



FEDERAL PUBLIC SERVICE MJSP  
- FEDERAL POLICE  
POLICE LOGISTICS CONTROL SERVICE - SECOL/DPC/CGPLAM/DLOG/PF

**ANNEX II - A**  
**9x19MM MUNITION RECEIPT TESTS**

**1. PREAMBLE**

- 1.1. The following tests were drawn up based on SENASP draft technical standard No. 08/2022, national and international standards relating to sampling, metrology tests and ballistic tests of ammunition.
- 1.2. For the purposes of studies for future acquisitions and the prospecting of new technologies, with a view to improving the safety of the operator and third parties during confrontations, samples will be chosen at random by the Contract Planning Team, which will be subjected to the tests detailed in this annex.
- 1.3. The tests to be applied in the process of assessing the conformity of standardized products will be described below, in accordance with the characteristics and criteria widely discussed and covered by national and international standards, plus the technical consensus for appropriate application to the reality of Brazilian public security.
- 1.4. In all tests, the ammunition must show ballistic performance in line with the standards, within their tolerances;
- 1.5. Of the quantity subjected to visual inspection, metrological and laboratory tests, some copies may be sent to one or more independent laboratories or raw material producers, selected by the members of the Contracting Planning Team, in accordance with the public interest of the Federal Police, for the purposes of quality certification of the requirements of this specification, the costs of fees, shipping and dispatch of the report charged by the independent laboratory must be borne by the winning bidder, after the Authorizing Officer has been informed of the shipment and prior knowledge of the winning bidder, such definition being adopted in agreement with the manufacturer.

**2. REQUIREMENTS**

- 2.1. All the planned tests must be carried out in a controlled laboratory environment (indoor), at a temperature of  $21\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$  and a relative humidity of  $60\% \pm 5\%$ ;
- 2.2. All measuring instruments must be duly calibrated, and a calibration certificate issued by a body belonging to the Brazilian Calibration Network (RBC) of the General Accreditation Coordination (Cgcre) of the National Institute of Metrology, Quality and Technology (INMETRO) may be required.
- 2.3. If it is impossible to calibrate an instrument, the use of reference ammunition and/or redundant application by two pieces of equipment intended for the same purpose will be allowed.
- 2.4. The samples must be inspected on receipt and photographed before the tests provided for in this protocol are carried out, and the procedures adopted must be described and attached to the test reports;
- 2.5. In rehearsals involving the firing of a firearm, all safety measures relating to shooting ranges and the handling of firearms must be adopted, such as the use of goggles, mufflers, among others; and
- 2.6. Before the start of each test, the script must be read out to everyone present, and the procedures to be carried out during the sample evaluation must be clarified.

**3. TECHNICAL REFERENCE STANDARDS**

- 3.1 The reference standards will be those set out in Annex I - Technical Specifications and Standards

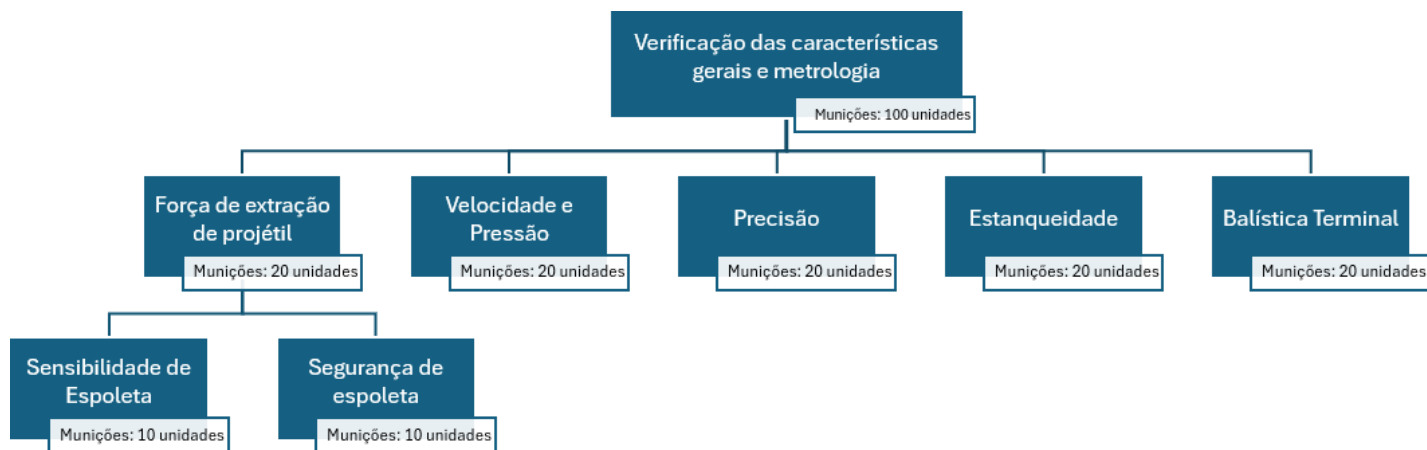
**4. THE TESTING PERIOD**

**TEST PLAN:** \_\_\_\_\_

- 4.1. In order to carry out the specified tests, it will be necessary to supply at least 100 (one hundred) units of ammunition, distributed according to the following Test Plan:
- 4.2. The plan includes 8 (eight) tests, with the letter "E" representing the designation "Test" followed by the order number, as shown in the legend below:

CODE	LEGEND	TEST IDENTIFICATION	NECESSARY AMMUNITION
E1	Test 1	Verification of general characteristics and metrology	100
E2	Test 2	Projectile extraction force	20
E3	Test 3	Fuze sensitivity	10
E4	Test 4	Fuze safety	10
E5	Test 5	Speed and pressure	20
E6	Test 6	Precision	20
E7	Test 7	Watertightness	20
E8	Test 8	Terminal ballistics	20

- 4.3. The distribution of the samples will be carried out with a view to the greatest economy, reliability and reasonableness of the planned tests, according to the test plan below:



4.3.1. The test protocol begins with the application of test E1 (Verification of general metrological characteristics), using 100 (one hundred) samples taken at random from the production line shipment or batch produced;

4.3.2. The samples from E1 will be divided up for the other tests, with 20 (twenty) samples for test E2, 20 (twenty) samples for test E5, 20 (twenty) samples for test E6, 20 (twenty) samples for test E7 and 20 (twenty) samples for test E8;

4.3.3. Tests E3 and E4 will be carried out with the same samples used for E2, with 10 (ten) samples for test E3 and 10 (ten) samples for test E4;

4.3.4. It should be noted that samples can only be considered APPROVED if they meet all the requirements of the mandatory tests contained in this protocol, and it is not possible to claim partial approval; and

4.3.5. In order to carry out a subsequent witness test on the ammunition submitted for certification, an additional 50 (fifty) cartridges from the same batch tested must be stored by the laboratory for a period of 10 (ten) years, counting from the date of completion of the procedure.

#### **COMMON CRITERIA FOR SHOOTING TESTS:**

4.4. Tests that require shooting must be carried out using a test barrel in accordance with the specifications of SAAMI Z299.3/2015;

4.5. Functional faults occurring during tests involving shooting must be recorded and classified according to the numerical codes in the table below:

Item	Failure	Classification
1	Percussion failure (nega failure)	Class 2
2	Specimen locking failure caused by ammunition	Class 2
3	Excessive expansion of the case	Class 2
4	Fuze drilling	Class 2
5	Separating the fuze from the case (popped primer)	Class 2
6	Chamber overpressure .with damage to equipment)	Class 3
7	Projectile does not leave the barrel	Class 3
8	Other	Class 1, according to item 4.11
9	Other	Class 2, according to item 4.12
10	Other	Class 3, according to item 4.13

#### **TESTS BY SPECIES:**

4.6. *Verification of general characteristics and metrology:*

4.6.1. Objective: to check that the cartridges under analysis comply with the minimum technical parameters, as well as the quality of the ammunition production process;

4.6.2. Sample: 100 (one hundred) cartridges;

4.6.3. Script:

The packaging in which the cartridges are stored must contain at least clear information on the manufacturer's identification or brand, traceability code, quantity, nominal caliber, type of projectile, batch number and year of manufacture. The absence or illegibility of this information must be noted in the test report;

All the ammunition selected to make up the sample must be photographed before the tests begin, and may be divided into batches of 20 (twenty) cartridges, according to the test plan;

Initially, each cartridge will be analyzed in terms of its general appearance, assessing whether the ammunition is free of deformations, dents, cracks, burrs, sharp edges, perforations, dents, corrosion or any other defect that compromises safety;

The following must be analyzed and recorded in a report: nominal caliber, headstamp, case material, type of projectile, type of case (in terms of shape and headspace) and type of fuze;

After the visual inspection, the cartridges' faults must be tabulated according to the following table:

ITEM	DEFECT	CLASSIFICATION
	<b>CARTRIDGE</b>	
1	Discolored. Dirty. Oily. Stained	Class 1

2	Different types of ammunition in the same box	Class 2
3	Unwanted sinking of the projectile	Class 2
	<b>CASE</b>	
4	Headstamp illegible or missing	Class 1
5	Scratched	Class 1
6	Cracked	Class 2
7	Defective mouth	Class 2
8	Crumpled	Class 2
9	Broken	Class 2
10	Folded	Class 2
11	Wrinkled	Class 2
12	Beveled waistcoat	Class 2
13	Deformed	Class 2
14	Protruding	Class 2
15	Corroded, Oxidized	Class 2
16	defective	Class 2
17	Perforated	Class 3
18	Extractor groove missing	Class 3
	<b>PROJECTILE</b>	
19	Scratched	Class 1
20	Loose	Class 2
21	Cracked	Class 2
22	Crumpled	Class 2
23	Cracked	Class 2
24	Peeled	Class 2
25	Crooked tip	Class 2
26	Inverted	Class 3
	<b>SPOILER</b>	
27	No sealant	Class 1
28	Positive	Class 2
29	Faulty crimp	Class 2
30	Loose	Class 2
31	Inverted	Class 3
32	Absent	Class 3
33	Chopped or crumpled	Class 3
34	Badly pocketed	Class 3
35	Double spraying	Class 3

Each cartridge will then be examined, using properly calibrated and/or gauged instruments, for the following parameters:

- I - Overall length (OAL);
- II - Head thickness;
- III - Diameter of the extraction collar;
- IV - Fuze depth;
- V - Projectile diameter; and
- VI - Total mass of the cartridge.

