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TECHNICAL NOTE 60: MEASURING HEADSPACE

BACKGROUND: Measurement of a firearm's headspace is a key technical inspection and has profound implications for the safety and durability of a firearm. The measurement technique itself is, oddly enough, so simple that it is frequently performed incorrectly. The purpose of this technical note is to provide facts and instructions for performing correct headspace checks.

FACTS:

1. Headspace is defined as *minimum and maximum acceptable dimensions from the locked breech of a firearm to some poin; either a contact surface or designated datum in the rifle chamber or to the rear of the barrel*. Headspace ranges are established by industry advisory bodies, government bodies, or by individual manufacturers. The measurement points and dimensions chosen depend on the particular cartridge case used and its design (rimmed, rimless, semi-rimmed, or belted). In a narrow sense, headspace is the size of the cartridge chamber designed to accept a particular cartridge. In a broader sense, the characteristics of the firearm design must be considered when defining headspace.

2. A headspace gage is a precision-made device that measures the headspace of a firearm. It is normally cylindrical in shape, but depending on the design may resemble a washer or even a small plate. It's key dimensions are based on industry standards or, more appropriately, industry standards that are adjusted to suit the characteristics of the firearm and ammunition being tested. These considerations guide the design of the *headspace gage.*

Because of normal dimensional variations (tolerances) in both the firearm and the ammunition, an acceptable *headspace range* for a firearm is established, and *minimum* and *maximum* gages are produced. The minimum headspace gage is often referred to as a *go* gage, and verifies that the chamber being measured is *at least* large enough for the intended cartridge. The *maximum* headspace gage is often referred to as a *no-go* gage, and if accepted by the firearm verifies that the chamber being measured is *too large* for safety. Other gages may be produced at dimensions between the minimum and maximum dimensions to allow other considerations to be tested such as remaining barrel life for a particular purpose (i.e "overseas deployment" or "field reject").

Successful use of the gage requires proper techniques that assure that the gage is not damaged and provides a proper reading.

3. Proper use of the headspace gage.

a. Clean all measurement surfaces, i.e. the gage, the bolt face, and the chamber (rimless cartridges) or the rear of the barrel (rimmed cartridges). Sand and grit in the chamber may damage both the firearm and the gage. If the gage is damaged, all subsequent checks will be suspect.

b. Insert the gage into the chamber with light force. Avoid feeding it into the firearm through the feed mechanism. Any contact that can damage the gage must be avoided.

c. Attempt to *gently* close the bolt. This will normally require eliminating contact between the ejector and/or extractor and the gage. This contact should be prevented by removing the extractor and ejector or by designing or modifying the gage so that there can be no contact between the gage and those parts. Failure to eliminate this contact may cause erroneous measurements or damage to the gage. The bolt should close on light finger pressure. In no case should the action be allowed to slam closed on the gage.

Test with the go gage first. If the go gage won't enter chamber, the longer no-go gage obviously will not.

d. Attempt to determine why the firearm failed, and tag or repair the firearm.

4. Calibration. Gages must be periodically *calibrated* to assure that they remain accurate. Successful calibration requires either periodic measurement with precise tools, or replacement of the gages themselves if that proves more economical.

5. Misconceptions:

There are a number of popular misconceptions concerning headspace, notably that the tighter the headspace, the better, that loose headspace is dangerous, and that one particular dimension is best. None of these common beliefs is totally true.

Insufficient (excessively tight) headspace tends to cause malfunctions such as failure to lock. It often makes extraction difficult and can cause dangerous stresses on the mechanism that shorten its life expectancy or lead to failure. Excessive headspace may lead to gas leakage around the case or head separation and the sudden release of high-pressure gas. Most shooters fear excessive headspace, but it is actually insufficient headspace that is more dangerous. A good firearm and cartridge case design can actually tolerate a great deal of excess headspace.

While a fairly wide range of dimensions work, manufacturers normally narrow their tolerances to conservative ranges that allow a reasonable combination of safety, reliable function, accuracy, and useful life.