NATO STANDARD

AOP-4172

TECHNICAL PERFORMANCE SPECIFICATION PROVIDING FOR THE INTERCHANGEABILITY OF 5.56 mm x 45 AMMUNITION

Edition A Version 1

SEPTEMBER 2020

NORTH ATLANTIC TREATY ORGANIZATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

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NATO LETTER OF PROMULGATION

4 September 2020

1. The enclosed Allied Ordnance Publication AOP-4172, Edition A, Version 1, TECHNICAL PERFORMANCE SPECIFICATION PROVIDING FOR THE INTERCHANGEABILITY OF 5.56 mm x 45 AMMUNITION, which has been approved by the nations in the NATO ARMY ARMAMENTS GROUP (NAAG – AC/225), is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 4172.

2. AOP-4172, Edition A, Version 1, is effective upon receipt.

3. This NATO standardization document is issued by NATO. In case of reproduction, NATO is to be acknowledged. NATO does not charge any fee for its standardization documents at any stage, which are not intended to be sold. They can be retrieved from the NATO Standardization Document Database ((https://nso.nato.int/nso/) or through your national standardization authorities.

4. This publication shall be handled in accordance with C-M(2002)60.

Dieter Schmaglowski
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Director, NATO Standardization Office

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
PRT	Portuguese Army on the next ammunition procurement will implement the aforementioned STANAG.
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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CHAPTER 1
AMMUNITION INTERCHANGEABILITY PRINCIPLES

1. The aim of this standard is to standardize 5.56 mm x 45 Ammunition and Link designs to ensure functional interchangeability between NATO Forces on the battlefield.

2. STANAG 4172 covers 5.56 mm x 45 combat ammunition and links. Ammunition natures other than these natures such as, blank or training cartridges are outside the scope of STANAG / AOP 4172.

3. The following paragraphs in Chapter 2 amplify and interpret the essential NATO military characteristics and specify the technical performance requirements for designs of 5.56 mm x 45 ammunition and/or links submitted for NATO Qualification to ensure functional interchangeability.

4. Under the scope of this standard, interchangeability is understood if the ammunition is in conformance with the performance, functioning and safety criteria as detailed in AEP-97, the Multi-Calibre Manual of Proof and Inspection (MC-MOPI) procedures for 5.56 mm x 45 ammunition.

5. The ammunition shall function safely and with the specified performance out of all 5.56 mm x 45 NATO Nominated Weapons to provide direct evidence testing of battlefield interchangeability.

6. The ammunition shall comply with the specifications prepared by national government agencies, which as a minimum should be in accordance with AOP-4172 for the performance requirements (Chapter 2 & Annex B) and the referenced dimensions (Annex A).

7. Where appropriate, the ballistic levels cited in Chapter 2 are to be obtained from the standard proof barrels described in AEP-97, Multi-Calibre Manual of Proof and Inspection after correction using the NATO Reference Ammunition.

8. NATO Reference Ammunition shall be used to verify barrel ballistics characteristics and test equipment as defined in Volume 8 of AEP-97.

9. Qualification is awarded to individual natures of ammunition but not to individual types of links. If a nation wishes to have its linked configuration NATO Qualified, both the ammunition and the link must meet the appropriate requirements cited below. If a linked configuration is NATO Qualified and, during a subsequent Production Test, the link fails to meet NATO requirements, the ammunition is still considered NATO Qualified.

10. It should be noted that this standard by itself should not be used for acquisition purposes.

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CHAPTER 2
TECHNICAL PERFORMANCE REQUIREMENTS FOR 5.56 mm x 45 AMMUNITION AND LINKS

1. PRESSURE

(*AEP-97, Volumes 12 & 13*)

1a. For ammunition conditioned at + 21 °C, the corrected mean case mouth pressure plus 3 standard deviations shall not exceed 445 MPa. (*AEP-97, Volume 12*)

1b. For ammunition conditioned at + 52 °C or - 54 °C, the corrected mean case mouth pressure shall not vary from the corrected mean case mouth pressure of ammunition conditioned at + 21 °C by more than + 55 MPa or - 110 MPa. (*AEP-97, Volume 12*)

1c. For ammunition conditioned at + 52 °C or - 54 °C, the corrected mean case mouth pressure shall not exceed 455 MPa. (*AEP-97, Volume 12*)

1d. For ammunition conditioned at + 21 °C, the corrected mean port pressure minus 3 standard deviations shall not be less than 103 MPa. (*AEP-97, Volume 12*)