4.6.4. After carrying out the E2 test, in accordance with the specific test script provided for in item 4.7, the 20 (twenty) cartridges intended for this test will also be measured:

- I - Mass of the projectile; and
- II - Propellant mass.

4.6.5. Acceptance criteria:

- I - The samples must meet the minimum technical requirements described in the prescriptions of this test;
- II - A sample with any class 3 fault, class 2 faults with more than 2 (two) occurrences and class 1 faults with more than 5 (five) occurrences will be considered to have failed, according to Table 3.
- III - The dimensions measured must comply with the standard established as a reference by SAAMI, CIP or NATO;
- IV - The absence of propellant in the cartridge will lead to the sample being rejected;
- V - The variation in total length parameters between the cartridges in the sample must not exceed 0.8 %;
- VI - The propellant charge variation must not exceed  $\pm 0.03$  g for 9 x 19 mm calibers;
- VII - The variation in projectile mass must not exceed  $\pm 1.5\%$ ; and
- VIII - The variation in projectile diameter must not exceed - 0.076 mm.

#### 4.7. Projectile wear force test:

4.7.1. Objective: to check the force required to disengage the projectile from the case;

4.7.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology verification test;

4.7.3. Script:

The cartridge must first be inserted into the clamping block and aligned with the jaws on a tension tester suitable for this purpose (degasser);  
The grips must be fitted to the projectile just above the neck of the case before the charge is applied;  
A rate of between 7.5 and 15 cm per minute (cm/min) should be applied to disengage the projectile from the case;  
The equipment must measure the force required to completely disengage the projectile from the case. Once it has been disengaged, the equipment

must be stopped; and

All test projectiles must have their mass measured after extraction. This average parameter can be used to determine the kinetic energy of the ammunition.

4.7.4. Acceptance criteria:

I - The average wear force must be equal to or greater than 200 N (two hundred newtons).

4.8. Fuze sensitivity test:

4.8.1. Objective: To assess the reliability of the fuze's detonation when hit by the striker;

4.8.2. Sample: made up of 10 (ten) fuzed cases from the projectile extraction force test;

4.8.3. Script:

Steel balls weighing 55 g (fifty-five grams)  $\pm 0.57$  g must be used for the test, along with a specific device that allows the ball to fall freely from a determined height over the striker that will hit the fuze.

4.8.4. Acceptance criteria:

I - All fuzes must detonate when dropped from a height of 240 mm (two hundred and forty millimeters) from the steel ball for 9 x 19 mm calibers;

4.9. Fuze safety test:

4.9.1. Objective: to assess the level of safety against mechanical shocks to the fuze;

4.9.2. Sample: made up of 10 (ten) fuzed cases from the projectile extraction force test;

4.9.3. Script:

Steel balls weighing 55 g (fifty-five grams)  $\pm 0.57$  g should be used for the test, allowing the ball to fall freely at a determined height over the striker that will hit the fuze.

4.9.4. Acceptance criteria:

I - No fuze must detonate during the test at a height of 51 mm (fifty-one millimeters) for 9 x 19 mm calibers;

4.10. Pipe mouth velocity and pressure test:

4.10.1. Objective: To verify the variation in projectile muzzle velocities in order to demonstrate consistent performance and to evaluate the average chamber pressure generated in order to guarantee compliance with the specified safety levels;

4.10.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology test.

4.10.3. Script:

This test will simultaneously analyze the pressure generated by the cartridge at the moment of deflagration and the velocity developed by the projectile;

For this test, a properly calibrated chronograph should be used, positioned at a distance of 4.6 m from the mouth of the test piece;

The pressure will be measured using a chamber tester equipped with a piezoelectric transducer, according to the SAAMI, CIP or NATO reference standard; and

The test must be conducted at a temperature of 21 °C,  $\pm 5$  °C.

4.10.4. Acceptance criteria:

I - Ammunition that shows more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered to have failed;

II - In a series of shots, the arithmetic mean of the velocities recorded at 4.6 m (four meters and sixty centimeters) from the mouth of the test barrel must be  $332 \pm 27$  m/s, in accordance with SAAMI standard Z-299.3-2015;

The maximum speed variation tolerated is  $\pm 5\%$  (five percent) between all test measurements;

III - The average pressure for the specific type of cartridge must meet the limits set by the SAAMI, CIP and/or NATO reference standard.

4.11. Precision testing:

4.11.1. Objective: to verify the grouping resulting from the series of shots, in order to evaluate the performance and manufacturing quality of the ammunition;

4.11.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology test;

4.11.3. Script:

The test must be conducted at a temperature of 21 °C  $\pm 5$  °C;

A 4" (four-inch) test specimen must be used to make the shots;

Four (4) series of five (5) shots each will be taken at a distance of 22.86 m (twenty-two point eighty-six meters), or 25 yds (twenty-five yards) from the target;

The targets to be used in this test may have center-aligned horizontal and vertical lines; and

Accuracy will be established by measuring the diameter of the maximum circumference covering all valid impact points (grouping), measured in relation to the geometric center of the shots fired.

4.11.4. Acceptance Criteria:

I - Ammunition that shows more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered to have failed;

II - The grouping of the shots fired must cover a maximum diameter of 3" (three inches), or 7.62 cm.

III - A maximum grouping diameter of 4.5" (11.4 cm) will be allowed for cartridges intended exclusively for training and which do not have a projectile jacket.

4.12. Leak test:

4.12.1. Objective: to check the airtightness of ammunition when exposed to water;

4.12.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology test;

4.12.3. Script:

This test is not mandatory for ammunition intended for training purposes;

For the test, a special chamber must be used, as described in volume 26 of AEP-97;

The ammunition to be tested, no more than 05 (five) at a time, must be placed horizontally in the desiccator tray;

The chamber must allow the cartridges to be immersed in water to a depth of 50 mm (fifty millimeters) and negative pressure to be applied;

The chamber must be subjected to a negative pressure of 50 kPa (fifty kilopascals) for a time of 30 s (thirty seconds), observing the release of bubbles at the case/projectile and case/spoon junctions; and

This rehearsal must be filmed.

The following classification of the cartridges' performance in the test must be included in the report:

No leakage: just a bubble being released from the projectile/case and/or case/spoon is not considered leakage;

Slow leak (projectile/case): when a series of two or more bubbles are visualized in the mouth of the cartridge, being released at a rate where only one moves to the surface at any given time. At least two bubbles must be released during the 30 s (thirty seconds) time period to be considered a leak;

Slow leak (case/fuze): when a series of two or more bubbles are seen between the fuze and the case, being released at a rate where only one moves to the surface at any given time. At least two bubbles must be released during the 30 s (thirty second) time period to be considered a leak;

Rapid leakage (projectile/shell): when a series of bubbles are visualized in the mouth of the cartridge, being released at a rate where more than one moves to the surface at any given time; and

Rapid leakage (case/fuze): when a series of bubbles are seen between the fuze and the case, being released at a rate where more than one moves to the surface at any given time.

4.12.4. Acceptance criteria:

I - For the cartridge to be approved, there must be no leaks, in accordance with the above criteria; and

II - Any sample with leakage failures in more than 3 (three) cartridges, in any of the leakage classifications provided for, will be deemed to have failed.

