



M215 / M4

Nikel Boron (NiB) Testing for M4 Platform conducted by UnWin

GOVERNMENT • LAW ENFORCEMENT

M215/M4 STYLE ASSAULT RIFLE/SMG

The M215/ M4 Assault Rifle is a select fire platform chambered in 5.56 x 35mm. It is a direct gas impingement system with a carbine length gas system. It features a manual 2 position safety system. Nickel Boron NiB coated Fire Control Group, Barrel Extension and BCG Black hard-anodized, forged 7075-T6 lightweight aircraft-grade aluminum alloy upper and lower receivers. Mil-Spec barrel, gas tube and BCG. Black polymer pistol grip, handguard and buttstock made by Magpul or Mission First Tactical.

M4 Carbine



- M4 Carbine Series 14.5" Barrel
- M4 Commando Series 10.5" Barrel

BARREL
Chrome-lined, Magnesium Phosphate or Nitride. Removable Birdcage-style flash hider installed on threaded muzzle. 1:7"
SIGHTS
Flip Up Front sight Delta A2 fixed sight Flip Up Rear sight
HANDGUARDS
Standard Handguard with Heat Shield

ACCESSORIES
- 2Pcs. 30 rd. Magazines - Cleaning kit - Hard-shell Plastic Case - Flip Up Alloy Rear sight
OVERALL LENGTH
662 mm / 27.5" with stock collapsed 775 mm / 30.5" with stock extended
WEIGHT (EMPTY)
2.75 kilograms / 6 lbs

Stock, Grip and Magazine come in Mission First Tactical or Magpul



M4 Carbine ML15



- 15" M-Lok Rail • 16" Barrel
- Available in KeyMod

BARREL
Chrome-lined, Magnesium Phosphate or Nitride. Removable Birdcage-style flash hider installed on threaded muzzle. 1:7"
SIGHTS
Alloy Flip Up Front sight Alloy Flip Up Rear sight
HANDGUARDS
Std. M-Lok Handguard (Available in KeyMod)

ACCESSORIES
- 2Pcs. 30 rd. Magazines - Cleaning kit - Hard-shell Plastic Case - Flip Up Alloy Rear sight
OVERALL LENGTH
662 mm / 27.5" with stock collapsed 775 mm / 30.5" with stock extended
WEIGHT (EMPTY)
2.75 kilograms / 6 lbs

Stock, Grip and Magazine come in Mission First Tactical or Magpul



M4 Carbine Elite



- M4 Carbine Series 14.5" Barrel
- M4 Commando Series 10.5" Barrel

BARREL
Cold-hammer forged, chrome-lined, removable Birdcage-style flash hider installed on threaded muzzle. 1:7"
SIGHTS
Delta A2 fixed sight Flip Up Rear sight
HANDGUARDS
Knights Armament M4 RAS Forend Assy

ACCESSORIES
- 2Pcs. 30 rd. Magazines - Cleaning kit - Hard-shell Plastic Case - Flip Up Alloy Rear sight
OVERALL LENGTH
662 mm / 27.5" with stock collapsed 775 mm / 30.5" with stock extended
WEIGHT (EMPTY)
2.75 kilograms / 6 lbs

Stock, Grip and Magazine come in Mission First Tactical or Magpul



IO M4 ASSAULT RIFLE

Throughout the world today, the M4's reliability, performance, and accuracy provide joint coalition forces with the confidence required to accomplish any mission.

Designed specifically for lightweight mobility, speed of target acquisition, and potent firepower capability - the M4 delivers. The M4 can be comfortably carried, yet be instantly available to provide the level of firepower, dependability and accuracy of a 5.56mm rifle. Proven in military combat operations all over the world, it is in a class by itself as a first rate combat weapon system. The IO M4 Carbine serves as the weapon of choice and the weapon of the 21st century warfighter.

The IO M4 5.56mm carbine is manufactured to meet or exceed the stringent performance specifications (MILSPEC) required for acceptance and use by the U.S. Armed Forces.