1e. For ammunition conditioned at + 52 °C or - 54 °C, the corrected mean port pressure shall not vary from the corrected mean port pressure of ammunition conditioned at 21 °C by more than ± 15 MPa. (*AEP-97, Volume 12*)

1f. For ammunition conditioned at + 52 °C, the corrected port pressure mean minus 3 standard deviations shall not be less than 103 MPa. (*AEP-97, Volume 12*)

1g. For ammunition conditioned at - 54 °C, the corrected mean port pressure shall not be less than 103 MPa. (*AEP-97, Volume 12*)

1h. For ammunition subjected to the climatic conditioning of Exposed Desert, Continuous Heating or Continuous Arctic, the corrected mean case mouth pressure plus 3 standard deviations shall not exceed 465 MPa. (*AEP-97, Volume 13*)

1i. For ammunition subjected to the climatic conditioning of Exposed Desert, Continuous Heating or Continuous Arctic, the mean case mouth pressure of the treated ammunition shall not vary from the mean case mouth pressure of the untreated ammunition by more than ± 50 MPa. (*AEP-97, Volume 13*)

2. VELOCITY

(*AEP-97, Volumes 12 & 13*)

2a. For ammunition conditioned at + 52 °C or - 54 °C, the corrected mean velocity shall not vary from the corrected mean velocity of ammunition conditioned at + 21 °C by more than + 50 m/s or less than - 80 m/s. (*AEP-97, Volume 12*)

2b. For ammunition subjected to the climatic conditioning of Exposed Desert, Continuous Heating or Continuous Arctic, the mean velocity of the treated ammunition shall not vary from the mean velocity of the untreated ammunition by more than ± 20 m/s. (*AEP-97, Volume 13*)

3. ACTION TIME

(*AEP-97, Volumes 12 & 13*)

3a. For ammunition conditioned at - 54 °C, the mean action time plus 5 standard deviations shall not exceed 3 ms. *(AEP-97, Volume 12)*

3b. For ammunition subjected to the climatic conditioning of Exposed Desert, Continuous Heating or Continuous Arctic and then conditioned at - 54 °C, the mean action time plus 5 standard deviations shall not exceed 3 ms. (*AEP-97, Volume 13*)

4. FUNCTION AND CASUALTY

(*AEP-97, Volume 11 & 14*)

The ammunition shall perform satisfactorily in the NATO Nominated Weapons listed in AEP-97, Volume 10 when fired in accordance with the test requirements defined in AEP-97, Volume 11 at temperatures (+21 °C, -54 °C and +52 °C). The Function and Casualty firing defects shall not exceed the permitted number defined in the relevant table in AEP-97, Volume 14 for any NATO Nominated Weapon type.

5. ENVIRONMENTAL REQUIREMENTS

(*AEP-97, Volumes 12, 13 & 14)*

5a. Compliance with the requirements for performance after temporary heating or cooling will be tested by conditioning the ammunition to + 52 °C and - 54 °C and firing the ammunition at those temperatures. (*AEP-97, Volumes 12 & 14*)

5b. Compliance with the requirements for performance after prolonged climatic storage will be tested by exposure of the ammunition to appropriate intensified storage cycles and subsequent firing of the ammunition at + 21 °C (- 54 °C for action time). (*AEP-97, Volume 13*)

6. LINKED AMMUNITION

(*AEP-97, Volume 15*)

Linked ammunition shall meet the following requirements:

6a. Belt Strength - The linked belt shall withstand a tensile load of 147 newtons without separation and shall be able to be fired successfully in the NATO Nominated machinegun(s).

6b. Free Hinging - The linked belt must hinge without binding or grabbing.

6c. Cartridge Stripping - There are no specific NATO cartridge stripping requirements for linked ammunition to be considered NATO interchangeable. The nation submitting its linked ammunition for NATO interchangeability shall provide a Certificate of Conformity indicating that the links meet all cartridge stripping requirements of its national specification for links.

6d. Dimensional Characteristics - There are no specific NATO dimensional requirements for linked ammunition to be considered NATO interchangeable. The nation submitting its linked ammunition for NATO interchangeability shall provide a Certificate of Conformity indicating that the links meet all dimensional requirements of its national specification for links.

6e. Visual Inspection - There are no specific NATO requirements for visual inspection of the links for the linked ammunition to be considered NATO interchangeable. The nation submitting its linked ammunition for NATO interchangeability shall provide a Certificate of Conformity indicating that the links meet the visual inspection requirements of its national specification for links.

6f. Salt Corrosion - There are no specific NATO requirements for salt corrosion of the links for the linked ammunition to be considered NATO interchangeable. The nation submitting its linked ammunition for NATO interchangeability shall provide a Certificate of Conformity indicating that the links meet the salt corrosion requirements of its national specification for links.

