

This article is not intended to be the "end-all" scientific guide to the technologies and specifications associated with the headspace of a firearm. It is intended to be a general overview for the beginning collector who like me strives to shoot "safely".

Headspace is the measurement between two points in a rifle's chamber. These points are the boundaries of cartridge movement when a cartridge is chambered. In strict SAAMI terms headspace is the distance from the face of the closed breech of a firearm to the surface in the chamber on which the cartridge case seats.

Why is headspace important with a mil-surp firearm?

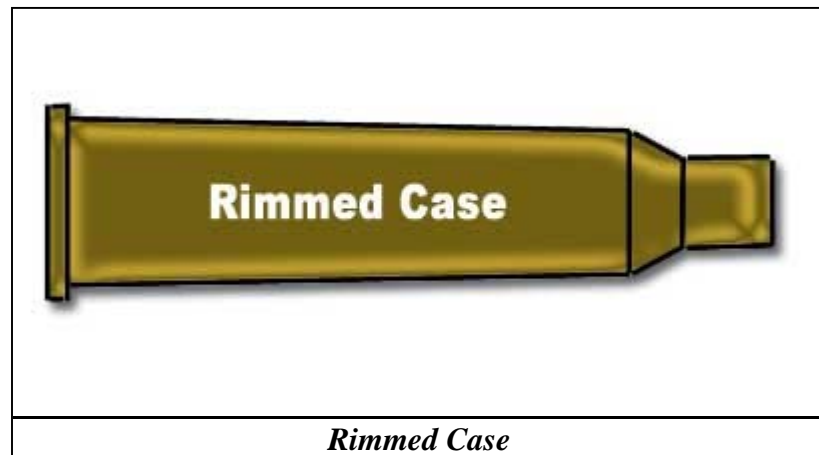
To start with, most curio & relic mil-surp firearms are at least fifty years old. Most have had thousands of rounds fired through them (*if not tens of thousands of rounds*) and tolerances have most likely deviated from the original manufacturing specifications. These deviations can include but are not limited to: throat erosion, worn rifling, and headspace issues.

In this article we are going to focus on: excessive headspace, insufficient headspace, and measuring headspace with commercial off-the-shelf headspace gauges.

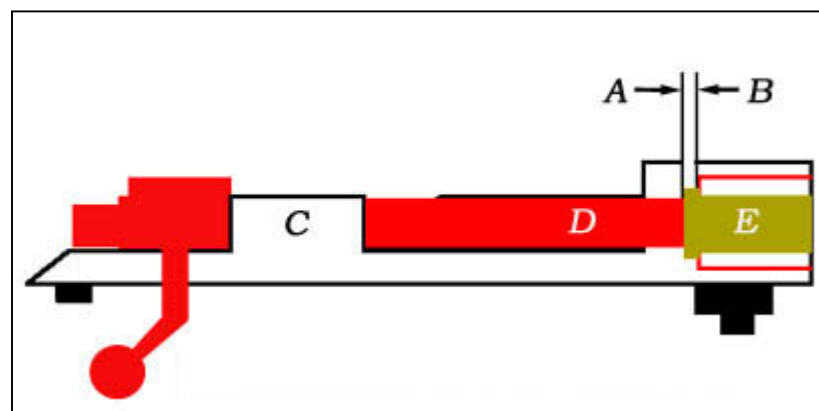
Headspace is measured differently depending on what firearm you are shooting. **Most (but not all)** twentieth century mil-surp rifles chamber and fire one of two types of metallic centerfire cartridges: **rimmed cartridges** and **rimless cartridges**. The table below shows common military calibers and their associated rifles categorized by rimless or rimmed cartridge.

