

**Supporting Document for  
Service Manual of  
Firearms and Physical Evidence Section**

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# Service Manual

## Firearms and Physical Evidence Section

Forensic Investigation Division, Central Institute of Forensic Science,  
Ministry of Justice

### 1. Background of the Firearms and Physical Evidence Section under Forensic Investigation Division, and Its Roles and Responsibilities

The Firearms and Physical Evidence Section operates under the Forensic Investigation Division, Central Institute of Forensic Science, Ministry of Justice. It was established to support forensic casework involving the examination and analysis of evidence related to firearms, ammunition, and physical evidence. The Unit plays a critical role in the criminal justice system.

Its establishment was driven by the necessity to apply scientific principles and advanced technologies in the verification of facts in criminal cases, particularly those of a complex nature. These include firearm-related offenses, homicide cases, hit-and-run incidents, and cases involving trace evidence. The objective is to ensure that examination results are accurate, reliable, and admissible as evidence in court proceedings.

Accordingly, the Firearms and Physical Evidence Examination Unit serves as a key scientific mechanism that links physical evidence to criminal events. It facilitates the establishment of verifiable facts, minimizes errors arising from subjective judgment, and enhances the overall credibility and integrity of the justice process.

The Firearms and Physical Evidence Examination Unit under the Division of Scientific Examination is responsible for conducting forensic examinations to determine the nature of evidence and to establish associative links between evidentiary items. Its core responsibilities include the following:

#### 1.1 Firearms and Toolmark Examination

1.1.1 Determination of the type and caliber of firearms and ammunition.

1.1.2 Examination and classification of submitted items to determine whether they constitute firearms and/or ammunition in accordance with the Firearms Act.

1.1.3 Examination of obliterated, altered, or tampered serial numbers and registration markings on firearms.

1.1.4 Test firing to assess the operational capability and potential to cause harm.

**Note:** The Firearms and Physical Evidence Examination Laboratory is not equipped to accommodate examinations that require test firing within the laboratory. This includes, but is not limited to, the test firing of firearms with the following types and calibers:

- 1) Shotguns
- 2) Homemade firearms
- 3) Military firearms (e.g., machine guns, submachine guns, assault rifles)
- 4) Rifles with a caliber greater than .22

#### 4.1.2 Physical Evidence Examination

- 1) Detection and analysis of gunshot residue (GSR) using SEM-EDS techniques.
- 2) Examination and comparison of plastic materials.
- 3) Identification and confirmation of chemical substances and suspected materials.
- 4) Examination and comparison of automotive paint.
- 5) Examination of fibers.
- 6) Examination of obliterated, altered, or tampered vehicle identification numbers (VIN) and engine numbers.

In addition, the Unit is responsible for the continuous development of forensic examination methodologies to accommodate a wide variety of evidentiary materials, ensuring comprehensive coverage within its scope of duties. This is achieved through the optimal and efficient utilization of available instrumentation and resources.

Furthermore, the Unit provides academic and technical knowledge to external stakeholders who seek to understand forensic examination processes. This includes disseminating knowledge on the application of forensic science in case resolution, with the ultimate aim of supporting the delivery of justice to the public.

## 2. Procedures

### 2.1 Evidence Reception

#### 2.1.1 Receipt of Evidence from Internal Submitters

Internal submitters include, but are not limited to, The Evidence Management Section, Forensic Science Operation Section, Southern Border Forensic Science Operations Section, and Forensic Pathology Section. Evidence items shall be submitted at the designated evidence submission and receiving point of the Firearms and Physical Evidence Section, located on the 1st floor of the Laboratory Building, Central Institute of Forensic Science, 111 Moo 4, Ban Mai Subdistrict, Mueang Pathum Thani District, Pathum Thani 12000.

Upon receipt, the unit's evidence receiving officer shall verify that the evidence recorded in the FSSC system corresponds with the details indicated on the evidence packaging. If the information is consistent and correct, the officer shall formally acknowledge receipt of the evidence in the system.

#### 2.1.2 Receipt of Evidence from External Submitters

The receipt of evidence from external submitters shall be conducted in accordance with the Procedure for Evidence Management (PR-EMS-001\_E).

