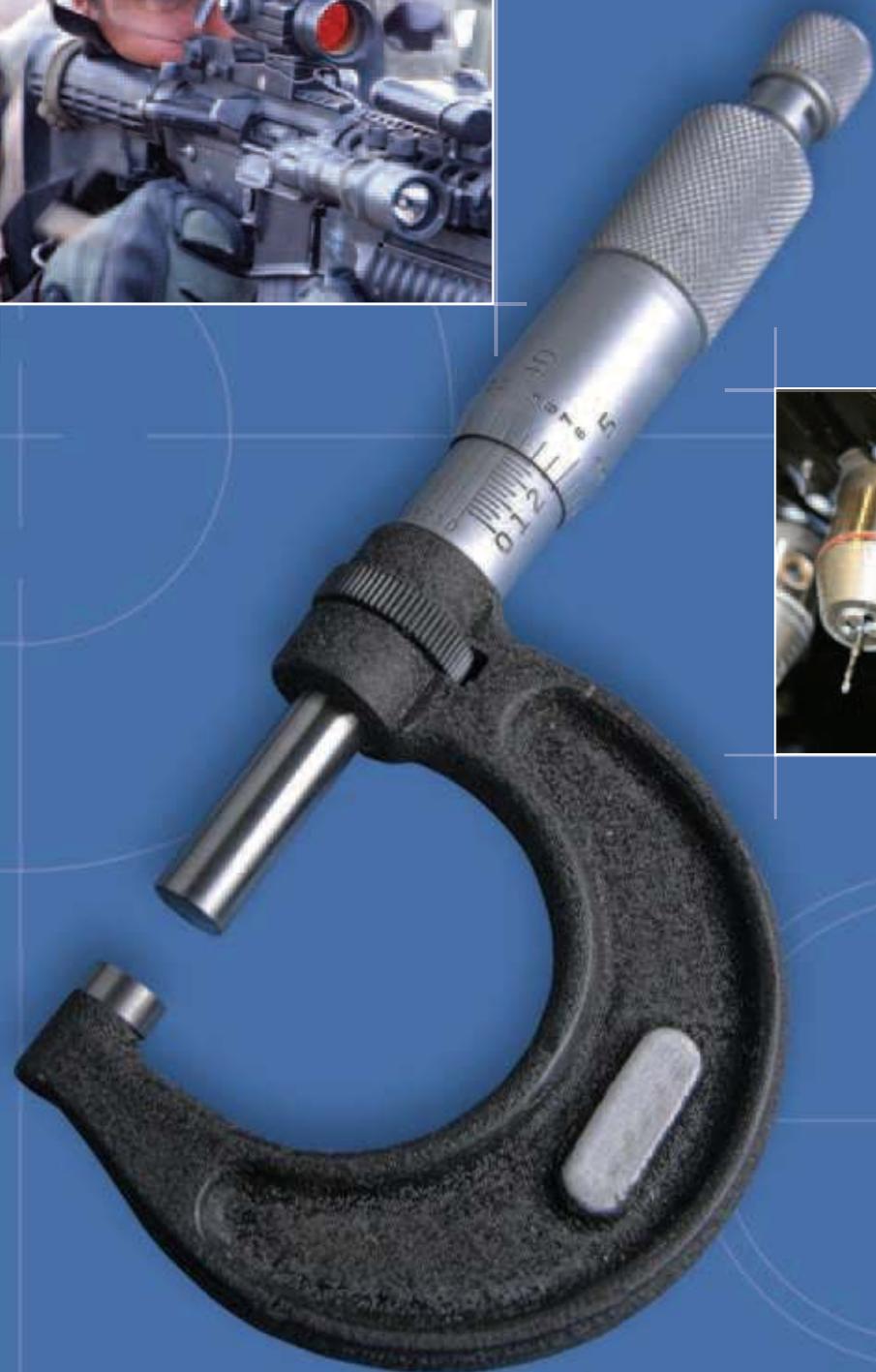


The Truth



ABOUT Mil-Spec

What exactly is “Mil-Spec” as it applies to the AR15/M16 and what precisely does it mean? A special investigative report lays it all out.

