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Response Characteristics of HAE Charge with Different Sealing Condition and Coating Layer in Fast Cook-off

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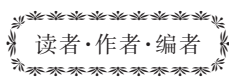
Abstract: To evaluate the vulnerability of explosive charge, a roast bomb structure with different sealing conditions (state 1: the end cover is 2 steel plugs and 2 pressure membranes. state 2: the end cover is 4 pressure membranes) and thermal conductivity of coating layer (state 3: the end cover is 4 pressure membranes, hollow glass microspheres (HGMs) partially instead of the silicone rubber in the coating layer) was designed. The response characteristics of octogen (HMX)-based aluminized explosive (HAE) under the condition of external fire with liquid fuel were studied. Results show that the pressure membrane of end cover and HGMs coating layer can achieve the purpose of reducing the vulnerability of explosive charge. The effect of pressure relief area and thermal conductivity of coating layer on the fast cook-off characteristics of explosive charge is different. The response level of roast bomb of decreasing the thermal conductivity of coating layer (projectile body is complete, charge and end cover sprayed, and the charge is not steady combustion) is lower than that of roast bomb with the change of sealing conditions (projectile body is complete, the charge is steady combustion). When the ratio of pressure relief area to the surface area of HAE charge is greater than 0.015, the explosive charge reveals in steady combustion state. When the content of the HGMs exceeds 5%, the end cover of roast bomb and explosive charge are sprayed out, and the structure of the explosive charge is integrated and the combustion state does not occur.

Key words: HMX-based aluminized explosive (HAE charge); fast cook-off; pressure membrane; hollow glass microspheres (HGMs); response

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《含能材料》“损伤与点火”专栏征稿

含能材料的损伤特征与点火过程有密切的联系,炸药、推进剂的内部损伤及其对力学特性、安全特性和点火行为的影响规律受到了含能材料学界的高度重视,为推动这一重要研究方向的学术交流,本刊特设立“损伤与点火”专栏。专栏主要征集炸药、推进剂等含能材料的损伤观测与多尺度表征技术、含损伤的本构方程、准静态与动态损伤演化规律、损伤与破坏的宏(细)观模式、损伤对起爆、爆炸、爆轰成长以及非冲击起爆行为的影响等方向的原创性研究论文。来稿请注明“损伤与点火”专栏。

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