7. BARREL EROSION

(*AEP-97, Volume 16*)

Ammunition with all metal bullets, excluding tracer ammunition, shall be free from design features which render barrels unserviceable because of erosion in less than 5000 rounds while meeting both the bullet yaw criteria and the velocity drop criteria.

7a. Bullet Yaw Criteria - No more than 20 % of bullets in any 100 round group of consecutive shots may show keyholing (yaw exceeding 15° at 25 metres).

7b. Velocity Drop Criteria - The average velocity drop shall be less than 60 m/s at 25 metres when compared to the initial velocity level obtained at the start of the test.

8. FOULING

(*AEP-97, Volumes 14 & 16*)

The ammunition shall be designed to avoid excessive fouling. Satisfactory functioning in the Barrel Erosion Test on prolonged firing and in the Function and Casualty Test in the NATO Nominated Weapons shall be used as a criterion. If fouling is considered excessive, it will be investigated and recorded by the Test Centre in its report for consideration by appropriate NATO authorities.

9. SMOKE AND FLASH

(*AEP-97, Volumes 17*)

The ammunition shall be designed to avoid excessive smoke and flash. Observation of these features will be performed during the Barrel Erosion Test and the Function and Casualty Test in the NATO Nominated Weapons. If a standard of comparison is required, this will be provided by the performance of the reference ammunition. If either smoke or flash is considered excessive, the Test Centre will record this in its report for consideration by appropriate NATO authorities.

10. PRECISION

(AEP-97, Volume 18)

When fired from a precision barrel at a range of 550 metres, the pooled mean of the vertical standard deviations and the pooled mean of the horizontal standard deviations from all targets shall be 200 mm or less for all metal bullets and 300 mm or less for tracer or pyrotechnic bullets.

11. TERMINAL EFFECTS

(AEP-97, Volume 19)

A projectile containing inert materials shall completely perforate a mild steel plate of 3.5 mm nominal (10 gauge) thickness, as defined in AEP-97, placed at 570 metres from the muzzle at zero degree obliquity (normal to the line of fire). At least one splinter shall perforate a 0.5 mm aluminum witness plate set at zero degree obliquity positioned 300 mm behind the mild steel plate. The ammunition shall be considered to have met the NATO requirement if no less than 90 % of the projectiles meet the conditions for terminal effects.

12. TRAJECTORY MATCH

(AEP-97, Volume 20)

12a. At 300 metres, the mean point of impact for all natures of ammunition must not deviate from the mean point of impact of the reference cartridge more than 125 mm vertically and 175 mm horizontally.

12b. At 550 metres, the mean point of impact for all natures of ammunition must not deviate from the mean point of impact of the reference cartridge more than 275 mm vertically and 385 mm horizontally.

13. TRACER PERFORMANCE

(*AEP-97, Volumes 13 & 21*)

13a. Trace Distance - No less than 80% of the tracer ammunition shall be dim or invisible from the muzzle to at least 13 metres; shall be visible by 140 metres and shall maintain continuous visibility between 140 metres and a minimum of 600 metres.

13b. Trace Quality - No less than 80% of the tracer ammunition tested shall exhibit a continuous trace of satisfactory quality throughout its visible range. The requirement applies to daylight visibility conditions in which it is reasonable to expect satisfactory observation of trace.

13c. For ammunition subjected to the climatic conditioning of Exposed Desert, Continuous Heating or Continuous Arctic, a minimum percentage of 70% of the treated tracer ammunition shall meet the Trace Distance and Trace Quality requirements listed above. (*AEP-97, Volume 13*)

14. RESIDUAL STRESS

(*AEP-97, Volume 22*)

No brass cartridge case shall display either splits or cracks when subjected to the Residual Stress Test, except as permitted in “I” area of the case in accordance with the technical parameters of AEP-97. A split is defined as a separation of the metal entirely through the wall of the case. A crack is a surface condition and represents a separation of the metal not entirely through the case wall.

15. PRIMER SENSITIVITY

(*AEP-97, Volume 23*)

When tested by a run-down method, using a ball of 111.7 g, the mean height of fire (H) and standard deviation shall meet the following requirements:

15a. H + 5 standard deviations shall be less than or equal to 450 mm.

15b. H - 2 standard deviations shall be greater than or equal to 75 mm.

16. BULLET EXTRACTION

(*AEP-97, Volume 24*)

The force required to extract the bullet from the cartridge shall not be less than 200 newtons.