--	--

<b>Rimless Cartridges</b>	<b>Rifle</b>
5.56mm NATO	M16, AR15, Mini-14
7.62mm NATO	FAL, M1A, M14, FN-49
6.5 x 55 Swede	Swedish Mausers
7mm Mauser	1893 Mauser
30-06 Springfield	m1917, 1903, 1903A3, M1 Garand
7.62 x 39mm	AK, SKS Carbine
8mm x 57 Mauser	German 98k, Yugo m48, CZ BRNO Vz 24, CZ BRNO 98/22, etc.....
<b>Rimmed Cartridges</b>	
7.62 X 54 Russian	Mosin-Nagant Rifles & Carbines, SVT-38, SVT-40, Dragunov
303 British	U.S. Krag-Jorgensen Rifles and Carbines
30-40 Krag	Krag Jorgenson



For a rifle that fires a **rimmed cartridge** the headspace measurement is taken from the face of the bolt to face of the chamber or the maximum allowed space between the bolt face and the face of the chamber.

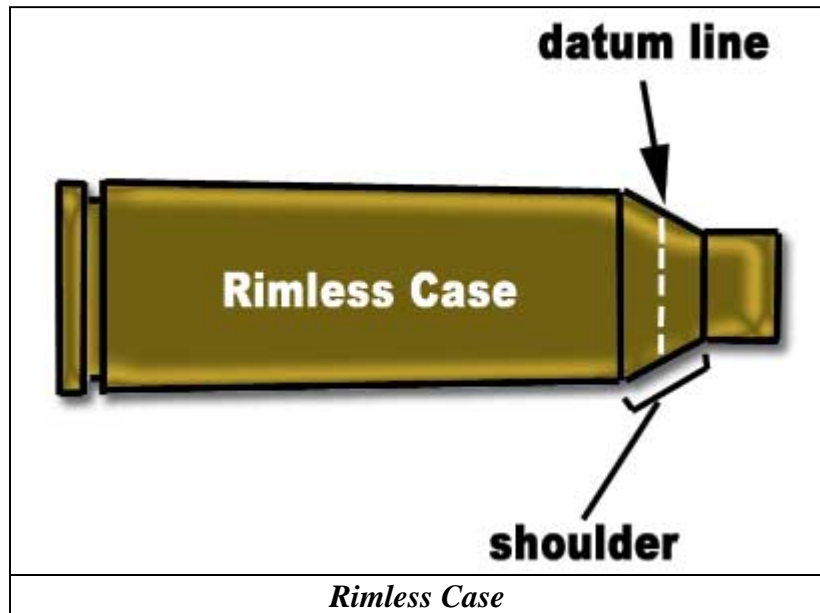


*Drawing shows how headspace is measured in a rifle that*

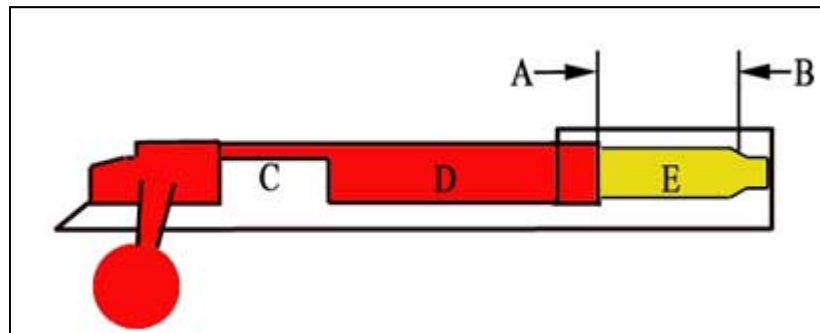
*shoots rimmed cartridges. The measurement is the distance between the face of the bolt and the top of the rim (face of the chamber) when the bolt is closed.*

*Figure Legend: Rimmed Cartridges*

<i>Part</i>	<i>Part Name</i>
<b>A</b>	<b>Bolt Face</b>
<b>B</b>	<b>Chamber Face</b>
<b>C</b>	<b>Receiver</b>
<b>D</b>	<b>Bolt</b>
<b>E</b>	<b>Cartridge</b>



For a rifle that fires a **rimless cartridge** this measurement is taken from the face of the bolt to the point on the cartridge's first shoulder that has been determined to be the datum line. The datum line specification for each caliber of cartridge is determined by SAAMI.



