# The Truth About 7.62x51mm NATO and 308 Winchester

By FALPhil

## Introduction

The internet firearms and shooting culture is a relatively close knit group and very computer savvy, as hobby groups go. Many of the community are members of the several dozen discussion groups that revolve around the special interests of gun owners.

Because of the nature of the internet and the inherent tendency of human beings towards believing anything that sounds reasonable, without applying critical thinking skills (probably a result of trends in government school systems – but that is another treatise), there is much misinformation available to the casual gun enthusiast about a variety of subjects concerning firearms.

One of the most pernicious of these "urban legends" is that there is a significant difference in the pressures between the 7.62x51mm NATO cartridge and the 308 Winchester cartridge. The misinformation indicates that using the commercial offering in a military weapon will visit death and destruction of biblical proportions upon the miscreant who would attempt such a thing.

I first ran into this ugly rumor in 1996, while participating on the rec.guns usenet forum. It made for interesting reading. At one point, a well-known Highpower Match competitor, who will remain unnamed, asked the question, "Why would you expect significant differences in pressure when commercial and military cartridges are loaded with the same technology (powders, primers, cases, and projectiles) and the velocities are very close to each other?"

This issue reared its ugly head a couple of years ago when the many boatloads of Ishapore 2A1 rifles hit the US shores. Much disinformation about what was safe in these fine rifles was bandied about over the internet.

That got me to thinking. My brother had been a lab technician at Aberdeen Proving Grounds in the late '70s, so I called him to ask him about it. It turns out that he worked on artillery dispersal, but he still knew some technicians involved in small arms research. He said he would reach out to them and get back to me with some information.

About a month later, my brother called and described to me the method (in general terms) by which small arms ammunition is tested by the US Army. After speaking to him, I came to my own conclusion that 308 Winchester and 7.62 NATO were completely interchangeable.

However, I am an unknown to many firearms enthusiasts. So, in order to support my position, I have performed a little research and documented my findings.

## The Cartridges

The .308 Winchester is a rifle round and is the commercial version of the military 7.62x51mm NATO centerfire cartridge. The .308 Winchester was introduced in 1952, two years prior to the NATO adoption of the 7.62x51mm NATO or T65 round as it was known during testing. Winchester (a subsidiary of Olin Corporation) branded the cartridge and introduced it to the commercial hunting market as the 308 Winchester. Winchester's Model 70 and Model 88 rifles were subsequently chambered for the new cartridge. Since then, the .308 Winchester has become one of the most popular short-action big-game

hunting cartridges in the world. It is also commonly used for civilian target shooting, military sniping, and police sharpshooting.

The purpose of the T65 was to achieve the same or similar performance of the then-standard 30-06 cartridge in a package that was more conducive to reliability in fully automatic weapons and infantry weapons under extreme conditions. A weight savings was a by-product of the project, but it was not a primary consideration

While Winchester intended the T65 (later named 7.62x51mm NATO) and 308 Winchester ammunition to be identical and fully interchangeable, there are some differences. The two primary differences are the specification of chambers size between the two, and the construction or the cartridge case.

**Chamber Size**

Look at the table below. The right column represents a military headspace gauge specification; the left one, the SAAMI specification. With many military rifles, the chambers can be significantly longer than, say, a Remington 700. Note that the military chamber would fail a NO GO check with a SAAMI gauge, but pass a FIELD check using the proper military gauges.

There is a .013" difference in acceptability, between these two specifications. This is significant in that, for reloading purposes, brass will stretch more in a military chamber upon firing, thereby reducing the life of the brass and possibly promoting case head separation. But that additional length will allow a round to chamber in an incredibly dirty weapon, which is a requirement for military applications.

| **308 Winchester (SAAMI) Headspace** | **7.62 NATO (Military) Headspace** |
|---|---|
| GO - 1.6300" | GO - 1.6350" |
| NOGO - 1.6340" | NOGO - 1.6405" |
| FIELD - 1.6380" | FIELD - 1.6455" |

However, it must be noted that this is the chamber specification and not the ammunition specification. The external dimensions of the two types of ammunition are nearly identical.

**Cartridge Case Construction**

In my personal experiments, I have found, on average, that commercial 308 Winchester cases are able to contain approximately 58 grains of water, on average. The average for Lake City 92 cases, according to my measurements approached very close to 56.2 grains of water, and for Portuguese NATO marked cases which are Berdan primed, the average was close to 55.9. All brass had been fired once was sized with the same die, a Hornady New Dimension 308 Winchester die.

