

## ***WP PDS SHOCK REBUILD (Links to Gold Valve Installation)***

WP Progressive Damping System (PDS) shocks are found on many KTM and Husabergs since 1999. They are designed so that the damping increases as the shock compresses. To accomplish this they have a second valving piston and a metering needle. General servicing procedures are the same as other piston reservoir shocks. There are instructions for installing a Telescopic Needle (SWCN Series) as well.

These shocks come with Piston Style Reservoirs. RT offers Bladder Conversions (SWBL Series) for most models.

**Valving Stacks - Consult the instruction sheet that comes with the Gold Valve Kits for specific procedures. See your DVS Setup Sheet for valving and setup recommendations.**

Shortcuts:

- > [SHOCK DISASSEMBLY](#)
- > [VALVING AND SHAFT ASSEMBLY](#)
- > [TELESCOPIC NEEDLE INSTALL](#)
- > [SHOCK ASSEMBLY](#)



### ***SHOCK DISASSEMBLY***

D1 - Place the end of the shock body in a vise, preferably using Aluminum Vice Jaws (TMVJ 065). Check the clicker positions and note the settings. Back the rebound adjusters out all the way before you continue.

Remove the spring first - not shown but similar to most Bladder Shocks.



D2 - Back out the compression adjusters all the way.

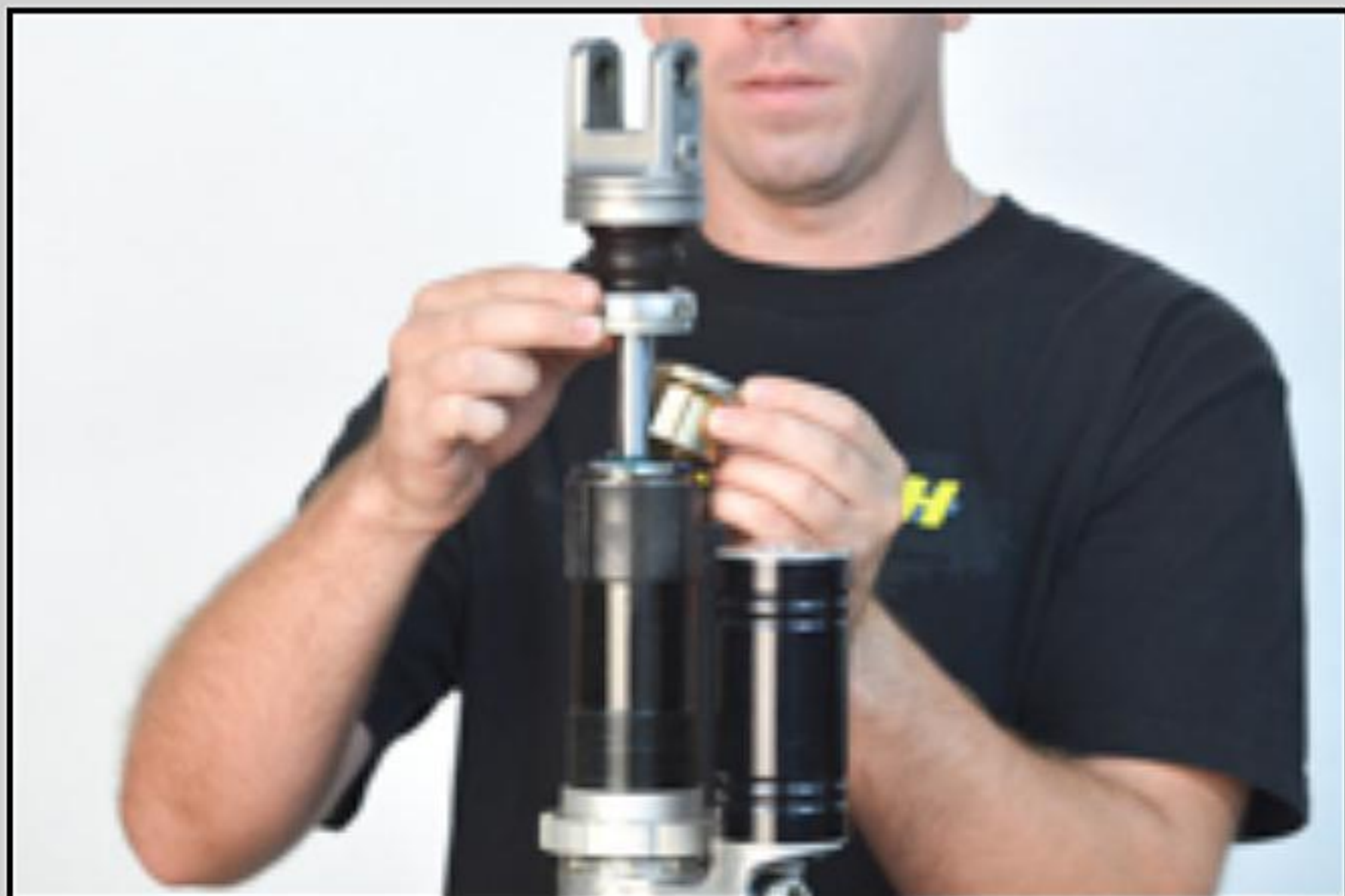




D3 - Release the nitrogen pressure from the reservoir by unscrewing the Allen Bolt.



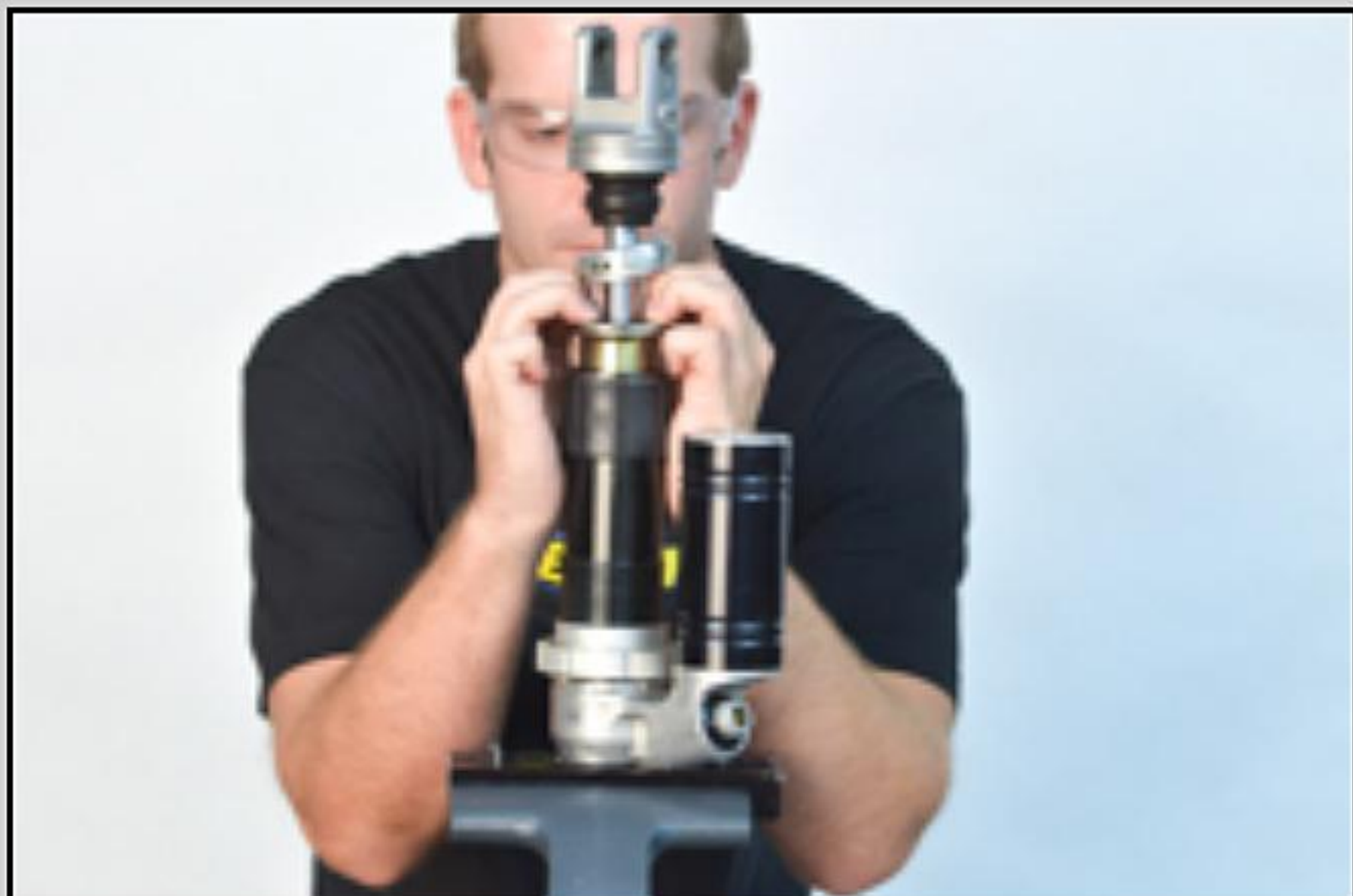
D4 - Remove the shock body cap with a sharp wood chisel. It is a press fit style cap.