Features

- Designed specifically for lightweight mobility, speed of target acquisition, and potent firepower capability
- Comfortably carried, yet compact and instantly available
- The ONLY 5.56mm carbine in the world today that is manufactured to meet or exceed the stringent performance specifications (MILSPEC) required for acceptance and use by the U.S. Armed Forces

Nikel Boron Coating

Bolt Carrier Group



Bolt: Carpenter 158 case hardened, shot peened and magnetic particle inspected. Manufactured to Government drawings. Mil Spec gas rings. NiB coated

Extractor: Manufactured, heat treated, hardened, per Government drawings. Black extractor buffer and heavy duty spring. NiB coated.

Firing Pin: Manufactured, heat treated, hardened, Chromed and certified

Bolt Assembly: case hardened, shot-peened, magnetic particle inspected, Carpenter 158 bolt with high-performance extractor, ejector springs, mil spec gas ring.

Carrier: 8620 material (M-16 style) heat treated and case hardened.

Gas Key: Attached using grade 8 hardened fasteners, stake per mil specs. NiB Coating on all components is highly lubricious (CoF=.07)

This Nickel Boron coated barrel extension provides a permanently lubricious surface for extreme durability and increased wear and corrosion resistance. This barrel extension has upgraded M16/M4 feed ramps.



M16/M4 Feed Ramps

Barrel Extension



Frequently fire control groups will show a lot of wear, and this can be an issue no matter what kind of shooter you are. One of the best ways to deal with excess wear in the action parts of a fire control group is to use parts with next-generation coatings that are less susceptible to wear from friction and repeated use.

Fire Control Group

Coated Components

- NiB Trigger
- NiB Hammer
- NiB Disconnect



Nickel Boron Dry Lubricant Treatment Testing and Evaluation Report

PURPOSE

The purpose of the testing was to evaluate and identify benefits, if any, of utilizing the Nickel Boron Coatings on selected parts of M16 type firearms.

PRODUCT BACKGROUND INFORMATION

The dry lubricant is currently in use in automotive, aerospace and firearms industries as an alternative to lubricants that must be applied and re-applied. The surface treatment nucleates on the surface atoms of metals, creating a permanently dry-lubricated surface and making the surface harder than the substrate itself. The manufacturer claims this surface treatment offers a quantum leap in performance, reliability, lifecycle and maintenance of moving metal parts of firearms.

SCOPE

A bolt carrier group (BCG) which had been surfaced with a metal coating (Nickel Boron (NiB)) and installed into an M4 style rifle, serial number 8029672, which is permanently modified for blank fire. It is important to note, the BCG provided to Unwin was used and had already been in some kind of service prior to Unwin's testing. The extent of use is unknown. This rifle will be referred to as the "test rifle".

Two "control" blank fire M4s were used; one that was properly lubricated and one that was over lubricated. The properly lubricated rifle, serial number 6235968, will simulate users that fail to clean or lubricate their firearms for extended periods of time, and the over lubricated rifle, serial number 6235632, will simulate users who, in lieu of proper cleaning time, equipment or facilities, opt to continue to re-lube the firearm in order to keep it functioning. Prior to the beginning of each test, all rifles received a detailed cleaning so as to start each test in as near perfect a condition as possible.

As another control, the same magazines were used in each rifle for every test. All tests were either conducted or observed by one of Unwin's Engagement Simulation Systems (ESS) Technicians, who are also armorers certified through the Department of Energy's (DOE) National Training Center (NTC).

DoE / UnWin Sand Test



The DoE / UnWin Sand test consists of opening ejection port door and filling it with sand. The weapon is then tilted and excess shaken off. With the rifle in a fully loaded condition and lying with the open ejection port up, one teaspoon of fine sand/dirt was poured over the bolt. The shooter picked up the rifle and attempted to shake off as much of the sand/dirt as possible and then began to fire. Firearm was re-sanded after every magazine change.