#### 4.13. Terminal ballistics test:

4.13.1. Objective: To evaluate the terminal ballistic behavior of the projectile intended for operational use, in a standardized medium (ballistic gelatin), ensuring its effectiveness for operational use according to internationally established parameters;

4.13.2. Sample: made up of 20 (twenty) cartridges from the general checks and metrology test;

4.13.3. Exclusion: cartridges intended exclusively for training should not be subjected to this test, since their construction does not take into account terminal ballistics aspects;

4.13.4. Script:

The gelatine used as raw material, of organic origin, must have a Bloom between 250 (two hundred and fifty) and 265 (two hundred and sixty-five);

The ballistic gelatine must be calibrated to 10% (ten percent) by mass; the

test must be conducted at a temperature of  $21\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ ;

The gelatine calibration is checked by firing a steel ball from a 4.5 mm caliber air rifle at a speed of 590 fps (five hundred and ninety fps)  $\pm 15$  fps, i.e. approximately  $179.8\text{ m/s} \pm 4.5\text{ m/s}$ , measured by a chronograph, resulting in  $8.5\text{ cm}$  (eight and a half centimeters)  $\pm 1\text{ cm}$  of penetration;

All pads must be calibrated before shooting;

The gelatine block must have the following approximate dimensions: 16" (sixteen inches), or (40.6 cm) long x 6.25" (six and a quarter inches), or (15.8 cm) wide x 6.25" (six and a quarter inches), or (15.8 cm) high, with a tolerance of  $\pm 2.5\text{ cm}$  for either measurement;

After preparation, the blocks must be kept in a refrigerator for at least 48 h (forty-eight hours) before testing, at a temperature of  $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . It is recommended that the blocks be wrapped in bubble wrap or similar material until the time of testing;

If necessary, the blocks should be transported to the test site in cool boxes wrapped in ice;

The temperature of the gelatine block and the relative humidity must be monitored during the test, and this information must be duly recorded in a report;

Because of the possibility of transfixation, two blocks of gelatine must be juxtaposed longitudinally to carry out the test; The shots must be taken at a distance of 3.0 m (three meters);

Penetration must be measured using a properly calibrated tape measure, with the starting point being the beginning of the gelatine block and the end point being the surface of the projectile with the deepest resting point; and

The occurrence of fragmentation or jacket/core separation must be expressly stated in the report. Bare gelatine test:

A total of 10 (ten) shots will be fired at the bare gelatine blocks, preferably one shot per block. For this test, up to five shots may be fired at a single block, provided that their cavities do not overlap. If there is overlap, the test must be repeated;

After the series of shots, the penetration of each projectile must be measured and the occurrence of fragmentation and/or core/shell separation checked;

Each projectile or fragment must then be removed from the block, cleaned and photographed. Next, the projectile or the largest fragment (in the case of fragmentation) should be measured for diameter and final mass; and

In the event of fragmentation, all component parts of the projectile that are located must be extracted from the gelatine.

Heavy clothing barrier test:

An intermediate barrier of heavy fabric will be arranged in contact with the gelatine block, made up of the following layers: cotton T-shirt (approximately 5.25 oz/yd; 0.17 g/m), cotton shirt (approximately 3.5 oz/yd; 0.11 g/m), synthetic wool (Polartec Fleece) and cotton jeans (approximately 14.4 oz/yd; 0.46 g/m);

A total of 10 (ten) shots will be fired against the gelatine preceded by the heavy tissue barrier, preferably with one shot per block. For this test, up to five shots can be made in a single block, as long as their cavities do not overlap;

After the series of shots, the penetration of each projectile must be measured and the occurrence of fragmentation and core/shell separation checked; and

Each projectile or fragment should then be removed from the block, cleaned and photographed. Next, the projectile or the largest fragment (in the case of fragmentation) should be measured for diameter and final mass.

#### 4.13.5. Acceptance criteria:

The penetration averages (P) from both tests must be tabulated in a report according to the following levels: I - Level I - 8" (eight inches), or (20.3 cm)  $< P < 12"$  (30.4 cm); II - Level II - 12" (twelve inches), or (30.4 cm)  $\leq P \leq 18"$  (46 cm); and III - Level III -  $P > 18"$  (46 cm).

Samples that show an average penetration of less than 12" (twelve inches), or (30.4 cm), in any of the tests will be considered unsuccessful;

The minimum projectile mass retention for approval is 90% (ninety percent) for both tests. If there is fragmentation, only the mass of the main projectile will be measured, with lead and/or jacket fragments being disregarded; and

In the bare gelatine test, expansive projectiles must expand at a minimum rate of 45% (forty-five percent) of their initial diameter for the sample to be considered approved.

Ammunition that shows more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered to have failed;

## ANNEX II - B RECEIVING TESTS FOR 5.56X45MM AND 7.62X51MM AMMUNITION

### 5. PREAMBLE

5.1. The following tests have been drawn up on the basis of the NATO standard (AEP-97 Edition A), national and international standards relating to sampling, metrology tests and ballistic tests of ammunition.

5.2. For the purposes of studies for future acquisitions and the prospecting of new technologies, with a view to improving the safety of the operator and third parties during confrontations, samples will be chosen at random by the Contract Planning Team, which will be subjected to the tests detailed in this annex.

5.3. The tests to be applied in the process of assessing the conformity of standardized products will be described below, in accordance with the characteristics and criteria widely discussed and covered by national and international standards, plus the technical consensus for appropriate application to the reality of Brazilian public security.

5.4. In all tests, the ammunition must show ballistic performance in line with the standards, within their tolerances;

5.5. Of the quantity subjected to visual inspection, metrological and laboratory tests, some copies may be sent to one or more independent laboratories or raw material producers, selected by the members of the Contracting Planning Team, in accordance with the public interest of the Federal Police, for the purposes of quality certification of the requirements of this specification, the costs of fees, shipping and dispatch of the report charged by the independent laboratory must be borne by the winning bidder, after the Authorizing Officer has been informed of the shipment and prior knowledge of the winning bidder, such definition being adopted in agreement with the manufacturer.

### 6. REQUIREMENTS

6.1. All the planned tests must be carried out in a controlled laboratory environment (indoor), except for those requiring distances of more than 30 (thirty) meters, at a temperature of  $21^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and a relative humidity of  $60\% \pm 5\%$ ;

6.2. All measuring instruments must be duly calibrated, and a calibration certificate issued by a body belonging to the Brazilian Calibration Network (RBC) of the General Accreditation Coordination (Cgcre) of the National Institute of Metrology, Quality and Technology (INMETRO) may be required.

6.3. If it is impossible to calibrate an instrument, the use of reference ammunition (in accordance with the NATO standard (AEP-97 Edition A) and/or redundant application by two pieces of equipment intended for the same purpose will be permitted.

6.4. The samples must be inspected on receipt and photographed before the tests provided for in this protocol are carried out, and the procedures adopted must be described and attached to the test reports;

6.5. In rehearsals involving the firing of firearms, all safety measures relating to shooting ranges and the handling of firearms must be adopted, such as the use of ballistic protection vests, goggles, mufflers, among others; and

6.6. Before the start of each test, the planned script must be read out to everyone present, and the procedures to be carried out during the sample evaluation must be clarified.

### 7. TECHNICAL REFERENCE STANDARDS

7.1 The reference standards will be those set out in Annex I - Technical Specifications and Standards

### 8. THE TESTING PERIOD

#### TEST PLAN: \_\_\_\_\_

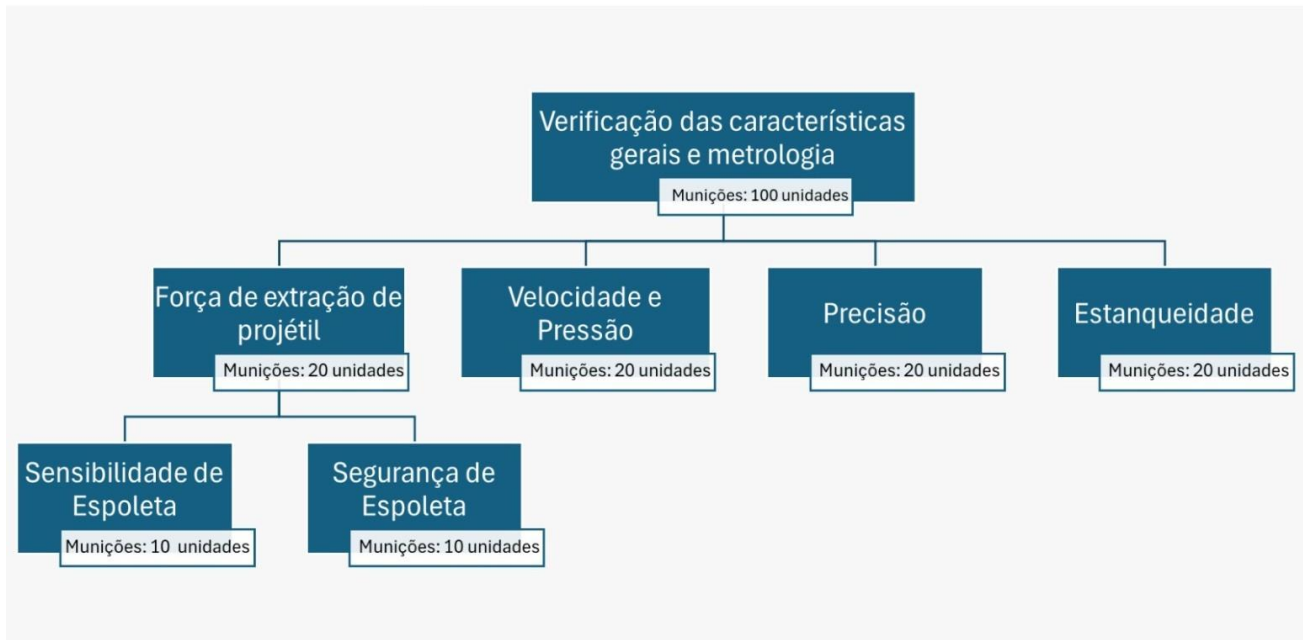
8.1. In order to carry out the specified tests, it will be necessary to supply at least 100 (one hundred) units of ammunition, distributed according to the following Test Plan:

8.2. The plan includes 7 (seven) tests, with the letter "E" representing the designation "Test" followed by the order number, as shown in the legend below:

CODE	LEGEND	TEST IDENTIFICATION	NECESSARY AMMUNITION
E1	Test 1	Verification of general characteristics and metrology	100
E2	Test 2	Projectile extraction force	20
E3	Test 3	Fuze sensitivity	10
E4	Test 4	Fuze safety	10
E5	Test 5	Speed and pressure	20
E6	Test 6	Precision	20
E7	Test 7	Watertightness	20

8.3. The distribution of samples will be carried out with a view to the greatest economy, reliability and reasonableness of the planned tests, according to the plan

of tests below:



- 8.3.1. The test protocol begins with the application of test E1 (Verification of general metrological characteristics), using 100 (one hundred) samples taken at random from the production line shipment or batch produced;
- 8.3.2. The samples from E1 will be divided up for the other tests: 20 (twenty) samples for test E2, 20 (twenty) samples for test E5, 20 (twenty) samples for test E6, 20 (twenty) samples for test E7;
- 8.3.3. Tests E3 and E4 will be carried out with the same samples used for E2, with 10 (ten) samples for test E3 and 10 (ten) samples for test E4;
- 8.3.4. It should be noted that samples can only be considered APPROVED if they meet all the requirements of the mandatory tests contained in this protocol, and it is not possible to claim partial approval; and
- 8.3.5. In order to carry out a subsequent witness test on the ammunition submitted for certification, an additional 50 (fifty) cartridges from the same batch tested must be stored by the laboratory for a period of 10 (ten) years, counting from the date of completion of the procedure.