D5 - Insert the proper Shock Seal Head Setting Tool (TSSS Series) around the shock shaft, onto the seal head.

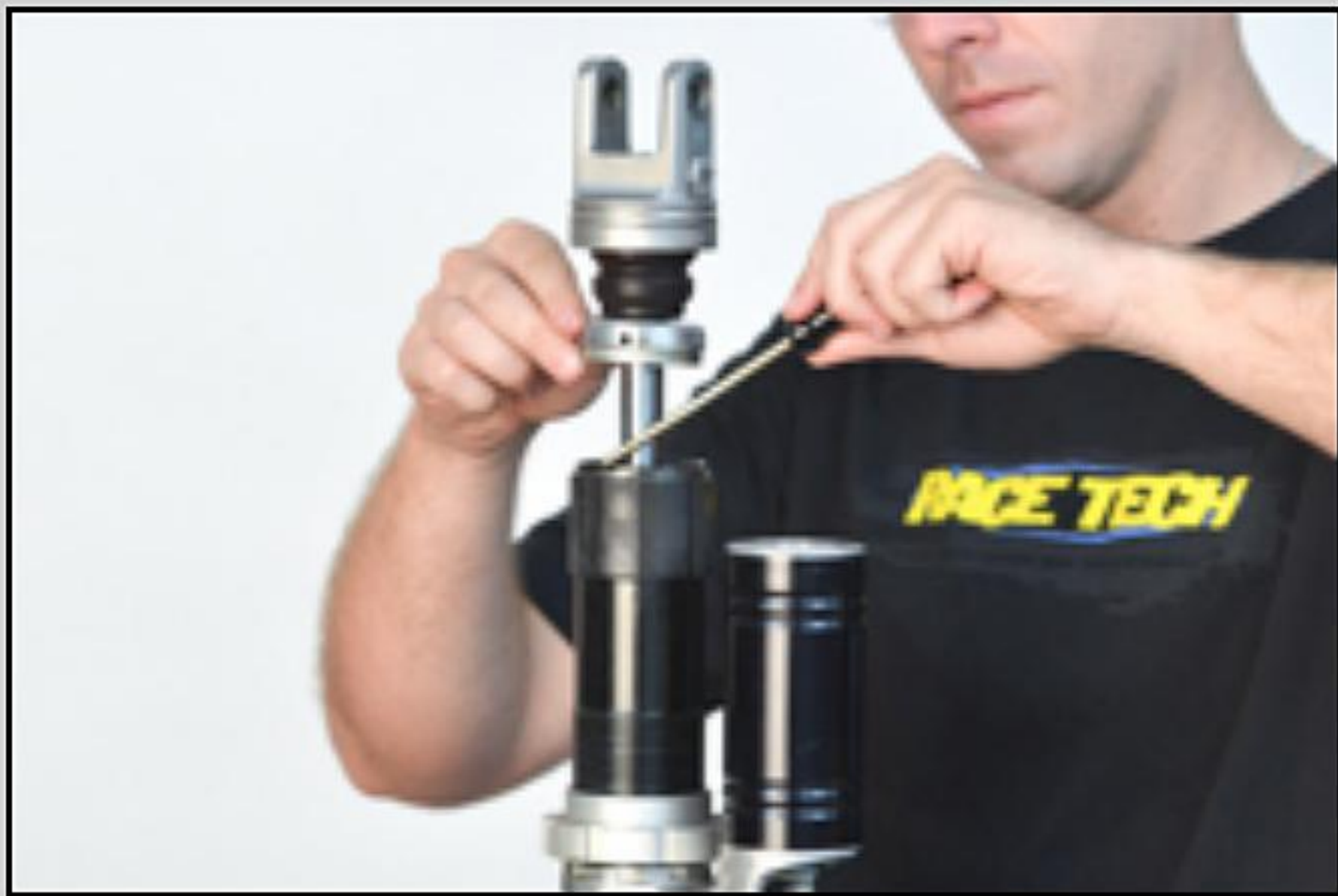
This tool is not required but makes things a lot easier.

Alternately you can push down on the seal head with your fingers or, my least favorite method, you can push down with a large flat blade screwdriver.



D6 - Compress the seal head enough to expose the circlip.





D7 - Remove the circlip with a TSCP 01 Clip Tool or a small screwdriver.



D8 - Remove the shaft assembly from the shock body by tapping with a plastic mallet.



D9 - Unscrew the reservoir cap using a Pin Spanner (TMPS Series).

This tool is really cool as the pins have a back cut. This means they dig into id of the pin holes so it is really hard for them to pop out. (I have NEVER had them slip out but I'm just covering my bets.)





D10 - Remove the reservoir cap.

On later models the cap is built into the reservoir body.



D11 - Remove the reservoir piston. Method 1

These are special pliers that expand when you squeeze them.



D12 - Method 2: Remove the reservoir piston with compressed air through the bleed port. Cover the end with a rag to catch the piston.

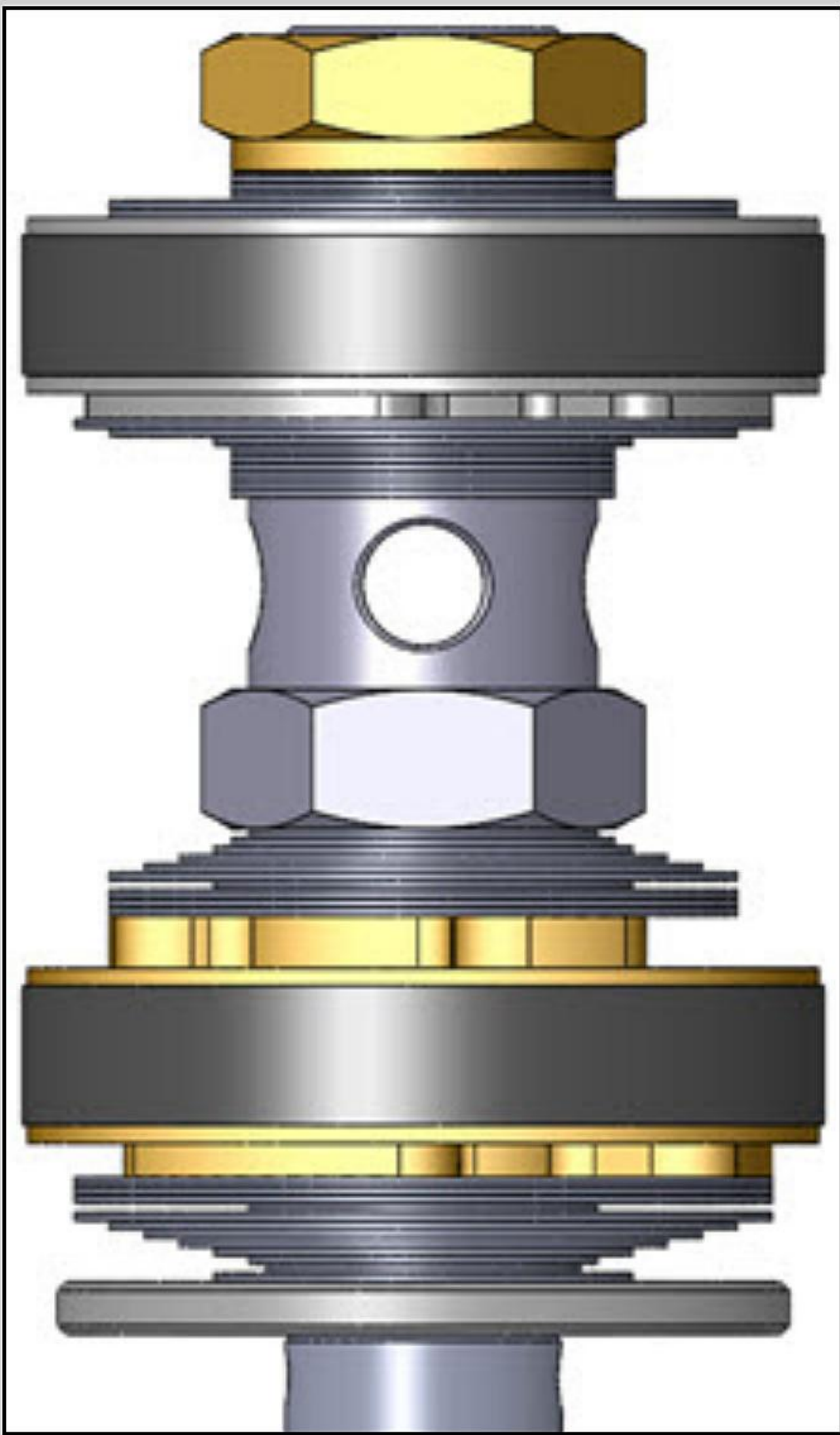
Method 3: Alternately you can push down on the piston with a blunt rod (a #3 Phillips Screwdriver works) through the bleed port.



