

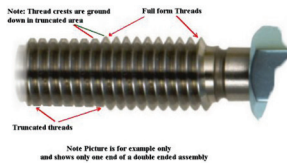
Adjustable Thread Ring Setting

by:

Larry Borowski, President
Greenslade & Company, Inc.
2234 Wenneca Ave.
Ft. Worth, TX 76102 USA
www.greensladeandcompany.com

Our Emphasis Article in the October 2013 issue laid the groundwork as to what the thread standards require for calibration or setting of adjustable thread ring gages. Now we get into the “nuts & bolts” of calibration/setting procedure.

The first thing you want to do is either choose a set plug style or familiarize yourself with what you are currently using. There are two main types, truncated and progressive.



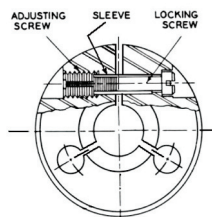
Truncated Setting Plug



Progressive Setting Plug

Truncated setting plugs have a full form and a truncated section with a continuous thread and pitch diameter across both. Truncated set plugs are the most common, so we will be focusing on how they are used. As a point of information, a progressive setting plug has a high (Hi) pitch diameter section and a low (Lo) pitch diameter section separated by an interruption in the thread form. The basic concept is to set on the Lo (front) end, and the ring should not go onto the Hi (back) end.

Next, you want to either choose a style of adjustable ring or familiarize yourself with what you are currently using. There are two normal types, and both have locking screws and adjustment screws. These are called AGD or American Gage Design as defined in the *ASME B47* standard on gage blanks, and there is the Southern Style. Since the American Gage Design (AGD) is the most popular style, this is what we will be covering.



American Gage Design (AGD)



“Southern Style”

Before starting any calibration, make sure your rings and setting plugs are cleaned and have a fresh coat of light gage oil. Although there are some differences in opinion on how to go about the next step, we are going to approach it with the “if it ain’t broke, don’t fix it” attitude.

First thing is first—you have to thread the ring gage onto the set plug. The variation in approach is that some may remove the sealing wax and loosen the ring before this step, while others will try it on the plug first. If you are dealing with any type of accredited calibration, you have to know the “as found” condition of the ring. This is the reason why we try it on the setting plug before doing anything else. None of the standards go into detail regarding the ring gage setting process, nor do they cover all the same steps. They all agree on the following basic concepts though:

- Set the ring to the full form section of the setting plug.
- Evaluate the fit on the truncated section of the setting plug.
- This may take several attempts by loosening and tightening the adjusting and locking screws.

Well, if you took the gamble on your ring gage being properly set so no adjustment was necessary, and lost, you’ll have to roll up your sleeves and dig in. If you won, then you are done. The following steps should be considered when attempting to properly set a ring gage. We’ll take it from the top, since you probably can’t even see the adjusting hardware due to the tamper-proof wax sealant applied to the hardware access points.



Tamperproof Wax Sealant

Getting Started:

1. Remove the wax from both the locking screw and adjusting screw. There are all different kinds of wax, some being more difficult to remove than others. A little heat works well to melt some types, but can be messy. Do your best to dig the wax from the hardware drive mechanisms.

2. Evaluate the condition of the hardware and replace it if needed. It is quicker to replace a questionable locking screw than to try and get it out once you’ve completely stripped the screw driver slot.

3. Measure your minor diameter using 0.0001" increment pin gages or a three-point of contact bore gage (straight type contacts). This info is useful when trying to figure out what the pitch diameter was before you started adjusting it.

4. Since we already determined that our ring needed adjustment, you should at least start threading your ring onto your set plug to determine if it has to be loosened up or tightened down.

Making the Adjustment

(with the ring engaged on the set plug if possible):

5. Loosen the locking screw (counter clockwise).
6. Turn the adjusting screw in or out depending on whether the ring was loose or tight on your setting plug. Turning it in (clockwise) will open up the ring making it looser on the setting plug. Backing it out (counter clockwise) will close up the ring making it tighter on the setting plug.



Locking Screw



Adjusting Screw

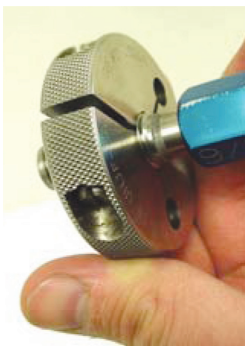
Get the ring gage to the full form section of the setting plug:

7. If your ring was tight, follow the instructions in steps

6 and 7 in order to open up the ring gage so that you can screw it all the way back to engage the full form section of the setting plug.