#### **COMMON CRITERIA FOR SHOOTING TESTS:**

- 8.4. Tests that require shots to be fired must be carried out using a test barrel, the length of which complies with NATO specifications (AEP-97 Edition A);
- 8.5. Functional faults occurring during tests involving shooting must be recorded and classified according to the numerical codes in the table below:

Item	Failure	Classification
1	Percussion failure (nega failure)	Class 2
2	Specimen locking failure caused by ammunition	Class 2
3	Excessive expansion of the case	Class 2
4	Fuze drilling	Class 2
5	Separating the fuze from the case (popped primer)	Class 2
6	Chamber overpressure .with damage to equipment)	Class 3
7	Projectile does not leave the barrel	Class 3
8	Other	Class 1, according to item 4.11
9	Other	Class 2, according to item 4.12
10	Other	Class 3, according to item 4.13

#### **TESTS BY SPECIES:**

- 8.6. *Verification of general characteristics and metrology:*
- 8.6.1. Objective: to check that the cartridges under analysis comply with the minimum technical parameters, as well as the quality of the ammunition production process;
- 8.6.2. Sample: 100 (one hundred) cartridges;
- 8.6.3. Script:
- The packaging in which the cartridges are stored must contain at least clear information on the manufacturer's identification or brand, traceability code, quantity, nominal caliber, type of projectile, batch number and year of manufacture. The absence or illegibility of this information must be noted in the test report;
- All the ammunition selected to make up the sample must be photographed before the tests begin, and may be divided into batches of 20 (twenty) cartridges, according to the test plan;
- Initially, each cartridge will be analyzed in terms of its general appearance, assessing whether the ammunition is free of deformations, dents, cracks, burrs, sharp edges, perforations, dents, corrosion or any other defect that compromises safety;
- The following must be analyzed and recorded in a report: nominal caliber, headstamp, case material, type of projectile, type of case (in terms of shape and headspace) and type of fuze;
- After the visual inspection, the cartridges' faults must be tabulated according to the following table:

ITEM	DEFECT	CLASSIFICATION
	<b>CARTRIDGE</b>	
1	Discolored. Dirty. Oily.	Class 1
2	Different types of ammunition in the same box	Class 2
3	Unwanted sinking of the projectile	Class 2
	<b>CASE</b>	
4	Headstamp illegible or missing	Class 1
5	Scratched	Class 1
6	Cracked	Class 2
7	Defective mouth	Class 2
8	Crumpled	Class 2
9	Broken	Class 2
10	Folded	Class 2
11	Wrinkled	Class 2
12	Beveled waistcoat	Class 2
13	Deformed	Class 2
14	Protruding	Class 2
15	Corroded, Oxidized	Class 2
16	defective	Class 2
17	Perforated	Class 3
18	Extractor groove missing	Class 3
	<b>PROJECTILE</b>	
19	Scratched	Class 1
20	Loose	Class 2
21	Cracked	Class 2
22	Crumpled	Class 2
23	Cracked	Class 2
24	Peeled	Class 2
25	Crooked tip	Class 2
26	Inverted	Class 3
	<b>SPOILER</b>	
27	No sealant	Class 1
28	Positive	Class 2
29	Faulty crimp	Class 2
30	Loose	Class 2
31	Inverted	Class 3
32	Absent	Class 3
33	Chopped or crumpled	Class 3
34	Badly pocketed	Class 3
35	Double spraying	Class 3

Each cartridge will then be examined, using properly calibrated and/or gauged instruments, for the following parameters:

- I - Overall length (OAL);
- II - Head thickness;
- III - Diameter of the extraction collar;
- IV - Fuze depth;
- V - Projectile diameter; and
- VI - Total mass of the cartridge.

8.6.4. After carrying out the E2 test, in accordance with the specific test script provided for in item 8.7, the 20 (twenty) cartridges intended for this test will also be measured:

- I - Mass of the projectile; and
- II - Propellant mass.

8.6.5. Acceptance criteria:

- I - The samples must meet the minimum technical requirements described in the prescriptions of this test;
- II - A sample with any class 3 fault, class 2 faults with more than 2 (two) occurrences and class 1 faults with more than 5 (five) occurrences will be considered to have failed, according to Table 3.
- III - The dimensions measured must comply with the standard established as a reference by SAAMI, CIP or NATO;
- IV - The absence of propellant in the cartridge will lead to the sample being rejected;
- V - The variation in total length parameters between the cartridges in the sample must not exceed 0.8 %;
- VI - The propellant charge variation must not exceed  $\pm 0.08$  g for the 5.56x45mm and 7.62x51mm calibers;
- VII - The variation in projectile mass must not exceed  $\pm 1.5\%$ ; and
- VIII - The variation in projectile diameter must not exceed - 0.076 mm.

8.7. Projectile wear force test:

- 8.7.1. Objective: to check the force required to disengage the projectile from the case;
- 8.7.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology verification test;
- 8.7.3. Script:

In a tension testing machine suitable for this purpose (degasser), the cartridge must first be inserted into the



and aligned with the clamps;

The grips must engage in the projectile just above the neck of the case, before the load is applied; The NATO AEP-97 Edition A, Section 25 method for disengaging the projectile from the case must be applied;

The equipment must measure the force required to completely disengage the projectile from the case. When the projectile has been disengaged, the equipment must be stopped; and

All test projectiles must have their mass measured after extraction. This average parameter can be used to determine the kinetic energy of the ammunition.

8.7.4. Acceptance criteria:

- I - The average degreasing force must be equal to or greater than 157 N (two hundred newtons) for 5.56x45 mm and 7.62x51 mm caliber (MIL-STD
- AMCR 715-505 Vol 3.);

8.8. Fuze sensitivity test:

8.8.1. Objective: to assess the reliability of the fuze's detonation when hit by the striker;

8.8.2. Sample: made up of 10 (ten) fuzed cases from the projectile extraction force test;

8.8.3. Script:

For the test, steel balls weighing 111.7g (one hundred and eleven grams)  $\pm 0.57$ g must be used, along with a specific device that allows the ball to fall freely from a determined height over the striker that will hit the fuze.

8.8.4. Acceptance criteria:

I - All fuzes must detonate when dropped from a height equal to or greater than 450 mm (four hundred and fifty millimeters) from the steel ball for 5.56x45mm calibers;

II - All fuzes must detonate when dropped from a height of 500 mm (five hundred millimeters) from the steel ball for 7.62x51mm calibers;

8.9. Fuze safety test:

8.9.1. Objective: to assess the level of safety against mechanical shocks to the fuze;

8.9.2. Sample: made up of 10 (ten) fuzed cases from the projectile extraction force test;

8.9.3. Script:

For the test, steel balls weighing 111.7g (one hundred and eleven grams)  $\pm 0.57$ g should be used, allowing the ball to fall freely from a determined height over the striker that will hit the fuze. (NATO AEP-97 Edition A, Section 24)

8.9.4. Acceptance criteria:

I - No fuze must detonate during the test at a height equal to or below 75 mm (fifty-one millimeters) for calibers 5.56x45 mm;

II - No fuze must detonate during the test at a height of 75 mm (fifty-one millimeters) for calibers 7.62x51 mm;

8.10. Speed test

8.10.1. Objective: To verify the variation in projectile muzzle velocities, in order to demonstrate the consistency of performance to guarantee compliance with the specified safety levels;

8.10.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology test.

8.10.3. Script:

This test will analyze the velocity developed by the projectile;

For this test, a properly calibrated chronograph must be used, positioned at a distance of 24 m (twenty-four meters) from the mouth of the test piece;

The test must be conducted at a temperature of 21 °C,  $\pm 5$  °C.

8.10.4. Acceptance criteria:

I - Ammunition that shows more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered to have failed;

II - In a series of shots, the arithmetic mean of the velocities recorded at 24 m (twenty-four meters) from the mouth of the test barrel must be  $965 \pm 12$  m/s, for 5.56x45 mm calibers (M193);

III - In a series of shots, the arithmetic mean of the velocities recorded at 24 m (twenty-four meters) from the mouth of the test barrel must be  $830 \pm 5$  m/s, for 5.56x45 mm calibers (MK262);

IV - In a series of shots, the arithmetic mean of the velocities recorded at 24 m (twenty-four meters) from the mouth of the test barrel must be  $900 \pm 15$  m/s, for 5.56x45 mm calibers (M855A1);

V - In a series of shots, the arithmetic mean of the velocities recorded at 24 m (twenty-four meters) from the mouth of the test barrel must be  $825 \pm 10$  m/s, for 7.62x51 mm calibers.

VI - The maximum speed variation tolerated must have a standard deviation of 9m/s.