D13 - Drain the oil from the nitrogen reservoir and shock body.



## ***SHOCK SHAFT REBUILD and GOLD VALVE INSTALLATION***



## ***TELESCOPIC NEEDLE INSTALL***

TN1 - If changing the needle to an RT Telescopic Needle, use the proper TSST Series Pin Spanner. There are 3 sizes available.



TN2 - This is the RT Telescopic Needle (left) and the stock needle (right).







TN3 - Apply Loctite on the retaining collar

Use a small amount of Grease on the bellville (cupped) washer to hold it in place during installation.

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TN4 - Insert the needle assembly into the tool.



TN5 - Insert the tool with the needle assembly into the shock. Tighten the needle assembly down to specification.

This is best done holding the shock inverted vertically so the bellville washer stays in place.

This looks really hard to do but once you get the hang of it... no problem.





TN6 - Tighten the telescopic needle.



## ***SHOCK ASSEMBLY***

A1 - If you are reusing the stock reservoir piston. Grease the groove of the piston and install the band onto the reservoir piston.



A2 - Fill the reservoir with oil.





A3 - Push the piston down until the band engages the reservoir. The oil should be overflowing at this point.



A4 - Invert the shock so any trapped air will be pushed out of the reservoir (not shown). Be sure to catch the fresh oil. Bleed all of the air from the reservoir by pushing the reservoir piston all the way to the bottom (inverted - not shown).

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A5 - Apply Loctite to the reservoir cap.



A6 - Lightly grease the O-ring and install the reservoir cap.





**TSNC 02**

A7 - There are five choices for charging WP shocks.

- 1) Use a SPNV 0512 Nitrogen Charging Bolt and a TSNN 01 Nitrogen Needle.
- 2) Replace the reservoir with a Bladder Conversion Kit (SWBL Series). Many riders swear by this mod.
- 3) Use a TSNC 02 WP Charging Tool with the stock hardware. (If you are doing a lot of shocks this one really pays off.)
- 4) Use the official WP charging tool with the stock hardware.
- 5) Drill and tap the reservoir cap to 1/8" NPT and install a Schrader "Tank" Valve. You must be careful as on some models the swingarm will break off the Schrader at full bottom-out.



A8 - Insert the nitrogen charging bolt (SPNV 0512) into the reservoir cap.



A9 - Insert the nitrogen needle and...





A10 - charge the reservoir to about 20 to 40 psi. This insures that the piston remains all the way to the end of the reservoir during the bleeding process.



A11 - Add oil in the shock body up to about 50mm from the top.



A12 - Install the shaft assembly into the shock body.



A13 - The oil will overflow.





A14 - To bleed the shock rapidly and forcefully compress the shock.



A15 - Extend the shock shaft slowly to avoid cavitation.

Repeat as necessary until there are no more bubbles.

Note - On some shocks it helps to hit the end of the shock shaft with a plastic mallet to force the valve stack open.

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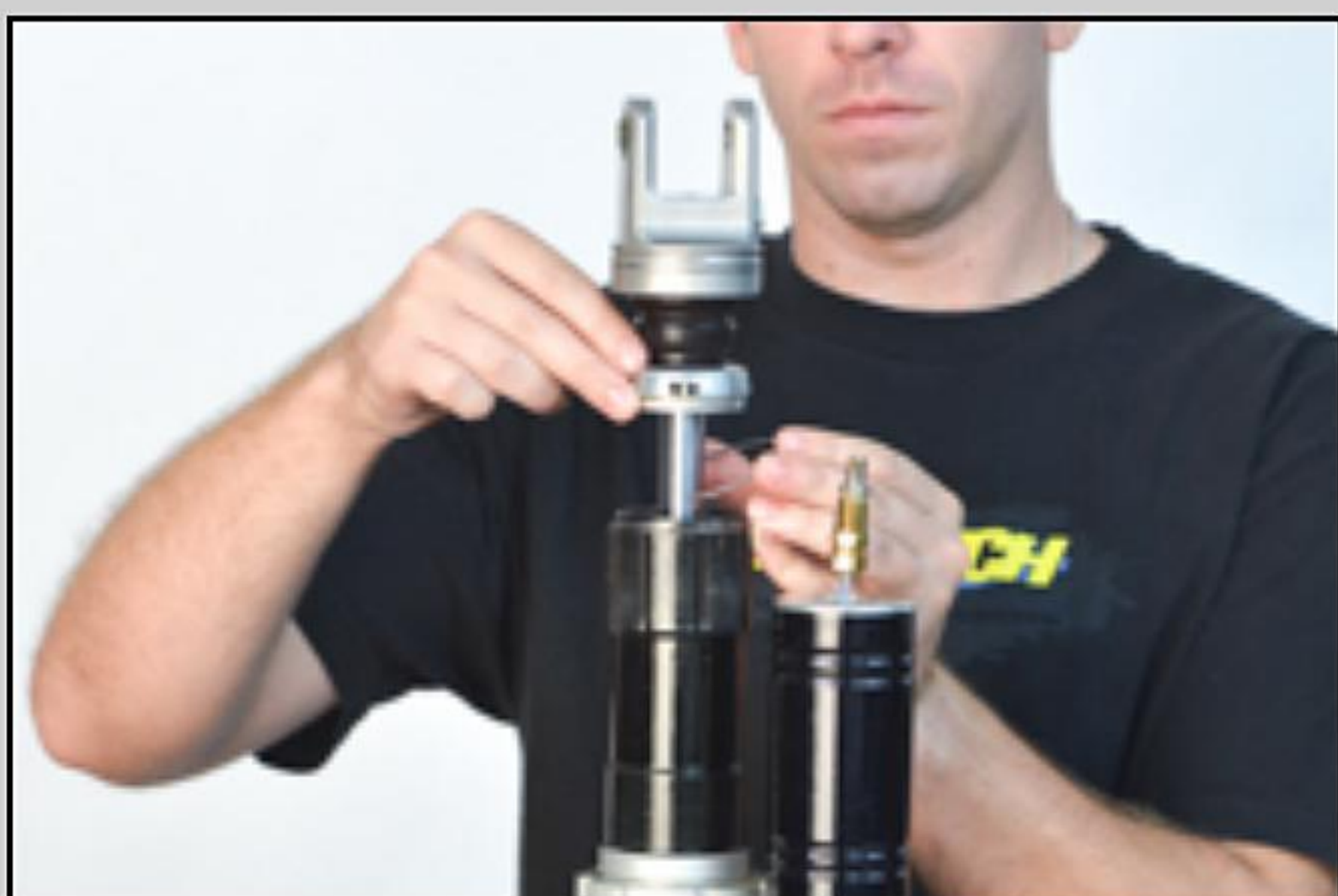


A16 - Use the Shock Seal Head Setting Tool and...





A17 - compress the seal head while releasing nitrogen from the reservoir.



A18 - Install the circlip making sure the clip is fully seated in the groove.



A19 - Pressurize the shock, in this case (with a SPNV 0512), using a TSNN 01 Nitrogen Needle.



A20 - Another option to pressurize the shock is to use a RT WP Nitrogen Charging Tool (TSNC 02). Push down on the tool and tighten the allen clamp bolts.





A21 - Charge the reservoir with nitrogen to approximately 175 psi.



A22 - Tighten down the allen bolt and remove the tool.



A23 - Compress the shaft and verify that it is charged by watching it return completely.



A24 - Install the body cap by lightly, and evenly, tapping it with a plastic mallet.





A25 - Install the groovy sticker. Set the clickers, install the spring with the proper preload (see the DVS) and enjoy.

Go ride!



# **Shock Gold Valve Installation**

## **VALVING WP PDS**

These instructions cover installation of the Shock Gold Valve onto the shaft for WP PDS shocks. To get to this point in the installation see the

[DVS Setup Sheet](#) - If you haven't already, go to [DVS Valving Search](#), insert your Access Code, and rider data and print your [DVS Setup Sheet](#).

Some SMGV 4633 kits are for standard shocks, not PDS.