Properly Lubed M4



- Note the even film of sand on the carrier
- Weapon fired 52 rounds prior to failure

Open ejection port door after sand has been shaken from the weapon

NiB BCG (no lube)



- Limited amount of sand that adhered/ remains on the carrier
- Weapon fired 154 rounds prior to failure

Open ejection port door after sand has been shaken from the weapon

Overlubed M4



- Note the clumps of sand
- Weapon fired 63 rounds prior to failure

Open ejection port door after sand has been shaken from the weapon

TEST 1 – Endurance Test (Up to 1000 rounds per rifle)

1. Utilizing 30 round magazines loaded with 25 rounds of blank ammunition, each M4 was fired in full-auto mode until a stoppage occurred that could not be cleared through normal clearing procedures or until there were multiple consecutive failures. Rate of fire was: Expend one magazine, hand-load the same magazine and then expend that magazine, repeat.

- a. The properly lubricated rifle did not receive additional lubrication after the start of the test.
- b. The over lubricated rifle was re-oiled after every 100 rounds.
- c. The test rifle did not have any lubrication applied to the BCG or upper receiver.

2. After an initial 500 rounds, the rifles were allowed to completely cool down for a minimum of two hours, simulating a break in training or activities.

3. After the cool down period, the test resumed by attempting to expend the remaining 500 rounds per rifle.

4. All stoppages were evaluated for cause and recorded.

Rifle Used #	Stoppages Recorded	Completed Test?
Test Rifle (NiB)	1	Yes
Properly Lubed Rifle	5	No – Test stopped at 628 rds
Over Lubed Rifle 4	4	No – Test stopped at 976 rds

After the completion of the Endurance Test, each rifle was cleaned. The ease or difficulty of cleaning was noted to include those areas with high carbon build up.

On a scale of 1 to 5, a rating was given to difficulty of cleaning (**1 = Not difficult, 3 = Moderately Difficult, 5 = Extremely Difficult**)
The amount of carbon build up in identified areas. (**1 = light buildup/fouling, 3 = heavy, 5 = extreme buildup/fouling**)

Carbon Buildup/Fouling Tables

Test Rifle (NiB) Nickel Boron Coated Components		
Area of buildup/Fouling	Amount of Buildup/Fouling	Ease/Difficulty of Clean
Bolt Face and Lugs	2	1
Rear of Bolt Body	2-3	3
Barrel Extension	2-3	2
Carrier	1	1

Properly Lubed Rifle		
Area of buildup/Fouling	Amount of Buildup/Fouling	Ease/Difficulty of Clean
Bolt Face and Lugs	4	2
Rear of Bolt Body	5	4
Barrel Extension	3	3
Carrier	2	2

Over Lubed Rifle		
Area of buildup/Fouling	Amount of Buildup/Fouling	Ease/Difficulty of Clean
Bolt Face and Lugs	4	2
Rear of Bolt Body	4	2
Barrel Extension	5	5
Carrier	4	2

TEST 2 – Water / Rain (Up to 200 rounds per rifle)

1. Utilizing 30 round magazines loaded with 25 rounds of blank ammunition, each M4 was fired in full-auto mode until a stoppage occurred that could not be cleared through normal procedures, or until there were multiple, consecutive failures. Rate of fire was: expend one magazine, hand-load the same magazine and then expend that magazine, repeat.

- The properly lubricated rifle did not receive additional lubrication after the start of the test.
- The over lubricated rifle was re-oiled after every 100 rounds.
- The test rifle did not have any lubrication applied to the BCG or upper receiver once the test started.

2. Utilizing a spray bottle, water was sprayed into the ejection port of each rifle before and during firing.

- One spray bottle was used for all tests, with the nozzle adjusted for a medium to light stream.
- Once the nozzle was adjusted, no more adjustments were made after testing had begun.

3. Prior to firing, all rifles received one spray from the water bottle into the ejection port with the bolt locked to the rear and an additional spray of the bottle with the bolt forward.