These water measurements indicate that, for the military cases, the brass is thicker. This finding was not unanticipated, as the military brass weighs more, and the military specification calls for the “beefing up” of the area around the web for the purpose of providing an additional safety margin in case the cartridge is fired in an automatic weapon and the charge is ignited before the cartridge is completely in battery in said weapon.

This characteristic also has implications for hand loaders and other enthusiasts where pressure is concerned. More on that later

**Regulating Bodies**

The American Sporting Arms and Ammunition Manufacturers' Institute (commonly abbreviated as SAAMI and pronounced "Sammy") is an association of American firearms and ammunition manufacturers. SAAMI publishes various industry standards related to the field, including fire code, ammunition and chamber specifications, and acceptable chamber pressure. SAAMI is an example of industry self-regulations. In the United States firearms and ammunition specifications are not overseen by the Consumer Product Safety Commission or any other branch of government. Firearms enthusiasts should be aware that only manufacturers that are members of SAAMI are bound by the Institute's guidelines. All other adherence to SAAMI specifications is strictly voluntary.

The European equivalent of SAAMI is the Commission Internationale Permanente pour l'Epreuve des Armes à Feu Portatives (Permanent International Commission for Testing Portable Firearms, commonly abbreviated as C.I.P. or CIP). CIP is funded and mandated by several governments that are part of the European Union.

There are two other organizations that are germane to this discussion. They are the US Army and the North Atlantic Treaty Organization (NATO). Each has its own specifications and testing methodologies which are not influenced by commercial interests unless there is a very good reason.

**Pressure**

Despite working together, the two main industry standards organizations SAAMI and C.I.P. have assigned different standards for some cartridges. This leads to officially sanctioned conflicting differences between European and American ammunition and chamber dimensions and maximum allowed chamber pressures.

Under SAAMI proof test procedures, for bottlenecked cases the center of the transducer is located .175" behind the shoulder of the case for large diameter (.250") transducers and .150" for small diameter (.194") transducers. For straight cases the center of the transducer is located one-half of the transducer diameter plus .005" behind the base of the seated bullet. Small transducers are used when the case diameter at the point of measurement is less than .35".

Under C.I.P. proof test standards a drilled case is used and the piezo measuring device (transducer) will be positioned at a distance of 25 mm from the breech face when the length of the cartridge case permits that, including limits. When the length of the cartridge case is to short, pressure measurement will take place at a cartridge specific defined shorter distance from the breech face depending on the dimensions of the case.

The difference in the location of the pressure measurement gives different results than the C.I.P. standard.

According to the official C.I.P guidelines the .308 Winchester (referred to as 7.62x51 by CIP) case can handle up to 415 MPa (60,190 psi) piezo pressure. In C.I.P. regulated countries every rifle cartridge combo has to be proofed at 125% of this maximum C.I.P. pressure to certify for sale to consumers.

The .308 Winchester and 7.62x51mm NATO cartridges are not identical and there are minor differences in their inner case dimensions, though SAAMI does not list either cartridge as unsafe in a firearm designed for use with the other. [http://www.saami.org/Unsafe_Combinations.cfm].

NATO EPVAT testing is one of the three recognized classes of procedures used in the world to control the safety and quality of firearms ammunition.

EPVAT Testing is described in unclassified documents by NATO, more precisely by the AC/225 Army Armaments Group (NAAG).

EPVAT is an abbreviation for "Electronic Pressure Velocity and Action Time". This is a comprehensive procedure for testing ammunition using state-of-the-art instruments and computers. The procedure itself is described in NATO document AC/225 (Com. III/SC.1)D/200.

Unlike the C.I.P. procedures aiming only at the user's safety, the NATO procedures for ammunition testing also includes comprehensive functional quality testing in relation with the intended use. That is, not only the soldier's safety is looked at, but also his capacity to incapacitate the enemy. As a result, for every ammunition order by NATO, a complete acceptance approval on both safety and functionality is performed by both NATO and the relevant ammunition manufacturers in a contradictory fashion.

For this, a highly accurate and indisputable protocol has been defined by NATO experts using a system of reference cartridges.

The civilian organizations C.I.P. and SAAMI use less comprehensive test procedures than NATO, but NATO test centers have the advantage that only a few chamberings are in military use. The C.I.P. and SAAMI proof houses must be capable of testing hundreds of different chamberings requiring lots of different test barrels, etc..[7.62 mm. STANAG 2310 and NATO Manual of Proof and Inspection AC/225 (LG/3-SG/1) D/9.]