Shortcuts:

- > [SHAFT DISASSEMBLY](#)
- > [SEAL HEAD REBUILD](#)
- > [SHAFT ASSEMBLY](#)
- > [VALVING](#)

**CAUTION: IF YOU ARE UNFAMILIAR WITH REBUILDING AND REVALVING SHOCKS, STOP!!! DO NOT PROCEED; SEEK OUT A QUALIFIED SUSPENSION TECHNICIAN.**

**NOTE:** All measurements are metric (for inches divide by 25.4). The valving list starts at the piston face and goes towards the Base Plate. Valve specs are listed by (QUANTITY) THICKNESS x DIAMETER. A number in parentheses means quantity. If there is no number in parenthesis the quantity is one. Example: (2).15x30 means quantity two, 15 hundredths of a millimeter thick by 30 millimeters in diameter.



### **Tools**

- Torque wrench (SnapOn Digital Torque Wrench shown)
- Metric calipers and micrometer
- [TMVJ 065 Vise Jaws](#) mounted on a Vise - suggested
- [TSSB Series Bullet Tool](#) - for Seal Head installation
- [TSCP 01](#) - Clip Tool
- [TSSS Series](#) - Seal Head Setting Tool

### **Supplies**

- Contact Cleaner - or other good, clean solvent
- Loctite - Hi-Strength (included in the Gold Valve Kit)
- [USSG 01](#) - Ultra Slick Seal Grease



# PDS SHOCK TYPES

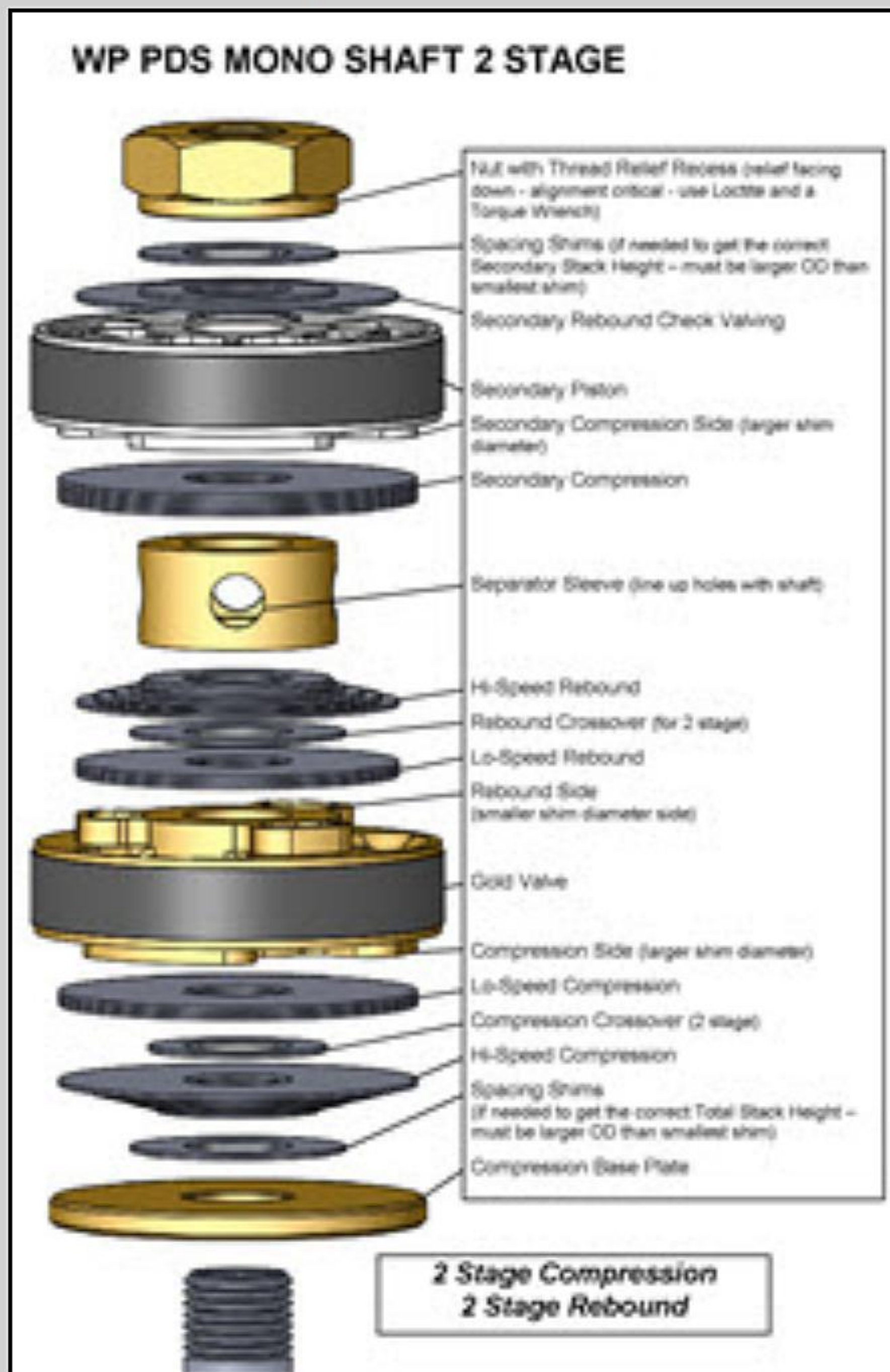
There are 3 types of WP PDS Shocks:

**Type 1 - Mono Shaft** - 1999 thru 2008 - SMGV 5046

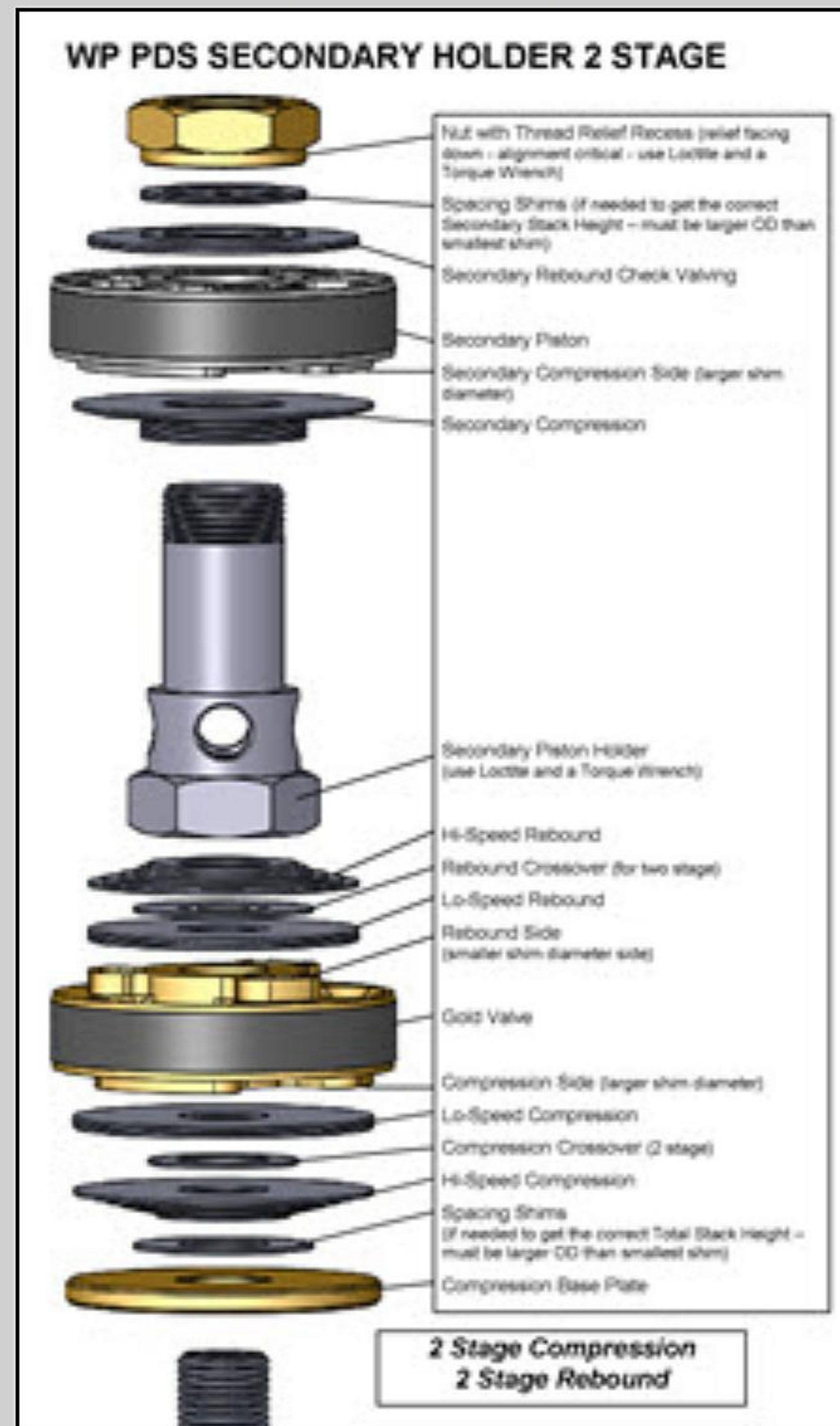
**Type 2 - Secondary Piston Holder** - 2009 thru current - SMGV 5042

