

# **ANNEX C**

## **C21**

### **MULTI-CALIBRE SNIPER WEAPON SYSTEM**

#### **MANDATORY TECHNICAL REQUIREMENTS**



Reference Number: **W8476**-196090

Date: 7 May 2019

Prepared by:

DSSPM 9

Technical Authority/Life Cycle Material Manager

National Defence Headquarters

Major General George R. Pearkes Building

Ottawa, Ontario

K1A 0K2



#### **NOTICE**

This documentation has been reviewed by the technical authority and does not contain controlled goods. Disclosure notices and handling instructions originally received with the document shall continue to apply.

1. **SCOPE**

1.1. **Objective**

This document defines the mandatory technical requirements for the C21 Multi-Calibre Sniper Weapon (MCSW) System.

1.2. **Acronyms**

AECTP	Allied Environmental Conditions Test Publication
FED-STD	Federal Standard
GFE	Government Furnished Equipment
IAW	In Accordance With
MOA	Minute of Angle
MPI	Mean Point of Impact
NATO	North Atlantic Treaty Organization
OEM	Original Equipment Manufacturer
MCSW	Multi-Calibre Sniper Weapon
STANAG	Standardization Agreement
TA	Technical Authority

1.3. **Definitions**

**“3 O’clock NATO Accessory Rail”** (STANAG 4694 Rail) is defined as the rail located on the right side of the weapon forestock, from the shooter’s perspective, when holding the weapon in a shooting position.

**“6 O’clock NATO Accessory Rail”** (STANAG 4694 Rail) is defined as the rail located on the bottom of the weapon forestock, from the shooter’s perspective, when holding the weapon in a shooting position.

**“9 O’clock NATO Accessory Rail”** (STANAG 4694 Rail) is defined as the rail located on the left side of the weapon forestock, from the shooter’s perspective, when holding the weapon in a shooting position.

**“12 O’clock NATO Accessory Rail”** (STANAG 4694 Rail) is defined as the rail located on the top of the weapon forestock, from the shooter’s perspective, when holding the weapon in a shooting position.

**“Ambidextrous”** is defined as the capability to operate switches and controls with either hand, without reconfiguration of the weapon.

**“Length of Pull”** is defined as the distance from the middle of the trigger to the end of the Rifle’s buttstock.

**“MCSW”** is defined as the Rifle and all its accessories that are required to fire the weapon: All Magazines, Suppressor, Muzzle Brake, Sling, Bi-pod and Optical Scope System as illustrated in Figure 1.

**“MCSW System”** is defined as the complete C21 weapon system consisting of the MCSW, Transit Case, Maintenance Items and Documentation as illustrated in Figure 1.

**“Mean Point of Impact (MPI)”** is defined as the point whose coordinates are the arithmetic means of the coordinates of the separate points of impact of a series of projectiles fired at the same aiming point.

**“Minute of Angle (MOA)”** is as an angular measurement defined as 1/60th of a degree.

**“Monopod accessory rail”** (STANAG 4694 Rail) is defined as the rail located at the bottom of the weapon buttstock / stock, from the shooter’s perspective, when holding the weapon in a shooting position.

**“Optical Scope System”** is defined as the complete rifle mounted optical sighting system consisting of soft storage bag, operator tools, kill flash honeycomb filter (aka anti reflection device), sunshade, scope and scope rings.

**“Rifle”** is defined as the C21 Multi-Caliber rifle equipped with all STANAG rails, but not including the Magazine, Sling, Suppressor or Muzzle Brake.

**“Two-Stage Trigger”** is defined as a trigger mechanism that releases the hammer (firing the weapon) after two distinct amounts of spring and mechanical resistance are overcome by the trigger finger. The initial stage is light and relatively long, and the second stage has noticeable greater resistance but over a shorter distance.

**“Weapon Related Stoppage”** is a stoppage that is caused by a malfunction in the weapon. Any stoppage that is caused by a deficiency in the cartridge used is not considered a weapon related stoppage.