By David Crane

MIL-SPEC is mil-speak for “military specification.” This term is becoming increasingly misused by marketers in the firearms business who are trying to capitalize on the current popularity of military-style weapons, but the fact is that Mil-Spec has a very precise meaning. The most flagrant misuse of the term is found in reference to the AR-15, but is also applied to the M16 and M4 rifles. Knowing that facts are the best antidote to hype, *Combat Tactics* presents this comprehensive, in-depth report on current Mil-Spec rifles.

According to a Government Accounting Office (GAO) report, “In general, ‘military specifications’ describe the physical and/or operational characteristics of a product and ‘military standards’ detail the processes and materials to be used to make the product.”

Mil-Spec, then, is related to Mil-Std, which stands for “military standard.” Together they comprise the specifications and standards for making a given product that the U.S. Department of Defense (DoD) has issued as a major part of DoD’s Standardization Program, the goal of which is to ensure that products designed for military use meet the necessary requirements with regard to quality, durability, ruggedness, commonality, interchangeability, total cost of ownership, logistics and other military and defense-related objectives.

In the case of an M16 rifle or carbine, the military specification might require a weapon’s bolt to be made out of a certain type and grade of steel and for it to be made via a specific manufacturing protocol, while the military standard might outline the specific inspection and testing protocols for and relating to that part.

According to Jim Battaglini, Executive Vice President and Chief Operating Officer (COO) of Colt Defense

LLC, “Commercial black rifles are not considered Mil-Spec because there is no U.S. government verification to assure that their performance, endurance, accuracy, interchangeability and reliability meet all of the detailed and exacting military standards and specifications imposed by the United States Armed Forces.”

Just so we’re crystal-clear on this important point: no commercial AR-15 carbine or rifle is, or ever will be, Mil-Spec. If the government is not testing the gun, by definition, it is not Mil-Spec. “Mil-Spec commercial” is an oxymoron.

Technical Data Package

Colt Defense actually owns the technical data package (TDP) on the M4 carbine, M4A1 carbine and M16 rifle (M16A3/A4 rifle). These weapons are therefore manufactured and inspected in strict accordance with Colt’s TDP, which contains proprietary know-how, trade secrets and other intellectual property (IP) that is owned solely by Colt.

The Colt technical data packages for the M4/M4A1 carbine and M16A3/A4, respectively, are, according to Battaglini, specifically identified in the military specification, i.e. Mil-Spec. Only Colt and FN Manufacturing, LLC can use Colt’s TDPs to manufacture the M4/M4A1 and M16, respectively.

If another firm wants to make one of those weapons, they must first obtain a license from Colt to do so.

Since 1988, FN Manufacturing, a U.S. division of FN Herstal, has won a number of U.S. government awards to manufacture the M16 rifle to Mil-Spec. In

order to do this, they must use the aforementioned Colt TDP for the rifle. FN does this under government license, and this license applies only to the production of M16A3/A4 for U.S. government contracts. This licensing agreement is actually between Colt and the U.S. government, and it permits the government to competitively procure the M16 rifle from FN.

It's also important to understand that the M4 carbine, M4A1 carbine, M16A3 rifle, and M16A4 rifle are all select-fire weapons that allow either 3-round burst fire or true full-auto fire, which is written into the government's and Colt's technical data package. Semi-auto AR-15 carbines and rifles, again by definition, can't be Mil-Spec. Therefore, parts like the safety selector, bolt carrier, disconnect, trigger, hammer and others will be different in the semi-auto versions.

Even the steel that some of these



components are made from will be different and, once again, non-Mil-Spec. Bottom line: if it's not select-fire, it's not following Colt's TDP for military weapons, and if it's not following Colt's TDP, it's not mil-spec.

Inspection Requirement

All the TDP drawings (the government's and Colt's) are fully coded and have inspection requirements on them, and those requirements are to Mil-Std. So, for example, if Colt receives a government drawing for a lower receiver, Colt will then have its



Colt no longer is housed in its historic factory (left) with the famous "onion dome" roof. The rampant Colt statue atop the dome was sold to a collector. However, in Colt's new factory (above) a state-of-the-art ISO manufacturing and assembly facility is housed to produce Mil-Spec rifles for the U.S. military.