**Type 3 - Dual Diameter Piston** - used on KTM 85 SX models - SMGV 4633

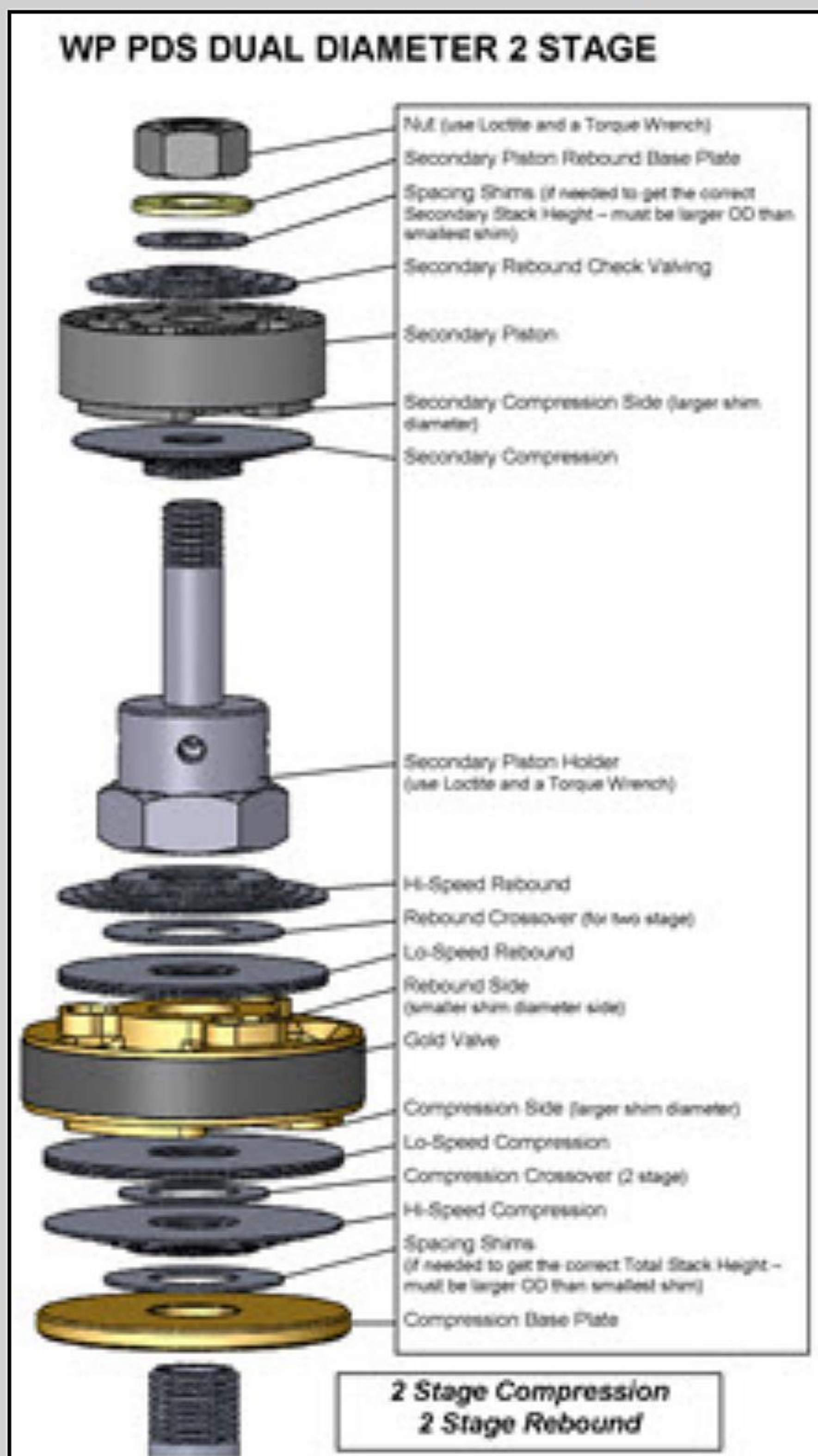
## TYPE 1 - MONO SHAFT (to 2008)



## TYPE 2 - SECONDARY HOLDER (2009 on)



## TYPE 3 - DUAL DIAMETER PISTONS (85 SX)







## ***SHAFT DISASSEMBLY***

SD1 - PDS Shocks use two pistons. The bottom one is the Primary Piston and the top is the Secondary.



SD2 - Remove the shock shaft nut. Notice that it is directional (there is an up and a down.) On the inside at the bottom there is thread relief.



SD3 - Remove the valving stack.

This is a Type 1 Mono Shaft early model shock where both pistons are on the main shaft.

On later models (Type 2 and 3) the Secondary Piston is held with a Secondary Piston Holder that threads onto the main shaft. This Piston Holder acts as the Nut for the Primary Piston Assembly.

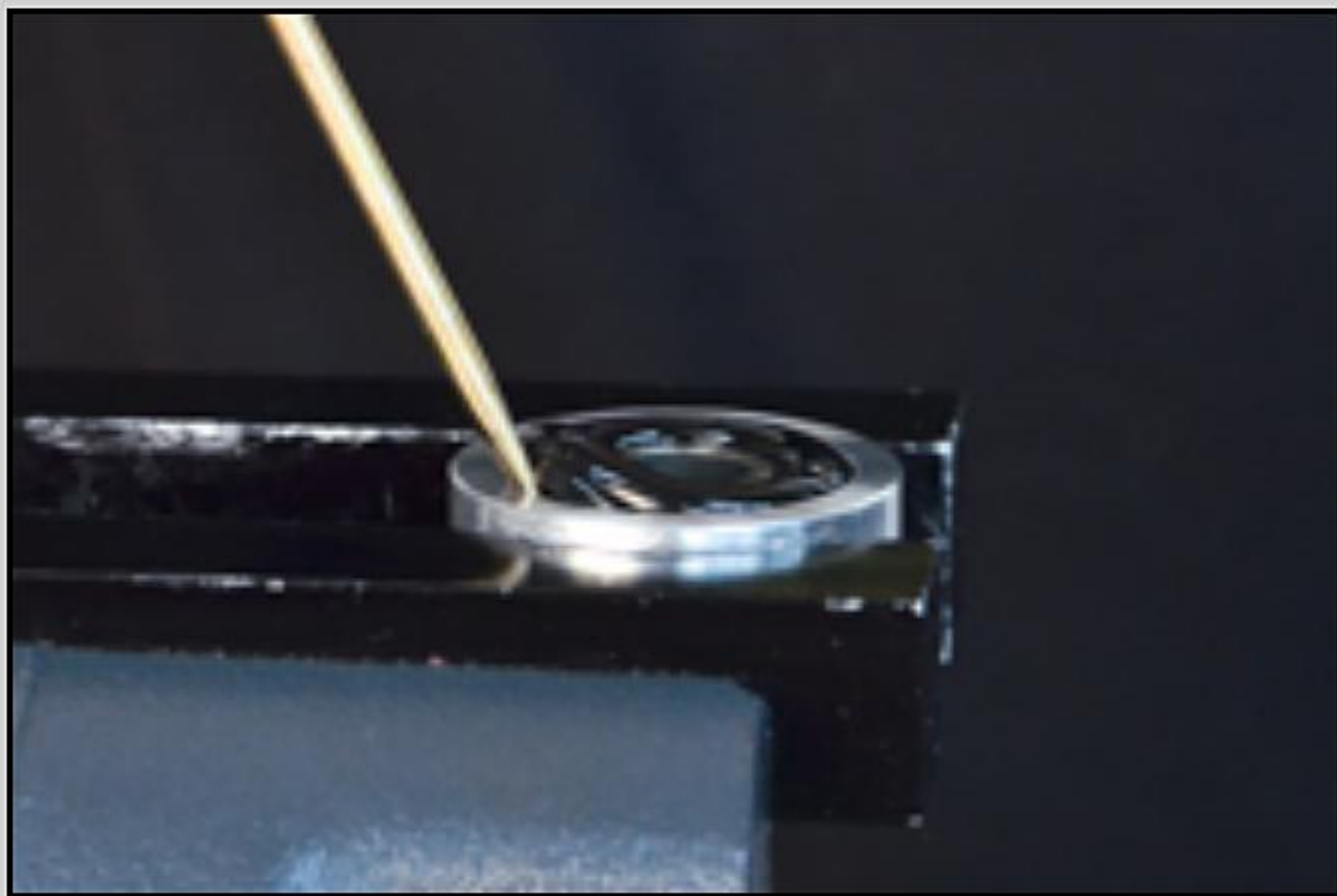




SD4 - Remove the seal head, body cap and bottom-out bumper.