1.4. MCSW System Equipment Breakdown Chart

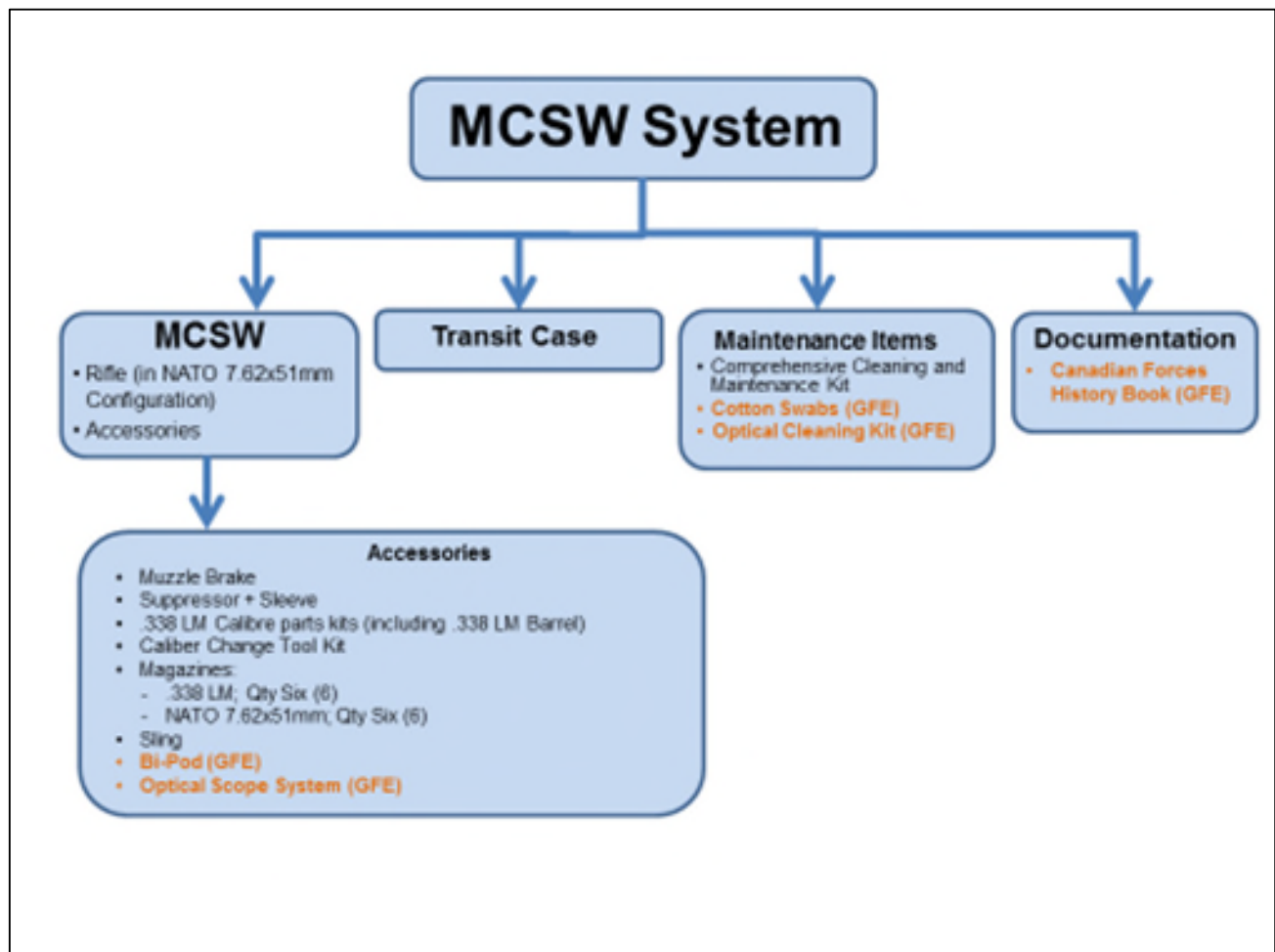


Figure 1: MCSW System Equipment Breakdown Chart

2. **Applicable Documents**

The following documents form part of this specification to the extent specified and are supportive of the specified when referenced; all other document references are to be considered supplemental information only. In the event of a conflict between the documents referenced and the contents of the specification, then the contents of the specification must take precedence.

