

O. V. PYLYPENKO, N. A. KONOVALOV, V. I. KOVALENKO, D. V. SEMENCHUK

SUBMACHINE GUN AND RIFLE SILENCERS WITH A TYPE MULTI-Y FRONT COVER

*Institute of Technical Mechanics
of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine,
15 Leshko-Popel St., Dnipro 49005, Ukraine; e-mail: office.itm@nas.gov.ua*

This paper describes the development stages of universal silencers for firearms (of caliber 5.45 mm, 5.56 mm, and 7.62 mm) that have expansion chambers equipped with baffles in the form of thin-walled conical shells whose longitudinal axis coincides with the longitudinal axis of the silencer body and a newly designed Multi-Y front cover.

The efficiency of the silencers developed was measured with a sound level meter and was confirmed by comparison tests with basic prototypes developed earlier and foreign silencers. The tests were conducted using different types of 5.45 mm and 7.62 mm small arms. The efficiency was found to be 18 – 35 dB(A). The efficiency of the silencers developed was also estimated theoretically by simulating the gas-dynamic process in a chamber-type silencer using the gas mass and energy conservation laws in integral form. The theoretical results agree with the experimental data to within 17.6 % on average.

The silencer design does not affect firearm automatics and sustains standard firing regimes. The PSUZV-03T.19-7.62 mm silencer provides a high level of muzzle flash suppression thanks to the Multi-Y cover design, which improves muzzle flash suppression in comparison with the PSUZV-02T.19-7.62 mm silencer, whose cover is of the traditional design.

The silencers affect the position of the mean point of impact only minimally, and they do not affect the scattering characteristics throughout the barrel service life.

With the silencers developed, firearms operate reliably and safely after exposure to dust, mud, salt fog, rain, and icing in the temperature range -50 ° to +50 ° without any impairment of the service characteristics.

Thus the measured and calculated efficiency of the PSUZV-02T.19-7.62 mm and PSUZV-03T.19-7.62 mm universal silencers show that they reduce gunfire sound intensity to a sufficient extent and eliminate muzzle flash. It is expedient that these silencers be used by law-enforcement agencies in special operations and range practice.

Keywords: *firearm silencer, baffle elements, Multi-Y front cover, gunfire sound intensity reduction.*

1. Strategy of local actions in hybrid warfare (*in Ukrainian*). URL: <http://www.politico.ua/blogpost115980>.
2. Konovalov N. A., Kvasha Yu. A., Kulik A. D., Kovalenko V. I., Lakhno N. I., Skorik A. D. Mathematical simulation of the gas-dynamic process of silencer operation (*in Russian*). Teh. Meh. 1999. No. 1. Pp. 13–17.
3. Pylypenko O. V., Konovalov N. A., Kovalenko V. I., Semenchuk D. V. Development and study of small-arms silencers (*in Russian*). Teh. Meh. 2018. No. 3. Pp. 18–32.
4. Pylypenko O. V., Konovalov N. A., Skorik A. D., Polyakov G. A., Kovalenko V. I., Semenchuk D. V. Advanced sound suppressors for small arms (*in Russian*). Teh. Meh. 2015. No. 4. Pp. 44–65.
5. New developments of B&T Company at Enforce Tac 2018: M.A.R.S. and USW (*in Russian*). URL: <https://www.all4shooters.com/ru/strelba/aksessuary/b-t-mars-glushitel-i-usw-nabor-dlya-sig-sauer-p320> (last accessed on March 28, 2018).
6. Waldbrenner M. B&T silencer for Haenel G29 rifle (*in Russian*). Russian edition of Deutsches Waffen Journal. 2019. No. 3. URL: <https://www.kalashnikov.ru/shvejtsarskij-glushitel-dlya-bundesvera> (last accessed on March 27, 2019).
7. Silencers for Kalashnikov Submachine and Light Machine Guns. Specification (*in Russian*). TU U 88.057.004-98. Dnipropetrovsk, Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the National Space Agency of Ukraine, 1998. 20 pp.
8. Program of Testing of Prototype Silencers for Kalashnikov Submachine Guns and their Modifications (*in Russian*). PI-PSUZV/ -01-217. Dnipropetrovsk, Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the National Space Agency of Ukraine, 1998. 5 pp.
9. Konovalov N. A., Pylypenko O. V., Skorik A. D., Kvasha Yu. A., Kovalenko V. I. Silenced Small Arms. Submachine Gun Silencers. Design and Experimental Development (*in Russian*). Dnipropetrovsk, 2008. 303 pp.
10. Konovalov N. A., Pylypenko O. V., Skorik A. D., Kovalenko V. I., Bilenko A. I. Development and full-scale tests of unified sound suppressors for small arms (*in Russian*). Teh. Meh. 2014. No. 1. Pp. 3–10.

Received on July 23, 2019,
in final form on September 24, 2019