower viscosity, higher thermal conductivity, and higher specific heat of water, all of which reduce the tendency to form significant temperature gradients. Obviously, the water would have to be in a closed system or covered with a thin layer of oil to prevent cooling by evaporation. However, in our case the presence of water, or even ethylene glycol which takes up a significant amount of water from the atmosphere, is unacceptable because of