

Standard Test Method for the Examination and Testing of Firearms

*Firearms and Toolmarks Subcommittee
Physics/Pattern Interpretation Scientific Area Committee
Organization of Scientific Area Committees (OSAC) for Forensic Science*





OSAC Proposed Standard

Standard Test Method for the Examination and Testing of Firearms

Prepared by
Firearms & Toolmarks Subcommittee
Version: 1.0

Disclaimer:

This document has been developed by the Firearms & Toolmarks Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science through a consensus process and is *proposed* for further development through a Standard Developing Organization (SDO). This document is being made available so that the forensic science community and interested parties can consider the recommendations of the OSAC pertaining to applicable forensic science practices. The document was developed with input from experts in a broad array of forensic science disciplines as well as scientific research, measurement science, statistics, law, and policy.

This document has not been published by a SDO. Its contents are subject to change during the standards development process. All interested groups or individuals are strongly encouraged to submit comments on this proposed document during the open comment period administered by the Academy Standards Board (<http://www.asbstandardsboard.org/>).



Keywords: *Firearms, physical examination, classification, testing, test fire*

This document provides procedures for the examination and testing of evidence firearms by forensic firearm and toolmark examiners or technicians.



Foreword

This standard test method document was proposed by the Firearms and Toolmarks Subcommittee of the Organization of Scientific Area Committees (OSAC) by submitting a request to the American Academy of Forensic Sciences (AAFS) Academy Standards Board (ASB). This document is intended to provide procedures for the examination and testing of firearms by forensic firearm and toolmark examiners or technicians.

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.



Acknowledgements

Editor:

Deputy Editor(s):

Drafting Working Group Members:

Cassey Allen	Texas Department of Public Safety - Crime Laboratory
James Carroll	Los Angeles County Sheriff's Department - Scientific Services Bureau
Erica Lawton	Alabama Department of Forensic Sciences
Steve Scott	Federal Bureau of Investigation
Andy Smith	San Francisco Police Department Criminalistics Laboratory
David Wright	Johnson County (Kansas) Sheriff's Office Criminalistics Laboratory

Consensus Group Members:

Table of Contents

1	Scope.....	1
2	Normative References.....	1
3	Terms and Definitions	1
4	Requirements.....	2
4.1	Equipment and Materials.....	2
4.2	Test Preparations.....	3
4.3	Documentation.....	3
4.4	Evidence Handling	3
4.5	Initial Documentation.....	3
4.6	Physical Examination.....	3
4.7	Barrel and/or Overall Length	5
4.8	Mechanical Function Testing.....	5
4.9	Trigger Pull Weight	6
4.10	Non-Functional Firearms	6
4.11	Test Firing	6
4.12	Test Reports	6
	Annex A (informative) Foundation Principles	8
	Annex B (information) Bibliography.....	9

1 Scope

This document provides 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

OSAC Best Practice Recommendation, *Best Practice Recommendations for the Safe Handling of Firearms and Ammunition*.

OSAC Standard, *Standard for Barrel and Overall Length Measurements for Firearms*.

OSAC Standard, *Standard for Trigger Pull Uncertainty of Measurement for Firearms*

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.¹

3.2

Dry Fire

To release the firing pin on an unloaded chamber of a firearm.²

3.3

Dummy Cartridge

An inert cartridge which cannot be fired.³

3.4

Field Strip

To dismantle 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

¹ Association of Firearm and Tool Mark Examiners. *Glossary*. 6th Ed., 2013

² Ibid.

³ Ibid.

performed to determine if all safety features are operable and/or if the firearm is capable of firing a cartridge.⁴

3.7

Slam Fire

The accidental discharge of a firearm upon closing of the action.⁵

3.8

Snap Cap

A protective device to permit dry firing without damage to the firing pin.⁶

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.⁷

3.10

Trigger Pull

The amount of force which must be applied to the trigger of a firearm to cause sear release. It is measured by hanging weights or an instrument touching the trigger at a point where the trigger finger would normally rest. The force applied during measurement is approximately parallel to the bore axis.⁸

4 Requirements

4.1 Equipment and Materials

Various light sources suitable for the examination of a firearm

Personal protective equipment

Engraver or scribe

Stereo microscope

Dummy cartridges of various calibers/gauges

Snap caps

Trigger pull measuring device

⁴ Ibid.

⁵ Ibid.

⁶ Ibid.

⁷ Ibid.

⁸ Ibid.



Firearm barrel and/or overall length measuring device

Various tools necessary for disassembly of firearms. Some of these may be specialty tools.

Remote firing device

Firing range and/or bullet recovery device(s)

4.2 Test Preparations

4.2.1 Use appropriate personal protective equipment 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. Refer to *Best Practice Recommendations for the Safe Handling of Firearms and Ammunition*.

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

4.3 Documentation

4.3.1 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 for identification in accordance with laboratory protocols.

4.5 Initial Examination

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

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:

- Make/manufacture

- Firearm type (shotgun, rifle, pistol, revolver, etc)
- Model
- Caliber/gauge
- Serial number

4.6.2 Additional descriptions may include the following information:

- Serial number location(s), including any hidden location(s)
- Action type (semi-automatic, lever action, bolt action, etc)
- Country of origin
- Importer
- Finish
- Construction (e.g. polymer, metal type, etc.)
- Other markings on the firearm
- Positions and class characteristics of marking surfaces (e.g. extractor and ejectors)
- Safeties and location(s)
- Type of operation (recoil, blowback, etc)
- 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:

- Rifling type (e.g. polygonal or conventional)
- Number of lands and grooves
- Direction of rifling twist

4.6.6 Document the following for revolvers:

- Cylinder capacity
- Direction of cylinder rotation
- The presence and location of cylinder flares

4.6.7 Document the following for shotguns:

- The chamber length
- Any choke designations or choke devices and their settings

4.6.8 Examine safety mechanisms of the firearm and document their operating condition.

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 may 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

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*.

4.7.1 Measure and record the barrel and/or overall length of the firearm.

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.

4.8.1 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.

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

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

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

4.8.4.1 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.

4.8.5 Individually check the operability of the safety mechanisms of the firearm.

4.8.5.1 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 Weight

4.9.1 Measure and record the trigger pull weight(s) of the firearm. Laboratory policy may dictate when this measurement is required. A detailed procedure for measuring the trigger pull weight of a firearm is found in the *Standard for Trigger Pull Uncertainty of Measurement for Firearms*.

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 the above examinations, 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 the firearm. 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 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 malfunctioning firearms, 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.

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)

Foundational Principles

A.1 General

The standard outlined in this document is grounded in the generally accepted body of knowledge and experience in the field of firearm and toolmark examination.

Annex B
(informative)

Bibliography

- 1] Association of Firearm and Tool Mark Examiners. *Technical Procedures Manual*. November 2015
 - 2] Association of Firearm and Tool Mark Examiners. *Glossary*. 6th Ed., 2013
-