Inspect the Bottom-out Bumper for tears or damage. Bumpers are wear items. They break down over time and should be replaced when any signs of deterioration exist.

Bumpers available at Race Tech.



## ***SEAL HEAD REBUILD***

SH1 - This is only required if replacing seals or shaft bushings. Shock Seals can last a long time but it is a good practice to replace both the Shaft Seal and Dust Seal together if they are over a year old.



## ***SHAFT ASSEMBLY***

SA1 - Install the bottom-out bumper and shock body cap.





SA2 - Grease the seal with Ultra Slick Grease.



SA3 - Reinstall the seal head with a Shock Seal "Bullet" Tool (TSSB Series).



SA4 - Install the base plate. In this case this is a lowering base plate used for Supemoto.

## V1- **VALVING**

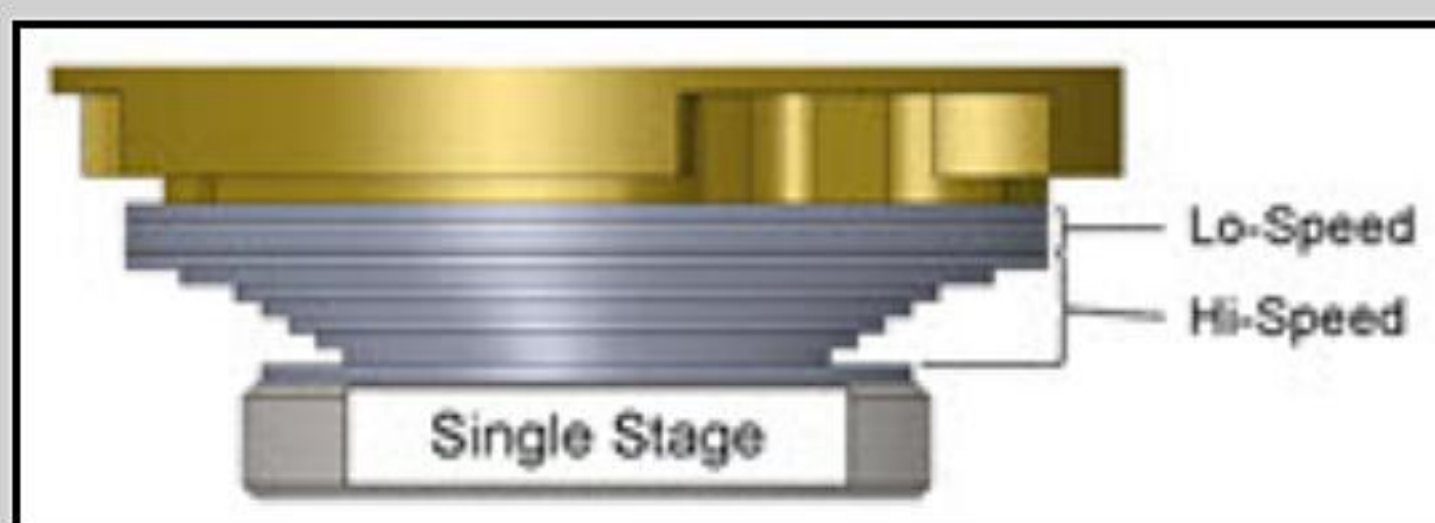
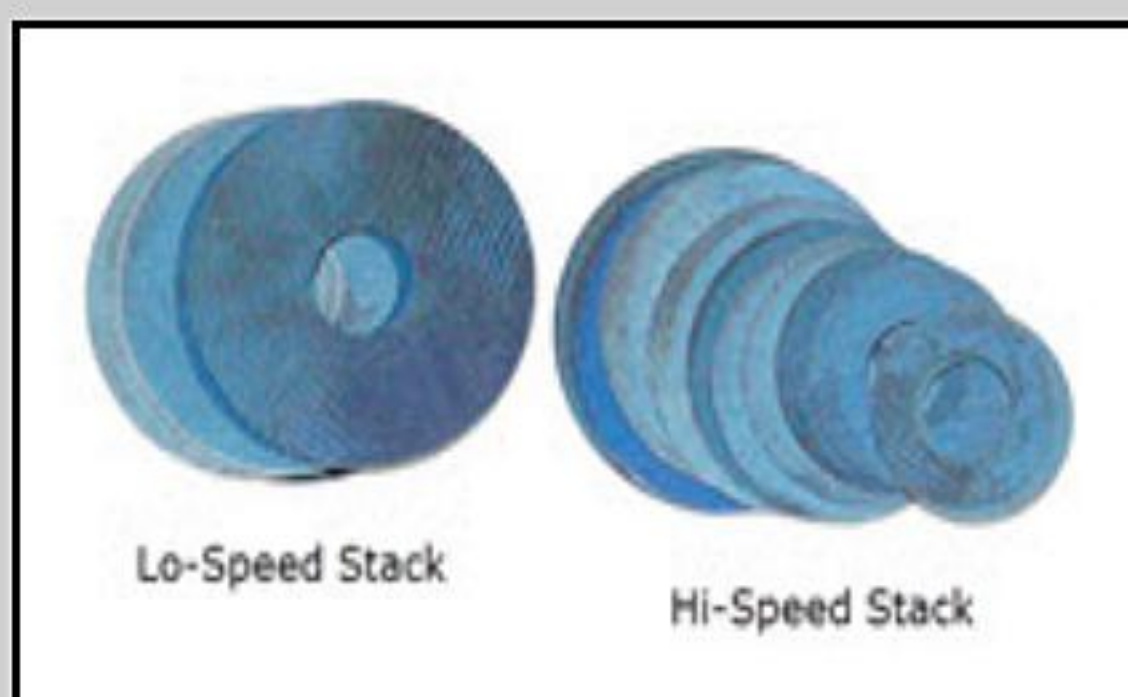
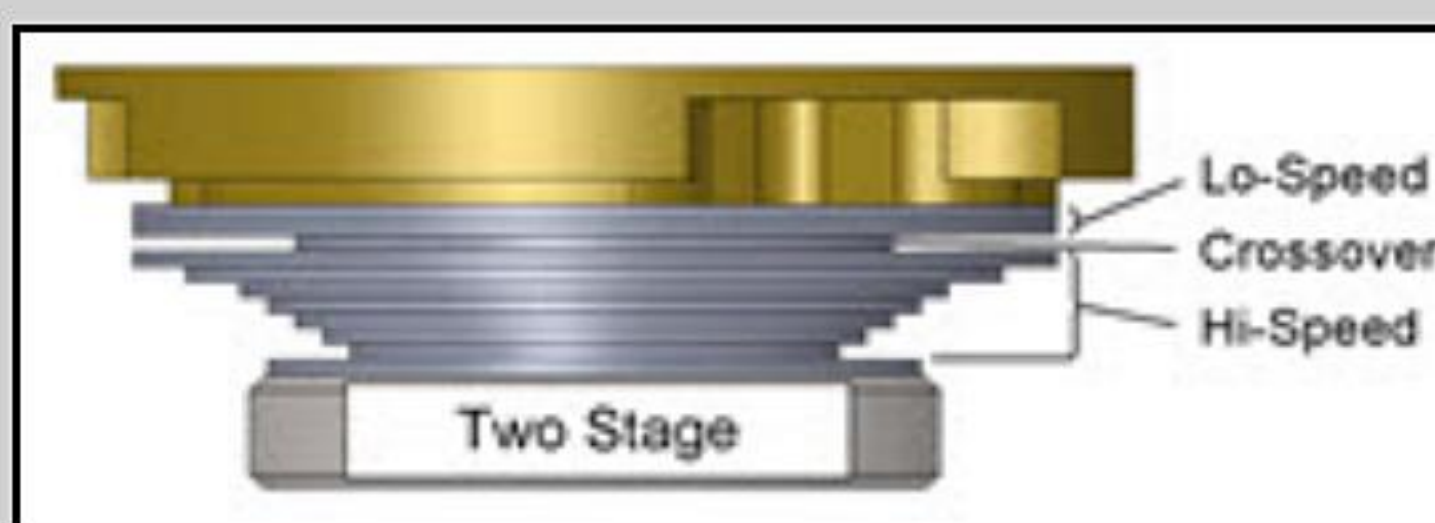
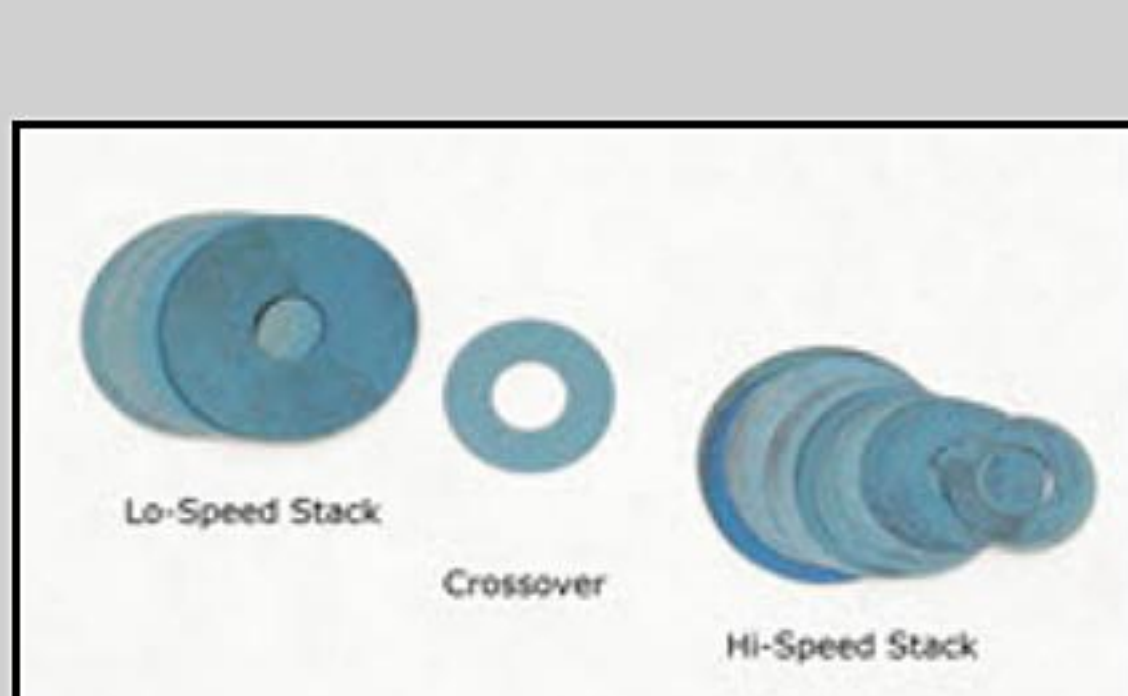
First build and install the Compression Valving Stack onto the shaft. Next goes the Gold Valve and then the Rebound Stack.