The US Army continues to use (as of 1995) the M-11 Copper Crusher device for pressure measurements of small arms ammunition. The M-11 was enhanced, when in 1982, it was noted that the results generated at the high end of the test range did not meet NATO standards. [Defense Technical Information Center, ARMY BALLISTIC RESEARCH LAB/APD, Accession Number : ADP000024]

What is interesting to note is that around the time of the engineering change to the M-11 Copper Crusher device, the US Army changed the units of measurement for the device from PSI to Copper Units of Pressure, or CUP. Both SAAMI and CIP used the copper crusher method until the advent of inexpensive, reliable piezoelectric strain gauges, at which point, both organizations converted their methodologies to take advantage of the newer technology.

The copper crusher method was the standard for small arms pressure measurements since the late 1800s. A copper pellet just like a small watch battery in placed in the test pressure chamber which is attached to the cartridge chamber, the test round is fired and the copper pellet is then measured with a micrometer. The micrometer measurement is then converted into a PSI reading by using a chart that converts the length of the pellet into a pressure reading. The charts are constructed using the theoretical modulus of compression for the particular copper alloy used in the pellet, and may or may not have any relation to the actual absolute pressure. BUT, the results of the copper crusher method are always relative to previous results, which allows for determining what is safe and what is not.

Both SAAMI and the CIP have detailed specifications for the arrangement and dimensions of the copper crusher. Because these two systems are not identical, the two crusher standards cannot always agree. Further, as explained above, CIP crusher ratings are generally a bit higher than SAAMI's due to differences in definitions. Also, SAAMI is generally more conservative with older military rounds, such as the 8mm Mauser.

With the SAAMI methodology, the piston is positioned over the brass case, and the case will rupture somewhere below 20,000 PSI. The resulting sudden jump in pressure under the piston magnifies problems with piston inertia, and this makes the reading more sensitive to parameters such as burning rate, case strength, and true peak pressure. The CIP methodology requires the piston case be drilled at the sensor location, and the benefit is that crusher and piezoelectric ratios are much more consistent from cartridge to cartridge, allowing them to reasonably use a conversion formula.

The table below outlines some of the salient differences in testing:

| **Proof House** | **Cartridge** | **Specific Weapon Detail** | **Service Pressure Pmax (MPa / (psi))** | **Proof Round Pressure Requirement (MPa / (psi))** | **Detailed Requirement for Proof Ammunition** |
|---|---|---|---|---|---|
| SAAMI | 308 Winchester | Specialized proof chamber and barrel | 430 / (62,000) or 52,000 c.u.p. | 558 / (80,600) | Transducer located 175" behind the shoulder of the case for large diameter (.250") transducers. |
| NATO EPVAT | 7.62 mm (7.62x51mm NATO) | Designed to chamber NATO ammunition | 415 / (60,190) | 519.0 / (75,275) | Pressure recorded in NATO design EPVAT Barrel with Kistler 6215 Transducer or by equipment to C.I.P. requirements |
| C.I.P. | 7.62 mm (7.62x51mm) | Specialized proof chamber and barrel. | 415 / (60,200) | 519 / (75,250) | Transducer positioned at a distance of 25 mm from the breech face when the length of the cartridge case permits that, including limits. |
| US Army | 7.62 mm (7.62x51mm NATO) | M11 Copper Crusher | 50,000 c.u.p (52,000 c.u.p. for M118 Special Ball) | Unk. | Modified military weapon (See Hatcher's Notebook, Page 341) |

**Pressure Confusion**

However, neither method addresses the figure "50,000 PSI" that is so often misquoted, especially by "expert" sources such as 6mmbr.com and surplusrifle.com.

This figure comes from the US Army in various technical manuals, most notably, TM-D001-27