*Drawing shows how headspace is measured in a rifle that shoots rimless cartridges. The measurement is the distance between the face of the bolt and about the mid point of the*

*cartridge's shoulder (or the point where the front of the cartridge rests on its shoulder - "headspace on shoulder") when the bolt is closed.*

*Figure Legend: Rimless Cartridges*

<i>Part</i>	<i>Part Name</i>
<b>A</b>	<b>Bolt Face</b>
<b>B</b>	<b>Middle of Shoulder (Datum Line)</b>
<b>C</b>	<b>Receiver</b>
<b>D</b>	<b>Bolt</b>
<b>E</b>	<b>Cartridge</b>

### Headspace Measurement Standards

There are two different standards for measuring headspace: **Military** and **SAAMI** specifications. Military specifications are more lenient in tolerances than the SAAMI specifications. Military firearms are purposely designed to have very lenient specifications so a variance in ammo supplies and adverse weather conditions would not cause the weapon to malfunction. Also military brass is thicker and can tolerate more stretching than a commercial case and because of this they can tolerate excessive headspace better than commercial ammunition, greatly reducing the chance for cases rupturing.

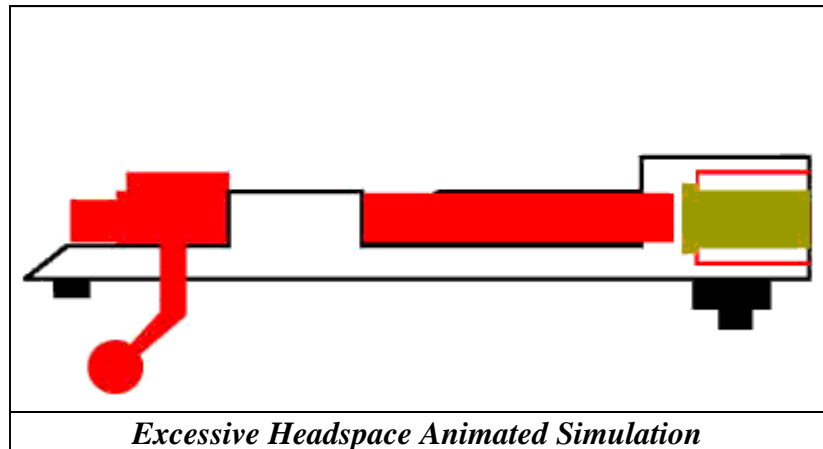
Because most all reloading components, commercial ammunition, and headspace gauges available today are based upon SAAMI standards we will focus on those standards of measurements in this article. The only downside to this is that firearms manufactured for the military are based upon the military specifications. This means that it is possible to deem a firearm unsafe to shoot using SAAMI specification gauges while the firearm may actually still be in military tolerances and somewhat safe to shoot. Still it is a very safe approach to use SAAMI gauges and accept the test outcomes because you would be much less likely to experience unsafe conditions while shooting your firearm.

The great thing about commercially available headspace gauges is that you don't have to know the prescribed distances and tolerances in measuring the headspace of your firearm. You can purchase a set of gauges specific to the caliber and cartridge you are wishing to measure for in your firearm. The gauges are manufactured exact to the SAAMI specifications. These gauges are very accurate and well made with heat treated steel that is actually harder than any of the firearm's metal parts.

### Excessive Headspace

**Excessive headspace** allows movement of the case during firing. This can cause case stretching, case separation (*ruptured case*), and gas leakage. When the powder is ignited the base of the cartridge can move back while the sides of the case stick to the walls of the chamber. As a result the case can separate and rupture. If the bolt and receiver are not strong enough to contain and vent the blast you can at the very least damage the firearm or at worst you can injure or cause even greater harm to a bystander or yourself. Some mil-surp firearms are designed to handle a problem like case rupture. The ported holes on the side of Mauser bolts are an example of a design to vent off gases that may be inadvertently sent through the bolt to the rear of the firearm. If designs like this do not exist in the firearm you are shooting, then you could be in trouble.

The wayward pressure and gas has got to go somewhere!