17. PROPELLANT AND PRIMER MIX COMPOSITION

(*AEP-97, Volume 25*)

NATO does not specify the chemical composition for propellant or primer composition contained in ammunition submitted for NATO qualification. However, once acceptability of an ammunition design is established and the design is qualified, then all subsequent production of that ammunition design, which bears the NATO Symbol of Interchangeability on the basis of that qualification, must contain the same propellant and primer composition as were identified in the Qualification Approval sample.

18. WATERPROOF

(*AEP-97, Volume 26*)

The ammunition shall be considered to have met the waterproof requirement if no more than fifteen percent (15%) of the cartridges tested display leaks in accordance with the technical parameters of AEP-97.

19. PACKAGING AND STORAGE – CAPABILITY OF WITHSTANDING TRANSPORTATION

19a. NATO ammunition shall be produced from materials and using processes which assure a long shelf life. Ammunition shall be packaged in waterproof containers sufficiently rugged to withstand service use.

19b. Ammunition will not be specifically tested to assess these features. However, when NATO ammunition is assessed for compliance with transportation and rough-handling requirements, the assessment shall be of ammunition in its complete tactical pack.

20. MARKING

NATO ammunition and its packaging shall be marked in accordance with AOP-2.

21. QUALIFICATION OF OTHER THAN BALL & TRACER DESIGNS

This standard is structured to ascertain an ammunition's design in order for it to be interchanged on the battlefield among NATO and Partner Member Forces. While this standard only refers to ball and tracer designs, other natures of ammunition (i.e. armour piercing, enhanced / high / improved performance, etc.) may also be submitted for NATO Qualification Approval. These designs will only be assessed to the requirements described within the standard but upon successful NATO Qualification will allow the NATO Member Forces to apply the NATO Symbol of Interchangeability to these other ammunition designs thereby increasing the logistical stockpile available in theater. However, should it be determined by higher NATO authorities that an additional requirement(s) should be pursued, the NATO body implementing this standard will formulate appropriate requirements and tests to assess suitability of the design to those new requirements.

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ANNEX A - 5.56 mm x 45 STANADARDIZATION DRAWINGS

A.1. SHEET 1 – 5.56 mm x 45 CARTRIDGE & CASE DIMENSIONS
A.2. SHEET 2 – 5.56 mm x 45 PROOF WEAPON CHAMBER & BARREL

Please note the following:

Note 1: The drawings are for reference only and are NOT to be used for manufacture, dimensions are for guidance only. Please refer to the drawings published in AEP-97, Volume 6 – NATO Test Equipment and Visual Standards

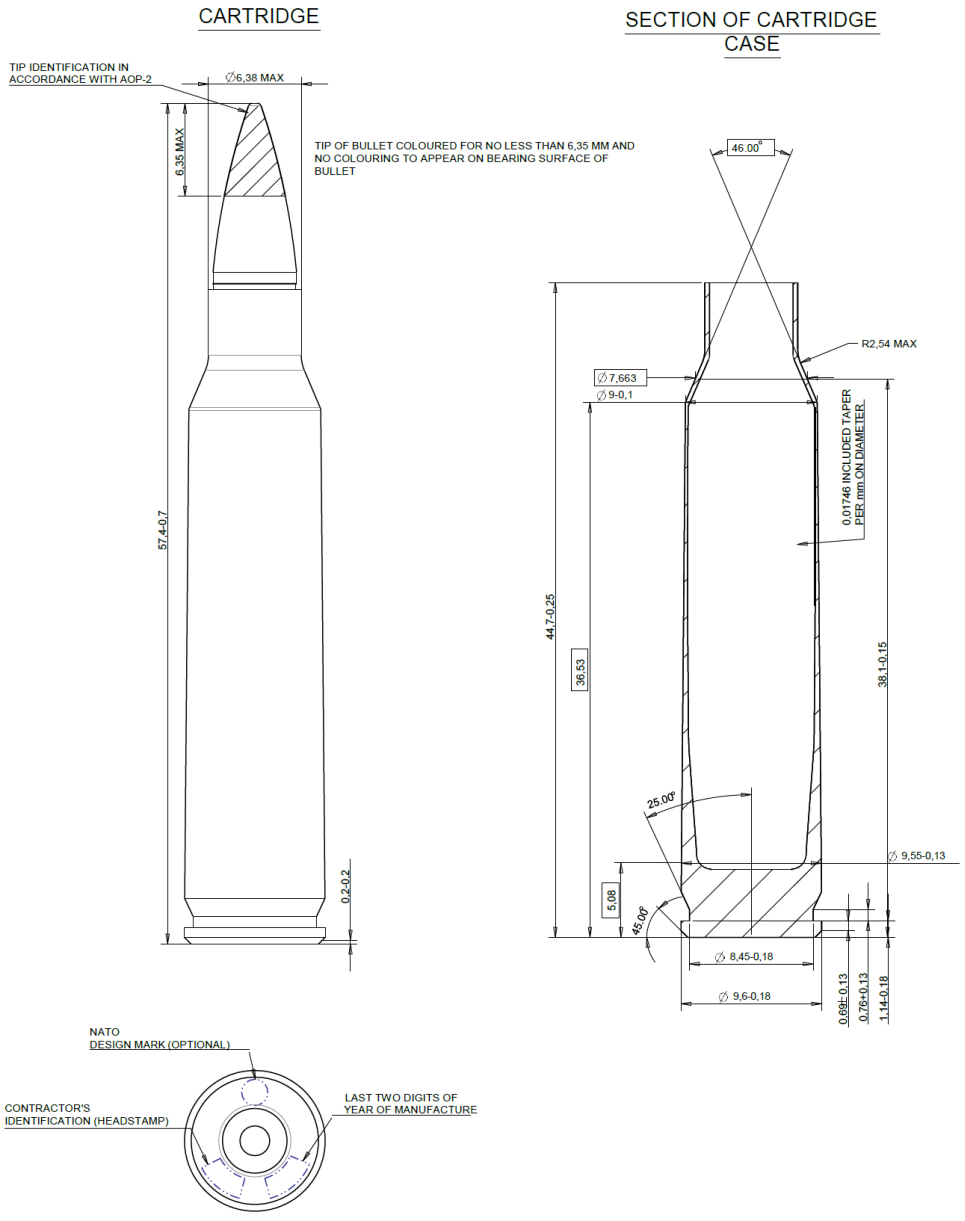
Note 2: Deviations are allowed if all other requirements of AEP-97 (incl. functioning in the NATO Nominated Weapons) are met.