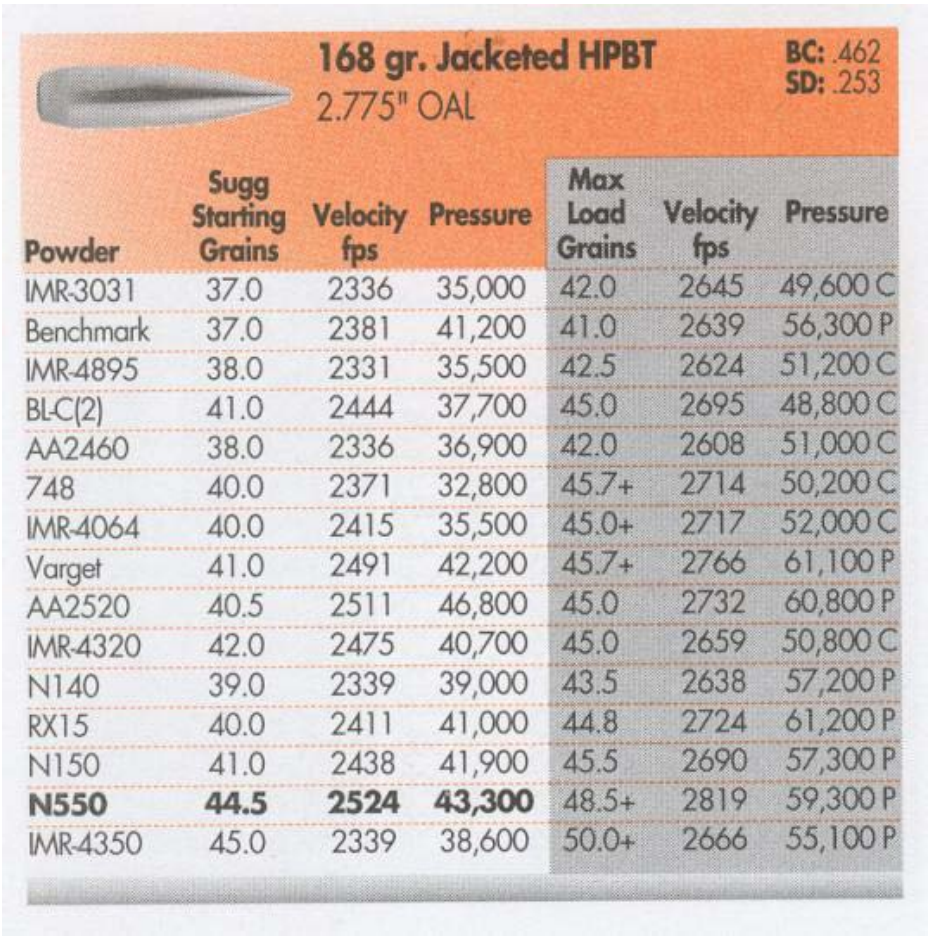
The real problem is the confusion between the old and the new methods of pressure testing. The old pressure testing method used for the 7.62 NATO cartridge started out life in the 1950s and is still published today in the US Army Technical Manuals. The figures are based on the copper crusher method in CUP, but are published as PSI.

The new method is the piezoelectric strain gauge transducer method; it is the same technology used today to show an automobile's oil pressure. The piezoelectric strain gauge transducer pressure method is a direct pressure reading based on an absolute standard, where the older copper crusher method a conversion based on a relative measure and a conversion chart. And this is why you see the difference in the pressure readings, but the older 52,000 CUP is equal to 62,000 PSI (piezoelectric transducer method).

Today, these two methods are called CUP and PSI and the readings are different, but 52,000 CUP equals 62,000 PSI and both are the same pressure, similar to the way 60 MPH equals 100 KPH.

To add even more confusion about the Ishapore 2A1, which started me on this article, many shooters want to use the headspace specifications set by NATO, which is different from what the Indian Army set for the Ishapore rifles.

In the figure below, you can actually see a page from an older reloading manual in which equivalent loads are portrayed in both CUP (C) and piezoelectric transducer PSI (P).



**168 gr. Jacketed HPBT** — **BC:** .462 **SD:** .253
2.775" OAL

| Powder | Sugg Starting Grains | Velocity fps | Pressure | Max Load Grains | Velocity fps | Pressure |
|---|---|---|---|---|---|---|
| IMR-3031 | 37.0 | 2336 | 35,000 | 42.0 | 2645 | 49,600 C |
| Benchmark | 37.0 | 2381 | 41,200 | 41.0 | 2639 | 56,300 P |
| IMR-4895 | 38.0 | 2331 | 35,500 | 42.5 | 2624 | 51,200 C |
| BL-C(2) | 41.0 | 2444 | 37,700 | 45.0 | 2695 | 48,800 C |
| AA2460 | 38.0 | 2336 | 36,900 | 42.0 | 2608 | 51,000 C |
| 748 | 40.0 | 2371 | 32,800 | 45.7+ | 2714 | 50,200 C |
| IMR-4064 | 40.0 | 2415 | 35,500 | 45.0+ | 2717 | 52,000 C |
| Varget | 41.0 | 2491 | 42,200 | 45.7+ | 2766 | 61,100 P |
| AA2520 | 40.5 | 2511 | 46,800 | 45.0 | 2732 | 60,800 P |
| IMR-4320 | 42.0 | 2475 | 40,700 | 45.0 | 2659 | 50,800 C |
| N140 | 39.0 | 2339 | 39,000 | 43.5 | 2638 | 57,200 P |
| RX15 | 40.0 | 2411 | 41,000 | 44.8 | 2724 | 61,200 P |
| N150 | 41.0 | 2438 | 41,900 | 45.5 | 2690 | 57,300 P |
| **N550** | **44.5** | **2524** | **43,300** | 48.5+ | 2819 | 59,300 P |
| IMR-4350 | 45.0 | 2339 | 38,600 | 50.0+ | 2666 | 55,100 P |