Half hrz AD



Colt is the sole source for the M4 carbine, shown here as specified by Mil-Spec standards. The oft-seen RIS M1913 forend is added later as part of a SOPMOD upgrade.

own drawing numbers that they use internally, but really Colt's drawing is just a snapshot of the government drawing and has all the inspection criteria on it, all the special testing requirements, the inspection requirements, the level of inspection, and the references to, in this case, MIL-STD-1916.

When a production lot of parts comes in from a vendor— or Colt or FN manufactures a production lot of parts— samples of the components or parts are pulled, and they go through points of inspection. A

lower receiver goes through approximately 102 points of inspection, for example.

“You can't just make the parts and throw 'em in the guns. Probably a good thing to say is that the military-standard really means that you're doing all the testing and all the inspection in accordance with the military-specification for that weapon's specification. Are you doing everything that the standard requires you to do?” explained Phil Hinckley, Colt's Director of Engineering.

The individual components have to meet the U.S.

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Who Owns The M4 Name?

APPARENTLY no one, according to a federal court. The term is generic.

The United States District Court in Maine recently ruled that Colt does not own a valid trademark for the designation "M4." The decision came in a summary judgment granted in favor of Bushmaster Firearms in a trademark case brought by Colt Defense, in which Colt accused Bushmaster of infringing on the "M4" trademark and the trade dress of the M4, both of which Colt claimed it owned to the exclusion of others in the industry.

In addition to denying Colt's infringement claims, the Court granted judgment for Bushmaster on its claim for cancellation of Colt's federal trademark registration for the name "M4."



Bushmaster spokesman and chairman, Richard Dyke, said he is gratified with the decision, not only for Bushmaster, but for the entire firearms industry. "Colt has for years made all sorts of claims [about intellectual property], but this case clearly shows Colt has been overstating its rights. In this case, the Court determined that the right to use the M4 term and to sell firearms that look like the M4 type, are rights that belong to the industry, not just Colt."

The Court's order affirmed a prior recommended decision of a U.S. Magistrate Judge in the case. Among other things, the Magistrate's decision held that "M4" is a generic term that merely describes a type of firearm, and is not an identifier of Colt as a sole source for such firearms.

In doing so, the decision noted that more than a dozen firearm manufacturers other than Colt have used the term M4 for years to refer to military-style carbines with collapsible buttstocks and shortened barrels. Since the M4 term is generic, the Court granted judgment for Bushmaster that Colt's federal trademark registration for the M4 should be cancelled.

The court also dismissed Colt's claim for infringement of M4 trade dress, both because the alleged trade dress is primarily non-functional and because Colt could not establish that the buying public associated the look of the M4 only with Colt.

Additionally, the Court dismissed Colt's claims for infringement of the terms M16, CAR, Match Target, AR-15 and Commando because it concluded that there was no likelihood of confusion among purchasers as to the source of Bushmaster's products.

The court also held that Colt could recover no damages on its only remaining claim under Section 43(a) of the Lanham Act.



Colt M4 with M203 grenade launcher and optional M203 sight on the flat-top upper.

government's technical data package and Colt's TDP, which are identical, except Colt puts the government's M4/M4A1 carbine TDP into its own numbering format for its own manufacturing process. Colt actually owns the technical data package.

"We utilize the same one as the government requires, but we also may add to it. It's never less than, but it can be greater than [the government's TDP]," Hinckley said.

MIL-STD-1916 is the inspection requirement which is to say, it's an inspection sampling plan. All the com-

ponents are laid out on a drawing as to what actually has to be inspected, and at what level. Colt or FN will pull a specific quantity of components based on the size of a production lot. They have to then put the pulled components through all the inspection criteria. If they find even one defect in one part, that puts it out of specification on a 102-point (or 102-code) inspection, and the whole production lot is rejected.

If the government wants to upgrade the M4/M4A1 carbine or M16 A3/A4 TDP, they would present an

Thanks For Nothing, Guys

Colt's Technical Data P (TDP) for the M4/M4A1 carbine— their intellectual property— apparently hasn't always been easy to protect.

