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Standard Test Method for the Forensic Examination and Testing of Firearms

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Foreword

Depending on the intended use of the information provided by the examination, differing levels of examination may be required. Laboratory policy may inform examiners/technicians as to which steps in the process are appropriate, such as when testing firearms for the sole purpose of function, or when producing samples for individual characteristic database entry. This document is intended to provide procedures for the examination and testing of firearms by forensic firearm and toolmark examiners or technicians.

This document was revised, prepared, and finalized as a standard by the Firearms and Toolmarks Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Firearms and Toolmarks Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science.

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the term **'shall'** indicates that a provision is mandatory, and can be audited for compliance

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All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

Keywords: *Firearm, test fire, function test, physical examination, ammunition, barrel length, overall length, trigger pull.*

Table of Contents

Standard Test Method for the Forensic Examination and Testing of Firearms

1 Scope

This document establishes standard procedures for the examination and testing of a firearm by firearm and toolmark examiners or technicians. Following these procedures, an examiner or technician will be able to conduct, document, and report the examination and testing of a firearm.

2 Normative References

There are no normative reference documents. Annex A, Bibliography, contains informative references.

3 Terms and Definitions

3.1
cylinder flare
The circular gray-to-black deposit around the front margin of the chamber(s) of a revolver composed of gunshot residues deposited during the firing process. Also known as a smoke ring, halo, or simply flare.[a]

3.2
dry fire
To release the firing pin on an unloaded chamber of a firearm.[a]

3.3
dummy cartridge
A cartridge that does not contain primer, propellant, or explosive charge and therefore cannot be fired.

3.4
field strip
The limited disassembly of a firearm, generally without the use of tools, and usually into its sub-assemblies.

3.5
field test
Testing the operating condition of a firearm without ammunition.

3.6
function test
The examination of a firearm concerning its mechanical condition and operation. It is usually performed to determine if all safety features are operable and/or if the firearm is capable of firing a cartridge.[a]

[a] Association of Firearm and Tool Mark Examiners. *Glossary*. 6th Ed., 2013

3.7
slam fire
The accidental discharge of a firearm upon closing of the action.[b]

3.8
snap cap
A protective device to permit dry firing without damage to the firing pin.[b]

3.9
test fire
To discharge a firearm in a laboratory or controlled setting in order to obtain representative bullets and cartridge cases for comparison or analysis, or to determine functionality of the firearm.[b]

3.10
trigger pull
The amount of force which must be applied to the trigger of a firearm to cause sear release.[b]

4 Requirements

4.1 Equipment and Materials

The following equipment and materials are commonly used for firearm examination:

a) various light sources suitable for the examination of a firearm;

b) personal protective equipment;

c) engraver or scribe;

d) stereo microscope;

e) dummy cartridges of various calibers/gauges;

f) snap caps;

g) trigger pull measuring device;

h) firearm barrel and/or overall length measuring device;

i) various tools necessary for disassembly of firearms (some of these may be specialty tools);

j) remote firing device;

k) firing range and/or bullet recovery device(s);

l) camera.

[b] Association of Firearm and Tool Mark Examiners. *Glossary*. 6th Ed., 2013

4.2 Test Preparations

4.2.1 Appropriate personal protective equipment shall be used when handling evidence contaminated with chemical and/or biological hazards.

4.2.2 Ensure that the firearm is unloaded prior to examination and follow all appropriate measures for safe handling. A detailed procedure for safe handling of firearms can be found in the ANSI/ASB *Best Practice Recommendation 068, Safe Handling of Firearms and Ammunition,* First Edition 2020 [1].

4.2.3 Perform function testing of the firearm prior to test firing unless specifics of the case dictate otherwise.

4.3 Documentation

Document the examination. Acceptable forms of documentation include, but are not limited to, worksheets, laboratory notes, sketches, photographs, or a combination thereof.

4.4 Evidence Handling

4.4.1 Document the condition of the evidence packaging as received and mark the packaging in accordance with laboratory protocols.

4.4.2 Mark the evidence with identifying information in accordance with laboratory protocols.

4.5 Initial Examination

4.5.1 Conduct a preliminary examination of the firearm and document the condition as received. Note any pertinent observations such as damage, modifications, improper assembly, accessories, missing parts, broken parts, or defects (paying particular attention to anything that may affect the structural integrity of the firearm).

4.5.2 Document the presence of any pertinent foreign or trace material adhering to the firearm. Collect and preserve any such material in accordance with laboratory policy.

4.6 Physical Examination

4.6.1 Describe the firearm to include the following, if known:

a) make/manufacturer;

b) firearm type (shotgun, rifle, pistol, revolver, etc.);

c) model;

d) caliber/gauge;

e) serial number.

4.6.2 Additional descriptions may include the following information:

a) serial number location(s), including any hidden location(s);

b) action type (semi-automatic, lever action, bolt action, etc.);

c) country of origin;

d) importer;

e) finish;

f) construction (polymer, metal type, etc.);

g) other markings on the firearm;

h) positions and class characteristics of marking surfaces (extractor, ejector, etc.);

i) safeties and location(s);

j) type of operation (recoil, blowback, etc.);

k) single action and/or double action.

4.6.3 Document any additional actions taken or sources consulted to identify a firearm.

4.6.4 Inspect the bore(s) of the firearm for general condition, obstructions, or defects.

4.6.5 Document the following for rifled barrels:

a) rifling type (polygonal, conventional, etc.);

b) number of lands and grooves;

c) direction of rifling twist.

4.6.6 Document the following for revolvers:

a) cylinder capacity;

b) direction of cylinder rotation;

c) the presence and location of cylinder flares.