## **2.2 Rejection of Evidence**

In cases where evidence cannot be accepted for examination due to deficiencies or non-compliance with the laboratory's examination requirements, the evidence shall be rejected in the FSSC system by selecting "Reject," and returned to the submitter for correction.

The grounds for rejection include the following:

2.2.1 The item(s), type, or quantity of the submitted evidence do not correspond to those specified in the submission documentation.

2.2.2 The evidence is contained in damaged or broken packaging, or the seal is compromised or absent.

2.2.3 The evidence is not labeled with a barcode, or the barcode is partially damaged, scratched, torn, or illegible.

2.2.4 The barcode on the evidence does not match the information provided in the submission documentation.

2.2.5 The requested analytical procedure is inappropriate, or there are other deficiencies that may affect the accuracy and reliability of the examination report.

2.2.6 The submitted evidence falls outside the scope of services of the laboratory.

In cases where evidence has already been accepted into the laboratory, assigned for examination, and subsequently found to be unsuitable or unexaminable, the item shall be canceled in the FSSC system. A formal evidence return document shall then be prepared, and the evidence shall be returned to the submitter through The Evidence Management Section

## **2.3 Return of Evidence to the Client**

2.3.1 The evidence return officer shall notify the internal requesting units such as the The Evidence Management Section, Forensic Science Operation Section, Southern Border Forensic Science Operations Section, and Forensic Pathology Section once the examination has been completed and the examination report has been duly issued.

2.3.2 Authorized personnel from the requesting internal units may collect the returned evidence at the designated evidence submission and collection point of the Firearms and Physical Evidence Examination Section, Building 3, 1st Floor.

2.3.3 The evidence return officer shall retrieve the evidence from the storage cabinet based on the list of completed examination items recorded in the FSSC system and verify the items to be returned.

2.3.4 The evidence return officer shall record the return of evidence in the FSSC system and formally hand over the evidence to the requesting personnel.

## **2.4 Workload Statistics**

Workload statistics shall be compiled based on the number of examination reports that have been formally issued, in accordance with the prescribed format and within the defined examination timeframe. Each case shall be completed within 24 working days from the date the evidence is submitted into the FSSC system by the client.

### 3. Requirements and Specifications of Evidence for Submission for Forensic Examination Services

#### 3.1 Firearms

Requirements	Details
Type of Evidence	Firearms, imitation firearms, firearm components, or objects suspected to be firearms.
Essential Information	<ol style="list-style-type: none"> <li>1. Specify the type, caliber, brand, registration markings, and serial number of the firearm.</li> <li>2. If inquiries relate to registration markings or serial numbers, a copy of the firearm license (Form Por.4) should be attached, if available.</li> </ol>
Scope of Examination	<ol style="list-style-type: none"> <li>1. Determination of whether the firearm has been discharged and the approximate time since discharge (e.g., examination for gunshot residue within the barrel).</li> <li>2. Determination of whether the item qualifies as a firearm under the Firearms Act.</li> <li>3. Identification of the type and caliber of the firearm.</li> <li>4. Assessment of whether the firearm is of a type eligible for licensing by the registrar.</li> <li>5. Evaluation of whether the firearm is capable of discharging and causing harm to life or property.</li> <li>6. Examination for obliteration, alteration, or tampering of registration markings and serial numbers.</li> </ol>
Appropriate Packaging	The item should be placed in a cardboard box and secured with straps.
Precautions	<ol style="list-style-type: none"> <li>1. Do not clean the firearm, wash the barrel, or insert any object into the barrel.</li> <li>2. The firearm must be rendered safe prior to submission. All ammunition must be removed from the chamber and magazine. If ammunition or cartridge cases are present, they must be removed prior to submission. The condition of the evidence and any actions taken must be documented.</li> <li>3. Do not conduct any test firing of the firearm.</li> <li>4. If bloodstains are present, allow them to air-dry prior to packaging.</li> </ol>

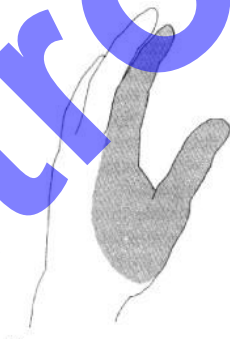
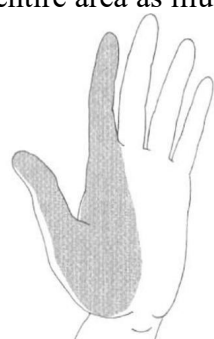
### 3.2 Ammunition

