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Effect of Shock Precompression on the Critical Diameter of Liquid Explosives OREN E. PETEL, ANDREW J. HIGGINS, McGill University, Mechanical Engineering Department, Montreal, Quebec H3A 2K6 Canada, AKIO YOSHINAKA, FAN ZHANG, Defence R&D Canada–Suffield, Medicine Hat, Alberta T1A 8K6 Canada — The critical diameter of both ambient and shock pre-compressed liquid explosives confined in PVC tubing are measured experimentally. In the precompression experiments, the explosive is compressed by a strong shock wave generated by a donor explosive and reflected from a high impedance anvil prior to being detonated by a secondary event. The final pressure in the test section reaches approximately 6.8 GPa before the detonation enters the test section. The results demonstrate a 20% decrease in the critical diameter for the shock compressed explosive. This critical diameter decrease is observed despite a significant decrease in the predicted Von Neumann temperature of the detonation in the precompressed explosive. The results are discussed in the context of theoretical predictions based on thermal ignition theory and previous critical diameter measurements.

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