AECTP 200: Environmental Conditions;

AECTP 230: Climatic Conditions;

AECTP 300: Climatic Environmental Tests;

AECTP 400: Mechanical Environmental Tests;

STANAG AC/225 (LG/3-SG/1) D/14: Evaluation Procedures for Future NATO Small Arms Weapon Systems;

STANAG 2310: Small Arms Ammunition (7.62mm); and

STANAG 4694: NATO Accessory Rail.

### 3. Technical Requirements

SERIAL	REQUIREMENT
<b>3.1</b>	<b>Rifle</b>
<b>3.1.1</b>	<b>General Rifle</b>
3.1.1.1	The Rifle <b>must</b> be a Multi-Calibre, right-handed bolt operated precision weapon.
3.1.1.2	The Rifle <b>must</b> be compatible with NATO 7.62 x 51mm ammunition in one configuration, and with .338 Lapua Magnum ammunition in another configuration.
3.1.1.3	The Rifle's magazine location <b>must</b> be forward of the trigger.
3.1.1.4	The Rifle <b>must</b> have a manually applied safety.
3.1.1.5	The Rifle <b>must</b> have an ambidextrous magazine release.
3.1.1.6	The Rifle <b>must</b> have a pistol grip.
3.1.1.7	The mass of the Rifle, with an empty magazine, in any calibre configuration, <b>must</b> be less than or equal to 7 kg.
3.1.1.8	The external surfaces of the Rifle <b>must</b> have a CERAKOTE ELITE finish.
3.1.1.9	The colour of the external surfaces of the chassis and barrel <b>must</b> be Coyote M17 Tan E-170. All other components of the rifle can be either black or the same color as the chassis/barrel.
3.1.1.10	The Rifle <b>must</b> have ambidextrous sling mounting points on the butt stock or on the rear portion of the chassis that accommodates the sling specified in para. 3.3.2.
3.1.1.11	The Rifle <b>must</b> have an ambidextrous sling mounting point at the front, that is rail mounted and removable, and that accommodates the specified sling in para. 3.3.2.
3.1.1.12	With an empty magazine inserted into the Rifle slot, the Rifle design <b>must</b> allow for a single round to be inserted directly into the Rifle chamber and cocked without having to insert the round into the magazine.
3.1.1.13	The bolt <b>must</b> be taken apart for cleaning by the Operator without the need for tools.
<b>3.1.2</b>	<b>Rifle Stock</b>
3.1.2.1	The Rifle stock <b>must</b> be foldable and lockable in place without affecting installed accessories.
3.1.2.2	The Rifle stock <b>must</b> fold on the bolt handle side of the rifle.
3.1.2.3	The Rifle stock <b>must</b> be adjustable in length of pull without the use of tools and have an adjustment range of at least 38 mm.