Requirements	Details
Type of Evidence	Ammunition, bullets/projectiles, cartridge cases, and fragments or components of ammunition.
Essential Information	<ol style="list-style-type: none"> <li>1. Specify the exact or approximate caliber.</li> <li>2. If a cartridge case is found within a firearm, document the observed condition and location (e.g., within the cylinder chamber in the case of a revolver), and include photographic documentation of the evidence as found.</li> </ol>
Scope of Examination	<ol style="list-style-type: none"> <li>1. Determination of whether the ammunition is capable of being discharged and causing harm to life or property.</li> <li>2. Determination of whether the item qualifies as ammunition under the Firearms Act.</li> <li>3. Identification of the type and caliber of the ammunition.</li> <li>4. Assessment of whether the ammunition is of a type eligible for licensing by the registrar.</li> </ol>
Appropriate Packaging	For fired ammunition, wrap the item in gauze or cotton to prevent the formation of new marks before placing it in a cardboard box, plastic container, or paper envelope.
Precautions	<ol style="list-style-type: none"> <li>1. During submission, care must be taken to avoid any action that may cause damage or impact, which could create new marks or alter/destroy existing marks on bullets or cartridge cases.</li> <li>2. Basic cleaning may be performed if necessary; however, extreme caution must be exercised to avoid any action that could damage the evidence or alter existing microscopic markings.</li> </ol>

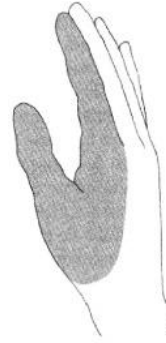
### 3.3 Gunshot Residue (GSR)

Requirements	Details
Type of Evidence	STUB samples collected from areas suspected to contain gunshot residue (GSR), such as the hands of a suspect, interior surfaces of a vehicle, clothing, etc.
Scope of Examination	Determination of the presence or absence of gunshot residue (GSR) particles.
Equipment	<ol style="list-style-type: none"> <li>1. Aluminium stub (pin stub), 12.7 mm in diameter.</li> <li>2. Carbon adhesive tape, 12.5 mm in diameter.</li> <li>3. Storage tube for stubs.</li> <li>4. Zip-lock bags.</li> <li>5. Gloves.</li> </ol>
Preparation Method	<ol style="list-style-type: none"> <li>1. Wear gloves.</li> <li>2. Attach the Aluminium Stub to the base of the stub storage tube.</li> <li>3. Apply the adhesive side of the Carbon Tape onto the center of the stub.</li> <li>4. Close the plastic cover.</li> </ol>



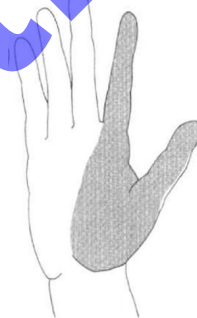
Requirements	Details
Storage Method 1. Control	<p><b>Control Stub Handling and Storage</b></p> <ol style="list-style-type: none"> <li>1. Remove the plastic covering from the Carbon Tape</li> <li>2. Expose it to the air in the sampling area for approximately 10 minutes.</li> <li>3. Close the plastic cover and label as “Control Stub.” Store one control stub per sampling area.</li> </ol> <p><b>Note:</b> Control stubs are used for quality control in the analytical process to detect potential contamination originating from the environment.</p>
2. Suspect’s Hands	<p><b>Sampling Method: Suspect’s Hands</b></p> <p>Use four stubs per person for gunshot residue (GSR) collection.</p> <p>Remove the plastic covering from the Carbon Tape when ready to collect GSR.</p> <p><b>Stub 1:</b> Press the stub evenly over the back of the suspect’s left hand, covering the entire area as illustrated.</p>  <p>(A)</p> <ol style="list-style-type: none"> <li>1. After collecting the sample, immediately close the plastic cover and label as: “Stub collected from the back of the left hand of [suspect’s name].”</li> <li>2. <b>Stub 2:</b> Press the stub evenly over the palm of the suspect’s left hand, covering the entire area as illustrated.</li> </ol>  <ol style="list-style-type: none"> <li>3. After collecting the sample, immediately close the plastic cover and label as: “Stub collected from the palm of the left hand of [suspect’s name].”</li> </ol>

4. **Stub 3:** Press the stub evenly over the back of the suspect's right hand, covering the entire area as illustrated.