8. If your ring was loose, simply rotate the ring gage all the way back to engage the full form section of the setting plug.

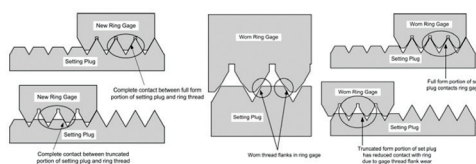
9. Once you are on the full form section, work back and forth adjusting the hardware and tightening the locking screw so that you achieve a drag or friction when rotating the ring gage on the setting plug. Note: there is no definition of “drag”, nor are there torque specifications, or “two finger” rules, so it is very subjective. The point is to have a friction fit, whether it is a lot of friction or a little friction is inconsequential. You are wrapping the ring gage around a mating thread of known size, so as long as you have friction there, you know you are touching the surfaces together, and can consider the ring set to whatever size your setting plug measures on that area of thread.



Evaluating the flank angles on the truncated section of the setting plug:

10. Once you have a good feel on the full form section, unthread the ring until it fully engages the truncated section of the setting plug.

11. This is another area where some standards describe the evaluation process differently, but at the end of the day, the concept is the same. Some standards say to check for “shake”, some say consistent drag, some have you tapping on the ring with a rubber mallet. The bottom line is that you still want to have friction or drag on the truncated section of the set plug. If you don’t have friction, it means your surface-to-surface contact has been lost, and you probably have worn out flank angles along the pitch cylinder. A good indication on whether there is friction or not is to give the ring a good spin with your fingers. If the ring spins freely after letting go, chances are you don’t have enough drag or friction.



Checking the other side of the ring:

12. We never defined which side of the ring we want to check, and that is because both sides should be checked. Just because it is good on the “marked side”, doesn’t mean it is automatically good on the unmarked side.

13. Remove the ring entirely from the setting plug, turn it around and start it back up the set plug. You should have the same friction feel all the way up and down the setting plug. If you don’t, it probably means that you only use the ring in one direction, which is typically a bad practice because you get uneven wear and less life out of your rings.

Finishing up:

14. If you completed the above process and had a good

friction fit on both sides of the ring, it is now time to seal off that hardware to ensure the setting remains in tact.

15. Seal the hardware access points back up using any manner of tamper proofing material. Hot glue works well because it is a relatively clean process and is easily removed for the next calibration. Standard sealing wax works well too, but has a tendency to be difficult to dig out. I would not recommend materials like solder or other melted metallic substances because of the difficulty in accessing it again for future calibrations.

16. Before putting the ring gage back into the cabinet or sending it out for use, you should take another minor diameter measurement. This measurement combined with your initial minor measurement and the final pitch diameter setting will help you get a relatively good estimate of the actual functional pitch diameter size before you made the adjustment. You can use the following formula to estimate that value:

$$\text{Initial Pitch diameter} = ((\text{final minor diameter} - \text{initial minor diameter}) + \text{Final Pitch diameter})$$

If your ring gage ended up being “bad” meaning that at some point during the setting procedure, you lost flank contact or your friction fit, then you should either replace it or attempt to have it reworked. Some manufacturers can refurbish worn ring gages, but many times it costs almost as much as a new ring just because of the labor involved, at which point it becomes more of a business decision.

If your ring gage ended up being “good”, then you’ve sealed it all up and you are ready to put it into use, or store it for the next time you need it. There is no shelf life for the setting of a ring gage, which becomes a calibration cycle discussion for another time.

Either way, hopefully you now have a better understanding of the process used to set adjustable ring gages. You can now decide to take on this endeavor yourself, or send it off to someone that does this for a living, for example, an ISO 17025-accredited calibration laboratory.

To learn more, contact the author or visit the Greenslade & Company website listed below.
www.greensladeandcompany.com

FTI

Company Profile:

Greenslade & Company, Inc. is an ISO 17025-accredited provider of dimensional calibration services to suppliers of mechanical fasteners. The firm also supplies a range of fastener inspection equipment and services.
www.greensladeandcompany.com

Author Profile:

Larry Borowski has been active in the fastener industry since 2005. He holds a Bachelor’s Degree in Mechanical Engineering from **Syracuse University**. In addition to guiding the activities of Greenslade & Company, he is also active on the **ASME B1 Committee on Screw Threads**. With his expertise, he provides gage training and works to resolve fastener application and testing issues with his customers in the fastener industry. He is also instrumental in developing custom inspection equipment, and working through quality-related issues.