SERIAL	REQUIREMENT
3.1.2.4	The Rifle stock length of pull <b>must</b> have at least 4 lockable adjustment positions unless fully adjustable.
3.1.2.5	The Rifle stock cheek rest and recoil pad <b>must</b> allow both right handed and left handed users to maintain the proper sight picture.
3.1.2.6	The Rifle stock cheek rest <b>must</b> be adjustable vertically without the use of tools.
3.1.2.7	The Rifle length, with stock unfolded and collapsed to the minimal length of pull and without the muzzle brake <b>must</b> be less than or equal to 1270 mm in both calibre configurations.
3.1.2.8	The Rifle length, with stock folded and collapsed to the minimal length of pull and without the muzzle brake <b>must</b> be less than or equal to 1020 mm in both calibre configuration.
<b>3.1.3</b>	<b>NATO Accessory Rails</b>
3.1.3.1	The MCSW <b>must</b> be equipped with removable NATO accessory rails installed at the 3, 6 and 9 O'clock positions on the Rifle fore-end.
3.1.3.2	The 3 and 9 O'clock NATO accessory rails <b>must</b> be at least 75 mm long each.
3.1.3.3	The 6 O'clock NATO accessory rail <b>must</b> be at least 125 mm long.
3.1.3.4	The 3, 6 and 9 O'clock NATO accessory rails <b>must</b> be able to be mounted at various positions along the length of the Rifle forestock.
3.1.3.5	The 3, 6 and 9 O'clock NATO accessory rails <b>must</b> be interchangeable between each other.
3.1.3.6	The MCSW <b>must</b> be equipped with a removable NATO rail installed at the 12 O'clock position of the Rifle Chassis.
3.1.3.7	The 12 O'clock NATO rail <b>must</b> have a usable mounting space of 533mm or more.
3.1.3.8	The 12 O'clock NATO rail <b>must</b> have a 40 MOA slanted angle, sloping down towards the front of the Rifle.
3.1.3.9	The MCSW <b>must</b> be equipped with a removable NATO rail at the bottom of the Rifle stock to be used for a monopod.
3.1.3.10	The 3, 6, 9, 12 O'clock and monopod NATO rails <b>must</b> be IAW STANAG 4694.
<b>3.1.4</b>	<b>Trigger Mechanism</b>
3.1.4.1	The trigger mechanism <b>must</b> be a Two-Stage Trigger.
3.1.4.2	The trigger <b>must</b> automatically return to its normal forward position upon release after partial or complete trigger pull.
3.1.4.3	The trigger second stage pull force <b>must</b> be adjustable and include a pull force range of 13.3 N to 15.6 N (3 lb to 3.5 lb).
<b>3.1.5</b>	<b>Safety</b>

SERIAL	REQUIREMENT
3.1.5.1	The Rifle design <b>must</b> prevent the bolt from being disengaged from the cocked position while the safety is in the "SAFE" position, in both configurations.
3.1.5.2	The Rifle design <b>must</b> prevent a bullet from being fired while the safety is in the "SAFE" position.
3.1.5.3	The state of the Rifle Safety mechanism <b>must</b> be verifiable by both sight and touch.
3.1.5.4	When the safety is in the "FIRE" position and the bolt is not fully engaged, the Rifle design <b>must</b> prevent the bolt from disengaging upon a trigger pull.
<b>3.2</b>	<b>Transit Case</b>
3.2.1	The Transit Case <b>must</b> be a rigid case equipped with molded custom inserts.
3.2.2	The Transit Case <b>must</b> store the entire MCSW System.
3.2.3	The Transit Case <b>must</b> store the Rifle with the optical scope, muzzle brake and bipod mounted, and with all recoil pad spacers mounted and cheek piece fixed in a user-required position.
3.2.4	The Transit Case <b>must</b> store the Rifle with the 12 O'clock NATO Accessory Rail facing the Transit Case handle.
3.2.5	The colour of the Transit Case <b>must</b> be Tan or Black.
3.2.6	The Transit Case <b>must</b> be provided with a hinged cover.
3.2.7	The Transit Case <b>must</b> be equipped with hinged latches to securely close the case.
3.2.8	The Transit Case <b>must</b> be provided with a padlock locking point to secure the contents.
3.2.9	The Transit Case <b>must</b> be provided with a folding handle on its long side for carrying by hand.
3.2.10	The Transit Case <b>must</b> be provided with wheels located on one of the short edges for pulling the case.
3.2.11	The Transit Case <b>must</b> be provided with a folding handle, or integrated handle on the opposite end to the wheels for pulling the case.
3.2.12	The Transit Case <b>must</b> be equipped with a pressure release valve.
3.2.13	The Transit Case <b>must</b> operate without physical damage and without degradation of performance in all low temperature environments associated with the C0, C1, C2 (-46°C min) climatic regions as described in STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.