5. After collecting the sample, immediately close the plastic cover and label as: "Stub collected from the back of the right hand of [suspect's name]."

6. **Stub 4:** Press the stub evenly over the palm of the suspect's right hand, covering the entire area as illustrated.



7. After collecting the sample, immediately close the plastic cover and label as: "Stub collected from the palm of the right hand of [suspect's name]."

3. Sampling from Areas Suspected of Gunshot Residue (e.g., interior of a vehicle, clothing, walls, etc.)

1. Remove the plastic covering from the Carbon Tape when ready to collect gunshot residue.
2. Press the stub onto the area suspected of containing gunshot residue.
3. Immediately close the plastic cover after collecting the sample and label as: "Stub collected from [specific area]."

Appropriate Storage Container

Place each stub set in a ziplock bag, keeping one sample per bag.

Precaution

Collect gunshot residue only from dry surfaces.

### 3.4 Plastics and Polymers

Requirements	Details
Type of Evidence	Evidence composed of synthetic or semi-synthetic polymers, such as automotive bumper fragments, plastic debris, plastic bags, adhesive tapes, nylon ropes, plastic films, plastic packaging, components of electrical and electronic devices, medical materials, plastic firearm parts, and melted plastics resulting from fire incidents.
Scope of Examination	<ol style="list-style-type: none"> <li>1. Identification of the type of material.</li> <li>2. Comparative analysis with suspected materials.</li> </ol>
Appropriate Packaging	Plastic bags, paper envelopes, or cardboard boxes.
Precautions	<ol style="list-style-type: none"> <li>1. Store samples in areas away from heat or heat sources, solvents, and oils, as these may cause degradation or damage to the evidence.</li> <li>2. If multiple items are submitted and exhibit clearly different characteristics or originate from different locations, they must be packaged separately using the methods described above.</li> </ol>

### 3.5 Fibers

Requirements	Details
Type of Evidence	Single fibers, yarns, and textiles.
Scope of Examination	<ol style="list-style-type: none"> <li>1. Identification of the type of material.</li> <li>2. Comparative analysis with suspected materials.</li> </ol>
Appropriate Packaging	<ol style="list-style-type: none"> <li>1. Lint-free paper envelopes.</li> <li>2. Specialized tape lifts designed specifically for fiber evidence collection.</li> <li>3. Self-adhesive notes (e.g., Post-it, Elephant brand, etc.).</li> </ol>
Precautions	<ol style="list-style-type: none"> <li>1. Do not collect fibers using general adhesive tapes that are not specifically designed for fiber evidence, as this may render the evidence unsuitable for examination and the adhesive may interfere with analytical results.</li> <li>2. Store samples in environments away from factors that may affect fiber integrity, such as heat, heat sources, and chemicals.</li> <li>3. For fiber-containing materials that cannot be entirely packaged, cut and submit a representative portion that reflects the overall characteristics of the material.</li> <li>4. Suspected items must be packaged separately from known/reference samples intended for comparison.</li> </ol>

