NATO STANDARD

AOP-4383

TECHNICAL PERFORMANCE SPECIFICATION PROVIDING FOR THE INTERCHANGEABILITY OF 12.7 mm x 99 AMMUNITION

Edition A Version 1

SEPTEMBER 2020

NORTH ATLANTIC TREATY ORGANIZATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

4 September 2020

1. The enclosed Allied Ordnance Publication AOP-4383, Edition A, Version 1, TECHNICAL PERFORMANCE SPECIFICATION PROVIDING FOR THE INTERCHANGEABILITY OF 12.7 mm x 99 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 4383.

2. AOP-4383, 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.

for

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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]
DEU	Various reviews of AOP-4383 and related attempts to bring in the DEU position, both in writing and orally in ToE meetings, have shown that national proposals are not enforceable. In particular, N° 7) „Barrel Erosion“ and N° 16) „Bullet Extraction“ cannot be supported by DEU as they are contrary to DEU test and acceptance criteria.
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 12.7 mm x 99 Ammunition and Link designs to ensure functional interchangeability between NATO Forces on the battlefield.

2. STANAG 4383 covers 12.7 mm x 99 combat ammunition and links. Ammunition natures other than these natures such as, blank or training cartridges, are outside the scope of STANAG / AOP 4383.

3. The following paragraphs in Chapter 2 amplify and interpret the essential NATO military characteristics and specify the technical performance requirements for designs of 12.7 mm x 99 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 12.7 mm x 99 ammunition.

5. The ammunition shall function safely and with the specified performance out of all 12.7 mm x 99 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-4383 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 12.7 mm x 99 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 450 MPa. (*AEP-97, Volume 12*)

1b. For ammunition conditioned at + 52 °C or - 54 °C, the corrected individual case mouth pressure shall not exceed 450 MPa. (*AEP-97, Volume 12*)

1c. 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 470 MPa. (*AEP-97, Volume 13*)

1d. 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 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 4.5 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 4.5 ms. (*AEP-97, Volume 13*)

4. FUNCTION AND CASUALTY

(*AEP-97, Volumes 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 370 newtons without separation and shall be able to be fired successfully in the NATO Nominated Weapon(s).

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

6c. Cartridge and Link Extractor Pull - The linked cartridges must have an extractor pull force greater than 40 N and less than 190 N.

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*)

All ammunition natures shall be free from design features which render barrels unserviceable because of erosion in less than 2000 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 30 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 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 300 mm or less for all bullets other than tracer and 400 mm or less for tracer bullets.

11. TERMINAL EFFECTS

(AEP-97, Volume 19)

When an ammunition has combined functions, it must meet the characteristics of each function taken individually. 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.

11a. Perforation - A projectile with armour piercing capabilities shall completely perforate an armour plate of 22 mm thickness, as defined in AEP-97, Volume 19, at zero degree obliquity (normal to the line of fire), placed at 100 metres from the muzzle of the weapon. At least one splinter shall perforate a 1.5 mm mild steel witness plate set a zero degree obliquity positioned 500 mm behind the armour plate.

11b. **Incendiary Effect -** Incendiary bullets shall ignite and produce an incendiary flash in less than 600 mm behind an aluminum target plate of 2 mm nominal thickness, as defined in AEP-97, Volume 19, placed at 150 metres from the muzzle at zero degree obliquity (normal to the line of fire).

11c. Explosive Effect - Explosive bullets shall function and produce at least 8 perforations in a 0.5 mm aluminum witness plate located 1200 mm behind an aluminum target plate of 2 mm nominal thickness placed not less than 150 metres from the muzzle at zero degree obliquity (normal to the line of fire). The witness and target plates are defined in AEP-97, Volume 19.

12. TRAJECTORY MATCH

(AEP-97, Volume 20)

12a. 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 385 mm vertically and 550 mm horizontally.

12b. At 900 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 630 mm vertically and 900 mm horizontally.

13. TRACER PERFORMANCE

(*AEP-97, Volume 21*)

13a. Trace Distance - No less than 80% of the tracer ammunition shall be visible by 200 metres. For combined function ammunition, no less than 80% of the tracer shall maintain continuous visibility between 200 metres and a minimum of 1000 metres. For tracer ammunition, no less than 80% of the tracer shall maintain continuous visibility between 200 metres and a minimum of 1500 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*)

Brass cased ammunition shall be free from harmful residual stress and contain zero (0) splits and zero (0) cracks after subjected to conditioning.