SERIAL	REQUIREMENT
	AECTP 300, Ed 3, Method 303, Procedure II and III, C2 Cold, or Equivalent Test Method, is a sufficient means to demonstrate compliance to this requirement.
3.2.14	<p>The Transit Case, fully loaded with the MCSW System, <b>must</b> protect the contents from damage when dropped from a height of 1.5 m onto a concrete backed 5cm thick plywood surface at uncontrolled ambient conditions in the following orientations:</p> <ul style="list-style-type: none"> <li>a. Bottom side;</li> <li>b. Hinge side;</li> <li>c. One end; and</li> <li>d. One corner.</li> </ul> <p>Note:</p> <ul style="list-style-type: none"> <li>a. The drops may be spread over two cases.</li> </ul> <p>AECTP 400, Method 414, Procedure I, or Equivalent Test Method, is a sufficient means to demonstrate compliance to this requirement.</p>
3.2.15	<p>The Transit Case <b>must</b> not show any signs of leakage or water penetration into the interior where the equipment is being stored when submersed in 1 m of water for 30 minutes.</p> <p>AECTP 300, Method 307, or Equivalent Test Method, is a sufficient means to demonstrate compliance to this requirement.</p>
<b>3.3</b>	<b>Accessories</b>
<b>3.3.1</b>	<b>Magazines</b>
3.3.1.1	The MCSW <b>must</b> have a detachable magazine for the .338LM configuration that holds no less than five .338LM cartridges.
3.3.1.2	The MCSW <b>must</b> have a detachable, double-stacked magazine for the 7.62 x 51mm NATO configuration that holds no less than ten NATO 7.62 x 51mm cartridges.
3.3.1.3	The Magazines <b>must</b> self-align, be inserted with one hand and lock firmly on the Rifle.
<b>3.3.2</b>	<b>Sling</b>
3.3.2.1	The Sling <b>must</b> be the Tab Pinnacle Rifle Sling, part number PRS,E,C,F, NSN 1005-01-664-0176.
<b>3.3.3</b>	<b>Suppressor</b>
3.3.3.1	The MCSW <b>must</b> be provided with one Suppressor that is compatible for both calibre configurations. Canada will accept either a suppressor mounted directly to the barrel or one mounted to the muzzle brake.

SERIAL	REQUIREMENT
3.3.3.2	The Suppressor <b>must</b> attenuate the sound of the Rifle by a minimum of 20 dB when measured 1 m to the left of the muzzle, in both Calibre configurations.
3.3.3.3	The Suppressor <b>must</b> maintain the specified sound attenuation of 20 dB or more throughout a service life of 4,000 rounds in .338 configuration.
3.3.3.4	The Suppressor <b>must</b> maintain the specified sound attenuation of 20 dB or more throughout a service life of 8,000 rounds in 7.62mm configuration.
3.3.3.5	The Suppressor <b>must</b> attach and disconnect from the rifle without the use of tools.
3.3.3.6	The Suppressor <b>must</b> not add more than 175 mm to the length of the Rifle past the end of the barrel.
3.3.3.7	The external surfaces of the Suppressor <b>must</b> have a CERAKOTE ELITE finish.
3.3.3.8	The colour of the external surfaces of the Suppressor <b>must</b> be Coyote M17 Tan E-170.
3.3.3.9	The outer diameter of the Suppressor <b>must</b> be equal to or less than 51mm (2.0 in).
3.3.3.10	The Suppressor <b>must</b> not become loose when firing a 5 round grouping in both calibre configurations.
3.3.3.11	The Suppressor <b>must</b> be fitted with a MANTA suppressor sleeve to help reduce mirage.
<b>3.3.4</b>	<b>Muzzle Brake</b>
3.3.4.1	The MCSW <b>must</b> be provided with one Muzzle Brake that is compatible for both calibre configurations.
3.3.4.2	The Muzzle Brake <b>must</b> not become loose when firing a 5 round grouping in both calibre configurations.
<b>3.4</b>	<b>Comprehensive Cleaning and Maintenance Kit</b>
3.4.1	The Comprehensive Cleaning and Maintenance Kit <b>must</b> contain all items required to fully clean and maintain the MCSW as well as tools and accessories to change calibres.

