

FIG. 2. Cross-sectional view of the shot assembly used for the organic liquids.

must be continuous across the interface between the standard and the material under study. In the above equations  $P_0$  and  $V_0(=1/\rho_0)$  represent the pressure and specific volume ahead of the shock front and Pand V the pressure and specific volume behind the shock front.  $U_s$  and  $U_p$  represent the shock velocity and particle velocity relative to the undisturbed material ahead of the shock front.  $V/V_0$  is defined as the relative volume. The curves in the  $P-U_p$  plane in Fig. 1 illustrate the impedance match method. The measurement of the shock velocity in the known 2024 dural determines the state  $P_1$ ,  $U_{p1}$ . From this point the reflected Hugoniot curve is constructed and intersects the line of slope  $\rho_0 U_s$  determined for the liquid. This intersection is the pressure and particle velocity  $(P, U_p)$  in the sample.

The Hugoniot for the 2024 dural has been measured very accurately at ambient temperature. The equation of state<sup>14</sup> is expressed by

$$U_s = 5.328 + 1.338 U_p, \tag{3}$$

with  $\rho_0 = 2.785$  g/cc and the Gruneisen ratio  $\Gamma_0 = 2.0$ .

A detailed description of the experimental apparatus and fabricating techniques are given in Ref. 15. A cross-sectional view of the experimental apparatus used for the organic liquids is presented in Fig. 2. Three liquids were examined in a single experiment. Each liquid was contained in a glass cylinder set into a well machined in the target plate. The shock ve-



FIG. 3. Cross section view of the apparatus used for the liquid nitrogen.

6022