### Insufficient Headspace

**Insufficient headspace** prevents the closing of the bolt and possibly the complete chambering of the cartridge. If the bolt is forced this can cause the bullet to be compressed further into the neck of the cartridge's case. This will lead to over pressure conditions when the cartridge is fired and may cause very similar results as excessive headspace; the case may rupture sending very hot, high pressure gases through the rear of the receiver. Sounds like fun?

[\*Brownell's Safety Notes on Headspace\*](#)

**MIXING AND MATCHING BRANDS OF HEADSPACE GAUGES - Don't do it!! That's the short answer, here's why. It boils down to tolerance stacking. Each Headspace Gauge manufacturer works within a range specified by SAAMI. Manufacturer "A" may work at the high end of the range while Manufacturer "B's" gauges are in the middle of the tolerance range. Mixing the two could give an inaccurate reading. By sticking with one brand within a particular caliber, you will eliminate a variable. If you have a Forster, .308 GO gauge, get a Forster, .308 NO GO. Use Clymer with Clymer and Manson Precision with Manson Precision, etc. You can use any brand of headspace gauge with any other brand of chambering reamer. e.g. Forster Headspace Gauges with Clymer Reamers, Manson Precision Gauges with JGS Reamers, etc.**

**Caution:** Forcing the cylinder closed with a headspace gauge in a chamber may damage the cylinder, the ejector, the revolver's frame or the headspace gauge. The gauge is heat treated harder than any of the gun's components and can break if mistreated.

<b>Article Definitions:</b>
<b>Datum</b>
A reference plane, point or diameter that provides a base for calculations and measurements. Usually the mid point or predefined point on the first shoulder of a cartridge as determined by SAAMI.
<b>Chamber</b>
Opening in the rear of the barrel of a firearm where a cartridge can be inserted. 2) Opposite end of the barrel's muzzle. 3) The part that holds the cartridge at the time of firing. 4) The chamber is at the breech end of the barrel
<b>Headspace</b>
The distance from the face of the closed breech of a firearm to the surface in the chamber on which the cartridge case seats.
<b>Rim</b>
The feature at the base of most cartridge cases in which the extractor engages to pull a fired cartridge from the chamber.
<b>Rimless</b>
A case head type; rimless cases have a rim, but it is the same diameter as the case body so it does not protrude. A centerfire cartridge whose case head is of the same diameter as the body and having a groove turned forward of the head to provide the extraction surface.
<b>Rimmed</b>
A case head type whose rim protrudes beyond the case body. A cartridge having a rimmed or flanged head that is larger in diameter than the body of the case.
<b>SAAMI</b>
The acronym for the Sporting Arms and Ammunition Manufacturers' Institute. The organization that establishes firearms standards in the United States.
A good online resource - <a href="#">SAAMI Online Glossary of Terms</a>



<b>Vendor Supplied Information</b>
<p>dave MANSON Precision Reamers                      8200 Embury Road                      Grand Blanc, MI 48439</p> <p>Phone: 810-953-0732                      Fax : 810-953-0735</p> <p>Email: <a href="mailto:david@mansonreamers.com">david@mansonreamers.com</a></p> <p>Web: <a href="http://www.mansonreamers.com">http://www.mansonreamers.com</a></p> <p>Manson headspace gauges and other fine Dave Manson tools can be purchased at <a href="#">their website</a> and at <a href="#">Brownells</a>.</p>

<b>dave Manson Product Information</b>
<b>Rimless Cartridge \$26.00 each</b>
.223 Remington
.308 Winchester
6.5 x 55 mm
.30-06 Springfield
7 x 57 mm
7.62 x 39mm
8 x 57 mm
<b>Rimmed Cartridge \$24.00 each</b>
7.62 x 54R Russian



*Separating the Mosin-Nagant bolt assembly to remove the firing pin and firing pin spring.*