15. PRIMER SENSITIVITY

(*AEP-97, Volume 23*)

When tested by a run-down method, using a ball of 225.1 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 380 mm.

15b. H - 2 standard deviations shall be greater than or equal to 63 mm.

16. BULLET EXTRACTION

(*AEP-97, Volume 24*)

The force required to extract the bullet from the cartridge shall not be less than 900 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 15 % of the cartridges tested display leaks.

19. COOK OFF

(*AEP-97, Volume 27*)

Ammunition having projectiles with explosive effects shall not cook off within twenty (20) minutes after the cartridge has been chambered in a weapon barrel heated by firing 200 rounds in one burst.

20. PACKAGING AND STORAGE – CAPABILITY OF WITHSTANDING TRANSPORTATION

20a. 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.

20b. 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.

21. MARKING

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

22. 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 certain cartridge designs, other natures of ammunition may also be submitted for NATO Qualification Approval. These designs will only be assessed to the requirements described within the standard but upon successful 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 authority that an additional requirement 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.

ANNEX A – 12.7 mm x 99 STANADARDIZATION DRAWINGS

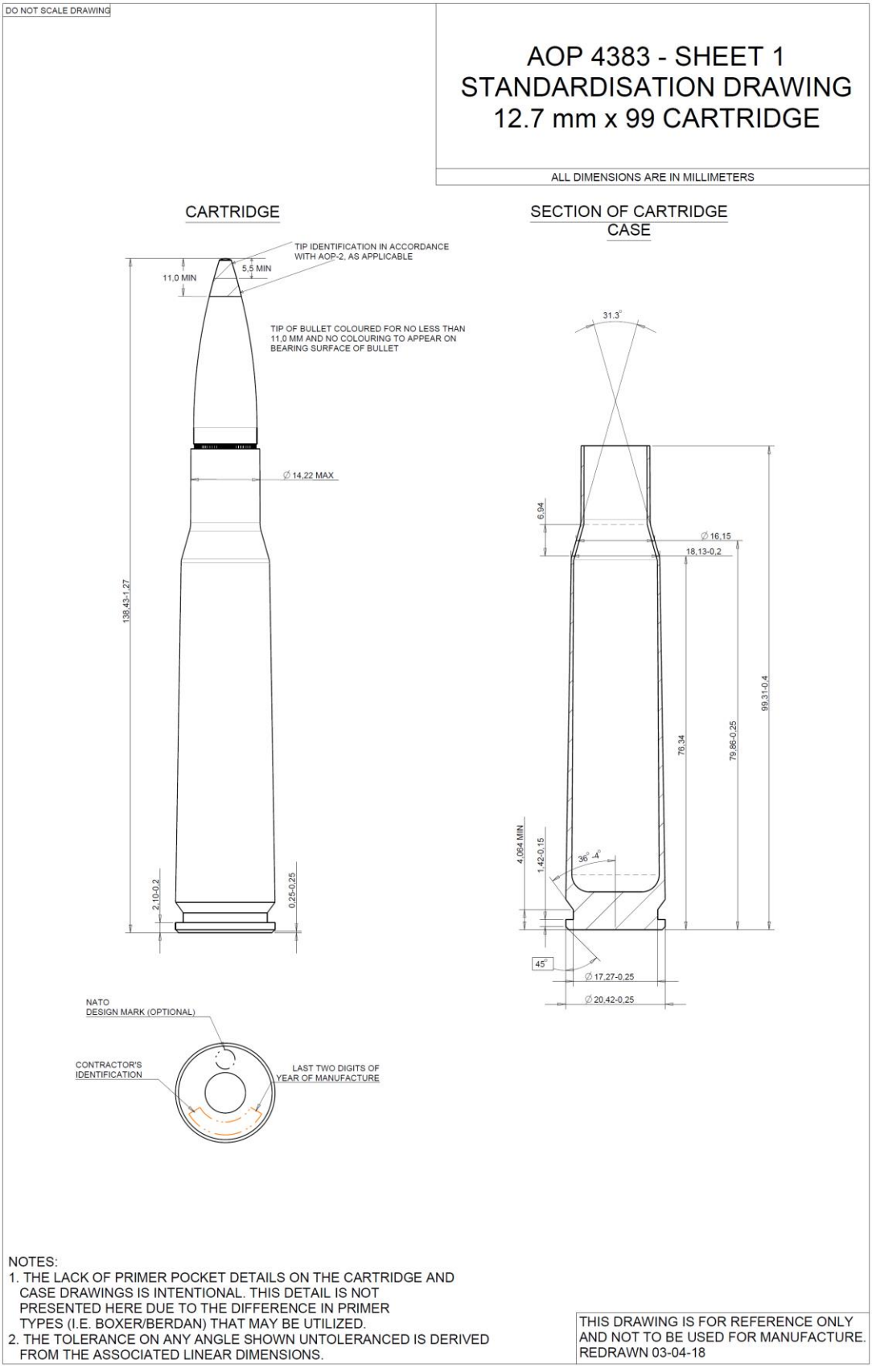
A.1. SHEET 1 – 12.7 mm x 99 CARTRIDGE & CASE DIMENSIONS
A.2. SHEET 2 – 12.7 mm x 99 PROOF WEAPON CHAMBER & BARREL