SERIAL	REQUIREMENT
3.4.2	<p>The Comprehensive Cleaning and Maintenance Kit <b>must</b> contain one (1) each of the following:</p> <ul style="list-style-type: none"> <li>a. Cleaning Rod - DEWEY# 30C44;</li> <li>b. 7.62mm Brass Jag - DEWEY# 30J;</li> <li>c. .338 Brass Jag - DEWEY# 338J;</li> <li>d. Rifle Bore Guide;</li> <li>e. 7.62mm Bronze Bore Brush - DEWEY# B-30;</li> <li>f. .338 Bronze Bore Brush - DEWEY# B-338;</li> <li>g. 7.62mm Nylon Bore Brush - DEWEY# B-30N;</li> <li>h. .338 calibre Nylon Bore Brush - DEWEY# B-338N;</li> <li>i. .338 Lapua Bronze Chamber Brush - DEWEY# CH-338L;</li> <li>j. One hundred (100) .30-.35 calibre Cotton Patches;</li> <li>k. Curved Cleaning Pick for cleaning barrel extension locking lugs;</li> <li>l. Bore Reflector;</li> <li>m. Brass Chamber Brush - DEWEY# CH-308; and</li> <li>n. Appropriate Carbon removal Scraper Tools.</li> </ul>
<b>3.5</b>	<b>Performance</b>
<b>3.5.1</b>	<b>Precision</b>
3.5.1.1	<p>The MCSW in the NATO 7.62 x 51mm configuration, with the Suppressor attached, <b>must</b> achieve an Average Mean Radius of 1.2cm or less for 5 groupings of 5 rounds at a range of 100m.</p>
3.5.1.2	<p>The MCSW in .338 Lapua Magnum configuration, with the Suppressor attached, <b>must</b> achieve an Average Mean Radius of 1.2cm or less for 5 groupings of 5 rounds at a range of 100m.</p>
<b>3.5.2</b>	<b>Safety Drop</b>
3.5.2.1	<p>The Rifle with Magazine inserted <b>must</b> not discharge the round in the chamber when dropped at a height of 1.5m in each calibre configuration, onto a concrete surface covered with 2mm thick layer of rubber surfacing at uncontrolled ambient conditions in the following rifle orientations:</p> <ul style="list-style-type: none"> <li>a. Rifle vertical, with Muzzle facing impact surface;</li> <li>b. Rifle vertical, with Butt stock facing impact surface;</li> <li>c. Rifle angled forward at 45° to impact surface;</li> <li>d. Rifle angled backwards at 45° to impact surface; and</li> <li>e. Rifle in shooting position and parallel to impact surface.</li> </ul> <p>Note: Drops to be conducted with the safety mechanism in the SAFE and FIRE positions, and 2nd stage trigger pull set to lowest specified trigger second stage pull force.</p>