8.11. Chamber pressure test:

8.11.1. Objective: to evaluate the average chamber pressure generated, to ensure that the specified safety levels are met;

8.11.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology test.

8.11.3. Script:

This test will also analyze the pressure generated by the cartridge at the moment of its deflagration;

The pressure will be measured using a chamber tester equipped with a 6215 piezoelectric transducer, and must be equal to or less than 379 MPa, measured in accordance with MIL-C-9963F; and

The test must be conducted at a temperature of 21 °C,  $\pm 5$  °C.

8.11.4. Acceptance criteria (for both calibers - 5.56x45mm and 7.62x51mm):

I - Ammunition that shows more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered to have failed;

II - The average pressure for the specific type of cartridge must be equal to or less than 379 MPa, in addition to meeting the limits established by the MIL-C-9963F reference standard.

8.12. Precision testing:

8.12.1. Objective: to verify the grouping resulting from the series of shots, in order to evaluate the performance and manufacturing quality of the ammunition;

8.12.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology test;

8.12.3. Script:

The test must be conducted at a temperature of  $21\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ ;

There will be 4 (four) series of 5 (five) shots each at a distance of 450 m (five hundred and fifty meters) from the target; The targets to be used in this test may have horizontal and vertical lines aligned in the center; and

Accuracy will be established by measuring the diameter of the maximum circumference covering all valid impact points (grouping), measured in relation to the geometric center of the shots fired.

8.12.4. Acceptance Criteria (for both calibers - 5.56x45mm and 7.62x51mm):

I - Ammunition that shows more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered to have failed;

II - The average radius of all sample targets must not exceed 130 mm, according to MIL-C-9963F, for M193;

III - The average vertical standard deviation (SV) and average horizontal standard deviation (SH) must be up to 164 mm for MK262, M855A1 and the 7.62x51mm caliber.

8.13. Leak test:

8.13.1. Objective: to check the airtightness of ammunition when exposed to water;

8.13.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology test;

8.13.3. Script:

For the test, a special chamber must be used, as described in MIL-STD - AMCR 715-505 Vol 3.

The ammunition to be tested, no more than 05 (five) at a time, must be placed horizontally in the desiccator tray;

The chamber must allow the cartridges to be immersed in water to a depth of 50 mm (fifty millimeters) and negative pressure to be applied;

The chamber must be subjected to a negative pressure of 50 kPa (fifty kilopascals) for a time of 30 s (thirty seconds), observing the release of bubbles at the case/projectile and case/spoon junctions; and

This rehearsal must be filmed.

The following classification of the cartridges' performance in the test must be included in the report:

No leakage: just a bubble being released from the projectile/case and/or case/spoon is not considered leakage;

Slow leak (projectile/case): when a series of two or more bubbles are visualized in the mouth of the cartridge, being released at a rate where only one moves to the surface at any given time. At least two bubbles must be released during a 30-second period to be considered a leak;

Slow leak (case/fuze): when a series of two or more bubbles are seen between the fuze and the case, being released at a rate where only one moves to the surface at any given time. At least two bubbles must be released during the 30 s (thirty seconds) time period to be considered a leak;

Rapid leakage (projectile/shell): when a series of bubbles are visualized in the mouth of the cartridge, being released at a rate where more than one moves to the surface at any given time; and

Rapid leakage (case/fuze): when a series of bubbles are seen between the fuze and the case, being released at a rate where more than one moves to the surface at any given time.

8.13.4. Acceptance criteria (for both calibers - 5.56x45mm and 7.62x51mm):

I - For the cartridge to be approved, there must be no leaks, in accordance with the above criteria; and

II - Any sample with leakage failures in more than 3 (three) cartridges, in any of the leakage classifications provided for, will be deemed to have failed.

## ANNEX II - C RECEIVING TESTS FOR 12 GAUGE AMMUNITION

### 9. PREAMBLE

9.1. The following tests have been drawn up on the basis of SAAMI standard Z299.2-2019 and C.I.P., national and international standards relating to sampling, metrology testing and ballistic testing of ammunition.

9.2. For the purposes of studies for future acquisitions and the prospecting of new technologies, with a view to improving the safety of the operator and third parties during confrontations, samples will be chosen at random by the Contract Planning Team, which will be subjected to the tests detailed in this annex.

9.3. The tests to be applied in the process of assessing the conformity of standardized products will be described below, in accordance with the characteristics and criteria widely discussed and covered by national and international standards, plus the technical consensus for appropriate application to the reality of Brazilian public security.

9.4. In all tests, the ammunition must show ballistic performance in line with the standards, within their tolerances;

9.5. Of the quantity subjected to visual inspection, metrological and laboratory tests, some copies may be sent to one or more independent laboratories or raw material producers, selected by the members of the Contracting Planning Team, in accordance with the public interest of the Federal Police, for the purposes of quality certification of the requirements of this specification, the costs of fees, shipping and dispatch of the report charged by the independent laboratory must be borne by the winning bidder, after the Authorizing Officer has been informed of the shipment and prior knowledge of the winning bidder, such definition being adopted in agreement with the manufacturer.

### 10. REQUIREMENTS

- 10.1. All the planned tests must be carried out in a controlled laboratory environment (indoor), except for those requiring distances of more than 30 (thirty) meters, at a temperature of  $21\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$  and a relative humidity of  $60\% \pm 5\%$ ;
- 10.2. All measuring instruments must be duly calibrated, and a calibration certificate issued by a body belonging to the Brazilian Calibration Network (RBC) of the General Accreditation Coordination (Cgcre) of the National Institute of Metrology, Quality and Technology (INMETRO) may be required.
- 10.3. If it is impossible to calibrate an instrument, the use of reference ammunition (according to SAAMI standard Z299.2- 2019 and C.I.P. and/or redundant application by two pieces of equipment intended for the same purpose will be allowed.
- 10.4. The samples must be inspected on receipt and photographed before the tests provided for in this protocol are carried out, and the procedures adopted must be described and attached to the test reports;
- 10.5. In rehearsals involving the firing of firearms, all safety measures relating to shooting ranges and the handling of firearms must be adopted, such as the use of ballistic protection vests, goggles, mufflers, among others; and
- 10.6. Before the start of each test, the planned script must be read out to everyone present, and the procedures to be carried out during the sample evaluation must be clarified.

## 11. TECHNICAL REFERENCE STANDARDS

- 11.1 The reference standards will be those set out in Annex I - Technical Specifications and Standards

## 12. THE TESTING PERIOD

### TEST PLAN:

- 12.1. In order to carry out the specified tests, it will be necessary to supply at least 100 (one hundred) units of ammunition, distributed according to the following Test Plan:
- 12.2. The plan includes 2 (two) tests, with the letter "E" representing the designation "Test" followed by the order number, as shown in the legend below:

CODE	LEGEND	TEST IDENTIFICATION	NECESSARY AMMUNITION
E1	Test 1	Verification of general characteristics and metrology	100
E2	Test 5	Speed	20

- 12.3. The test protocol begins with the application of test E1 (Verification of general metrological characteristics), using 100 (one hundred) samples taken at random from the production line shipment or batch produced;
- 12.3.1. Of the samples from E1, 20 (twenty) samples for the E2 test;
- 12.3.2. It should be noted that samples can only be considered APPROVED if they meet all the requirements of the mandatory tests contained in this protocol, and it is not possible to claim partial approval; and
- 12.3.3. In order to carry out a subsequent witness test on the ammunition submitted for certification, an additional 50 (fifty) cartridges from the same batch tested must be stored by the laboratory for a period of 10 (ten) years, counting from the date of completion of the procedure.

### COMMON CRITERIA FOR SHOOTING TESTS:

- 12.4. Tests that require shooting must be carried out using a test barrel with a length within the specifications of SAAMI Z299.2-2019 and C.I.P.;
- 12.5. Functional faults occurring during tests involving shooting must be recorded and classified according to the numerical codes in the table below:

Item	Failure	Classification
1	Percussion failure (nega failure)	Class 2
2	Specimen locking failure caused by the cartridge	Class 2
3	Excessive expansion of the case	Class 2
4	Fuze drilling	Class 2
5	Separating the fuze from the case (popped primer)	Class 2
6	Chamber overpressure, resulting in equipment damage)	Class 3
7	Projectile or projectiles do not leave the barrel	Class 3

### TESTS BY SPECIES:

- 12.6. *Verification of general characteristics and metrology:*
- 12.6.1. Objective: to check that the cartridges under analysis comply with the minimum technical parameters, as well as the quality of the ammunition production process;
- 12.6.2. Sample: 100 (one hundred) cartridges;
- 12.6.3. Script:
- The packaging in which the cartridges are stored must contain at least clear information on the manufacturer's identification or brand, traceability code, quantity, nominal caliber, type of projectile, batch number and year of manufacture. The absence or illegibility of this information must be noted in the test report;
- All the ammunition selected to make up the sample must be photographed before the tests begin, and may be divided into batches of 20 (twenty) cartridges, according to the test plan;
- Initially, each cartridge will be analyzed in terms of its general appearance, assessing whether the ammunition is free of deformations, dents, cracks, burrs, sharp edges, perforations, dents, corrosion or any other defect that compromises safety;
- The following must be analyzed and recorded in a report: nominal caliber, headstamp, case material, type of projectile, type of case (in terms of shape and headspace) and type of fuze;
- After the visual inspection, the cartridges' faults must be tabulated according to the following table:

ITEM	DEFECT	CLASSIFICATION
	<b>CARTRIDGE</b>	
1	Discolored. Dirty. Oily. Stained	Class 1
2	Different cartridge types in the same box	Class 2
	<b>CASE</b>	
3	Headstamp illegible or missing	Class 1
4	Scratched	Class 1
5	Cracked	Class 2
6	Crumpled	Class 2
7	Broken	Class 2
8	Folded	Class 2
9	Wrinkled	Class 2
10	Beveled waistcoat	Class 2
11	Deformed	Class 2
12	Protruding	Class 2
13	Corroded, Oxidized	Class 2
14	Defective	Class 2
15	Perforated	Class 3
	<b>SPOILER</b>	
16	Positive	Class 2
17	Loose	Class 2
18	Inverted	Class 3
19	Absent	Class 3
20	Chopped or crumpled	Class 3
21	Badly pocketed	Class 3
22	Double spraying	Class 3

12.6.4. Acceptance criteria:

- I - The samples must meet the minimum technical requirements described in the prescriptions of this test;
- II - A sample with any class 3 fault, class 2 faults with more than 2 (two) occurrences and class 1 faults with more than 5 (five) occurrences will be considered to have failed, according to Table 3.
- III - The dimensions measured must comply with the standard established as a reference by SAAMI, CIP or NATO;
- IV - The absence of propellant in the cartridge will lead to the sample being rejected;
- V - The variation in total length parameters between the cartridges in the sample must not exceed 0.8 %;
- VI - The variation in propellant charge must not exceed  $\pm 0.03$  g for 12 Gauge calibers;
- VII - The variation in projectile mass must not exceed  $\pm 1.5\%$ ; and
- VIII - The variation in projectile diameter must not exceed - 0.076 mm.

12.7. Speed test

12.7.1. Objective: To verify the variation in projectile muzzle velocities, in order to demonstrate the consistency of performance to guarantee compliance with the specified safety levels;

12.7.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology test.

12.7.3. Script:

This test will analyze the velocity developed by the projectile;

For this test, a properly calibrated chronograph must be used, positioned at a distance of 0.9144 m (twenty-four meters) or 1 (one) yard from the mouth of the test piece;

The test must be conducted at a temperature of 21 °C,  $\pm 5$  °C.

12.7.4. Acceptance criteria:

- I - Ammunition that presents more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered failed;
- II - In a series of shots, the arithmetic mean of the velocities recorded at 0.9144 m (ninety-one centimetres and forty-four millimetres) or 1 (one) yard from the mouth of the test barrel (30" test piece), must be  $430 \pm 27$  m/s, for Rifle A cartridges;
- II - In a series of shots, the arithmetic mean of the velocities recorded at 0.9144 m (ninety-one centimetres and forty-four millimetres) or 1 (one) yard from the mouth of the test barrel (28" test piece), must be  $450 \pm 27$  m/s, for Rifle B cartridges;

**ANNEX II - D**  
**RECEIPT TESTS FOR THE .308 WIN and .338 LM MUNITIONS**

**13. PREAMBLE**

13.1. The following tests have been drawn up on the basis of draft technical standard SAAMI - Z 299.4-2015, national and international standards relating to sampling, metrology testing and ballistic testing of ammunition.

13.2. For the purposes of studies for future acquisitions and the prospecting of new technologies, with a view to improving the safety of the operator and third parties during confrontations, samples will be chosen at random by the Contract Planning Team, which will be subjected to the tests detailed in this annex.

13.3. The tests to be applied in the process of assessing the conformity of standardized products will be described below, in accordance with the characteristics and criteria widely discussed and covered by national and international standards, plus the technical consensus for appropriate application to the reality of Brazilian public security.

13.4. In all tests, the ammunition must show ballistic performance in line with the standards, within their tolerances;

13.5. Of the quantity subjected to visual inspection, metrological and laboratory tests, some copies may be sent to one or more independent laboratories or raw material producers, selected by the members of the Contracting Planning Team, in accordance with the public interest of the Federal Police, for the purposes of quality certification of the requirements of this specification, the costs of fees, shipping and dispatch of the report charged by the independent laboratory must be borne by the winning bidder, after the Authorizing Officer has been informed of the shipment and prior knowledge of the winning bidder, such definition being adopted in agreement with the manufacturer.

#### 14. REQUIREMENTS

14.1. All the planned tests must be carried out in a controlled laboratory environment (indoor), except for those requiring distances of more than 30 (thirty) meters, at a temperature of  $21\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$  and a relative humidity of  $60\% \pm 5\%$ ;

14.2. All measuring instruments must be duly calibrated, and a calibration certificate issued by a body belonging to the Brazilian Calibration Network (RBC) of the General Accreditation Coordination (Cgcre) of the National Institute of Metrology, Quality and Technology (INMETRO) may be required.

14.3. If it is impossible to calibrate an instrument, the use of reference ammunition (according to SAAMI - Z 299.4-2015) and/or redundant application by two pieces of equipment intended for the same purpose will be allowed.

14.4. The samples must be inspected on receipt and photographed before the tests provided for in this protocol are carried out, and the procedures adopted must be described and attached to the test reports;

14.5. In rehearsals involving the firing of firearms, all safety measures relating to shooting ranges and the handling of firearms must be adopted, such as the use of ballistic protection vests, goggles, mufflers, among others; and

14.6. Before the start of each test, the planned script must be read out to everyone present, and the procedures to be carried out during the sample evaluation must be clarified.

#### 15. TECHNICAL REFERENCE STANDARDS

15.1 The reference standards will be those set out in Annex I - Technical Specifications and Standards

#### 16. THE TESTING PERIOD

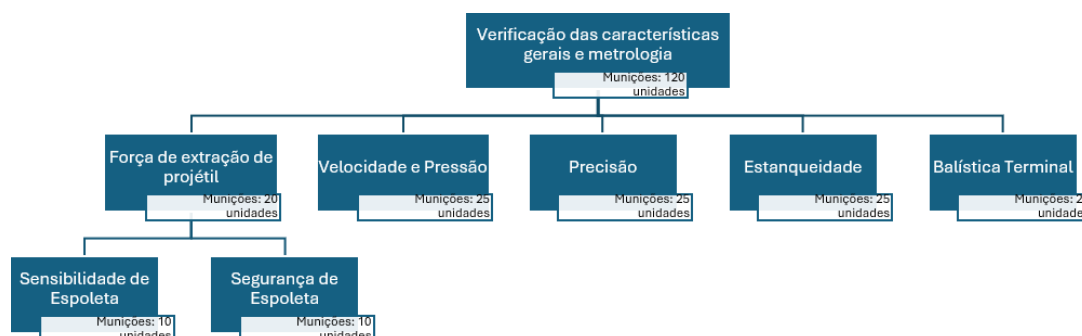
##### TEST PLAN: \_\_\_\_\_

16.1. In order to carry out the specified tests, it will be necessary to supply at least 120 (one hundred and twenty) units of ammunition, distributed according to the Test Plan below:

16.2. The plan includes 8 (eight) tests, with the letter "E" representing the designation "Test" followed by the order number, as shown in the legend below:

CODE	LEGEND	TEST IDENTIFICATION	NECESSARY AMMUNITION
E1	Test 1	Verification of general characteristics and metrology	120
E2	Test 2	Projectile extraction force	20
E3	Test 3	Fuze sensitivity	10
E4	Test 4	Fuze safety	10
E5	Test 5	Speed and pressure	25
E6	Test 6	Precision	25
E7	Test 7	Watertightness	25
E8	Test 8	Terminal ballistics	25

16.3. The distribution of samples will be carried out with a view to the greatest economy, reliability and reasonableness of the planned tests, in accordance with the test plan below:



16.3.1. The test protocol begins with the application of test E1 (Verification of general metrological characteristics), using 120 (one hundred and twenty) samples taken at random from the production line shipment or batch produced;

16.3.2. The samples from E1 will be divided up for the other tests, with 20 (twenty) samples for test E2, 25 (twenty-five) samples for each of the tests E5, E6, E7 and E8;

16.3.3. Tests E3 and E4 will be carried out with the same samples used for E2, with 10 (ten) samples for test E3 and 10 (ten) samples for test E4;

16.3.4. It should be noted that samples can only be considered APPROVED if they meet all the requirements of the mandatory tests contained in this protocol, and it is not possible to claim partial approval; and

16.3.5. In order to carry out a subsequent witness test on the ammunition submitted for certification, an additional 50 (fifty) cartridges from the same batch tested must be stored by the laboratory for a period of 10 (ten) years, counting from the date of completion of the procedure.