Please note the following:

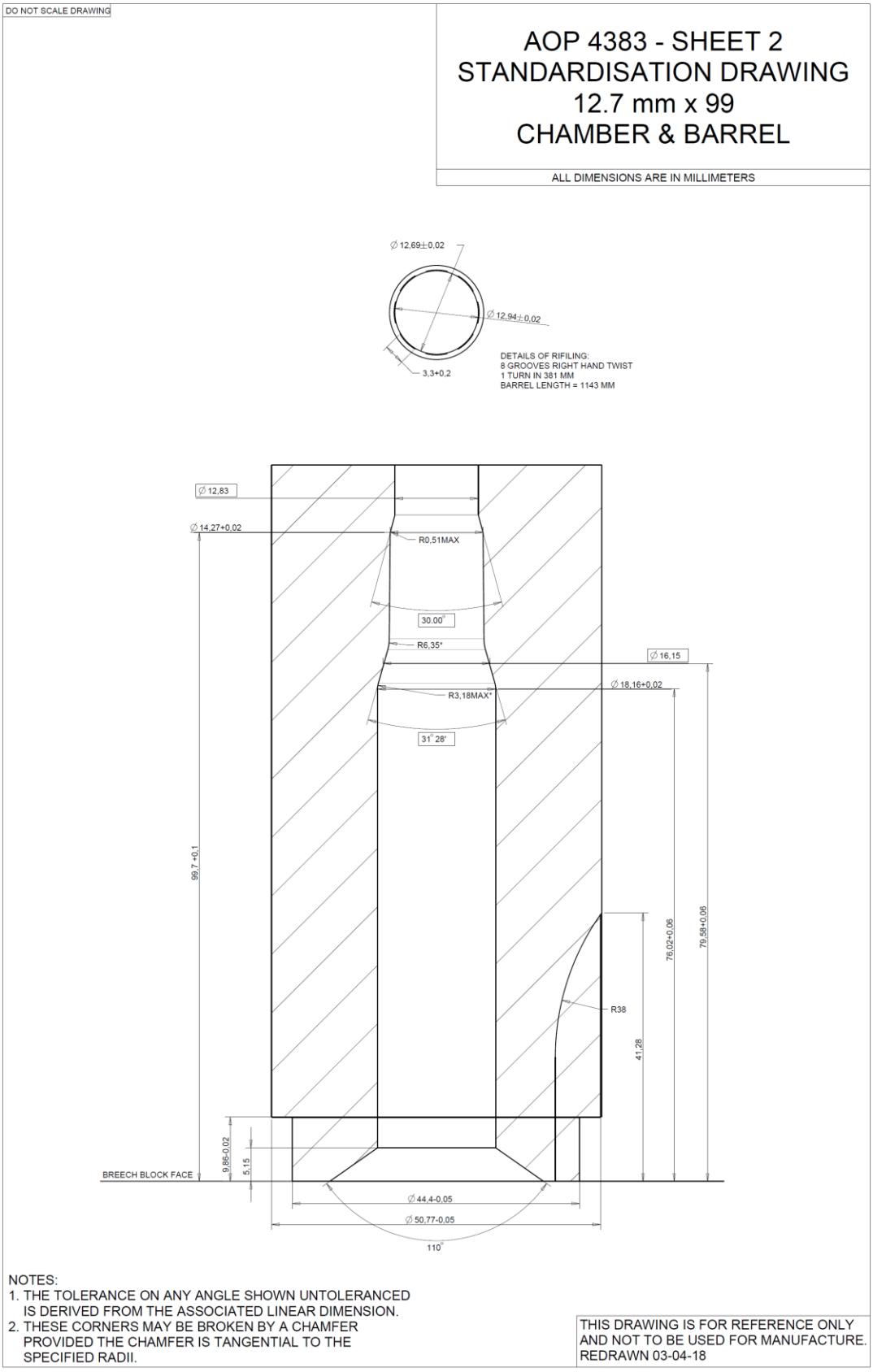
Note 1: The drawings are for reference only and are NOT to be used for manufacture, dimensions are for guidance only. Please refer to the drawings published in AEP-97, Volume 6 – NATO Test Equipment and Visual Standards.