SERIAL	REQUIREMENT
	AECTP 400, Method 414, Procedure I, or Equivalent Test Method, is a sufficient means to demonstrate compliance to this requirement.
<b>3.5.3</b>	<b>High Pressure Test</b>
3.5.3.1	Every assembled Rifle <b>must</b> be proof tested IAW AC/225(LG/3-SG/1)D/14, para 2.1.4.2 in each calibre configuration, inspected, and have proof marks on all pressure bearing components.
<b>3.5.4</b>	<b>Service Life</b>
3.5.4.1	The NATO 7.62 x 51mm barrel service life <b>must</b> be no less than 8,000 rounds while maintaining an Average Mean Radius of 1.2cm or less for 5 groupings of 5 rounds, at a range of 100 m.
3.5.4.2	The .338 Lapua Magnum barrel service life <b>must</b> be no less than 4,000 rounds while maintaining an Average Mean Radius of 1.2cm or less for 5 groupings of 5 rounds, at a range of 100 m.
<b>3.5.5</b>	<b>Reliability</b>
3.5.5.1	The MCSW in the NATO 7.62 x 51mm configuration <b>must</b> be capable of firing 8,000 rounds with no more than five weapon related stoppages.
3.5.5.2	The MCSW in the .338LM configuration <b>must</b> be capable of firing 4,000 rounds with no more than five weapon related stoppages.
<b>3.5.6</b>	<b>Accuracy</b>
3.5.6.1	The MCSW in the NATO 7.62 x 51mm configuration <b>must</b> achieve a MPI shift of no more than 29.1mm at a range of 100m between two groupings of five rounds, where the first grouping of 5 rounds is fired with the suppressor attached, and the second grouping is fired after removing and re-attaching the barrel, without removing the suppressor.
3.5.6.2	The MCSW in the .338LM configuration <b>must</b> achieve a MPI shift of no more than 29.1mm at a range of 100m between two groupings of five rounds, where the first grouping of 5 rounds is fired with the suppressor attached, and the second grouping is fired after removing and re-attaching the barrel, without removing the suppressor.
3.5.6.3	The MCSW in the NATO 7.62 x 51mm configuration <b>must</b> achieve a MPI shift of no more than 29.1mm at a range of 100m between two groupings of five rounds, where the first grouping of 5 rounds is fired with the suppressor attached, and the second grouping is fired after removing and re-attaching the suppressor.

SERIAL	REQUIREMENT
3.5.6.4	The MCSW in the .338LM configuration <b>must</b> achieve a MPI shift of no more than 29.1mm at a range of 100m between two groupings of five rounds, where the first grouping of 5 rounds is fired with the suppressor attached, and the second grouping is fired after removing and re-attaching the suppressor.
<b>3.5.7</b>	<b>Calibre Change</b>
3.5.7.1	The duration to change from one calibre to another <b>must</b> be less than or equal to 5 min using tools provided with the weapon system.
<b>3.6</b>	<b>Interchangeability</b>
3.6.1	All assemblies and sub-assemblies of the MCSW with identical part numbers <b>must</b> be completely interchangeable for the service life of the weapon without affecting fit, form, function, precision and safety, for both calibre configurations.
<b>3.7</b>	<b>Operational Environments</b>
3.7.1	<p>The MCSW in each calibre configuration <b>must</b> operate without physical damage and without degradation of performance in all low temperature environments associated with the C0, C1, C2 (-46°C min) climatic regions as described in STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.</p> <p>Note: Performance requirements to be assessed while firing a full magazine with no more than one weapon related stoppage in each configuration.</p> <p>AECTP 300, Ed 3, Method 303, Procedure II and III, C2 Cold, or Equivalent Test Method, is a sufficient means to demonstrate compliance to this requirement.</p>
3.7.2	<p>The MCSW in each calibre configuration <b>must</b> operate without physical damage and without degradation of performance in all high temperature environments associated with the A3, A2 and A1 (+49°C max) climatic regions as described in STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.</p> <p>Note: Performance requirements to be assessed while firing a full magazine with no more than one weapon related stoppage in each configuration.</p> <p>AECTP 300, Ed 3, Method 302, High Temperature Operation (constant temperature), Procedure II, or Equivalent Test Method, is a sufficient means to demonstrate compliance to this requirement.</p>
<b>3.8</b>	<b>Markings</b>

ANNEX C

7 May 2019

SERIAL	REQUIREMENT
3.8.1	The serial number for the suppressor <b>must</b> be visible when the mirage mitigation cover is attached.