# Notes on 338 Lapua Magnum Chamber
# Per *The Well Guided Bullet* Concepts

By James A. Boatright

## Introduction

These notes are given as custom modifications to the chambering reamer specification drawing for a CIP-standard, 338 Lapua Magnum chamber supplied by Dave Kiff of ***Pacific Tool and Gauge Company*** (Sheet 44-338; Print #462, Dated 12/17/2001). Drawings of both the original CIP-standard chamber and my modified chamber are attached. The letter designations for the various reamer dimensions seem to be unique to this standardized chamber drawing. My custom chamber design is specialized for long-range target shooting using carefully developed handloads with bullets seated out into contact the rifling. The chamber is designed for non-neck-turned ***Lapua*** brass and ***Sierra*** 300gr ***MatchKing*** (SMK) bullets. The assumed bore and groove dimensions for the barrel to be chambered are those of a cut-rifled ***Krieger***, 10-inch twist, match-grade, stainless-steel barrel blank. The loaded cartridge over-all length (OAL) is to be **3.840-inch**. The "trim-to" case length is **2.717-inch**, based on a maximum allowable case length of **2.727-inch**.

## Cartridge body area of chamber

Retain the **2.2797-inch** minimum headspace dimension (**u**) to a reference diameter of **0.4550-inch** (**aa**) on a **20-degree** shoulder (**w**). Specify a maximum headspace (**t**) of **2.2847-inch**, or **0.0050-inch** over minimum.

Reduce the case head diameter (**x**) to **0.5880-inch** to fit the Lapua brass with a better diameter clearance of **0.0030-inch** (instead of **0.0067-inch**) for the un-fired cases. The corresponding body taper reduces to **0.1984 inches per 20 inches**.

The body length dimension (**v**) figures to be **2.1578-inch**.

The neck diameters will be **0.3690-inch** at each end of the neck (**g** and **h**). This will provide a diametral clearance of about **0.0010-inch** when un-turned ***Lapua*** brass is loaded with 300gr ***Sierra*** MatchKing bullets. The neck taper is as near to **0.000-inch per 20 inches** as is practical.

At minimum headspace (**0.0000-inch**), the distance (**s**) to the bottom of the neck figures to be **2.3925-inch**.

The case length chamber cut (**r**, based on a maximum installed chamber headspace of **+0.0010-inch**) should be significantly reduced to **2.7270-inch** (from **2.7342-inch**) to better match the actual lengths of unfired ***Lapua*** cases. The "Trim-to Length" should be taken to be **2.7170-inches**. The massive bolt of the ***Surgeon Rifles XL*** action to be used should not set back enough to stretch the ***Lapua*** brass cases permanently with each firing.

## Throat dimensions

The ball seat diameters at each end (**e** and **f**) will be held closely to a minimum of **0.3382 inches** for these 300gr ***Sierra MatchKing*** (SMK) bullets, which run from **0.3381** to

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**0.3382 inch** maximum body diameter measurements. Either *zero* taper or a *very slight* taper from some (**f**) dimension down to this minimum **0.3382-inch** (**e**) dimension is desired. This ball seat dimension should result in barely removing the rifling lands in a ***Krieger*** cut-rifled barrel. By ***not*** cutting a tapered shoulder at the throat angle on the front end of an oversized ball seat into the solid stainless steel of the blank, we hope to control the increase in "bullet start force" required, that would otherwise produce higher peak chamber pressures with our recommended steeper throat angles.

The "nasty gap" at the end of the case neck will taper at the standard **45-degrees** from neck diameter to ball seat diameter (**f**) and will axially span **0.0154 inches**. So, dimension (**q**) figures to be **2.7424-inch** at minimum headspace.

The intended cartridge OAL is **3.840 inches**. The start of the boat-tail on the 300gr SMK bullet will be placed at approximately the junction of the case neck and shoulder. The *leade length*, or *ball seat length* (**b**), needs to be **0.3280 inches** for this bullet seating depth. The corresponding dimension (**a**) is **0.3126 inches** (or **0.0154-inch** less), and dimension (**p**) is **3.0450 inches** at minimum (**0.000-inch**) headspace.

A throat angle of **4.0-degrees** seems to match the secant ogive of these 300gr SMK bullets in the expected **0.3300-by-0.3382-inch** barrel rifling. This throat angle can also be expressed as a taper of **1.3985-inch per 20 inches**, and needs **0.0729-inch** of axial length to taper from the ball seat diameter (**0.3382-inch**) to a minor cutting diameter of **0.328-inch** for the reamer.

The bolt-face-to-end-of-throat dimension (**o**) calculates to **3.1179-inch**, and the neck-and-shoulders dimension (**n**) should be **0.5692-inch**. This reamer should accept any of the standard .338-caliber live pilots with enough undercutting to allow good coolant flow.

A **4.0-degree** by **0.3382-inch** major diameter throat *polishing hob* should also be provided so as to accept the same live pilot bushings mentioned above. It works well to install the burnishing surface about **0.5-inch** behind the pilot bushing. If need be, the polishing surface can be re-cut many times, working farther backward from the pilot. ***NECO-LAP*** **1200 grit** Polish seems to work well, requiring about three applications to polish up a throat.

