

6.2mm OCC

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My search for an improved military cartridge arose from the reported deficiencies of the 5.56mm NATO round in combat in Iraq and Afghanistan.

Everyone is trying to find the cartridge replacement for the 5.56x45mm (.223) or as some would say, the 'Holy Grail'.

Goal:

- Performance (better than 5.56x45mm)
- Accuracy
- Larger caliber
- Velocity
- Magazine capacity

All this and stay within the parameters of the AR-15/M-16/M-4 platform.

Some have come close - 6.8 SPC & 6.5 Grendel.

They both are arguably a better choice. But they both also have drawbacks.

Reasons why 6.8SPC & 6.5 Grendel FAIL

6.8 SPC = Good case ergonomics but the bullet caliber (.277) was a poor choice. The 110-115gr is short and fat, resulting in poor long range ballistics. Velocity is somewhere around 2500fps and below. Magazine capacity is 25-26 rounds.

Results

- poor velocity
- poor magazine capacity
- poor ballistics

Certain manufacturers have lightened the bullet to increase velocity, resulting in a poor ballistic coefficient.

Some wildcats are an SPC case necked down to 6.5mm and 6mm, resulting in better ballistics. Poor magazine capacity is the same.

6.5 Grendel = While the 6.5mm caliber bullet was a good choice, the case has poor ergonomics. Velocity 2500-2600fps. Case diameter is even larger than the 6.8SPC. Magazine capacity is 24-25 rounds.

Results

- poor magazine capacity
- poor case ergonomics
- poor velocity

A wildcat necked down to 6mm improved its ballistics some but still suffers from poor ergonomic case design.

* Magazine capacities were based on the standard AR-15/M-16 capacity.

Magazine Capacity Compared

5.56 NATO
30 rds

6.8 SPC
25-26 rds

6.5 Grendel
24-25 rds

These cartridges are good alternatives but they are not the solution. They were looking for a case that would have enough capacity to propel their 'ideal' bullet while staying within the platform parameters. Both cartridges have 100+ grain bullets. Bullets in excess of 100 grains cannot achieve the velocities needed and stay within the GOAL.

While they were looking for the ideal bullet, I have been looking for the ideal case, bullet diameter, and bullet weight for the platform.

SOLUTION

6.2mm OCC

Parent case - 6mm SAW (6x45mm SAW)
Design by Frankford Arsenal = Military Pedigree
Designed in early 1970s
Velocity with 105gr. bullet = 2520fps
Chamber Pressure = 47,700 psi

Designed to fill the role of both the assault & battle cartridges in service.
Dropped because the U.S. Military didn't want 3 cartridges in service.

Cartridge Comparisons

	5.56x45mm	6mm SAW	6.8 SPC
Bullet diameter	5.70mm/.244in	6.17mm/.243in	7.0mm/.277in
Neck diameter	6.43mm/.253in	6.63mm/.261in	7.6mm/.298in
Shoulder dia.	9.00mm/.354in	9.72mm/.383in	10.2mm/.402in
Base diameter	9.58mm/.377in	10.26mm/.404in	10.7mm/.421in
Rim diameter	9.60mm/.378in	10.36mm/.408in	10.7mm/.422in
Case length	44.7mm/1.76in	45.01mm/1.772in	42.6mm/1.676in
Overall length	57.4mm/2.26in	65.54mm/2.58in	58.8mm/2.315in

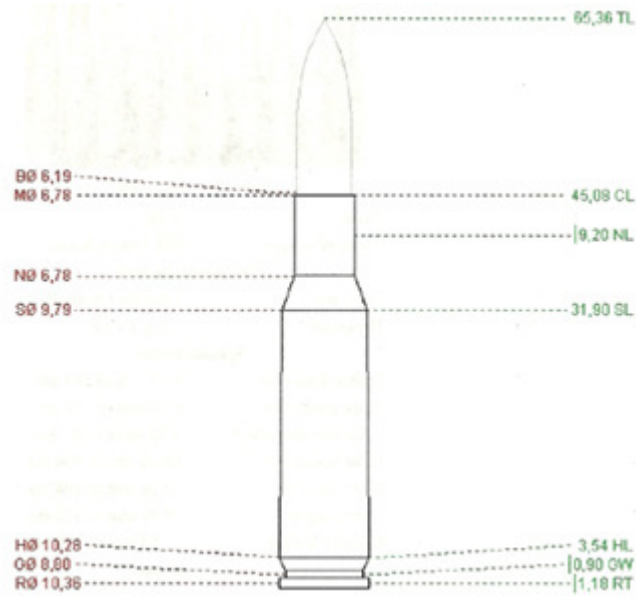
6.5 Grendel not used in comparison - Case diameter is larger than 6.8SPC

*Cartridge dimensions were taken from Wikipedia - may not be exact - for comparison only
Munition.org/6Mm/6x45Saw.htm 6x45mm SAW dimensions vary by source

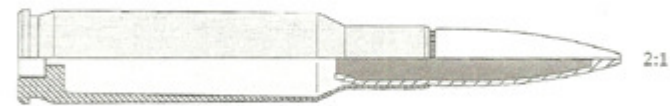


6 mm SAW, first on left.

