How to Properly Use Go/NoGo Thread Ring Gages to Check External Threads

by Larry Borowski

I am periodically asked if we have any type of written procedure or technical paper that addresses proper use of Go/NoGo thread rings. My answer is always, no, so I felt it is time to develop something. The procedure appears to be fairly fundamental, because the gages are called "Go" and "NoGo" which are not difficult terms or concepts to understand. However, when one is unfamiliar with the use of these gages, question like "does the Go ring just have to go onto the bolt a couple of turns?" or, "what if the NoGo ring gage goes on a couple of turns?" I'm hoping to clarify these type of questions by the end of this short article.

Let's start with the Go thread ring. Whether you are using an adjustable Go thread ring or a solid Go thread ring the rules are the same. Go thread rings are intended to check the maximum material limits of the fastener to make sure the thread is not oversized. An oversized screw or bolt thread can cause assembly problems, including binding and locking up in the mating internal thread, whether it is a nut or a tapped hole. In order to inspect a bolt for this maximum material limit, a calibrated Go thread ring should be used. ASME B1.2, section 5.1.1 states: The Go thread ring gage inspects the maximum-material Go functional limit of product external thread……and its purpose is to assure the interchangeable assembly of maximum-material mating parts.

Now that we have an understanding of why we use the Go thread ring gage, we need to understand how. Once again, pulling from ASME B1.2, section 5.1.1 states: The product thread must freely enter the Go thread ring gage for the entire length of the threaded portion. What this means is that if you have a partially threaded 4 inch long bolt with 3 inches of thread, the Go thread ring must freely pass along the entire 3 inches of thread. Likewise if you have a fully threaded 2 inch long bolt, the Go ring gage must freely pass the entire thread length, which means it might stop up against the head of the bolt depending on the chamfer of the ring gage threads, and the runnout of the product threads. The term "Freely enter", can be subjective as all people are built differently, and those with larger, stronger hands might find it easier to turn objects than those with smaller hands. Either way, freely still means freely, without forcing, cranking, or other similar terms to indicate more than a free spin. There are other standards that deal with manufacturing issues with externally threaded fasteners such as nicks or excessive plating buildup, and assign a minimum torque requirement to the fit of a Go ring gage over a product thread. That is a topic for another time.

Another question that comes up is whether the thread ring should be threaded onto the product thread, or the product thread should be turned into the thread ring. This is simply a matter of preference and even the size of the thread, but it does not matter whether you hold onto the ring gage and thread the bolt in, or hold onto the bolt and spin the ring gage on. Personally, I find it easier and faster to hold the bolt, and spin the ring gage on. Inertia will typically take the ring gage quite a way up the bolt thread with a good hard spin.

NoGo or Not Go thread ring gages have some not so straight forward rules. You would think that since the name of the gage is NoGo, that it should not even start to go onto the bolt threads. For practical reasons, this is not the case. Also, not all standards actually agree on how far the NoGo thread ring should be allowed to go onto a screw or bolt thread.

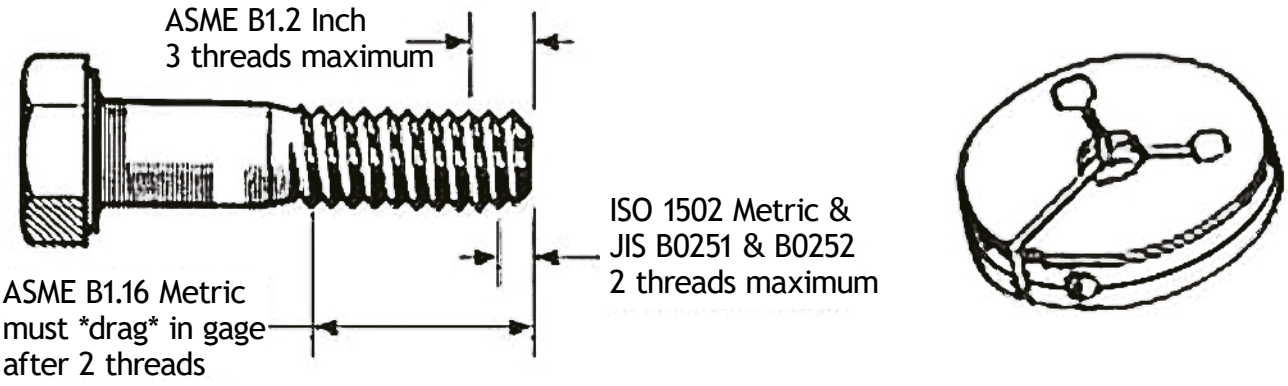
We will start by understanding the purpose of the NoGo thread ring gage. The NoGo thread ring gages inspect the Not Go functional diameter limit of a screw or bolt. This means that it makes sure that the screw or bolt is not undersized. Undersized screws and bolts can cause stripping of the threads and weakness of the bolted joint. ASME B1.2, section 5.2.1 states: The Not Go thread ring gage inspects the Not Go functional diameter limit of the product external thread.

This is where things start to get confusing because not all of our standards agree to how far the NoGo thread ring gage should be allowed to thread onto the external thread. Here are some excerpts from the various standards that cover this gaging practice:

- ASME B1.2, section 5.2.1 states: Not Go (LO) functional diameter is acceptable when the Not Go (LO) thread ring gage applied to the product external thread does not pass over the thread more than three complete turns. The gage should not be forced.
- ASME B1.16M, section 5.2.1 states: LO functional diameter limit is acceptable when the LO thread ring gage is applied the product external thread if:

  (a) it is not entered: or

  (b) all complete product threads enter, provided that a definite drag from contact with the product material results on or before the second turn of entry. The gage shall not be forced after the drag is definite.
- ISO 1502, section 7.1.9, b) states: A Not Go screw ring gauge, when screwed by hand without using excess force on the work piece thread, may enter on both sides of nut not more than two turns of the thread.
- JIS 0251 and B0252, section 7 states: ….the not-go thread can not be screwed two revolutions or more…



So the information we have from the standards referencing the rules for NoGo thread ring gages on external threads range from The NoGo ring stopping after 2 turns to allowing the Nogo thread ring gage to pass completely over all the threads only if a definite drag is felt. What are we to do with this information, and what happens when two gages provide different results?

If two gages provide different results, the first step is to make sure both gages are properly calibrated. If after finding the calibration on both is current and valid, and they still differ, ASME B1.2 addresses this by stating: It is possible that two individual limit gages of the same type be at opposite extremes of the gage tolerances permitted, and the borderline product threads accepted by one could be rejected by another. For this reason, a product screw thread is considered acceptable when it passes a test by any of the permissible gages in ASME B1.3 for the gaging system specified…

Now we still have to address the inconsistency among the standards. At the end of the day, everyone is making and inspecting product to different standards, and those are the standards that need to be used to accept or reject product. If we look past the standards, to try and develop a rule that applies everywhere for our own internal inspection criteria, it is my opinion, that the most stringent should be followed. In this case, the rule from ISO 1502 stating that the product should not enter the Nogo ring more than 2 complete turns is the strictest. If all manufactures apply this maximum 2 turn rule to all their products, it is not only a good practice, but it will ensure that the rules of all the other standards are also met.