4. During firing, all rifles received one spray into the ejection port for every magazine.

5. All stoppages were evaluated for the cause of the stoppage and recorded.

Rifle Used #	Stoppages Recorded	Completed Test?
Test Rifle (NiB)	0	Yes
Properly Lubed Rifle	0	Yes
Over Lubed Rifle 4	4	Yes

TEST 3 – Last Man Standing (Up to 200 rounds per rifle)

1. Utilizing eight - 30 round magazines each loaded with 25 rounds of blank ammunition, each M4 was fired in full-auto mode until a stoppage occurred that could not be cleared through normal clearing procedures or until there were multiple consecutive failures. Rate of fire was: expend all eight magazines as quickly as the shooter could load, fire, and reload.

2. All stoppages were evaluated for the cause of the stoppage and recorded.

Rifle Used #	Stoppages Recorded	Completed Test?
Test Rifle (NiB)	1	Yes
Properly Lubed Rifle	6	No - Test stopped at 156 rds
Over Lubed Rifle 4	4	No - Test stopped at 176 rds

TEST 4 – Dust / Sand (Up to 100 rounds per rifle)

1. With the rifle in a fully loaded condition and lying with the open ejection port up, one teaspoon of fine sand/dirt was poured over the bolt. The shooter picked up the rifle and attempted to shake off as much of the sand/dirt as possible and then began to fire.

2. Utilizing four 30 round magazines loaded with 25 rounds of blank ammunition, each M4 was fired in full-auto mode, utilizing 3-5 round bursts until a stoppage occurred that could not be cleared through normal clearing procedures or until there were multiple consecutive failures.

3. Steps one and two of this test was repeated for each of the four magazines.

4. All stoppages was evaluated for the cause of the stoppage and recorded.

Rifle Used #	Stoppages Recorded	Completed Test?
Test Rifle (NiB)	1	Yes
Properly Lubed Rifle	6	No - Test stopped at 156 rds
Over Lubed Rifle 4	4	No - Test stopped at 176 rds

FIELD TEST SUMMARY

PURPOSE

The purpose of the testing was to evaluate and identify benefits, if any, of utilizing the Nickel Boron (NiB) Coatings on selected parts of M16 & M4 type firearms.

PRODUCT BACKGROUND INFORMATION

The dry lubricant is currently in use in automotive, aerospace and firearms industries as an alternative to lubricants that must be applied and re-applied. The surface treatment nucleates on the surface atoms of metals, creating a permanently dry-lubricated surface and making the surface harder than the substrate itself. The manufacturer claims this surface treatment offers a quantum leap in performance, reliability, lifecycle and maintenance of moving metal parts of firearms.

Incorporating the NiB product into firearms will result in a reduction of malfunctions and provide the added benefit of reduced cleaning time and lubrication costs.

CONCLUSION



*** Because the test rifle performed so well during the dust/sand test, we attempted to fire an additional 100 rounds, following the above guideline. At 154 rounds the test rifle did malfunction due to a failure to extract. This was primarily due to sand getting into the chamber and acting like sandpaper between the cartridge and chamber preventing extraction though the normal cycle of operation. The test was concluded at this point.**

While the above tests are considered to be extreme, they are similar to some of the very conditions we have observed during past Composite Adversary Team (CAT) training cycles, when training time is so precious that it overrides proper firearms cleaning and maintenance. As shown in the above test results, the Test Rifle was the only rifle to complete all tests while producing few or no stoppages. Conversely, when a test was stopped involving one of the control rifles, the rifle could no longer be cleared though normal clearing procedures, but occasionally required armorer level skills to dismantle the firearm to clear the malfunction and return it to an operational condition. The testing also showed that in the absence of wet lubrication, carbon buildup and fouling is reduced and gives nothing for debris to cling to, allowing for easier and quicker cleaning. It is the opinion of Unwin's ESS Technicians, based upon the above testing, incorporating the NiB product into the HS-61 ESS firearms will result in a reduction of malfunctions and provide the added benefit of reduced cleaning time and lubrication costs.



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