

Abstract

Improved IM properties of an RDX/TPE based LOVA propellant for artillery applications

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This paper deals with the development of composite gun propellants, called LOVA propellants (LOw Vulnerability Ammunition). This type of propellants is a specific class of 'IM propellants' (Insensitive Munition) which are designed to have a mild cook-off reaction, whereas 'IM propellants' are generally aimed for having mild response to bullet and/or shock impact.

Currently commercially available LOVA propellants, like XM-39 and M-43 are produced by so-called solvent processes. As a result of by their hardness and brittleness, these propellants mostly do not comply with the IM requirements.

Since the 1990s TNO has made R&D efforts to develop LOVA propellants for artillery applications. The initially applied HTPB-based binder was replaced by other binder systems in order to avoid a curing step in the manufacturing process. Moreover, binder types were chosen which facilitate solventless production, aiming at sustainable manufacturing processes which are more environmentally benign than the conventional solvent processes.

Recently, TNO has developed a new Thermo-Plastic Elastomer (TPE)-based binder system for LOVA propellants with improved mechanical properties. Although the use of previously applied binder systems resulted in mechanical properties which are slightly better than those of the first-generation LOVA's like XM 39, their low temperature characteristics were still insufficient. In this paper several propellant characteristics as well as performance and IM test results will be described for a new LOVA propellant in comparison to some well known conventional and LOVA propellants. With the new binder system, LOVA propellants show IM properties which are better than those of the first-generation LOVA's, also at low temperatures, while their ballistic properties exceed those of conventional NC-based propellants.