A.1. SHEET 1 – 5.56 mm x 45 CARTRIDGE

DO NOT SCALE DRAWING

AOP 4172 - SHEET 1
STANDARDISATION DRAWING
5.56 mm x 45 CARTRIDGE

ALL DIMENSIONS ARE IN MILLIMETERS



NOTES:

1. THE LACK OF PRIMER POCKET DETAILS ON THE CARTRIDGE AND CASE DRAWINGS IS INTENTIONAL. THIS DETAIL IS NOT PRESENTED HERE DUE TO THE DIFFERENCE IN PRIMER TYPES (I.E. BOXER / BERDAN) THAT MAY BE UTILIZED.
2. THE TOLERANCE ON ANY ANGLE SHOWN UNTOLERANCED IS DERIVED FROM THE ASSOCIATED LINEAR DIMENSIONS.
3. AN INCLUDED TAPER NOT TO EXCEED 0,05 MM, IS ALLOWABLE IN NECK DUE TO VARIABLE EXPANSION OF BRASS.

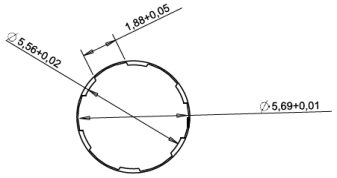
THIS DRAWING IS FOR REFERENCE ONLY AND NOT TO BE USED FOR MANUFACTURE
REDRAWN 24-08-20