In 1997, the DoD's Office of the Inspector General (OIG) conducted an audit on the procurement of M4/M4A1 carbines. Based on this audit, they issued a report (Report No. 97-165) on June 17, 1997 that discussed the failure of the U.S. Army and U.S. Navy to protect Colt's M4A1 TDP from "improper release."

Basically, an Army engineer released the M4A1 TDP to the Navy. The Navy had originally requested the TDP for internal use, but ended up releasing it to 21 different contractors—essentially Colt's competitors— in a solicitation for M4A1 adapter kits. Not good, at least not for Colt.

In the Army and Navy's defense (excuse the pun), they did take steps to remedy the TDP disclosure and security breach "...as is provided for in Article XX of the license agreement."

The OIG was unable to determine what, if any, deleterious effect the improper disclosure had on Colt's future sales of M4 and M4A1 carbines. While the OIG determined that the Army had been within its rights to terminate their contract with Colt for M4 carbines, OIG also determined that the Army had made "...numerous administrative and clerical errors" during M4 procurement.

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Engineering Change Request (ECR) to Colt. Alternatively, Colt could present an ECR to the government. Colt would evaluate the ECR to determine whether or not they can implement the requested change successfully.

If it involves a part that's the same on both the M4/M4A1 and the M16 A3/A4, the government would funnel the ECR out to FN, so Colt, FN and the government all have it and can unanimously agree on the change. It would then become a Notice of Revision (NOR), and Colt and FN would implement it. It's not an act of Congress, but a close second.

Pressure Cooker

Now that we have the big picture, what are the manufacturing, inspection, and testing protocols and procedures involved in meeting Mil-Spec requirements? The first protocol is something called the "High-Pressure Proof Testing and

Magnetic Particle Inspection."

This procedure calls for every bolt and barrel— not one in 10, not one from every lot, but every single one— to fire a high-pressure proof round. A proof round is about 20 percent over the normal pressure of a standard round of ammunition.

The bolt and the barrel get high-pressure proof tested simultaneously, where they fire the round inside an enclosed capsule, with the barrel and bolt closed behind it. This is the "pressure vessel," or high-pressure area, of the weapon.

After the barrel and bolt come out of the proof-testing area, they receive a magnetic particle inspection, where a non-destructive Level 2 test is performed by an NDT Level 2 tester. This magnetic particle testing is also known as "Magnafluxing," since it's done using a machine made by a company called Magnaflux. When someone says, "We Magnafluxed it," what they mean is they performed a

Colt M4 Carbine Specifications

CALIBER	5.56X45mm NATO (.223 Rem)
WEIGHT WITHOUT MAG:	5.9 lb (2.68 kg)
EMPTY 30 ROUND MAG:	0.25 lb (0.11 kg)
LOADED 30 ROUND MAG:	1.0 lb (0.45 kg)
OVERALL LENGTH:	33 in (84 cm)
Stock Retracted:	29.8 in (76 cm)
BARREL LENGTH:	14.5 in (37 cm)
BORE CHARACTERISTICS:	Hard Chrome Lined, 6 Lands and Groves, 1:7 in RH twist (178 mm)
METHOD OF OPERATION:	Gas; Direct System, Locking bolt
M UZZLE VELOCITY:	2,900 ft/sec (884 m/sec)
M UZZLE ENERGY:	1,645 Joules
EFFECTIVE RANGE:	600 m
FRONT SIGHT:	Adjustable front
REAR SIGHT:	M16A4 adjustable for windage and elevation to 600m
SIGHT RADIUS:	14.5 in (37 cm)
CYCLIC RATE OF FIRE:	700-950 rpm
FIRE CONTROL SELECTION:	Safe - Semi - Full Auto
UPPER RECEIVER:	Flat Top With Detachable Handle



Colt M16A4 with a 20-inch barrel, fixed stock and detachable carrying handle on an M1913 upper receiver.

magnetic particle inspection.

The NDT Level 2 inspector magnetically charges the bolt and barrel assembly, then dips it into a fluorescing solution and “reads” it under ultraviolet light. By magnetically charging the assembly, any and all imperfections, or “indications,” will show up under the UV light.