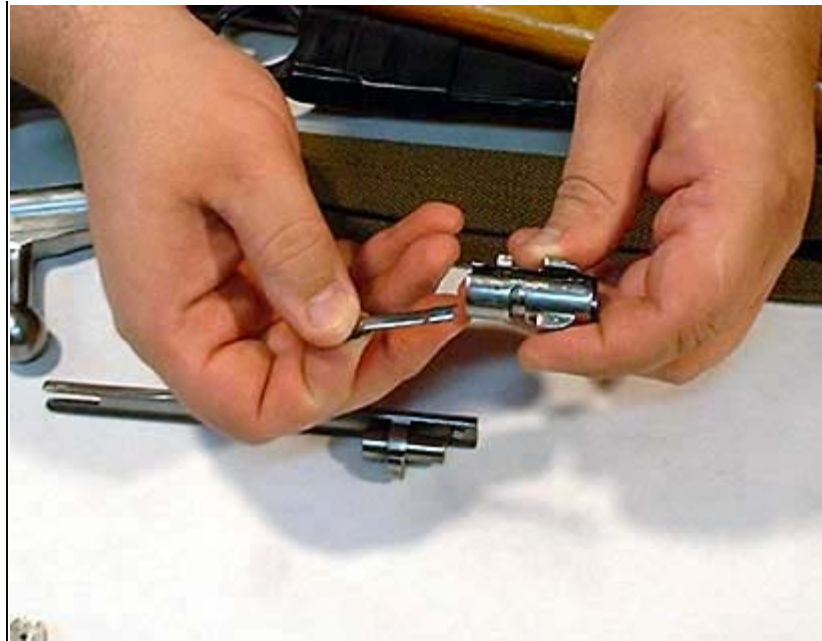
#### **Important Safety Notes**

- *Before checking headspace make sure chamber and magazine are empty of cartridges;*
- *Make sure bolt and chamber faces are clean and free from all raised surfaces such as scratches, nicks, burrs, etc.*

#### **Checking Headspace**

Dave Manson Precision Reamers manufactures excellent headspace gauges (*both rimless and rimmed are available*). To use the gauges you first have to remove the firing pin and extractor from the bolt. Following the instructions for bolt disassembly for your specific rifle supplied here on Surplusrifle.com this is an easy task to accomplish.

Each Dave Manson gauge is very well made and labeled as to which gauge and caliber they are intended to be used to measure. They offer sets in almost all military calibers and would make a fine addition to your gunsmithing tools that would last well past your life time.



*Removing the bolt's extractor.*



*The reassembled bolt minus the cocking piece, firing pin, firing pin spring, and extractor.*



*Inserting a Dave Manson Precision "Go" gauge into a 7.62x54r Mosin-Nagant.*

A typical set of headspace gauges usually consist of three gauges: a **"Go" gauge**, **"No-Go" gauge**, and a **"Field" gauge**.

### **"Go" gauge**

A "Go" gauge is the gauge that is used to measure minimum headspace. When you place the "Go" gauge in the rifle and close the bolt, the bolt should close and lock easily and completely.

If the bolt does close successfully then this tells you that the firearm has at least sufficient headspace. It may still have excessive headspace, but that is determined by the "No-Go" gauge.

If the bolt will not close on the "Go" gauge then you may not have sufficient headspace. This means you do not have enough headspace to chamber a cartridge properly and can damage the rifle if you force the bolt to close.

There are two potential fixes for this problem (*at least there is on a Mosin-Nagant rifle*):

1. Clean the face of the chamber. There may be unseen gunk and dirt at the face of the chamber. I have owned many Mosin-Nagant rifle and carbines that at first were very difficult to chamber a cartridge. Only later did I discover (*with the help of a flashlight*)

that there was gunk and dirt fused to the face of the chamber. Gunk and dirt that is so dark and hardened that at a casual glance, and without the aid of a very direct and bright light, it can be easily overlooked. After it is successfully cleaned and/or removed then it is quite possible you have eliminated the headspace problem and the "Go" gauge check should be repeated. If the same results occur then.....go to the second fix (*below*).

2. Take it to a gunsmith. You need to have the rifle looked at by a gunsmith and the rifle will need to be modified or adjusted (*possibly a chamber reaming, replace bolt parts, or moving the chamber face of the barrel closer to the bolt.*) in some way to compensate for the lack of headspace.