**COMMON CRITERIA FOR SHOOTING TESTS:**

16.4. Tests that require shooting must be carried out using a test barrel with a length of 24" (twenty-four inches) in accordance with the specifications of SAAMI Z299.4/2015;

16.5. Functional faults occurring during tests involving shooting must be recorded and classified according to the numerical codes in the table below:

Item	Failure	Classification
1	Percussion failure (nega failure)	Class 2
2	Specimen locking failure caused by ammunition	Class 2
3	Excessive expansion of the case	Class 2
4	Fuze drilling	Class 2
5	Separating the fuze from the case (popped primer)	Class 2
6	Chamber overpressure .with damage to equipment)	Class 3
7	Projectile does not leave the barrel	Class 3
8	Other	Class 1, according to item 4.11
9	Other	Class 2, according to item 4.12
10	Other	Class 3, according to item 4.13

**TESTS BY SPECIES:**

16.6. *Verification of general characteristics and metrology:*

16.6.1. Objective: to check that the cartridges under analysis comply with the minimum technical parameters, as well as the quality of the ammunition production process;

16.6.2. Sample: 120 (one hundred and twenty) cartridges;

16.6.3. Script:

The packaging in which the cartridges are stored must contain at least clear information on the manufacturer's identification or brand, traceability code, quantity, nominal caliber, type of projectile, batch number and year of manufacture. The absence or illegibility of this information must be noted in the test report;

All the ammunition selected to make up the sample must be photographed before the tests begin, and may be divided into batches of 20 (twenty) or 25 (twenty-five) cartridges, according to the test plan;

Initially, each cartridge will be analyzed in terms of its general appearance, assessing whether the ammunition is free of deformations, dents, cracks, burrs, sharp edges, perforations, dents, corrosion or any other defect that compromises safety;

The following must be analyzed and recorded in a report: nominal caliber, headstamp, case material, type of projectile, type of case (in terms of shape and headspace) and type of fuze;

After the visual inspection, the cartridges' faults must be tabulated according to the following table:

ITEM	DEFECT	CLASSIFICATION
<b>CARTRIDGE</b>		
1	Discolored. Dirty. Oily. Stained	Class 1
2	Different types of ammunition in the same box	Class 2
3	Unwanted sinking of the projectile	Class 2
<b>CASE</b>		
4	Headstamp illegible or missing	Class 1
5	Scratched	Class 1
6	Cracked	Class 2
7	Deflated mouth	Class 2
8	Amasado	Class 2
9	Broken	Class 2
10	Folded	Class 2
11	Wrinkled	Class 2
12	Beveled waistcoat	Class 2
13	Deformed	Class 2
14	Protruding	Class 2
15	Corroded, Oxidized	Class 2
16	defective	Class 2
17	Perforated	Class 3
18	Extractor groove missing	Class 3
<b>PROJECTILE</b>		
19	Scratched	Class 1
20	Loose	Class 2
21	Cracked	Class 2
22	Crumpled	Class 2
23	Cracked	Class 2
24	Peeled	Class 2
25	Crooked tip	Class 2
26	Inverted	Class 3
<b>SPOILER</b>		
27	No sealant	Class 1
28	Positive	Class 2
29	Faulty crimp	Class 2
30	Loose	Class 2

31	Inverted	Class 3
32	Absent	Class 3
33	Chopped or crumpled	Class 3
34	Badly pocketed	Class 3
35	Double spraying	Class 3

Each cartridge will then be examined, using properly calibrated and/or gauged instruments, for the following parameters:

I - Overall length (OAL);

II - Head thickness;

III - Diameter of the extraction collar;

IV - Fuze depth;

V - Projectile diameter;

VI - Total mass of the cartridge,

and VI - Concentricity of the

projectile.

16.6.4. After carrying out the E2 test, in accordance with the specific test script provided for in item 16.7, the 20 (twenty) cartridges intended for this test will also be measured:

I - Mass of the projectile; and

II - Propellant mass.

16.6.5. Acceptance criteria:

I - The samples must meet the minimum technical requirements described in the prescriptions of this test;

II - A sample with any class 3 fault, class 2 faults with more than 2 (two) occurrences and class 1 faults with more than 5 (five) occurrences will be considered to have failed, according to Table 3.

III - The dimensions measured must comply with the standard established as a reference by SAAMI, CIP or NATO;

IV - The absence of propellant in the cartridge will lead to the sample being rejected;

V - The variation in total length parameters between the cartridges in the sample must comply with SAAMI standards and other relevant regulations;

VI - The powder charge tolerance will be  $\pm 0.100\text{g}$  for the .308 WIN caliber;

VII - The variation in projectile mass must not exceed  $\pm 1.5\%$ ;

VIII - The variation in projectile diameter must not exceed  $0.076\text{ mm}$ ; and

IX - Projectile concentricity must not vary by more than 2%.

#### 16.7. Projectile wear force test:

16.7.1. Objective: to check the force required to disengage the projectile from the case;

16.7.2. Sample: made up of 20 (twenty) cartridges from the general characteristics and metrology verification test;

16.7.3. Script:

The cartridge must first be inserted into the clamping block and aligned with the jaws on a tension tester suitable for this purpose (degasser);

The grips must engage in the projectile just above the neck of the case, before the load is applied; The

NATO AEP-97 Edition A, Section 25 method for disengaging the projectile from the case must be

applied;

The equipment must measure the force required to completely disengage the projectile from the case. When the projectile has been disengaged, the equipment must be stopped; and

All test projectiles must have their mass measured after extraction. This average parameter can be used to determine the kinetic energy of the ammunition.

16.7.4. Acceptance criteria:

I - The average wear force must be equal to or greater than 265 N (two hundred and sixty-five newtons) for .308 WIN caliber;

II - The average wear force must be equal to or greater than 265 N (two hundred and sixty-five newtons) for .338 LM caliber;

III - The standard deviation of the measurements must not exceed 10% between measurements.

#### 16.8. Fuze sensitivity test:

16.8.1. Objective: to assess the reliability of the fuze's detonation when hit by the striker;

16.8.2. Sample: made up of 10 (ten) fuzed cases from the projectile extraction force test;

16.8.3. Acceptance criteria:

I - All fuzes must detonate when a steel ball weighing  $55 \pm 0.5\text{g}$  is dropped from a height of 560 mm (five hundred and sixty millimeters);

#### 16.9. Fuze safety test:

16.9.1. Objective: to assess the level of safety against mechanical shocks to the fuze;

16.9.2. Sample: made up of 10 (ten) fuzed cases from the projectile extraction force test;

16.9.3. Acceptance criteria:

I - No fuze should detonate when a steel ball weighing  $55 \pm 0.5\text{g}$  is dropped from a height of 114mm (ANSI/SAAMI Z- 2299.4 1992).

#### 16.10. Speed test

16.10.1. Objective: To verify the variation in projectile muzzle velocities, in order to demonstrate the consistency of performance to guarantee compliance with the specified safety levels;

16.10.2. Sample: made up of 25 (twenty-five) cartridges from the general characteristics and metrology test.

- 16.10.3. Script:
- This test will analyze the velocity developed by the projectile;
- For this test, a properly calibrated chronograph must be used, positioned at a distance of 4.6 m (four point six meters) from the mouth of the test piece;
- The test must be conducted at a temperature of 21 °C,  $\pm 5$  °C.
- 16.10.4. Acceptance criteria:
- I - In a series of shots, the arithmetic mean of the velocities recorded at 4.6 m (four point six meters) from the mouth of the test barrel must be at least 792 m/s, with a standard deviation of no more than 6 m/s in measurements for the .308 WIN caliber.
- II - In a series of shots, the difference between the highest and lowest velocity recorded in a sample of ammunition, measuring the variability of the velocity of the projectiles ("Extreme Spread") recorded at 4.6 m (four point six meters) from the mouth of the test barrel (specimen), must be a maximum of 14 m/s in measurements for the .308 WIN caliber.
- III - In a series of shots, the arithmetic mean of the velocities recorded at 4.6 m (four point six meters) from the mouth of the test barrel must be at least 800 m/s, with a standard deviation of no more than 9 m/s in measurements for the .338 LM caliber.
- IV - In a series of shots, the difference between the highest and lowest velocity recorded in a sample of ammunition, measuring the variability of the velocity of the projectiles ("Extreme Spread") recorded at 4.6 m (four point six meters) from the mouth of the test barrel (specimen), must be a maximum of 14 m/s in measurements for the .338 WIN caliber.
- 16.11. Chamber pressure test:
- 16.11.1. Objective: to evaluate the average chamber pressure generated, to ensure that the specified safety levels are met;
- 16.11.2. Sample: made up of the 25 (twenty-five) cartridges from the speed test, measured at the same time.
- 16.11.3. Script:
- This test will also analyze the pressure generated by the cartridge at the moment of its deflagration;
- The pressure will be measured using a test specimen with a chamber equipped with a 6215 piezoelectric transducer, it must be equal to or less than 445 MPa (66000 PSI) for .308 WIN and 476 MPa (69100 PSI) for .338 LM, measured according to SAAMI method Z299.4-2015; and
- The test must be conducted at a temperature of 21 °C,  $\pm 5$  °C.
- 16.11.4. Acceptance criteria (for both calibers - .308 WIN and .338 LM):
- I - Ammunition that shows more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered to have failed;
- II - The average pressure for the specific cartridge type must be equal to or less than 445 MPa (66000 PSI) for .308 WIN and 476 MPa (69100 PSI) for .338 LM, in addition to meeting the limits set by the SAAMI Z299.4-2015 reference standard.
- 16.12. Precision testing:
- 16.12.1. Objective: to verify the grouping resulting from the series of shots, in order to evaluate the performance and manufacturing quality of the ammunition;
- 16.12.2. Sample: made up of 25 (twenty-five) cartridges from the general characteristics and metrology test;
- 16.12.3. Script:
- Five (5) sets of five (5) shots each will be taken at a distance of 100 m (one hundred meters) from the target, with a 5-minute interval between sets;
- A 24" (twenty-four inch) test piece for .308 WIN must be used to make the shots; a 27" (twenty-seven inch) test piece for .338 LM must be used to make the shots;
- The targets to be used in this test may have center-aligned horizontal and vertical lines; and
- Accuracy will be established by measuring the diameter of the maximum circumference covering all valid impact points (grouping), measured in relation to the geometric center of the shots fired.
- 16.12.4. Acceptance Criteria (for both calibers - .308 WIN and .338 LM):
- I - Ammunition that shows more than 1 (one) class 2 functional failure or any class 3 functional failure during the test will be considered to have failed;
- II - The grouping of each series must be less than 01 Minute of Angle (MOA) or 29.1 mm (twenty-nine point one millimeters) at 100 meters;
- 16.13. Leak test:
- 16.13.1. Objective: to check the airtightness of ammunition when exposed to water;
- 16.13.2. Sample: made up of 25 (twenty-five) cartridges from the general characteristics and metrology test;
- 16.13.3. Script:
- For the test, an appropriate chamber must be used, as described in NATO AEP-97 Edition A, Section 27;
- The ammunition to be tested, no more than 05 (five) at a time, must be placed horizontally in the desiccator tray;
- The chamber must allow the cartridges to be immersed in water to a depth of 50 mm (fifty millimeters) and negative pressure to be applied;
- The chamber must be subjected to a negative pressure of 50 kPa (fifty kilopascals) for a time of 30 s (thirty seconds), observing the release of bubbles at the case/projectile and case/spoon junctions; and
- This rehearsal must be filmed.
- The following classification of the cartridges' performance in the test must be included in the report:
- No leakage: just a bubble being released from the projectile/case and/or case/spoon is not considered leakage;
- Slow leak (projectile/case): when a series of two or more bubbles are visualized in the mouth of the cartridge, being released at a rate where only one moves to the surface at any given time. At least two bubbles must be released during a 30-second period to be considered a leak;
- Slow leak (case/fuze): when a series of two or more bubbles are seen between the fuze and the case, being released at a rate where only one moves to the surface at any given time. At least two bubbles must be released during the 30 s (thirty seconds) time period to be considered a leak;
- Fast leak (projectile/shell): when a series of bubbles are seen in the mouth of the cartridge, being released at a rate where