Type	Rifle
Place of origin	United States
Production history	
Designer	Frankford Arsenal
Designed	Early 1970s
Specifications	
Bullet diameter	6.17 mm (0.243 in)
Neck diameter	6.63 mm (0.261 in)
Shoulder diameter	9.72 mm (0.383 in)
Base diameter	10.26 mm (0.404 in)
Rim diameter	10.36 mm (0.408 in)
Case length	45.01 mm (1.772 in)
Overall length	65.54 mm (2.580 in)
Primer type	Boxer



Christine-Regenstrief Number: 06045BGC030



Dimensions	mm	inch	mm	inch
Primer Diameter:	4.38	0.1725	Rim Width:	1.20 0.0470
Rim Diameter:	10.33	0.4065	Extractor Width:	0.90 0.0350
Extractor Diameter:	8.89	0.3500	Base to Head:	3.51 0.1380
Head Diameter:	10.26	0.4040	Base to Shoulder:	32.17 1.2665
Shoulder Diameter:	9.71	0.3820	Base to Neck:	35.69 1.4015
Neck Diameter:	6.77	0.2665	Case Length:	44.94 1.7695
Bullet Diameter:	6.18	0.2430	Overall Length:	65.58 2.5820
			Total Weight:	15.14 g

This comparison puts the 6mm SAW shoulder diameter .48mm less than the 6.8 and .72mm greater than the 5.56. The 6mm SAW base diameter is .44mm less than the 6.8 and .68mm greater than the 5.56.

SAW case

- case diameter is greater than the 5.56 = more powder
- case diameter is less than the 6.8 = higher magazine capacity

The problem with the 6mm SAW cartridge is that it's about 8.136mm too long for the platform. The 105gr bullet is too heavy for High Velocity.

Problem Solved

- 1) Shorten case/**neck** by 3mm (no more than 4mm, no less than 2mm)
Goal = 42mm (no less than 41mm, no more than 43mm)
- 2) Lighten bullet = less cartridge length
= higher velocity
- 3) Trim rim diameter by .05mm

6mm/6.17mm/.243

75gr. = Combat Round (CR) - L 23.75mm/.935in BC = .330

85/87gr. = Marksman Round (MR) - L 26.365mm/1.038in (87gr) BC = .395 (85gr)
BC = .400 (87gr)

Goal = CR needs to achieve 3000fps
= MR needs to achieve 2750fps

The 6mm SAW velocity with a 105gr bullet was 2520fps in the 1970s, with the same case capacity and decreased bullet weight by 20/30 grains, with an increase in chamber pressure to 50,000 - 52,000psi and today's powders these velocities could possibly be met.

Result

Goal

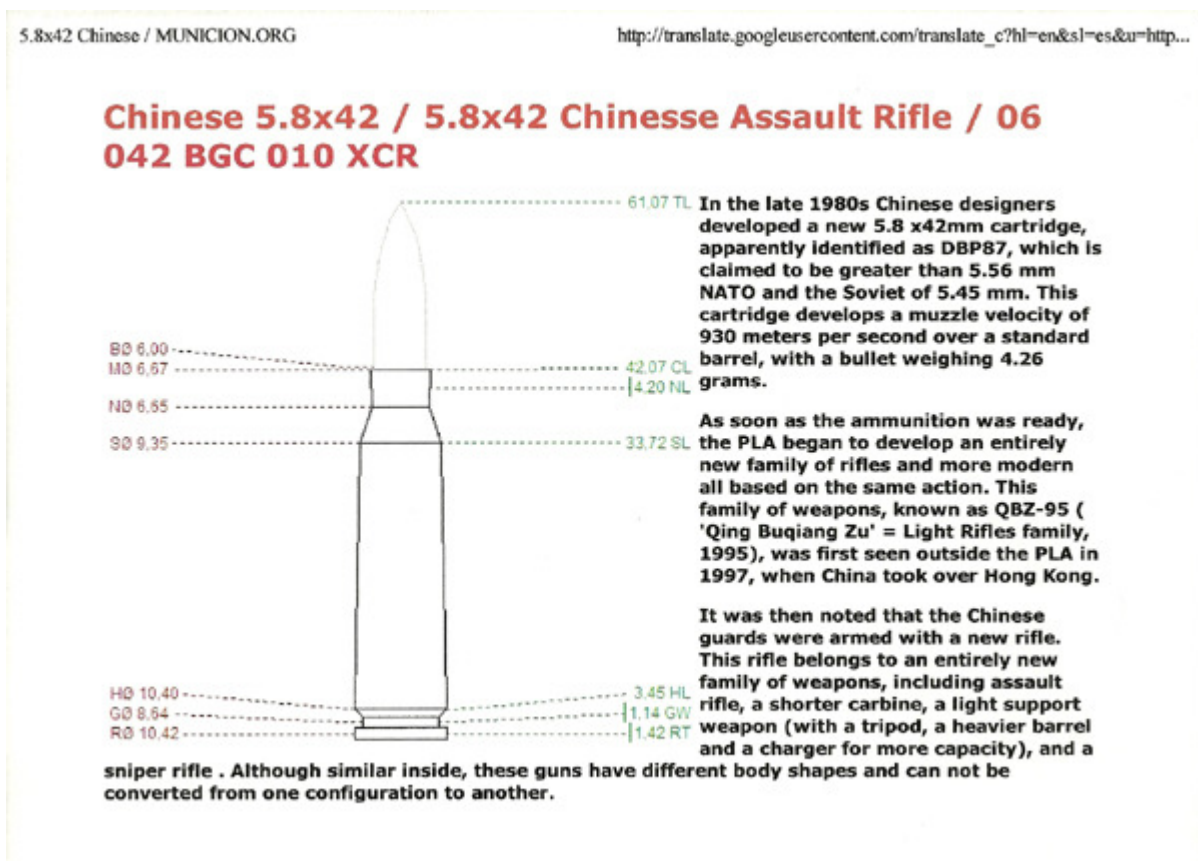
- Performance better than the 5.56x45mm (.223) = PASS
- Accuracy = PASS
- Larger caliber = PASS
- Velocity = PASS
- Magazine capacity = PASS
- Remain within the restrictions of the AR-15/M-16 platform = PASS