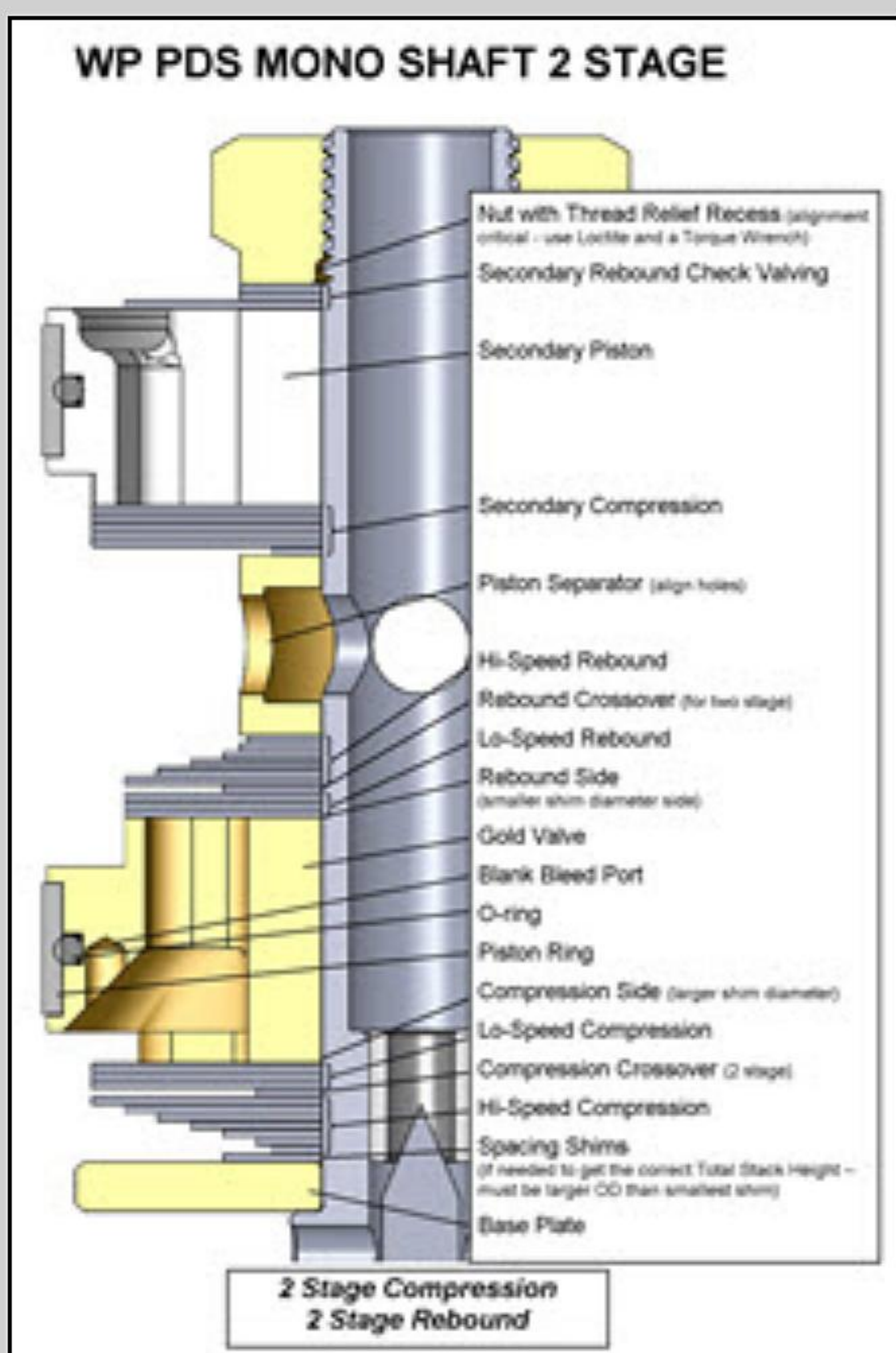


# VALVING STACK TYPES - SINGLE OR TWO STAGE

V2- You will either be building a Single Stage or a Two Stage Stack (or possibly a combination of both). The difference is the Crossover. The Crossover is a smaller diameter shim between the Lo-Speed and the Hi-Speed Stacks.

Note: The DVS Custom Setup Sheet displays individual shims and does not label Hi-Speed, Crossover, and Lo-Speed. This is for your information only. Also you will not use all the shims provided in the Gold Valve Kit.

<p>• <b>Single Stage</b> - made of: Lo-Speed Stack Hi-Speed Stack</p> <p>There is <u>NO</u> Crossover (it becomes one stack.)</p>	 <p>Lo-Speed Hi-Speed Single Stage</p>	 <p>Lo-Speed Stack      Hi-Speed Stack</p>
<p>• <b>Two Stage</b> - made of: Lo-Speed Stack Crossover Hi-Speed Stack</p> <p>The Crossover Gap is visible</p>	 <p>Lo-Speed Crossover Hi-Speed Two Stage</p>	 <p>Lo-Speed Stack      Crossover      Hi-Speed Stack</p>



## V3- Two Stage Stacks

(Single Stage is exactly the same except there is no Crossover)

