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Inexpensive Method of Testing Ambient and Thermally Elevated Resistive and Piezoresistive Thin-Film Pressure Gauges CHRISTOPHER ARMSTRONG, PHILIP RAE, ERIC HEATWOLE, DOUGLAS TASKER, Los Alamos National Laboratory, LOS ALAMOS NATIONAL LABORATORY TEAM — Manganin is an alloy that changes resistance when subjected to high-pressure, but is insensitive to temperature changes. Resistance curves as a function of pressure for these gauges have been established. Another commonly used piezoresistive pressure sensor are thin-film carbon gauges, which are more pressure sensitive than manganin gauges. Carbon gauge response in high temperature is not well quantified. The current research is focused on verifying these established resistance curves as well as verifying this specific experimental configuration. In this research the carbon gauges resistance change is measured for thermally elevated gauges. In this setup a 20 mm caliber gun drove planar copper projectiles at the gauge, which was embedded in a copper anvil. The Hugoniot relationship allows for a comparison between observed and theoretical pressure over a pressure range 5 to 20 GPa for manganin gauges and 1 to 5 GPa for carbon gauges. The comparison between the data obtained in this research and that of others shows that the pressure-resistance curve of manganin does not vary between lots of manganin. Additionally, the data shows that this setup is a relatively inexpensive quick means of testing gauge response to high-pressure shocks and is suitable for elevated temperature.

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