4.6.7 Document the following for shotguns:

a) the chamber length;

b) any choke designations or choke devices and their settings.

4.6.8 Document safety mechanism(s) of the firearm and their location(s) and/or position(s), as appropriate.

4.6.9 Document the presence/absence of a magazine and ammunition. Remove any ammunition from the magazine prior to using the magazine for testing with the firearm.

4.6.10 The magazine capacity should be documented.

4.6.10.1 For magazines that are removable from the firearm, unfired ammunition or dummy cartridges may be used.

4.6.10.2 For magazines that are integral to the firearm, dummy cartridges should be used, if available. When dummy cartridges are not available for this purpose, unfired ammunition may be used; however, testing with unfired ammunition shall be performed in an area designated for the test firing of a firearm.

4.7 Barrel and/or Overall Length

Measure and record the barrel and/or overall length of the firearm. Generally, barrel and/or overall length is a descriptor of the firearm. In these instances, the estimation of uncertainty of measurement is not required. However, when measuring barrel and/or overall length for assessment of conformance with a statutory requirement, the examiner should consult and follow laboratory policy, and if applicable, accreditation requirements. A detailed procedure for measuring barrel and overall length is found in the *Standard for Barrel and Overall Length Measurements for Firearms* [2].

4.8 Mechanical Function Testing

The testing of a firearm for mechanical function is not necessarily linear in nature, and this standard should not be considered a step-by-step guide. However, testing should confirm the operating condition of the firearm in all applicable modes of fire.

Certain tests below may require field stripping or more detailed disassembly of the firearm. Examiners and/or technicians should consider test firing prior to any disassembly, so as not to alter the as-received condition of the firearm.

Conduct an examination of the working mechanisms of the firearm. This may require the use of a firearm reference collection or consultation with manufacturer's product literature, armorer's manuals, disassembly/assembly guides, parts diagrams, recall and safety warning documents, or other reference materials.

a) Test the mechanical function in all applicable modes of fire (e.g., semiautomatic and automatic, single and double action, etc.). Field test semiautomatic firearms to determine if they are capable of fully automatic fire.

b) Inspect the firearm for any conditions which have the potential to cause slam firing.

c) Use caution when dry firing, as the practice of dry firing may damage certain types of firearms.

   Consider the use of dummy cartridges or snap caps when dry firing a rimfire firearm, or firearms known to be susceptible to firing pin breakage.

d) Individually check the operability of the safety mechanisms of the firearm.

Inspection and testing of internal working and safety mechanisms may require field stripping of the firearm. When it is necessary to disassemble the firearm beyond routine field stripping, this shall be recorded in the case notes.

4.9 Trigger Pull

Measure and record the trigger pull of the firearm. Laboratory policy may dictate when this measurement is required. Guidelines for measuring the trigger pull of a firearm is found in *Guidelines for Trigger Pull Analysis* [3].

4.10 Non-Functional Firearms

4.10.1 If a firearm is non-functional as received in the laboratory, replacement parts from a variety of sources may be utilized in order to render the firearm functional and obtain test specimens. This may include installing the barrel, bolt, or other component of the submitted firearm into a reference firearm. Any replacement of parts shall be documented in the case notes and removed after test-firing is complete.

4.10.2 For firearms that cannot be restored to operating condition, consider alternate methods for test specimen production. Examples may include casting, the use of soft lead media, etc.

4.11 Test Firing

4.11.1 Based on examinations listed above, determine if the firearm is suitable for test firing and if so, what test firing methods are appropriate. If there is any doubt as to whether the firearm can be safely fired by hand, consider the use of a remote firing device.

4.11.2 Use appropriate ammunition for case circumstances. If reloaded ammunition or a potentially unsafe firearm-ammunition combination must be used, exercise special caution.

4.11.3 When producing test specimens for subsequent comparative analysis, select appropriate ammunition and recovery device(s) to facilitate the analysis. Mark or package the test specimens at the time of firing so that they are traceable to the firearm from which they were fired.

4.12 Test Reports

4.12.1 The test report shall include a description/physical classification of any firearm that is examined. At a minimum, the description shall include, if known, the make/manufacturer, firearm type, model, caliber/gauge, and serial number.

4.12.2 If the firearm was assessed for mechanical function, the test report shall include a statement regarding whether or not the firearm was determined to be functional.

4.12.2.1 For a relevant malfunction of the firearm based on the case circumstances, the test report shall reflect that the firearm malfunctioned in the condition received and, if determined, include a statement as to the cause of the malfunction and if/how it was corrected.

4.12.2.2 For non-functional firearms, the test report shall reflect that the firearm was non-functional as received in the laboratory and shall include a summary of any measures used to obtain test specimens. If attempts to make the firearm functional were unsuccessful, this shall be reported.

Annex A
(informative)

Bibliography

This is not meant to be an all-inclusive list; other publications on this subject may exist. At the time this standard was drafted, these were the publications available for reference.

1] ANSI/ASB Best Practice Recommendation 068, Safe Handling of Firearms and Ammunition, First Edition 2020[c].

2] Organization of Scientific Area Committees for Forensic Science (OSAC). *Standard for Barrel and Overall Length Measurements for Firearms*[d].

3] Scientific Working Group for Firearms and Toolmarks (SWGGUN). *Guidelines for Trigger Pull Analysis*[e].

[c] Available from: http://www.asbstandardsboard.org/published-documents
[d] Available from: https://www.nist.gov/system/files/documents/2020/03/24/060_standard_for_barrel_and_overall_length_measurements_for_firearms_OSAC%20Proposed.pdf
[e] Available from: https://www.nist.gov/system/files/documents/2016/11/28/swggun_systemic_report.pdf

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