A.2. SHEET 2 – 5.56 mm x 45 PROOF WEAPON CHAMBER & BARREL

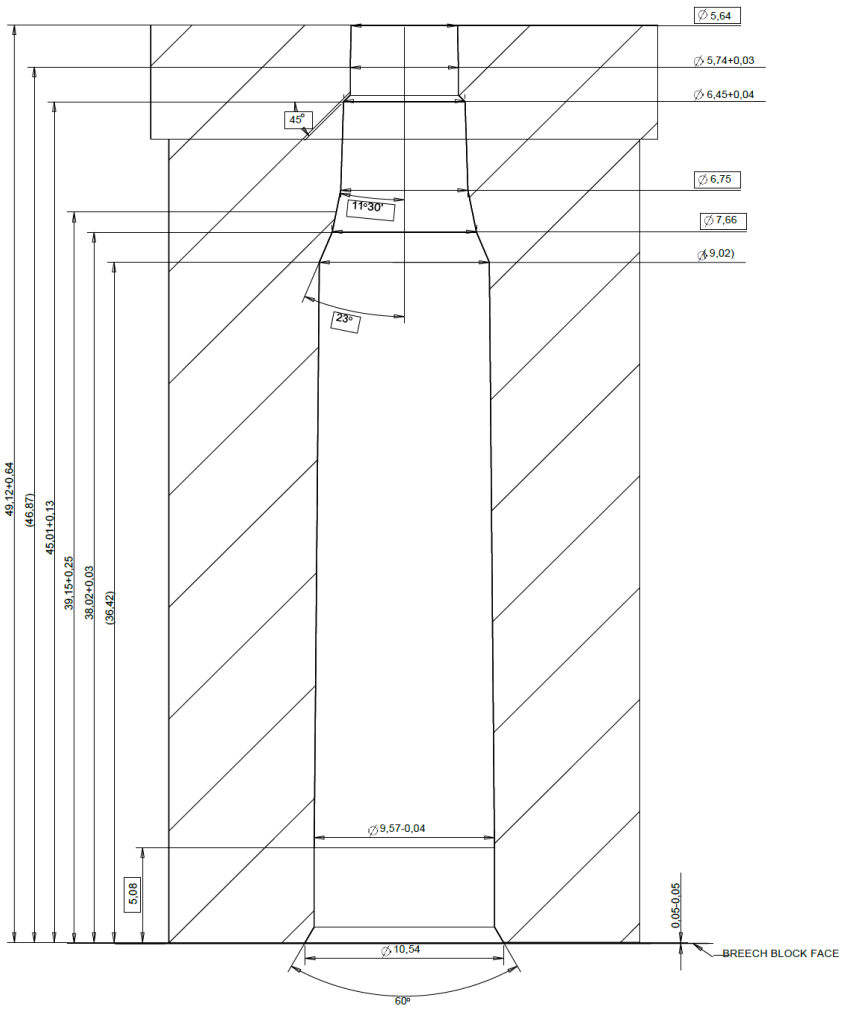
DO NOT SCALE DRAWING

AOP 4172 - SHEET 2
STANDARDISATION DRAWING
5.56 mm x 45
CHAMBER & BARREL

ALL DIMENSIONS ARE IN MILLIMETERS



DETAILS OF RIFILING:
6 GROOVES RIGHT HAND TWIST
1 TURN IN 177,8 MM
BARREL LENGTH = 508 MM



NOTES:
1. THE TOLERANCE ON ANY ANGLE SHOWN UNTOLERANCED IS DERIVED FROM THE ASSOCIATION LINEAR DIMENSION.
2. PRESSURE BLEED POSITION IN RELATION TO THE REFRENCE PLANE:
   CHAMBER: 46,5
   PORT: 280 (LOCATED IN THE BOTTOM OF A GROOVE)

THIS DRAWING IS FOR REFERENCE ONLY AND NOT TO BE USED FOR MANUFACTURE
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ANNEX B – 5.56 mm x 45 REQUIREMENTS TABLE

B.1. SHEET 1 – 5.56 mm x 45 REQUIREMENTS TABLE
B.2. SHEET 2 – 5.56 mm x 45 REQUIREMENTS TABLE (cont.)
B.3. SHEET 3 – 5.56 mm x 45 REQUIREMENTS TABLE (cont.)