### 3.6 Chemicals / Suspected Substances

Requirements	Details
Type of Evidence	Solids (e.g., flakes, pellets, fine powders, crystalline substances), liquids, stains or residues, chemicals mixed with other materials, hazardous or controlled substances, and chemicals contained within vessels or packaging.
Scope of Examination	<ol style="list-style-type: none"> <li>1. Identification of the substance.</li> <li>2. Comparative analysis with known or suspected chemicals.</li> </ol>
Appropriate Packaging	<ol style="list-style-type: none"> <li>1. Glass bottles with Teflon-lined caps for general chemicals and solvents.</li> <li>2. Amber glass bottles with Teflon-lined caps for UV-sensitive substances.</li> <li>3. HDPE plastic bottles for acids and bases.</li> <li>4. Plastic bags for dry, non-volatile solid substances (e.g., powders, granules).</li> <li>5. Metal containers for flammable liquids or chemicals (e.g., fuels in arson cases).</li> <li>6. After sealing the container, it should be further secured with an evidence seal.</li> </ol>
Quantity	<ol style="list-style-type: none"> <li>1. 10–15 mL for liquid samples.</li> <li>2. Approximately 2–5 grams or about one teaspoon for solid samples.</li> </ol>
Precautions	<ol style="list-style-type: none"> <li>1. Store samples away from heat sources and other chemicals.</li> <li>2. Submit samples as soon as possible after collection, as delays may result in evaporation or loss of evidence.</li> <li>3. Reference samples must be submitted in all cases where comparative analysis is required.</li> <li>4. Avoid direct contact with chemicals.</li> <li>5. For liquid samples, fill containers to approximately 60–70% of their capacity.</li> </ol> <p><b>Note:</b> Chemicals encountered at crime scenes are often diverse and potentially hazardous. For further information or consultation, please contact the Firearms and Physical Evidence Examination Laboratory or refer to the relevant Safety Data Sheets (SDS).</p>

### 3.7 Paint

Requirements	Details
Type of Evidence	Paint chips or coatings, and transferred paint residues on various surfaces; known reference samples from suspected sources (e.g., vehicles or coated materials); and samples collected on carrier materials such as clothing, adhesive tapes, or collection sheets.
Scope of Examination	<ol style="list-style-type: none"> <li>1. Identification of the material composition.</li> <li>2. Comparative analysis with known reference paint samples.</li> </ol>
Recommendations	<p><b>Collection of Suitable Samples:</b> The possibility of a physical match between known and questioned samples must be carefully considered prior to selecting collection methods. Appropriate precautions should be taken to preserve the integrity and potential for physical matching.</p> <p><b>1. Questioned Samples</b></p> <ol style="list-style-type: none"> <li>1.1 All suspected paint materials, including detached or transferred fragments, should be collected. Potential sources include tools, floors, walls, glass fragments, hair, fingernails, road surfaces, nearby structures, transfer marks or smears on vehicles, and person-to-person transfer (e.g., damaged clothing with adhered paint).</li> <li>1.2 Smear transfers may contain mixed components from multiple paint layers; therefore, the entire object bearing the suspected paint should be submitted whenever possible.</li> <li>1.3 When contact between two coated surfaces is suspected, the possibility of cross-transfer should be considered. Where feasible, samples from both surfaces should be collected for examination.</li> </ol> <p><b>2. Known Samples</b></p> <ol style="list-style-type: none"> <li>2.1 Known paint samples should be collected from areas as close as possible to the damaged or transfer site, but not directly from the damaged area. Samples must include all intact layers of the paint system.</li> <li>2.2 The underlying substrate beneath the suspected transfer area should also be included in the analysis.</li> <li>2.3 For paint flakes, appropriate collection methods should be used, such as cutting with a clean knife or blade, gently dislodging fragments, or applying a combination of methods as appropriate.</li> </ol>
Appropriate Packaging	<ol style="list-style-type: none"> <li>1. Paint chips should be wrapped in paper and placed in small envelopes or boxes to preserve their condition.</li> <li>2. For small objects bearing paint evidence, the entire</li> </ol>

	<p>item should be submitted, with the relevant area protected to prevent environmental contamination.</p> <p>3. For large objects that cannot be submitted in whole, carefully scrape the paint using a clean tool while preserving the transfer pattern as much as possible. Reference samples must also be collected for comparison. If multiple locations are involved, samples should be collected from each location and packaged separately.</p>
Precautions	<ol style="list-style-type: none"> <li>1. Store samples away from heat sources and other chemicals.</li> <li>2. Paint evidence should be collected with great care to preserve its integrity. Whenever possible, submit the entire item. Avoid scraping powder-like samples unnecessarily, as this may lead to contamination or loss of evidence.</li> </ol>

**4. Laboratory Location**

Firearms and Physical Evidence Section, 1st Floor, Operation Building, Central Institute of Forensic Science.

No. 111, Moo 4, Ban Mai Subdistrict, Mueang Pathum Thani District, Pathum Thani Province, 12000, Thailand