Karl Kleimenhagen points out:

> *In Denton Bramwell's article [http://www.shootingsoftware.com/ftp/psicuparticle2.pdf], a formula is derived using a basic statistical analysis of SAAMI's ratings, covering only pressures between 28,000 and 54,000 CUP :*
>
> *piezo = 1.52 * crusher - 18*
>
> *He also demonstrates that within this pressure range, the CIP appears to have generally used a simple conversion between their crusher and piezo ratings, roughly equal to:*
>
> *piezo = 1.21 * crusher - 2.8*
>
> *CIP pressures are multiples of 50 bar (about 700 psi), probably rounded after the conversion. (Please note that CIP crusher readings should not be equated with SAAMI CUP crusher readings.)*
>
> *In the 09/1968 issue of Handloader, Lloyd Brownell presents test data (crusher, but not necessarily CUP) which suggests a linear conversion formula is not the best choice, and in my Powley Computer I use:*
>
> *piezo = crusher * ( 1 + ( crusher^2.2 )/30000 )*
>
> *From 0 to about 60 ksi crusher, it fits both SAAMI's ratings and Brownell's data well, but it is low at the high end of Brownell's data. Brownell's data shows little to no error below 20 ksi, and a curve fit to only his data between 20 and 67 ksi crusher is:*
>
> *piezo = crusher + ( (crusher - 20) ^ 2.3 ) / 210*

**Conclusions**

The pressure difference between the two rounds is insignificant, the real problem is commercial ammunition has thinner cases that were not designed to shoot in military chambers BUT we do it all the time anyway and this why you see more case head separations on commercial cases fired in military chambers.

The M118 special long range round is loaded to 52,000 CUP (all other U.S. 7.62mm are 50,000 CUP) which would be equal to the pressure levels of commercial ammunition, this means actually there is no pressure difference between the .308 and 7.62 NATO for the M118 cartridge.

No accurate conversion between copper crusher and true pressure exists, but approximations can be made. In all the conversions outlined above, pressures are in thousands of PSI (KPSI). Expect errors of several KPSI, or about 15%, with such formulas. Many factors determine how much the indicated pressure reading from a crusher misses the true pressure, and the error varies among cartridges and even among different loads for one cartridge. The conversions might be accurate enough for many practical purposes.

So, to sum everything up, the pressure difference between the 308 Winchester and the 7.62x51mm NATO is less than 2,000 PSI which is statistically insignificant. The same pressure variation may be achieved by firing any rifle on a hot day and on a cold day or by changing brands of primers. It is safe to

shoot 308 Winchester in your 7.62x51 rifles (even the Ishapores) and vice versa. Handloaders should be aware that they should reduce the amount of powder when using military 7.62 NATO cases by about 10-12% and work up to safe pressures with corresponding velocities.

**References:**

[1] ANSI/SAAMI document Z299.4-1992 is the principle source for the SAAMI crusher and piezoelectric ratings listed here. The ratings listed are the "maximum average pressure". The book they offer is dated and doesn't include the ratings of newer commercial cartridges. The procedures and definitions should be current.

[2] The CIP documents are available on their site, and these were the reference for CIP procedures, definitions, and piezoelectric ratings. In these, past standards for crusher ratings are no longer listed. Instead, they refer you to past editions when proofing for a cartridge for which no current standard exists.

[3] The Soapbox of Karl W. Kleimenhagen (http://kwk.us/)

[4] Accurate Reloading Guide - http://www.accuratepowder.com/data/PerCaliber2Guide/Rifle/Standarddata(Rifle)/308Cal(7.82mm)/308%20Winchester%20Pages%20260%20to%20262.pdf