PARA. #	PERFORMANCE REQUIREMENTS	TEMP	VALUES	UNITS	AEP-97 VOL. #
	CASE MOUTH PRESSURE				
--	Maximum Corrected Mean Case Mouth Pressure	+21 °C	No Requirement	MPa	12
1a	Maximum Corrected Mean Case Mouth Pressure + 3 Std Dev	+21 °C	445	MPa	12
1b & 5a	Maximum Mean Case Mouth Pressure Δ from +21° C sample	+52 °C	+55 to -110	MPa	12
1b & 5a	Maximum Mean Case Mouth Pressure Δ from +21° C sample	-54 °C	+55 to -110	MPa	12
1c & 5a	Maximum Corrected Mean Case Mouth Pressure	+52 °C	455	MPa	12
1c & 5a	Maximum Corrected Mean Case Mouth Pressure	-54 °C	455	MPa	12
--	Maximum Corrected Mean Case Mouth Pressure + 3 Std Dev	+52 °C	No Requirement	MPa	12
--	Maximum Corrected Mean Case Mouth Pressure + 3 Std Dev	-54 °C	No Requirement	MPa	12
--	Maximum Corrected Individual Case Mouth Pressure	+52 °C	No Requirement	MPa	12
--	Maximum Corrected Individual Case Mouth Pressure	-54 °C	No Requirement	MPa	12
1h & 5b	Maximum Corrected Mean Case Mouth Pressure + 3 Std Dev	AEP-97	465	MPa	13
1i & 5b	Maximum Δ between Mean of Treated & Untreated Samples	AEP-97	+50 to -50	MPa	13
	PORT PRESSURE				
1d	Minimum Corrected Mean Port Pressure – 3 Std Dev	+21 °C	103	MPa	12
1e & 5a	Maximum Mean Port Pressure Δ from +21° C sample	+52 °C	+15 to -15	MPa	12
1e & 5a	Maximum Mean Port Pressure Δ from +21° C sample	-54 °C	+15 to -15	MPa	12
1f & 5a	Minimum Corrected Mean Port Pressure – 3 Std Dev	+52 °C	103	MPa	12
1g & 5a	Minimum Corrected Mean Port Pressure	-54 °C	103	MPa	12
	VELOCITY				
2a & 5a	Maximum Mean Velocity Δ from +21° C sample	+52 °C	+50 to -80	m/s	12
2a & 5a	Maximum Mean Velocity Δ from +21° C sample	-54 °C	+50 to -80	m/s	12
2b & 5b	Maximum Δ between Mean of Treated & Untreated Samples	AEP-97	+20 to -20	m/s	13
	ACTION TIME				
--	Maximum Individual Action Time	+21 °C	No Requirement	ms	12
3a & 5a	Maximum Mean Action Time + 5 Standard Deviation	-54 °C	3	ms	12
3b & 5b	Maximum Mean Action Time + 5 Standard Deviation	-54 °C	3	ms	13
	FUNCTION & CASUALTY				
4 & 5a	The ammunition shall perform satisfactorily in the NATO Nominated Weapons when fired the Function and Casualty firing defects shall not exceed the permitted number defined in the relevant table in AEP-97, Volume 14 for any NATO Nominated Weapon type.	+21 °C - 54 °C +52 °C	Per AEP-97	--	11 & 14
	LINKED AMMUNITION				
4	NATO Chute [1]	--	Yes	--	14 & 15
4	Free Hanging [1]	AEP-97	Yes	--	14 & 15
--	Free Helical Flexibility	+21 °C	No Requirement	--	15
--	Free Fanwise Flexibility	+21 °C	No Requirement	--	15
6a	Belt Strength (and Firing)	+21 °C	147	N	15
6b	Free Hinging	+21 °C	Yes	--	15
--	Cartridge and Link Extractor Pull	--	No Requirement	--	15
6c	Cartridge Stripping	--	Nationally Certified	--	15
6d	Dimensional Characteristics	--	Nationally Certified	--	15
6e	Visual Inspection	--	Nationally Certified	--	15
6f	Salt Corrosion Test	--	Nationally Certified	--	15
	Note [1] Test is conducted and sentenced as part of the Function and Casualty Test				

B.1. SHEET 1 – 5.56 mm x 45 REQUIREMENTS TABLE

B.2. SHEET 2 – 5.56 mm x 45 REQUIREMENTS TABLE (cont.)

PARA. #	PERFORMANCE REQUIREMENTS	TEMP	VALUES	UNITS	AEP-97 VOL. #
	BARREL EROSION				
	Ammunition with all metal bullets, excluding tracer ammunition, shall be free from design features which render barrels unserviceable because of erosion in less than 5000 rounds while meeting both the bullet yaw criteria and the velocity drop criteria.				
7a	***Bullet Yaw Exceeding 15° @ 25 m*** (*Less than 20 % of bullets in any 100 round group of consecutive shots show keyholing*)	5°C to +30°C	≤ 20%	--	16 - ANNEX A
7b	***Velocity Drop of 60 m/s or less @ 25 m*** (*An average velocity drop of 60 m/s or less below the initial velocity level obtained at the start of the test*)	5°C to +30°C	≤ 60	m/s	16 - ANNEX A
	FOULING				
8	The ammunition shall be designed to avoid excessive fouling. Satisfactory functioning in the Barrel Erosion Test on prolonged firing and in the Function and Casualty Test in the NATO Nominated Weapons shall be used as a criterion.	per AEP 97	--	--	14 & 16
	SMOKE AND FLASH				
9	The ammunition shall be designed to avoid excessive smoke and flash. Observation of these features will be performed during the Barrel Erosion Test and the Function and Casualty Test in the NATO Nominated Weapons.	per AEP 97	--	--	17
	PRECISION				
	5.56 mm All Metal bullets @ 550m				
10	Horizontal Standard Deviation	+21 °C	≤ 200	mm	18
10	Vertical Standard Deviation	+21 °C	≤ 200	mm	18
	5.56 mm Tracer or Pyrotechnic bullets @ 550m				
10	Horizontal Standard Deviation	+21 °C	≤ 300	mm	18
10	Vertical Standard Deviation	+21 °C	≤ 300	mm	18
	TERMINAL EFFECTS				
11	A projectile containing inert materials shall completely perforate a 3.5mm mild steel plate (10 ga.) @ 570 m from the muzzle. At least one splinter shall perforate a 0.5 mm witness plate 300 mm behind the mild steel plate.	0°C to +35°C	≥ 90%	--	19
--	Muzzle Energy @ the muzzle (For Info Only)	+21 °C	Min: 1564	J	12
--	Muzzle Energy @ 24m from the muzzle (For Info Only)	+21 °C	Min: 1480	J	12
--	Bullet Mass	--	No Requirement	g	12
	TRAJECTORY MATCH				
	Mean Point of Impact (MPI) @ 300 m				
12a	MPI Δ Vertical from NATO Ref MPI	+21 °C	≤ 125	mm	20
12a	MPI Δ Horizontal from NATO Ref MPI	+21 °C	≤ 175	mm	20
	Mean Point of Impact (MPI) @ 550 m				
12b	MPI Δ Vertical from NATO Ref MPI	+21 °C	≤ 275	mm	20
12b	MPI Δ Horizontal from NATO Ref MPI	+21 °C	≤ 385	mm	20

