6.5mm Grendel

- **Type**: Rifle
- **Place of origin**: United States
- **Production history**
  - **Designer**: Bill Alexander and Janne Pohjoispää
  - **Designed**: 2003[1]

### Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>6.5mm Grendel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent case</strong></td>
<td>.220 Russian</td>
</tr>
<tr>
<td><strong>Case type</strong></td>
<td>Rimless, bottleneck</td>
</tr>
<tr>
<td><strong>Bullet diameter</strong></td>
<td>6.71 mm (0.264 in)</td>
</tr>
<tr>
<td><strong>Neck diameter</strong></td>
<td>7.44 mm (0.293 in)</td>
</tr>
<tr>
<td><strong>Shoulder diameter</strong></td>
<td>10.87 mm (0.428 in)</td>
</tr>
<tr>
<td><strong>Base diameter</strong></td>
<td>11.15 mm (0.439 in)</td>
</tr>
<tr>
<td><strong>Rim diameter</strong></td>
<td>11.2 mm (0.44 in)</td>
</tr>
<tr>
<td><strong>Rim thickness</strong></td>
<td>1.5 mm (0.059 in)</td>
</tr>
<tr>
<td><strong>Case length</strong></td>
<td>38.7 mm (1.52 in)</td>
</tr>
<tr>
<td><strong>Overall length</strong></td>
<td>57.5 mm (2.26 in)</td>
</tr>
<tr>
<td><strong>Rifling twist</strong></td>
<td>1 in 8” or 1 in 9”</td>
</tr>
<tr>
<td><strong>Primer type</strong></td>
<td>Small rifle</td>
</tr>
</tbody>
</table>

### Ballistic performance

<table>
<thead>
<tr>
<th>Bullet weight/type</th>
<th>Velocity</th>
<th>Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 gr (6 g) Speer TNT</td>
<td>2,880 ft/s (880 m/s)</td>
<td>1,658 ft·lbf (2,248 J)</td>
</tr>
<tr>
<td>120 gr (8 g) Norma FMJBT</td>
<td>2,700 ft/s (820 m/s)</td>
<td>1,942 ft·lbf (2,633 J)</td>
</tr>
<tr>
<td>123 gr (8 g) Sierra Matchking</td>
<td>2,650 ft/s (810 m/s)</td>
<td>1,917 ft·lbf (2,599 J)</td>
</tr>
<tr>
<td>130 gr (8 g) Norma</td>
<td>2,510 ft/s (770 m/s)</td>
<td>1,818 ft·lbf (2,465 J)</td>
</tr>
<tr>
<td>108 gr (7 g) Scenar (moly)</td>
<td>2,790 ft/s (850 m/s)</td>
<td>1,866 ft·lbf (2,530 J)</td>
</tr>
</tbody>
</table>

Test barrel length: 24 inches

Source(s): Alexander Arms Pressure-safe Load Data[2]
The **6.5mm Grendel** (6.5×39mm) is an intermediate cartridge designed by Bill Alexander and Janne Pohjoispää as a low recoil, high accuracy, 200-800 yard cartridge specifically for the AR-15 platform. Since its introduction it has proven to be a versatile design and is now expanding out into other platforms including bolt action rifles and the Kalashnikov system.

The name "6.5mm Grendel" was a trademark owned by Alexander Arms until it was legally released to allow the cartridge to become SAAMI standardized. The release of the trademark removes the requirement of manufacturers to seek the permission of the trademark holder to use the mark.

**Development and history**

The 6.5mm Grendel design goal was to create an effective 200-800 yard AR-15 magazine length loaded cartridge for the AR-15 platform that surpassed the performance of the native 5.56 NATO / 223 Remington cartridge. Constrained by the length of the 5.56 mm NATO round, the Grendel designers decided to use a shorter, larger diameter case for higher powder volume while allowing space for long, streamlined, high ballistic coefficient (BC) bullets. Firing factory loaded ammunition loaded with bullets ranging from 90 to 129 grains (5.8–8.4 g), its muzzle velocity ranges from 2,500 ft/s (760 m/s) with 129- and 130-grain (8.4 g) bullets to 2,900 ft/s (880 m/s) with 90 gr (5.8 g) bullets (similar in velocity to a 5.56 mm 77-grain (5.0 g) round).

The case head diameter of the Grendel is the same as that of the parent case the .220 Russian, the 7.62×39mm, and PPC cases. This is larger than the 5.56×45mm NATO, thereby necessitating the use of a non-standard AR-15 bolt. The increased case diameter results in a small reduction in the capacity of standard size M16/AR15 magazines. A Grendel magazine with the same dimensions as a STANAG 30-round 5.56 magazine will hold 26 rounds of 6.5mm ammunition.

**Timeline**

- 1943: The Soviets develop and adopt the 7.62×39mm M43 cartridge and begin to field it.
- Late 1950s: The .220 Russian hunting cartridge is developed based upon the military 7.62×39mm M43 design.
- 1984: Drs. Louis Palmisano and William B. Davis, PhD, develop the 6.5mm PPC from the .220 Russian for the US Shooting Team for use in bolt action rifles in the 1986 world championships. While performance was exceptional, the US Shooting Team stays with 6mm. The 6.5mm PPC is shelved and never seen again, although Dr. Louis Palmisano believes the 6.5mm PPC could be a formidable competition cartridge with new sub-100 grain bullets.
• 1998: Arne Brennan, a competition shooter and founder of competitionshooting.com, designs and orders 6.5 PPC reamer from JGS Tool optimized for AR-15 magazine length after conducting extensive theoretical study of multiple calibers and cartridge cases.

• 2000: Arne Brennan, after thousands of rounds of testing 6.5 PPC, compares notes with Dr Louis Palmisano (creator of the 22 and 6mm PPC cartridges).