*The bolt successfully closes on the "Go" gauge.*



*Inserting a Dave Manson Precision "No-Go" gauge into a 7.62x54r Mosin-Nagant.*



*The bolt does not close on the "No-Go" gauge. Note: Do not force the bolt closed.*

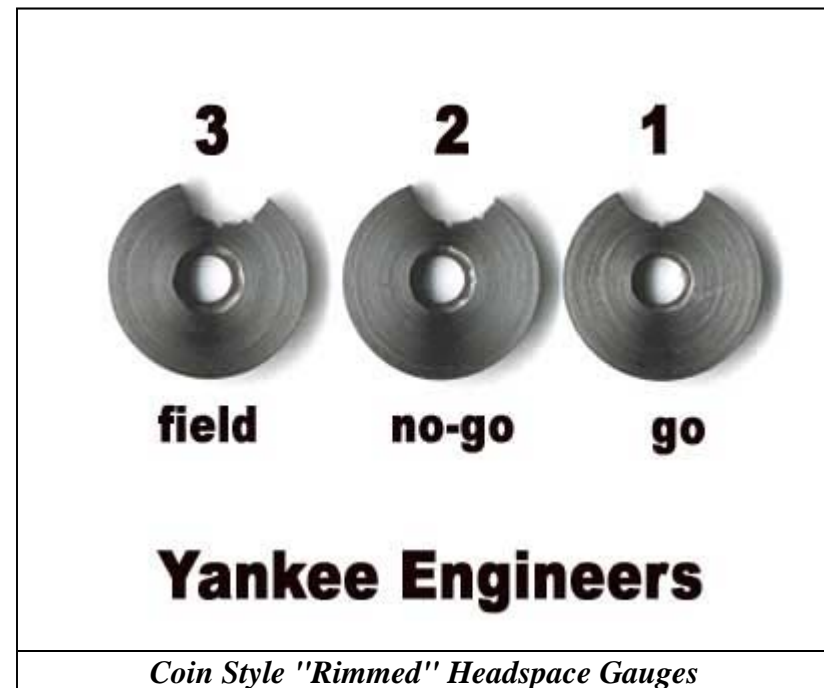
### "No-Go" gauge

A "No-Go" gauge is the gauge that is used to measure the maximum allowed headspace. When you place the "No-Go" gauge in the rifle and close the bolt, the bolt should not close and lock. If the rifle does close on the "No-Go" gauge you may have a problem that needs to be tended to by a gunsmith and may be an unsafe weapon to fire.

### "Field" gauge

If the rifle fails the "No-Go" gauge then you should measure using a "Field" gauge. A "Field" gauge is used to measure the largest possible safe headspace dimensions. When you place the "Field" gauge in the rifle and close the bolt, the bolt **absolutely** should not close and lock. If the rifle does close on the "Field" gauge you have a problem that needs to be tended to by a gunsmith and an unsafe weapon to fire.

If the bolt closes on a "No-Go" gauge but does not close on the "Field" gauge this means you have a rifle that has excessive headspace but is safe to shoot. Basically it will stretch the heck out of brass and good luck trying to reload.



#### **Vendor Supplied Information**

*We design manufacture and sell direct to our customers "coin style" headspace gauges for military surplus type rifles.*

*Our gauge is placed directly on the bolt face to check the correct gap between bolt and chamber faces with action closed. The "coin style" design is unique since the gauge does not enter the barrel chamber at all. This eliminates any problem with interference caused by rough surface conditions inside the chamber wall. Our gauge checks the direct relationship between bolt face and chamber rim. All gauges are made from tool steel hardened and ground to proper dimensions. There is a relief provided for the extractor and firing pin so no removal of those parts is required. Detailed instructions on proper use and care are included with every order. Gauges are available in Go, No-Go and Field configurations.*

Yankee Engineers  
P. O. Box 2183  
Brockton, MA 02305

Email: [YankEng@aol.com](mailto:YankEng@aol.com)

