UDC 533.6: 534.83: 443 (048.8)

O. V. Pylypenko, N. A. Konovalov, V. I. Kovalenko, D. V. Semenchuk

Small-size silencers for stub-barreled arms

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 designs and manufacturing and testing features of small-size silencers developed at the Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine for arms used in enclosed space.

The topicality of the development is due to the use of stub-barreled arms by Ukrainian special subunits. With consideration for the features of existing silencers for submachine guns of special subunits, a line of compact silencer development was chosen. The paper formulates requirements for the design of silencers for stub-barreled small arms and material and manufacturing accuracy requirements for their components.

The use of silent stub-barreled small arms in enclosed space without damaging the shooter's organs of hearing is justified. In combat operations, sound suppression allows subunits to contact with one another and their commanders to have the situation under control.

The paper shows the features of design solutions and describes the design of the silencers' internal components and their effect on the operating efficiency for different embodiments of theirs.

The paper presents the appearances, construction arrangements, and specifications of the small-size silencers developed and the results of their full-scale tests.

The sound suppression efficiency of the silencers developed was measured with a sound level meter and verified by comparison tests with basic prototypes developed earlier. The efficiency proved to be (28 – 34) dBA, which is on a level with their best foreign counterparts. The test showed that:

- the silencers do not affect firearm automatics and sustain standard firing regimes,
- the silencers do not affect the shot grouping characteristics, and
- the silencers do not affect other performance characteristics either.

Hence the compact silencers developed for stub-barreled submachine guns (assault rifles) are efficient and reliable.

Keywords: *firearm silencer, baffle elements, shot sound suppression, hemisphere.*

1. Popenker M. R. World's Assault Rifles. Moscow: AST, St Petersburg: Poligon, 2007. 383 pp. (in Russian).

2. Volkovsky N. L. Special Operation Forces. History, Use, Arms, and Equipment. St Petersburg: Poligon, AST, MCMXCVI. 368 pp. (in Russian).

3. Ardashev A. N., Fedoseev S. P. Special Unit Arms. Moscow: Yauza, Eksmo, 2008. 608 pp. (in Russian).

4. Shunkov V. N., Shunkov V. N. Encyclopedia of the Newest Small Arms. Moscow: AST, Minsk: Kharvest, 2006. 560 pp. (in Russian).

5. Konovalov N. A., Pylypenko O. V., Skorik A. D., Kvasha Yu. A., Kovalenko V. I. Silent Hand Firearms. Submachine Gun Silencers. Design and Experimental Development. Dnipropetrovsk: Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the National Space Agency of Ukraine, 2008. 303 pp. (in Russian).

6. URL: http://gutierr3dn.ru/blog/sielencers/2011-06-11-6 (Last accessed on January 30, 2020).

7. URL: http://word.guns.ru/assault/usa/colt-car-15-xm-177-2.html (Last accessed on January 30, 2020).

8. URL: http://uk.wikipedia.org/wiki/ %DO%A4%DO%BE%D1%80%D1% 82-224 (Last accessed on January 30, 2020).

9. URL: http://www.fort.vn.ua/ua/produkciya/avtomatichnazbroya/shturmova-gvintivka-fort-224.html (Last accessed on January 30, 2020).

10. URL:
http//calibr.ucoz.ru/publ/avtomaticheskoe_oruzhie/ssha/avtomat_modeli_colt_commando_car15_xm177-model-933/3-1-0-53 (Last accessed on January 30, 2020).

11. URL: http://gun.ucoz.ua/index/colt_ mod933_commando_ssha/0-332 (Last accessed on January 30, 2020).

12. AKS-74U (AKS-74UN2). 5.45 mm Stub Kalashnikov Submachine Gun Manual. Moscow: Voenizdat, 1983. 159 pp. (in Russian).

13. Tender for supply of silencers to the US Marine Corps. URL: https//kalashnikov.ru/konkurs-na-postavku-glushilelej-morskoj-pehote-ssha/ (Last accessed on August 28, 2017). (in Russian).

14. Small-arms silencer: Patent 108783 Ukraine. IPC F41A 21/20. No, a 2013 10602 : filed on February 9, 2013 ; published on June 10, 2015, Bul. No. 11. 8 pp. (in Ukrainian).

15. Paulson Alan C. Silencer. History and Performance. Volume 1, Sporting and Tactical Silencer. USA, Boulder, Colorado: Paladin Press, 1996. 354 pp.

16. URL: http://www.stewershaw-firearms.co.uk/moderators.html (Last accessed on January 30, 2020).

17. SURFIRE Sound Suppressors Catalog. 2009 - 2010. 31 pp.

18. URL: www.TACTICALYELLO-WISTOR.NET (Last accessed on October 1, 2020).

19. Small-arms silencer: Patent 94790 Ukraine: IPC (2011.01), F41A 21/30 (2006.01), F41A 17/00. Applicant and patentee Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the National Space Agency of Ukraine. Konovalov M. A., Pylypenko O. V., Avdieiev A. M., Puhach Ye, O,, Skorik O. D.; No. a200908628; filed on August 17, 2009; published on June 10, 2011; Bul. No. 11. 12 pp. (in Ukrainian).

20. Small-arms silencer: Patent 95693 Ukraine: IPC (2011.01), F41A 21/30 (2006.01), F41A 17/00. Applicant and patentee Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the National Space Agency of Ukraine. Konovalov M. A., Pylypenko O. V., Puhach Ye, O,, Skorik O. D., Strelnikov H. O., Avdieiev A. M.; No. a200913359 : filed on December 22, 2009 ; published on August 25, 2011. Bul. No. 6. 12 pp. (in Ukrainian).

21. Konovalov N. A., Pilipenko O. V., Pugach E. O., Skorik A. D., Avdeev A. N. Sniper's arms silencer. Teh. Meh. 2010. No. 2. Pp. 52-61. (in Russian).

22. Konovalov N. A., Pilipenko O. V., Polyakov G. A,, Strelnikov G. A., Skorik A. D., Avdeev A. N. Mall arms silencer with conical baffles. Teh. Meh. 2011. No. 1. Pp. 86-98. (in Russian).

23. Konovalov N. A., Kvasha Yu. A., Kulik A. D., Kovalenko V. I., Lakhno N. I., Skorik A. D. Mathematical Mathematical simulation of the gas-dynamic process of silencer operation. Teh. Meh. 1999. No. 1. Pp. 13-17. (in Russian).

24. Konovalov M. A., Pylypenko O. V., Kvasha Yu. O., Sichevyi O. V., Skorik O. D., Strelnikov H. O. Silent Automatic Firearms: Manual. Dnipropetrovsk: ART-PRESS, 2011. 346 p. (in Ukrainian).

Received on October 15, 2020,
in final form on November 3, 2020