• Early 2002: Bill Alexander, a well respected engineer who worked for the British Ministry of Defense and designer of the .224 BOZ, .499 L-W and .50 Beowulf cartridges, begins research on developing a 6.5mm Intermediate cartridge specifically for the AR-15. Eventually the 6.5mm PPC caught his attention as it would fit his existing high strength .50 Beowulf bolt. So he machined a solid brass 6.5mm PPC dummy round to ponder over. It seemed like a fantastic cartridge which was small enough to double-stack in an AR-15 size magazine.

• July 2002: Noted American firearms journalist David M. Fortier and Bill Alexander share ideas for a 6.5mm Intermediate cartridge. Fortier shares his idea for a 7.62x39mm based cartridge for use in the Kalashnikov system. He shelves his idea though when Alexander shares what he is working on for the AR-15 platform.

• August 2002: Arne Brennan and Bill Alexander are introduced by a mutual acquaintance at Lothar Walther USA.

• January 2003: Janne Pohjoispää, a noted engineer working for Lapua, and Bill Alexander begin working together on designing and finalizing what would become the 6.5mm Grendel cartridge. Pohjoispää shelves basing it on the PPC as Lapua is already producing .220 Russian brass. He redesigns it using Lapua's .220 Russian case as the starting point. The two bounce ideas off each other and finalize the cartridge. The end result is noticeably different than Brennan/Alexander's original 6.5mm PPC based design. The new design features a relocated shoulder, increased case capacity and a thicker neck for increased case life in auto-loading rifles.

• November 2003: Alexander Arms pays for the cartridge tooling and places an initial order for 50,000 brass cases.

• November 2003: JGS produces the first reamer for the new cartridge.

• January 2004: Alexander Arms officially introduces their new cartridge, dubbed the 6.5mm Grendel, at the SHOT Show. They introduce both a line of rifles and ammunition.

• May 2006: Independent ballistic gelatin testing completed for 90 gr (5.8 g) TNT, 120 grains (7.8 g) Norma, 120 gr (7.8 g) SMK, and 123 grains (8.0 g) SMK prototype.

• Aug 2006: Pressure safe loading data is published for AR platforms with 14.5- to 28.0-inch (370–710 mm) barrels.

• Feb 2007: Production Wolf brand ammunition becomes available. Wolf Performance Ammunition becomes a vocal supporter of the cartridge and introduces both a 123 grain Soft Point and 120 grain Multi Purpose Tactical HPBT in their brass cased Gold line.

• Nov 2009: Hornady teams with Alexander Arms to produce 6.5mm Grendel ammunition, cartridge cases and dedicated projectiles. They introduce a 123 grain AMAX load which quickly gains a reputation for excellent accuracy.

• Early 2011: Barnaul of Russia begins development of a 110 grain FMJ-BT load using steel cartridge cases. Preproduction cases are delivered for testing in the fall of 2011.

• February 2012: Molot of Russia begins production of 6.5mm Grendel AK rifles in their Vepr line.[citation needed]
Performance

Proponents assert that the Grendel is an ideal middle ground between the 5.56 mm NATO and the 7.62 mm NATO, taking the best attributes of each. It has a flatter trajectory and retains greater terminal energy at extended ranges than either of these cartridges due to its higher ballistic coefficient.[1]

External ballistics

![Muzzle Velocity Change with Bullet Weight](image)

<table>
<thead>
<tr>
<th>Bullet velocity: 20 inch (508 mm) barrel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bullet mass</strong></td>
</tr>
<tr>
<td><strong>gr</strong></td>
</tr>
<tr>
<td>Lapua Scenar</td>
</tr>
<tr>
<td>Lapua Scenar</td>
</tr>
<tr>
<td>Lapua FMJBT</td>
</tr>
</tbody>
</table>

As noted above, the Grendel case is very closely related to the .220 Russian case. When sufficient load data was made available, a thorough study of the Grendel case, which constitutes a precisely dimensioned combustion chamber when the round is chambered, was done with the following results. In general, each additional grain of bullet weight will reduce muzzle velocity by 10 ft/s (47 m/s for each gram) and each additional inch of barrel length will increase muzzle velocity by 20 ft/s (2.4 m/s for each centimeter). Therefore, a handy rule of thumb is "one inch of barrel length equals two grains of bullet weight (1 mm → 5 mg)". Specific details are available as graphs derived from Alexander Arms' public domain load table linked below.

Sporting uses

The cartridge developer, Bill Alexander, has been quoted as saying he was looking for a cartridge with "more legs" (i.e. longer effective range) than the .50 Beowulf so that it could be used for white tail deer hunting.[1] But its original marketing for military and police usage created skepticism about its suitability for hunting. Despite this there has been critical acknowledgement that it is sufficient for CXP2 class game such as deer.[1] Its manufacturer is more enthusiastic, saying that it has "flat trajectories and bullets well-suited to deer and varmints".[1] A neutral viewpoint is the acknowledgement that it is similar to proven deer cartridges such as the .30-30 Winchester, .257 Roberts and .243 Winchester but is not in the same class as the .270 Winchester nor the 30-06.[4]
References


Bibliography

• Shooting Times, February 2005, "Cooking up Loads for the 6.5mm Grendel," David Fortier, p. 52-56.
• Shooting Illustrated, September 2005, "6.5mm Grendel and Alexander Arms," J. Guthrie, p. 34-37, 67-69.
• Shooting Times, January 2007, "Other AR Chamberings," Sidebar Article, David Fortier, p. 56.
• Special Weapons for Military & Police #52, Spring 2007, "BETTER-IDEA 6.5mm GRENDEL," Stan Crist

External links

• http://www.alexanderarms.com/
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