Since they have already fired a high-pressure proof round, if the bolt or barrel has any imperfection in the raw material, the magnetic particle test will reveal it. There are zero “indications” allowed, for even the vaguest potential of a crack in the barrel assembly or bolt is unacceptable to the government. Any “indica-

tion” whatsoever, and the part is rejected.

One of the guidelines that’s used during this non-destructive testing— the Magnafluxing doesn’t damage the assembly in any way— is ASTM E-1444, which is standard practice for magnetic particle inspection. MIL-STD-1949 is also referenced in the standard. The wet fluorescent particles which conform to AMS-3045, are added to a light petroleum distillate conforming to DoD F-87935.

Commercial Standards

The tester has to be certified to American Society of

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Testing Materials (ASTM) standards, a commercial organization. Formerly, the government tested to a mil-standard, but now Uncle Sam is utilizing commercial specifications more and more. With the advent of internationally regulated commercial standards, the government has largely moved to industrial standards for manufacturing and quality control.

The most prominent of these commercial standards is ISO 9001-2000. ISO stands for International Organization for Standardization. When they write the ISO 9001-2000 into contracts, it's usually specified as a higher-level quality requirement.

ISO 9001-2000 is basically a

replacement for Mil-Standard 9858, and is largely based on Mil-Standard 9858. The ISO 9001-2000 is used not only for the M4 Carbine, M4A1 carbine, and M16-series weapons (M16A3, M16A4, etc.), but it's also written into individual components and parts, including small parts.

Barrels, spare barrels, upper receivers, even small components like pins and screws and other parts can be put into the ISO 9001-2000 specification manufacturing requirement.

When Colt first got their ISO certification, the U.S. government came in with twice as many people as usual and audited the company to the entire ISO standard, right



courtesy DoD

after a third-party registrar had already done so. That's what you might call "close scrutiny."

The ASTM inspectors are double-qualified as well. They are NDT Level 2 certified, a unique classification at Colt which requires in-house training offered only by Colt. They'll do on-the-job training and study for an exam at Colt. Then, they have to go to a contracted third-party NDT Level 3 house that performs the actual testing and certification.

The NDT Level 2 inspector, in turn, must be certified by an NDT Level 3 house to perform the required magnetic particle inspection on bolts and barrels. Hellier of Niantic, Conn. is Colt's NDT Level 3 magnetic particle house that conducts all training and certification for Colt's in-house NDT Level 2 inspectors.

Yet More Testing

The M4 and M4A1 carbines are tested in accordance with MIL-C-70599A(AR). This is the M4/M4A1 carbine military specification which, you may recall, is part of Colt's technical data package.

This specification requires all the inspection criteria: endurance testing, interchangeability testing, etc. It spells out what's acceptable and what's rejectable during the final inspection process.

There are approximately 108 points of inspection on every single gun that's manufactured. This testing is very time consuming. On the technical data package for inspection of all the components,

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The Truth About Mil-Spec

the government specifies all the major and minor characteristics on the drawing, and the contractor (Colt and FN Manufacturing, for instance) is responsible for inspecting all components in the drawing with MIL-STD-1916, which is essentially a sampling plan.

Every single individual part—every spring, every pin, every little ball bearing—has a coded drawing that specifies the inspection requirements, and the manufacturer has to show proof of inspection back to the original source if there's a third-party vendor involved.

The parts interchangeability test is performed in accordance with MIL-C-70599A(AR). In a nutshell, you're taking 10 guns in a lot, for example, breaking them down to their individual components, shaking up the boxes, and rebuilding the 10 guns with interchanged parts.

Those 10 guns then go back off to the firing range, where they're function-fired and targeted again to meet specifications. A government-employed inspector will be present for this.

The M4/M4A1 carbine's endurance test is 6,000 rounds. The weapon's bolt gets examined at the 2,400-round mark in accordance with the military specification. For the M16 series (M16A3 and M16A4), the bolt gets examined at the 6,000-round mark.

One Bad Lug

Let's say you have a 5,000-gun production lot. If anything fails, like



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one lug breaks off on the bolt on one weapon out of the entire 5,000, that would fail the entire lot.

The entire lot would have to go back, the manufacturer would have to determine the root cause, evaluate the failure, and then go back and make corrections to the core materials, replace the parts on all 5,000 weapons in the lot and go back to testing.