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 – 12.7 mm x 99 CARTRIDGE



A.2. SHEET 2 – 12.7 mm x 99 PROOF WEAPON CHAMBER & BARREL



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ANNEX B – 12.7 mm x 99 REQUIREMENTS TABLE

B.1. SHEET 1 – 12.7 mm x 99 REQUIREMENTS TABLE
B.2. SHEET 2 – 12.7 mm x 99 REQUIREMENTS TABLE (cont.)
B.3. SHEET 3 – 12.7 mm x 99 REQUIREMENTS TABLE (cont.)
B.4. SHEET 4 – 12.7 mm x 99 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	450	MPa	12
--	Maximum Mean Case Mouth Pressure Δ from +21° C sample	+52 °C	No Requirement	MPa	12
--	Maximum Mean Case Mouth Pressure Δ from +21° C sample	-54 °C	No Requirement	MPa	12
--	Maximum Corrected Mean Case Mouth Pressure	+52 °C	No Requirement	MPa	12
--	Maximum Corrected Mean Case Mouth Pressure	-54 °C	No Requirement	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
1b & 5a	Maximum Corrected Individual Case Mouth Pressure	+52 °C	450	MPa	12
1b & 5a	Maximum Corrected Individual Case Mouth Pressure	-54 °C	450	MPa	12
1c & 5b	Maximum Corrected Mean Case Mouth Pressure + 3 Std Dev	AEP-97	470	MPa	13
1d & 5b	Maximum Δ between Mean of Treated & Untreated Samples	AEP-97	+50 to -50	MPa	13
	PORT PRESSURE				
--	Minimum Corrected Mean Port Pressure – 3 Std Dev	+21 °C	No Requirement	MPa	12
--	Maximum Mean Port Pressure Δ from +21° C sample	+52 °C	No Requirement	MPa	12
--	Maximum Mean Port Pressure Δ from +21° C sample	-54 °C	No Requirement	MPa	12
--	Minimum Corrected Mean Port Pressure – 3 Std Dev	+52 °C	No Requirement	MPa	12
--	Minimum Corrected Mean Port Pressure	-54 °C	No Requirement	MPa	12
	VELOCITY				
--	Maximum Mean Velocity Δ from +21° C sample	+52 °C	No Requirement	m/s	12
--	Maximum Mean Velocity Δ from +21° C sample	-54 °C	No Requirement	m/s	12
2a	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	4.5	ms	12
3b & 5b	Maximum Mean Action Time + 5 Standard Deviation	-54 °C	4.5	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				
--	NATO Chute [1]	--	No Requirement	--	15
--	Free Hanging [1]	AEP-97	No Requirement	--	14
--	Free Helical Flexibility	+21 °C	No Requirement	--	15
--	Free Fanwise Flexibility	+21 °C	No Requirement	--	15
6a	Belt Strength (and Firing)	+21 °C	370	N	15
6b	Free Hinging	+21 °C	Yes	--	15
6c	Cartridge and Link Extractor Pull	+21 °C	≥ 40 & ≤ 190	N	15
--	Cartridge Stripping	--	No Requirement	--	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 – 12.7 mm x 99 REQUIREMENTS TABLE

B.2. SHEET 2 – 12.7 mm x 99 REQUIREMENTS TABLE (cont.)

