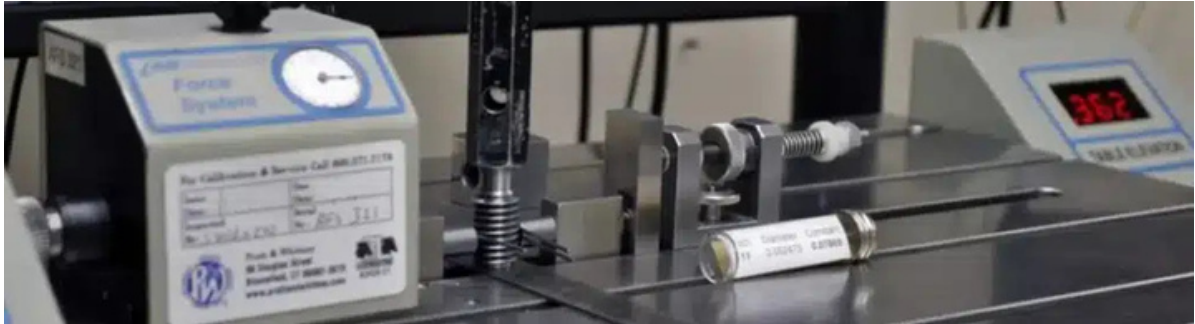


What to Know Before Buying a Thread Gage



Thread gages are essential tools for inspecting threaded components, ensuring parts meet precise specifications. Whether used in a high-precision metrology lab or a rugged shop floor, selecting the correct thread gage depends on a few key factors. Overlooking these considerations can lead to costly quality issues, production delays, or even safety risks. This guide is designed to help you confidently choose the right thread gage by outlining the main types, key standards, accuracy considerations, and maintenance best practices. For more in depth information, we have a full writeup on some common mistakes to avoid when using thread gages. There are several types of thread gages available, each designed for specific applications. We'll break them down into groups by function, specification, accuracy/fit, and material.

Thread Gage Types

Thread gages can be broken down into categories based on their function, these include thread plug gages, thread ring gages, thread depth gages, and even other tools like thread measurement wires. Most thread plug, ring, and depth gages are considered attribute gages — also known as fixed-limit gages — because they test parts based on a binary Go/No-Go decision, with no digital or dial readout. Here's a quick breakdown of each thread gage type.

Thread Plug Gages

Used to inspect internal (female) threads

- **Working Plugs:** Working gages are used to inspect parts. These are the most commonly seen plugs and are often used as a Go and No Go set. The Go gage checks the lower limit of Major Diameter and Pitch Diameter where the No Go checks the upper limit of pitch diameter. Certain types of threads have a different gaging process, which we will explain later.
- **Set Plugs:** Set plug gages are used to calibrate and adjust thread ring gages. Their Pitch Diameters are set to the nominal of the thread ring and are different dimensions than "Working" plugs. Set Plugs have a truncated portion set to the nominal Pitch Diameter and then a full form used to ensure that Major Diameter is still in specification after a ring has been adjusted. Set Plugs should not be used for inspecting product!

What to Know Before Buying a Thread Gage

- **Tapered and Specialty Gages:** Most tapered thread gages do not use a Go/No Go configuration, but rather have specific types of gages for their unique applications. Examples of these would be NPT & NPTF, Luer, and API gages.

Thread Ring Gages

Used to inspect external (male) threads.

- **Working Ring Gages:** Just like working plugs, thread ring gages are used to inspect parts to ensure conformance.
- **Wear Check Rings:** Wear Check rings are used to verify working plug gages. These are a great option for high volume thread gaging applications as they make sure that plugs are in specification. They are easier to use than other devices like Thread Wires and Optical Comparators and also address all components of the gage such as Pitch Diameter, Flank Angles, Lead Angle, and Pitch.
- **Tapered and Speciality Rings:** Like their tapered plug counterparts, these ring gages are used to check size and taper angle of tapered threaded parts for specific applications.

Thread Depth Gages

Used to measure the depth of threaded holes, ensuring they meet specified requirements.

- **Standard Depth Gages:** Feature depth notches or grooves on plug gages to indicate minimum or maximum thread depth. These visual cues help verify that the thread depth meets design specifications.
- **Combination Thread & Depth Gages:** Some tools allow simultaneous measurement of thread size and depth in one operation, enhancing efficiency and reducing the need for multiple tools.
- **Digital Thread Depth Gages:** Provide precise digital readouts of thread depth, often with resolutions as fine as 0.01mm. Some models, combine thread size verification with depth measurement in a single instrument, streamlining the inspection process.