Heaven forbid, if the inspectors were to determine that the heat-treating was off on the bolt—if it were too hard, for example—they'd evaluate it, find a cause, and the government would tell the contractor to quarantine and replace all the bolts in those 5,000 guns, go back through test firing on the functioning (reliability) and targeting (accuracy) side, then go back through endurance and interchange testing again to see if anything else breaks.

It's not easy to be Mil-Spec, as you may be gathering by now. Oh, but it's not over yet.

Colt and FN have to test the microstructure of the metal on the bolts to determine the proper case depths and hardness. All components have a specific hardness specification, which is part of the requirement. Colt

And By The Way...

Oh, in case we forget to mention it, Colt doesn't just make M4 and M4A1 carbines. They also make M16A3/A4-series rifles. Colt recently made a small number of M16A4s for the U.S. Marine Corps, but they've also made some for a foreign military sales contract.

has a full metallurgical laboratory with a chief metallurgist on staff, and they do all their materials testing in-house.

Before any raw material (steel, aluminum, polymer) is used in any of their firearms, the material has to fall within the material supplier's own specification and receive a certification. Once it's received in Hartford, it then goes to Colt's lab where it will go through the same

and even more rigorous testing all over again. Basically, Colt does advanced material analysis for their materials suppliers. Every component or part that gets heat-treated, gets hardness tested, including the aluminum receiver components.

Targeting And Firing

Let's say the production lot size of weapons is 1,000. All 1,000 guns go into the firing range. Each gun gets 30 rounds fired through it for function testing. If it's a full-auto gun (M4A1 carbine), the testers fire the gun on full-auto. If it's a three-round burst gun (M4 carbine), the tester fires 10 three-round bursts.

Next, the gun goes over to the firing ports on the

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Mil-Spec Features

On Commercially Produced M4 Carbines

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Magnaflux (MPI) Bolt	✓	✓	✓	✓	✓	2	✓					
Pressure Test (HPT) Bolt	✓	✓	✓	✓	✓	2						
Shot Peened Bolt	✓	✓		✓	2							
Black Extractor Spring Insert	✓	✓		✓	2			✓				
Properly Staked Gas Key	✓	✓	✓	✓	✓	2						
M16 Bolt Carrier	✓	✓	✓	2	✓	2						
Mil-Spec Barrel Steel	✓	✓	✓	✓		1		1				
Magnaflux (MPI) Barrel	✓	✓	✓	✓		✓						
Pressure Test (HPT) Barrel	✓	✓	✓	✓								
Chrome Chamber and Bore	✓	✓	✓	✓	✓	✓	✓	2	✓			2
1:7 Rifling Twist	✓	✓	✓	2		✓		2	2			
5.56 NATO Chamber	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
M4 Feedramps	✓	✓	✓	✓		✓		2				
Front Sight Base (FSB)	✓	✓	✓	✓	1	✓	1		✓			
Mil-Spec Receiver Extension	✓	✓	✓		✓	✓	✓			✓		
Staked Castle Nut	✓	✓	✓	✓	✓		✓					
"H" Buffer	✓		✓			2			2			
Taper Pins at FSB	✓		✓	✓	✓	✓	✓				✓	✓
Parkerize Under FSB	✓		✓	✓		✓	✓					
Double Shield Handguards	✓		✓			2		✓	✓			
Mil-Spec FCG Pins		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lifetime Warranty	✓	✓	✓			✓	✓		✓	✓	✓	
Average Street Price	\$1,275	\$1,225	\$1,400	\$1,150	\$900	\$1,100	\$850	\$900	\$850	\$950	\$750	\$825

(1) Advertised as meeting specifications, but reports are to the contrary.

(2) Available as an optional upgrade or in special limited runs.



QNC and other automated machinery assures precise tolerances to meet Mil-Spec requirements.

other side and is targeted at 100 yards inside an indoor firing range. The government requirement is 10 rounds on target to measure the group size of every gun. Colt allows up to five warm-up shots; targeting can require 15 rounds plus 30 rounds for function testing equalling (up to) 45 rounds per gun.