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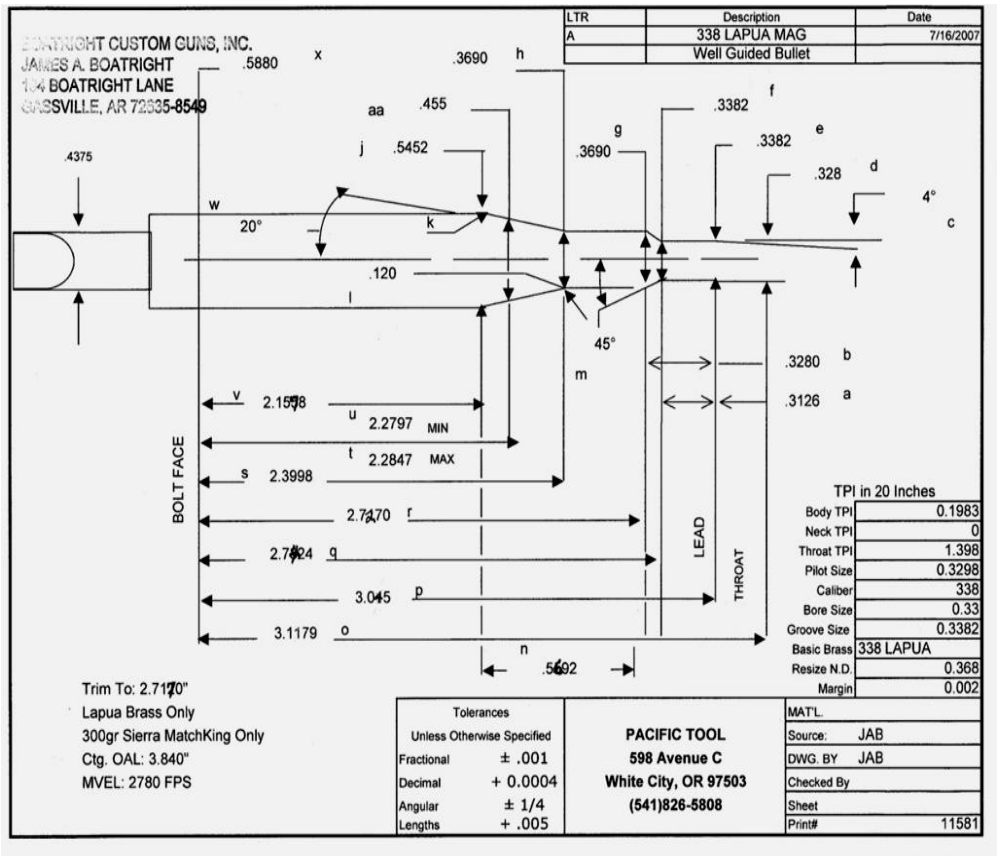


**Notes:** Dimensions **n**, **q, r,** and the "**Trim-to**" Length were each increased by **0.010-inch** after experience with the first two rifles chambered with this reamer. As of Sept 16, 2009, the dimensions are to be:

**n = 0.5692 inch**

**q = 2.7424 inch**

**r = 2.7270 inch, and**

**Trim-to Length = 2.7170 inch**.

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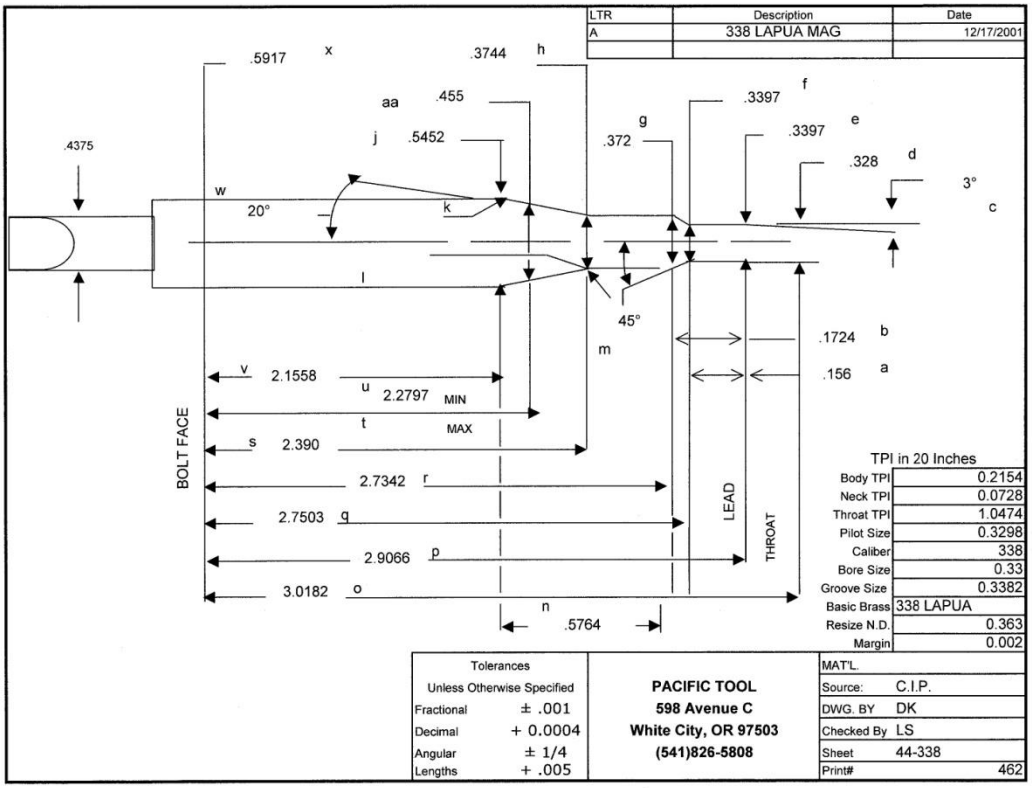


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