## LOW-RATE DETONATION OF TATB HIGH-EXPLOSIVE

I. A. Akhlyustin, I. E. Kosolapov, A. S. Gremitskykh, K. V. Eganov, K. M. Prosvirnin, K. M. Miroshkin, Yu. A. Belenovsky

FSUE «RFNC - VNIITF named after Academ. E. I. Zababakhin», Snezhinsk, Russia

According to the deflagration-to-detonation transition scheme, commonly adopted in Russia, detonation initiation is preceded by low-rate detonation (LRD). Low-rate detonation is a special wave mode of explosive transformation of an HE which possesses all properties inherent to the detonation process, but the parameters at the shock wave front (pressure, velocity) are found to be smaller than the analogous parameters at the detonation wave front. On the other hand, low-rate detonation is an unsteady explosive transformation process which, in contrast to detonation, has a limited portion of steady-state propagation [1, 2]. HE charge loading by weak shock waves with amplitude, insufficient for detonation initiation, frequently occurs under different dynamic impacts on shell explosive devices. It is also important to know LRD parameters in case of emergencies involving HEs and HE-containing products.

The paper presents the results of experimental investigation into LRD of TATB explosive initiated by a diverging shock wave of different amplitudes. Based on the conducted experiments, the LRD propagation velocity was found to be ~2.4 km/s for TATB HE below 6 GPa, which is equivalent of the sound speed in this material. Propagation velocity increased up to 4 km/s in the range of 6–7 GPa. As the amplitude increases above 7 GPa, the shock wave transforms into the detonation one.

## References

1. Belyaev, A. F. Deflagration-to-detonation transition in condensed systems [Text] / A. F. Belyaev, V. K. Bobolev, A. I. Korotkov et al. – M. : Nauka, 1973 (in Russian).

2. Ermolaev, B. S. Convective combustion and low-rate detonation of porous energetic materials [Text] /

B. S. Ermolaev, A. A. Sulimov. – M. : Torus Press, 2017 (in Russian).