After test firing is completed, the guns then go into the wash station, where they are broken down for a full wash. Technicians clean the bore, then do a drop-plug test on the barrel to test the straightness of the barrel. Each gun then goes to the final inspection bench for a 108-point final inspection by AT1-level inspectors.

Once the white-lab-coat guys have inspected all 1,000 guns, a government inspector comes in and pulls four guns at random from the lot and takes those four guns goes out to the range and into a function-testing port, where an in-house AT2-level tester conducts the 6,000-round endurance test in front of the government inspector.

Ten additional guns are then pulled at random for parts and components interchangeability testing in the interchange room, again in front of a government inspector. The government inspector will then pull a varying-size sample—perhaps 13 to 15 guns out of 1,000—and perform the exact same 108-point final inspection that the AT1-level inspectors did on all 1,000 guns.

In order to keep all the Colt in-house AT1 inspectors on their toes, the government rotates the inspectors they use to pull guns. You wouldn't want Joe Inspector to get too buddy-buddy with Fred Foreman. The government can be remarkably insightful.

This final inspection and testing process usually

takes two to three days to complete, and all inspection and testing is performed under the supervision of a rotating government inspector.

Pack It Up

After all the inspections are completed, the guns go to the packaging area. Colt has implemented a radio frequency identification (RFID) on all guns as part of the packaging system so the government can identify the products. This is now a requirement, as of January 2008.

Not only does the box have to contain an RFID device, but also the packaging itself has a military standard requirement for heat seals and leak testing!

The weapons are packed in boxes in accordance with the a mil-standard for boxes, along with the magazines and manuals. The boxes are then placed on pallets, which are on skids. The government inspector will then inspect individual packs to make sure that the labeling is correct and the boxes are properly packaged.

The inspector will eyeball the entire packaging process. He'll look at the boxes when they're put inside the pallets. Then he'll look at the way everything is strapped on the pallet to ensure the strapping is up to snuff. If he doesn't like the way a strap looks, or it's loose, he'll make Colt re-strap them.

When I made a comment about what a colossal pain in the ass this whole process appears to be, Colt's chief engineer calmly replied, "What we like to think about is the actual end-user, and realize that it's all worthwhile for the end-user." I understood that, but the point had been lost in the seemingly endless

M4 vs. M4A1

The M4 Carbine is issued to U.S. Army and U.S. Marine Corps infantry ground forces along with the M16A4 rifle. The M4A1 carbine is currently issued to Special Operations Forces (SOF) under USSOCOM and has true full-auto capability instead of the standard M4's three-round burst selector, which many SOF assaulter/operators don't like.

The M4A1 also has a heavier barrel and buffer than the M4. Specifically, the M4A1 has an H2 buffer while the M4 has an H buffer. The H2 buffer has an extra tungsten weight inside the buffer assembly.

According to a Colt engineer, the cyclic rate on the M4 and M4A1 is approximately 700 to 970 rpm, usually hovering in the 820 to 835 rpm range. The U.S. Army would like to give Colt Defense a \$375 million M4 carbine contract through fiscal 2009, but they've been running into some resistance from Congressional leaders, like Sen. Tom Coburn (R-Okla.), who would like other weapon systems to be considered and tested for a big Army contract.

courtesy DoD



parade of inspectors looking at everything, right down to the straps in the pallets.

Lives are on the line. If a gun gets damaged in shipment, all the inspections are for naught. The engineer nodded paternalistically, "That's it, and that's how we look at it. And I think people pay attention to that fact."

So, the bad news is, you can't have a Mil-Spec weapon unless you want to break into Ft. Bragg. The good news is, you have some seriously great commercial alternatives at your disposal, thanks to a veritable plethora of manufacturers making ARs. Just be ready to slap this article down if any of them claim to be Mil-Spec.

Now you know better.



The author, David Crane, would like to thank Colt Defense for providing detailed information about their manufacturing, inspection, and testing procedures and protocols, with special appreciation for the cooperation to Phil Hinckley, Kevin Langevin (Senior Design Engineer) and Jim Battaglini (COO). The author regrets that the appropriate people at FN Manufacturing did not to return his phone calls in time for this article, consequently this story has focused on Colt Defense.

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