Other Thread Measuring Tools

- **Thread Measuring Wires:** Used with micrometers to measure pitch diameter of external threads precisely. Ideal for setup or calibration labs.
- **Thread Micrometers:** Thread Micrometers can be a great option for high volume thread inspection where using wires is too cumbersome.
- **Thread Comparators:** Thread Comparators typically use either wires or rolls for actual Pitch Diameter measurement. This can be great for process control or applications where a measured value is required.

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Thread Gage Standards

Different industries and applications require adherence to specific thread standards. Selecting the right gage means understanding which thread form you're working with. Here are some of the most common standards used in the United States.

- **Unified National Thread (UNC/UNF/UNJ):** Common U.S. thread forms for general industrial or aerospace use.
- **ISO Metric Thread:** Widely used internationally in machinery and automotive applications.
- **NPT/NPTF:** Tapered threads used for pressure-tight seals in piping and fluid systems.
- **BSPT/BSPP:** British standards often used in European and Asian piping systems.
- **API Threads:** Specialized forms used in petroleum, energy, and extraction industries.
- **Acme and Trapezoidal Threads:** Found in high-load, linear motion systems like vises or jacks.

Thread Gage Class and Accuracy

Thread gage classes define how tight or loose a thread fit should be. It's important to note that these classes correspond to specific standards, primarily AGD/ASME for imperial (inch) threads and ISO for metric threads.

AGD/ASME (Imperial) Classes:

The most common classes in the U.S. are 2A/2B for standard fits and 3A/3B for precision fits. The letter A refers to external threads (e.g., bolts) and B refers to internal threads (e.g., nuts or tapped holes).

- 2A / 2B – Standard fit; allows for easier assembly and is common in general-purpose applications.
- 3A / 3B – Precision fit; tighter tolerances for high-performance or critical assemblies, such as in aerospace or instrumentation.

ISO (Metric) Classes:

For metric threads, the most common classes are 6g and 6H.

- 6g – Standard tolerance for external threads, ensuring a medium-quality fit.
- 6H – Standard tolerance for internal threads, also providing a medium-quality fit.

Always match your gage class to the thread class on your part print to ensure proper inspection.

Thread Gage Material and Durability

Gage longevity depends on the material and application environment.

- **Tool Steel:** Most common; good wear resistance and cost-effective

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- **Chrome:** Chrome plating provides a harder surface on top of the gage body to add life. Many gage makers will add plating to the high side of the tolerance to extend the wear life further.
- **Titanium Nitride:** Titanium Nitride coating is commonly used in gaging applications for aluminum parts. The TiN coating adds lubricity which helps to prevent the gage from sticking. This gives the user a better feel and also prevents the gage from becoming stuck in the part.
- **Carbide-Tipped or Full Carbide:** For high-volume or abrasive applications; longer lifespan and better wear performance.

Thread Gage Calibration, Maintenance, and Storage

Gages should be regularly cleaned and calibrated, usually based on the level of usage.

- **Calibration:** Gages should be calibrated and traceable to national standards (e.g., NIST). Consider gages with traceable certification for critical use. Cross Company has several calibration laboratories throughout our network that hold ISO 17025 accreditation for the calibration of thread plugs and thread gages. In addition, we maintain a full library of API thread gage standards.
- **Cleaning and Maintenance:** Regular visual inspections for nicks or wear are recommended, especially in high-usage situations. To maximize accuracy and extend the life of your thread gages, clean them after each use to remove cutting oils, metal chips, and debris that could cause premature wear. Wipe the thread gage with non-abrasive lint-free cloth or use a soft brush to dislodge more stubborn debris. Alcohol can be used to break down greases and oils allowing them to be removed from the steel surface. Avoid harsh solvents and cleaning agents that could damage protective coatings. Apply a coating of light oil after cleaning to lubricate the threads during use and to protect the thread gage from surface rust during storage.
- **Storage:** It's recommended that thread gages be stored in protective cases to avoid dents, chips, or rust. Expect your threads to come back from calibration coated in wax in order to prevent damage. Also, something to keep in mind is temperature controlled storage. If a gage standard is stored in a different environment than the test subject, a sufficient amount of time to acclimate is required to ensure proper measurements. Check out our writeup on thermal expansion.