PARA. #	PERFORMANCE REQUIREMENTS	TEMP	VALUES	UNITS	AEP-97 VOL. #
	BARREL EROSION				
	All ammunition natures shall be free from design features which render barrels unserviceable because of erosion in less than 2000 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 C
7b	***Velocity Drop of 30 m/s or less @ 25 m*** (*The average velocity drop shall be less than 30 m/s when compared to the initial velocity level obtained at the start of the test*)	5°C to +30°C	≤ 30	m/s	16 - ANNEX C
	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				
	12.7 mm All bullets except Tracer @ 550m				
10	Horizontal Standard Deviation	+21 °C	≤ 300	mm	18
10	Vertical Standard Deviation	+21 °C	≤ 300	mm	18
	12.7 mm Bullets containing tracer component @ 550m				
10	Horizontal Standard Deviation	+21 °C	≤ 400	mm	18
10	Vertical Standard Deviation	+21 °C	≤ 400	mm	18
	TERMINAL EFFECTS				
	When an ammunition has combined functions, it must meet the characteristics of each function taken individually.				
11a	**Penetration** - A projectile with armour piercing capabilities shall completely perforate an armour plate of 22 mm thickness @ 100 m from the muzzle. At least one splinter shall perforate a 1.5 mm mild steel witness plate positioned 500 mm behind the armour plate	0°C to +35°C	≥ 90%	--	19
11b	**Incendiary Effect** - Incendiary bullets shall ignite and produce an incendiary flash in less than 600 mm behind an aluminum target plate of 2 mm nominal thickness placed @ 150 m from the muzzle.	0°C to +35°C	≥ 90%	--	19
11c	**Explosive Effect** - Explosive bullets shall function and produce at least 8 perforations in a 0.5 mm aluminum witness plate located 1200 mm behind an aluminum target plate of 2 mm nominal thickness placed not less than 150 m from the muzzle.	0°C to +35°C	≥ 90%	--	19
11b, 11c & 5b	After the ammunition has been subjected to Climatic Conditioning the minimum percentage of the treated sample that shall meet the requirements for Explosive and Incendiary bullets.	0°C to +35°C	≥ 80%	--	19
--	Muzzle Energy @ the muzzle	+21 °C	No Requirement	J	12
--	Muzzle Energy @ 24m from the muzzle	+21 °C	No Requirement	J	12
--	Bullet Mass	--	No Requirement	g	12

B.3. SHEET 3 – 12.7 mm x 99 REQUIREMENTS TABLE (cont.)

PARA. #	PERFORMANCE REQUIREMENTS	TEMP	VALUES	UNITS	AEP-97 VOL. #
	TRAJECTORY MATCH				
	Mean Point of Impact (MPI) @ 550 m				
12a	MPI Δ Vertical from NATO Ref MPI	+21 °C	≤ 385	mm	20
12a	MPI Δ Horizontal from NATO Ref MPI	+21 °C	≤ 550	mm	20
	Mean Point of Impact (MPI) @ 900 m				
12b	MPI Δ Vertical from NATO Ref MPI	+21 °C	≤ 630	mm	20
12b	MPI Δ Horizontal from NATO Ref MPI	+21 °C	≤ 900	mm	20
	TRACER PERFORMANCE				
	Trace Distance				
--	The tracer shall be dim or invisible from the muzzle to at least 13 m.	+21 °C	No Requirement	--	21
13a	The tracer shall be visible by 200 m.	+21 °C	≥ 80%	--	21
13a	For combined function ammunition, the tracer shall maintain continuous visibility between 200 m and a minimum of 1000 m.	+21 °C	≥ 80%	--	21
13a	For tracer ammunition, the tracer shall maintain continuous visibility between 200 m and a minimum of 1500 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 & Trace Distance 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 225.1 g ball)				
15a	Mean Height (H) + 5 Standard Deviation	+21 °C	≤ 380	mm	23
15b	Mean Height (H) - 2 Standard Deviation	+21 °C	≥ 63	mm	23
	BULLET EXTRACTION				
16	The force required to extract the bullet from the cartridge	+21 °C	≥ 900	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
	COOK OFF				
19	A projectile with explosive effects shall not cook off within 20 min when chambered in a weapon after it has fired 200 rounds in one burst.	+21 °C	≤ 20	min	27

B.4. SHEET 4 – 12.7 mm x 99 REQUIREMENTS TABLE (cont.)

PARA. #	PERFORMANCE REQUIREMENTS	TEMP	VALUES	UNITS	AEP-97 VOL. #
	PACKAGING AND STORAGE – CAPABILITY OF WITHSTANDING TRANSPORTATION				
20a	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	--	--
20b	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				
21	NATO ammunition and its packaging shall be marked in accordance with AOP-2.	--	National Requirement	--	--

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