Web: <http://hometown.aol.com/yankeng/myhomepage/business.html>

#### Yankee Engineer Product Information

Caliber	Rifle	Price
7.62X54R	Mosin Nagant	\$23.00 / gauge
.30-40 Krag	U.S. Krag	\$23.00 / gauge
.303 British	Lee Enfields	\$26.00 / gauge
8X50R / 8X56R	Steyr Mannlicher	Contact Vendor



**Inserting a Yankee Engineers "No-Go" gauge into a 7.62x54r Mosin-Nagant.**

The Yankee Engineers manufacture a set of gauges that are designed specifically for rifles that fire cartridges with a rimmed case. Each headspace disc has a hole cut out of the center that makes it unnecessary to remove the firing pin while taking measurements. Each gauge also has a notch cut out on the side that when aligned with the extractor while measuring headspace you don't have to remove the extractor. This makes it very quick and easy to check headspace on "rimmed" cartridge rifles.

Each Yankee Engineers disc has lines cut into the extractor notch representing its function:

- One line: "Go" gauge;

- Two lines: "No-Go" gauge;
- Three lines: "Field" gauge.

To measure headspace with the discs, make sure the bolt face and chamber face are clean and then drop the discs in one at a time. The bolt should close on the "Go" gauge, should not close on the "No-Go" gauge, and absolutely should never close on the "Field" gauge.

I found the discs very quick and easy to use. They would be a good field set to take with you to stores or gun shows when purchasing rifles. This would give you the ability to check headspace before the purchase thus saving yourself from headaches and heartaches only to be discovered once you get home.



*Note that the bolt's extractor is intact and the coin style gauge can be seen at the face of the bolt.*



*The bolt does not close on the "No-Go" gauge. Note: Do not force the bolt closed.*



Because headspace for "rimless" cases are measured on the datum line on the first shoulder, and not the top of the rim like a rimmed case, the gauges are considerably longer as shown in the photo above. The instructions to use "rimless" gauges are identical to the procedures supplied earlier in this article for "rimmed" gauges. You do need to remove the extractor and firing pin from the bolt before measuring.

Forster gauges are very well known and very well made gauges. Each is manufactured from hardened steel and well labeled as to their caliber and use.

#### **Vendor Supplied Information**

*Every gunsmith knows that proper use of a headspace gage is the most reliable way to test the length of a rifle chamber. "Headspace" is the distance between the face of the breech and the base of the cartridge when the action is closed, and excessive headspace can be dangerous as well as impair accuracy. For instance, unsupported brass fired in a rifle action with excessive headspace can rupture, allowing gas to blow rearward like a rocket exhaust. Because your safety is on the line, Forster Headspace Gages are made with painstaking care and exacting manufacturing standards to ensure accurate testing of your rifle's chamber.*

*Forster Precision Products  
310 E. Lanark Avenue  
Lanark, Illinois 61046  
Phone: (815) 493-6360  
Fax: (815) 493-2371*

*Email: [info@forsterproducts.com](mailto:info@forsterproducts.com)*

*Web: <http://www.forsterproducts.com/>*

*Forster Headspace Gauges can be purchased at [Brownells](#).*

#### **Forster Product Information**

<b>Rimless Cartridge</b>
223 Remington
7.62mm NATO
6.5 x 55 Swede
7mm Mauser
30-06 Springfield
8mm x 57 Mauser
<b>Rimmed Cartridge</b>
7.62 X 54 Russian
303 British
30-40 Krag

Regardless of what type of headspace gauges you choose or even if you decide to let a good gunsmith check it for you instead of yourself, headspace is an important part of making sure that the collectable firearm you take to the range is safe to shoot.

jlm;)

**ALWAYS BE CERTAIN THAT YOUR FIREARM IS UNLOADED  
BEFORE WORKING ON IT.**

**WARNING** - Failure to follow this procedure may result in accidental discharge, firearm damage and serious bodily injury. Always be certain that your firearm is functioning properly before use.

## [Surplusrifle.com's Site Disclaimer](#)

Copyright 2003, 2004 © Jamie Mangrum