A 90gr. bullet would be the maximum. The 95-100-105gr bullets will diminish velocity and degrade the cartridge performance resulting in GOAL FAILURE.

High velocities cannot be achieved with 100gr bullets while staying within the platform parameters.

Rifling twist needs to be developed for the 87gr (90gr max).

** This cartridge is not intended to compete with the 6.8 SPC or the 6.5 Grendel. However, my belief is that the military will never adopt either cartridge. Rather, my intent was to find a cartridge that surpasses the lethality of the 5.56 NATO for combat operations and can compete with the 5.8x42mm (Chinese).**



My 6.2x42mm OCC is still in its basic design stage and needs further development. Neck length may need to be altered depending on various bullet weights. However untested, I believe the cartridge has potential as a replacement for the 5.56 NATO round. Brass will be needed, as existing cases are not available in sufficient numbers. Given its military heritage, this round is not designed as a benchrest or a hunting cartridge. It was originally designed as a military round, and its purpose is STILL that of a military round.

Cartridge Designation

Caliber

.243 - standard in inches-hunting cartridge-not designing hunting cartridge =FAIL
6mm - too many 6mm - does not stand apart = FAIL
6.17mm - .17 sounds weak - too long - just does not sound good = FAIL
6.2mm - shorter - rounded up - bolder = PASS

NAME

5.56x45 (.223) - no name, but designed long ago
6.5 Grendel - Beowulf - poem - film
6.2 Chupacabra = silly = FAIL = No NAME

Acronym

5.56x45 (.223) - no acronym
6.8SPC - special purpose cartridge - special purpose = good

C = Cartridge

I = Intermediate = FAIL

G = General = FAIL

A = Assault - 5.56 - 7.62x39 - 5.45x39 = assault rifle = too strong = FAIL

B = Battle - 7.62x51 - 7.62x54 - 7.62x63 = battle rifle = too old = FAIL

What do both assault and battle have in common? Assault+battle=**COMBAT**=Pass

CC= Combat Cartridge = 6.2mm CC - mm&cc = confusing = close

What is the 3rd acronym? _CC ?

What defines this cartridge ?

What defines its purpose ? **OPTIMUM**

Merriam-Webster - Optimum: Greatest degree attained or attainable under implied or specified conditions.

OCC = Optimum Combat Cartridge = PASS

6.2x42mm OCC

6.2mm OCC

6.2 OCC



The prototype 6.2mm OCC cartridge.
COAL = 2.250in / 57.15mm



6mm SAW (left) and the 6.2mm OCC.



6mm/.243 (L-R) Sierra 70gr MK, Sierra 85gr HPBT, Sierra 90gr FMJBT, Hornady 87gr BTHP, Berger 90gr Match Target, 6.2mm OCC with Sierra 90gr FMJBT.



6.2mm OCC (left) with 5.56 NATO



(L-R) 6.8 SPC, 6.5 Grendel, 5.56 NATO, and 6.2 OCC.



(L-R) 7.62x39mm, 6.8 SPC, 6.5 Grendel, 6.2 OCC, 5.56 NATO, and 5.45x39mm



As you can see, the round will properly engage the feed lips of a Magpul P-mag and shows adequate clearance at the nose of the bullet.



Left image shows two 6.2mm OCC rounds beneath a 5.56mm cartridge with adequate clearance in a GI metal magazine.

Right image shows two 6.2mm OCC rounds loaded above twenty eight 5.56 rounds. The 6.2mm OCC will not dislodge or accidentally eject under max pressure of a fully loaded magazine.

Efforts were made to dislodge rounds loaded in the magazine by dropping, impact, shaking, etc. Cartridges would not work loose from magazine unintentionally.

6.2mm OCC