more than one moves to the surface at any given time; and

Rapid leakage (case/fuze): when a series of bubbles are seen between the fuze and the case, being released at a rate where more than one moves to the surface at any given time.

16.13.4. Acceptance criteria (for both calibers - .308 WIN and .338 LM):

I - For the cartridge to be approved, there must be no leaks, in accordance with the above criteria; and

II - Any sample with leakage failures in more than 3 (three) cartridges, in any of the leakage classifications provided for, will be deemed to have failed.

16.14. Terminal ballistics test:

16.14.1. Objective: to produce a comprehensive report documenting the terminal ballistic behavior of the projectile intended for operational use. The tests will be carried out on a standardized medium (ballistic gelatine) and should include technical and illustrative information, such as photographs of the tests carried out and of the projectile deflagrated. This test is for information purposes only and does not establish minimum acceptance criteria.

16.14.2. Sample: made up of 25 (twenty-five) cartridges from the general checks and metrology test;

16.14.3. It will only be made for the regular precision .308 WIN caliber, and will not include the armor-piercing or the .338 LM caliber;

16.14.4. The tests should record the following information:

16.14.4.1. Total drilling depth;

16.14.4.2. Diameter of the temporary cavity;

16.14.4.3. Mass retention, including retention percentage;

16.14.4.4. Projectile expansion; and

16.14.4.5. Projectile fragmentation

16.14.5. Script:

The shots must be fired from a distance of 4.6 m (four point six meters);

**Bare gelatine test:**

A total of 5 (five) shots will be fired at the bare gelatine blocks, preferably one shot per block. For this test, it is possible to fire all five shots at a single block, as long as their cavities do not overlap. If there is overlap, the test must be repeated;

After the series of shots, the penetration of each projectile must be measured and the occurrence of fragmentation and/or core/shell separation checked;

Each projectile or fragment must then be removed from the block, cleaned and photographed. Next, the projectile or the largest fragment (in the case of fragmentation) should be measured for diameter and final mass; and

In the event of fragmentation, all the component parts of the projectile that are located must be extracted from the gelatine.

**Heavy clothing barrier test:**

An intermediate barrier of heavy fabric will be arranged in contact with the gelatine block, made up of the following layers: cotton T-shirt (approximately 5.25 oz/yd; 0.17 g/m), cotton shirt (approximately 3.5 oz/yd; 0.11 g/m), synthetic wool (Polartec Fleece) and cotton jeans (approximately 14.4 oz/yd; 0.46 g/m);

A total of 5 (five) shots will be fired against the gelatine preceded by the heavy tissue barrier, preferably with one shot per block. For this test, all five shots can be made in a single block, as long as their cavities do not overlap;

After the series of shots, the penetration of each projectile must be measured and the occurrence of fragmentation and core/shell separation checked; and

Each projectile or fragment should then be removed from the block, cleaned and photographed. Next, the projectile or the largest fragment (in the case of fragmentation) should be measured for diameter and final mass.

**Wooden barrier test:**

An intermediate barrier made of pine wood or high-density plywood, free of any chemical treatment that could affect the test results, with a minimum bulkhead thickness of 1.5 inches (approximately 3.8 cm) and wood humidity must be controlled, ideally between 8% and 12%, to ensure consistency in the results.

A total of 5 (five) shots will be fired against the gelatine preceded by the wood, preferably one shot per block. For this test, all five shots may be fired from a single block, provided that their cavities do not overlap;

After the series of shots, the penetration of each projectile must be measured and the occurrence of fragmentation and core/shell separation checked; and

Each projectile or fragment should then be removed from the block, cleaned and photographed. Next, the projectile or the largest fragment (in the case of fragmentation) should be measured for diameter and final mass.

**Drywall barrier test:**

An intermediate barrier of standard gypsum drywall (plasterboard), with a minimum drywall thickness of 1/2 inch (approximately 1.27 cm), mounted on a solid structure to simulate a standard wall, ensuring that the surface is flat and firm, free of moisture.

A total of 5 (five) shots will be fired at the gelatine preceded by the drywall, preferably one shot per block. For this test, it is possible to fire all five shots in a single block, as long as their cavities do not overlap;

After the series of shots, the penetration of each projectile must be measured and the occurrence of fragmentation and core/shell separation checked; and

Each projectile or fragment should then be removed from the block, cleaned and photographed. Next, the projectile or the largest fragment (in the case of fragmentation) should be measured for diameter and final mass.

**Metal barrier test:**

An intermediate barrier made of carbon steel plate, with a minimum plate thickness of 1/4 inch (approximately 6.35 mm) to guarantee sufficient resistance to impacts and a smooth surface free of corrosion or any coating that could affect the projectile's performance, securely fixed to prevent vibrations or displacement during testing.

A total of 5 (five) shots will be fired against the gelatine preceded by the metal, preferably one shot per block. For this test, all five shots can be made in a single block, provided that the cavities do not overlap;

After the series of shots, the penetration of each projectile must be measured and the occurrence of fragmentation and core/shell separation checked; and

Each projectile or fragment should then be removed from the block, cleaned and photographed. Next, the projectile or the largest fragment (in the case of fragmentation) should be measured for diameter and final mass.

The gelatine used as raw material, of organic origin, must have a Bloom between 250 (two hundred and fifty) and 265 (two hundred and sixty-five);

The ballistic gelatine must be calibrated to 10% (ten percent) by mass;  
the test must be conducted at a temperature of  $21\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ ;  
The gelatine calibration is checked by firing a steel ball from a 4.5 mm caliber air rifle at a speed of 590 fps (five hundred and ninety fps)  $\pm 15$  fps, i.e. approximately  $179.8\text{ m/s} \pm 4.5\text{ m/s}$ , measured by a chronograph, resulting in 8.5 cm (eight and a half centimeters)  $\pm 1$  cm of penetration;  
All blocks must be calibrated before firing;  
The gelatine block must have the following approximate dimensions: 16" (sixteen inches), or (40.6 cm) long x 6.25" (six and a quarter inches), or (15.8 cm) wide x 6.25" (six and a quarter inches), or (15.8 cm) high, with a tolerance of  $\pm 2.5\text{ cm}$  for either measurement;  
After preparation, the blocks must be kept in a refrigerator for at least 48 h (forty-eight hours) before testing, at a temperature of  $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . It is recommended that the blocks be wrapped in bubble wrap or similar material until the time of testing;  
If necessary, the blocks should be transported to the test site in thermal boxes wrapped in ice;  
The temperature of the gelatine block and the relative humidity must be monitored during the test, and this information must be duly recorded in a report;  
Because of the possibility of transfixation, two blocks of gelatine must be juxtaposed longitudinally to carry out the test;  
Penetration must be measured using a properly calibrated tape measure, with the starting point being the beginning of the gelatine block and the end point being the surface of the projectile with the deepest resting point;  
The occurrence of fragmentation or jacket/core separation must be expressly stated in the report.

<i>(Electronic Signature)</i> <b>LUCIAN RICARDO GUEDES FIDELIS</b> Federal Criminal Expert SECOL/DPC/CGPLAM/DLOG/PF	<i>(Electronic Signature)</i> <b>EDUARDO HOFMANN</b> Federal Police Agent SEIP/DPC/CGPLAM/DLOG/PF
<i>(Electronic Signature)</i> <b>EMANUEL PIMENTEL DANTAS</b> Federal Police Agent SAT/DEOP/CGDE/DIREN-ANP/PF	<i>(Electronic Signature)</i> <b>FERNANDO ALMEIDA CORNÉLIUS</b> Federal Police Agent COT/CGAP/DIREX/PF



Document electronically signed by **EDUARDO HOFMANN, Federal Police Agent**, on 04/12/2024, at 10:22, according to Brasília official time, based on art. 6, § 1, of [Decree No. 8.539, of October 8, 2015](#).



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