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Investigating the Deflagration to Detonation Transition in LLM-105 and RX-55-DQ Using High Confinement as a Function of Density[1]
SHAWN L. STRICKLAND, KEVIN S. VANDERSALL, MARTIN R. DEHAVEN, Lawrence Livermore National Laboratory — The potential for deflagration-to-detonation transition (DDT) in LLM-105 and RX-55-DQ (94/6 LLM-105/Viton) has been investigated as a function of loading density using high confinement tubes. The high confinement arrangement uses a 76 mm outer diameter by 25 mm inner diameter mild steel tube 320 mm in length with 25 mm thick mild steel end caps ignited using a thermite igniter and was loaded with samples of varying densities. None of the experiments showed a transition to detonation over the entire length with non-violent burning or extinguishing of the burning observed. The hand packed RX-55-DQ molding powder or neat LLM-105 (˜1.1 g/cm^3) burned nearly completely and vented non-violently by deforming or splitting the end caps. The RX-55-DQ was tested at higher densities with 1.35 g/cm^3 resulting in a burning reaction on the 2nd attempt that fractured the end cap while the 1.85 g/cm^3 resulted in the burning reaction extinguishing in the first ˜15 mm on the 2nd attempt. This work will outline the testing details, present the results, and compare them to the relatively high binder content HMX-based LX-04 (85% HMX and 15% Viton) and ultra-fine TATB results tested under similar confinement.

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