B.3. SHEET 3 – 5.56 mm x 45 REQUIREMENTS TABLE (cont.)

PARA. #	PERFORMANCE REQUIREMENTS	TEMP	VALUES	UNITS	AEP-97 VOL. #
	TRACER PERFORMANCE				
	Trace Distance				
13a	The tracer shall be dim or invisible from the muzzle to at least 13 m.	+21 °C	≥ 80%	--	21
13a	The tracer shall be visible by 140 m.	+21 °C	≥ 80%	--	21
13a	The tracer shall maintain continuous visibility between 140 m and a minimum of 600 m.	+21 °C	≥ 80%	--	21
5b & 13c	After the ammunition has been subjected to Climatic Conditioning the minimum percentage of the treated sample that shall meet the Trace Distance requirements	+21 °C	≥ 70%	--	21
	Trace Quality				
13b	The tracer ammunition tested shall exhibit a continuous trace of satisfactory quality throughout its visible range. The requirement applies to daylight visibility conditions in which it is reasonable to expect satisfactory observation of trace.	+21 °C	≥ 80%	--	21
5b & 13c	After the ammunition has been subjected to Climatic Conditioning the minimum percentage of the treated sample that shall meet the Trace Quality requirements	+21 °C	≥ 70%	--	21
	RESIDUAL STRESS				
14	Brass cased ammunition shall be free from harmful residual stress.	+21 °C	0 Splits 0 Cracks	--	22
	PRIMER SENSITIVITY (with 111.7 g ball)				
15a	Mean Height (H) + 5 Standard Deviation	+21 °C	≤ 450	mm	23
15b	Mean Height (H) - 2 Standard Deviation	+21 °C	≥ 75	mm	23
	BULLET EXTRACTION				
16	The force required to extract the bullet from the cartridge	+21 °C	≥ 200	N	24
	PROPELLANT AND PRIMER MIX COMPOSITION				
17	NATO does not specify the chemical composition for propellant or primer composition contained in ammunition submitted for NATO qualification. Once acceptability of an ammunition design is established and the design is qualified, then all subsequent production of that ammunition design, which bears the NATO Symbol of Interchangeability on the basis of that qualification, must contain the same propellant and primer composition as were identified in the Qualification Approval sample.	--	National Requirement	--	25
	WATERPROOF				
18	The ammunition shall be considered to have met the waterproof requirement if not more than 15 % of the cartridges tested display leaks.	+21 °C	≤ 15%	--	26
5b & 18	After the ammunition has been subjected to Climatic Conditioning the maximum permitted percentage of the treated sample displaying leaks of any type.	+21 °C	≤ 15%	--	26
	PACKAGING AND STORAGE – CAPABILITY OF WITHSTANDING TRANSPORTATION				
19a	NATO ammunition shall be produced from materials and using processes which assure a long shelf life. Ammunition shall be packaged in waterproof containers sufficiently rugged to withstand service use.	--	National Requirement	--	--
19b	Ammunition will not be specifically tested to assess these features. However, when NATO ammunition is assessed for compliance with transportation and rough-handling requirements, the assessment shall be of ammunition in its complete tactical pack.	--	National Requirement	--	--
	MARKING				
20	NATO ammunition and its packaging shall be marked in accordance with AOP-2.	--	National Requirement	--	--

AOP-4172(A)(1)