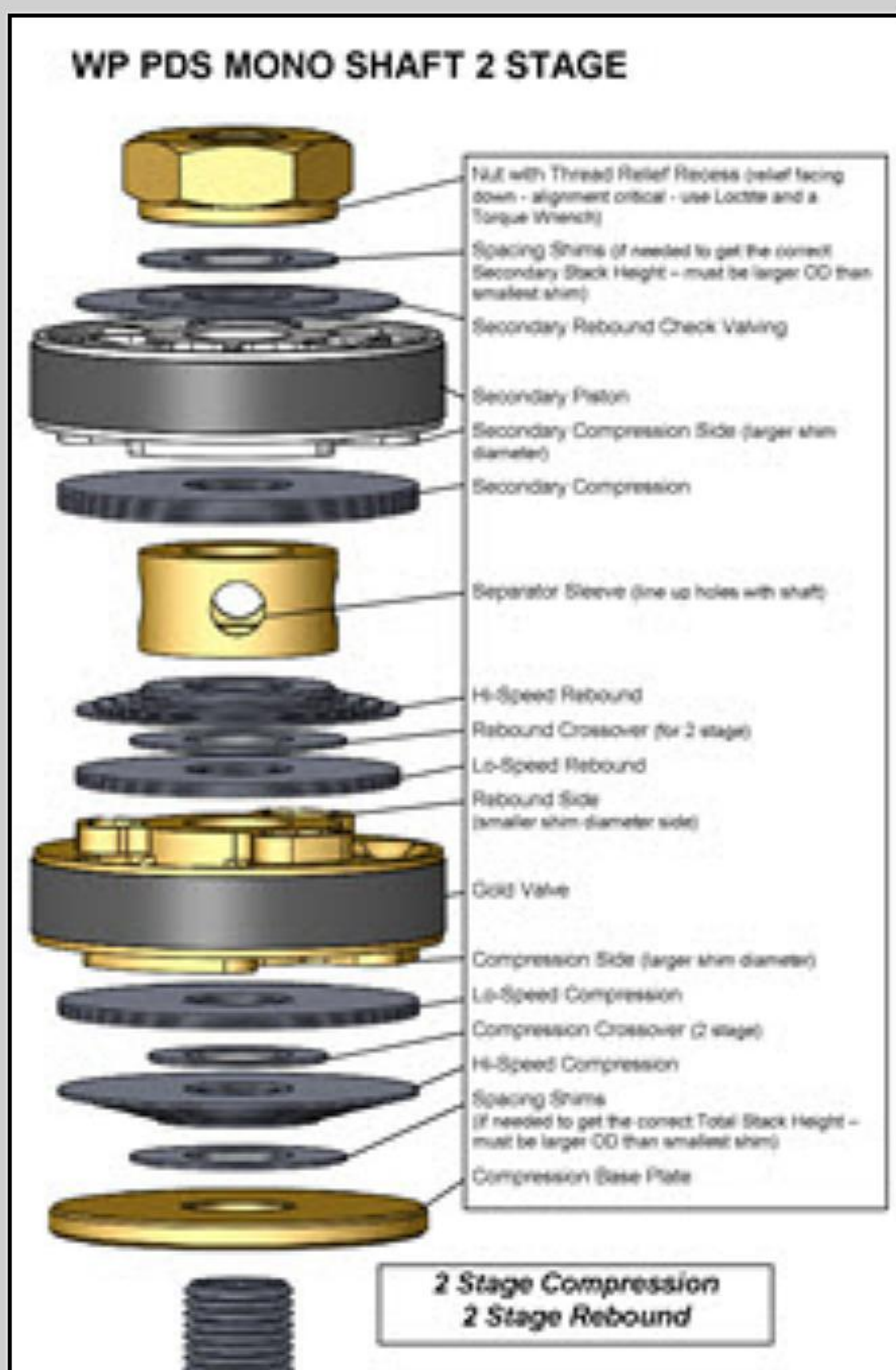
Note - Single vs. Two Stage only applies to the Primary Piston.

For Two Stage the total valving stack is made up of a:  
Lo-Speed Stack  
Crossover and a  
Hi-Speed Stack

(this is only an example - not your setting)

The Total Valving Stack starting from the Gold Valve piston face:

- (4) .20x44 - Lo-Speed Stack
- (1) .15x28 - Crossover (notice the smaller diameter)
- (1) .25x44 - Hi-Speed Stack
- (1) .25x42
- (1) .25x40
- (1) .25x38
- (1) .25x36
- (1) .30x34
- (1) .30x32
- (1) .30x30
- (1) .30x28
- (1) .30x26
- (1) .30x24
- (1) .30x22







V4 - Install the compression valving stack **in the reverse order that it is listed**, starting with the last (smallest diameter) shim of the Hi-Speed Compression Stack directly on the Base Plate and ending with the largest diameter shim of the Lo-Speed Compression Stack.

Shown is one of the Type 1 early style mono shafts used commonly through about 2008. In 2009 WP introduced a Type 2 two-piece shaft which allows the use of a much larger ID valve improving flow dramatically.



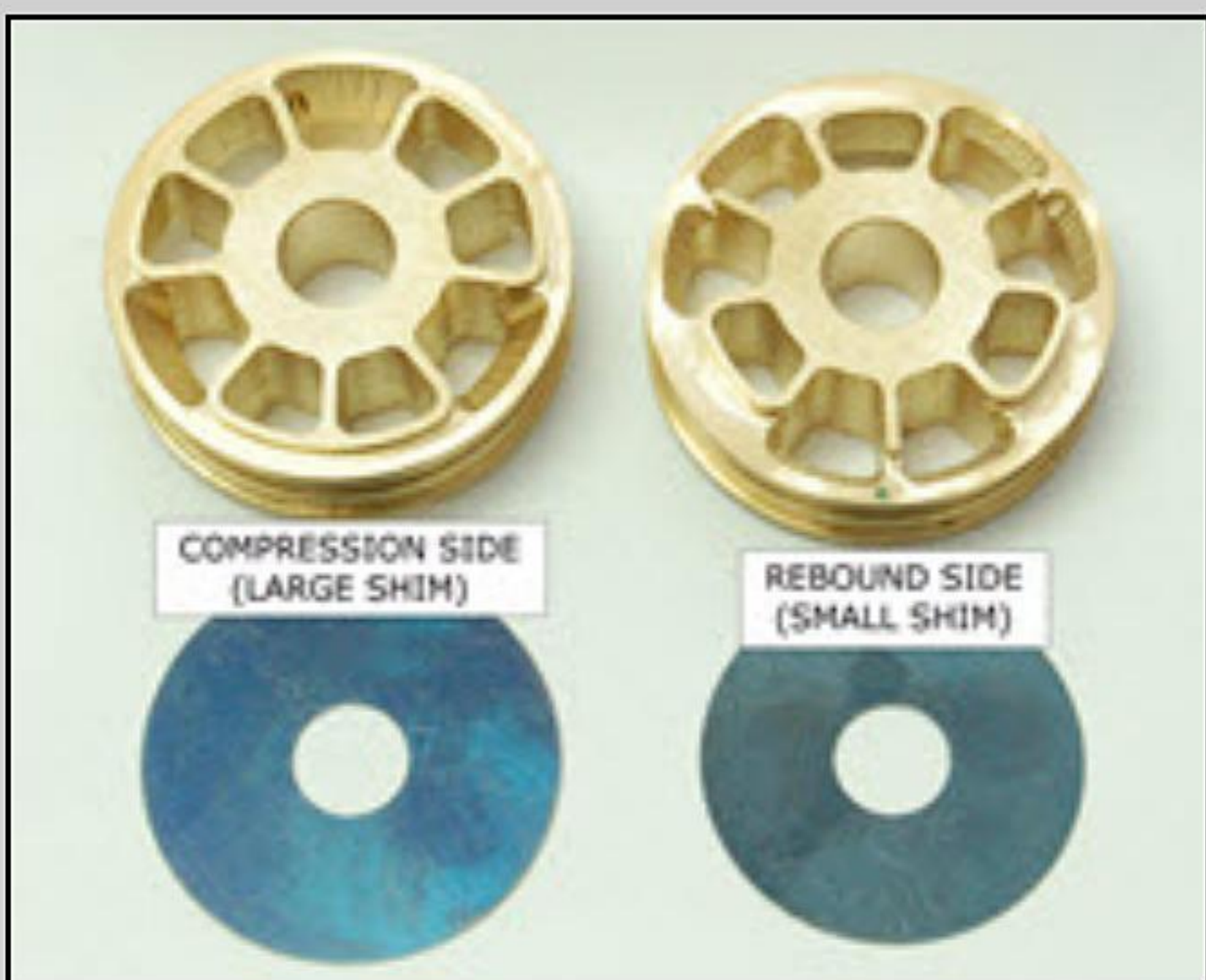
### V5- **BLEED HOLE (or no bleed hole)**

If the DVS does not call for a Bleed Hole (it says "n/a" for Bleed) skip this step.

If your DVS Setup Sheet calls for a Bleed Hole, drill it to the recommended size. To make drilling the Bleed Hole easier, most Gold Valves have a blank pilot hole or holes.

**How many holes?** - The DVS tells how many Bleed Holes to drill. Most of the time it is one. If there is a number in parenthesis before the hole size this is the quantity i.e. (2)1.3mm (#53) means two bleed holes. Otherwise the quantity is one.

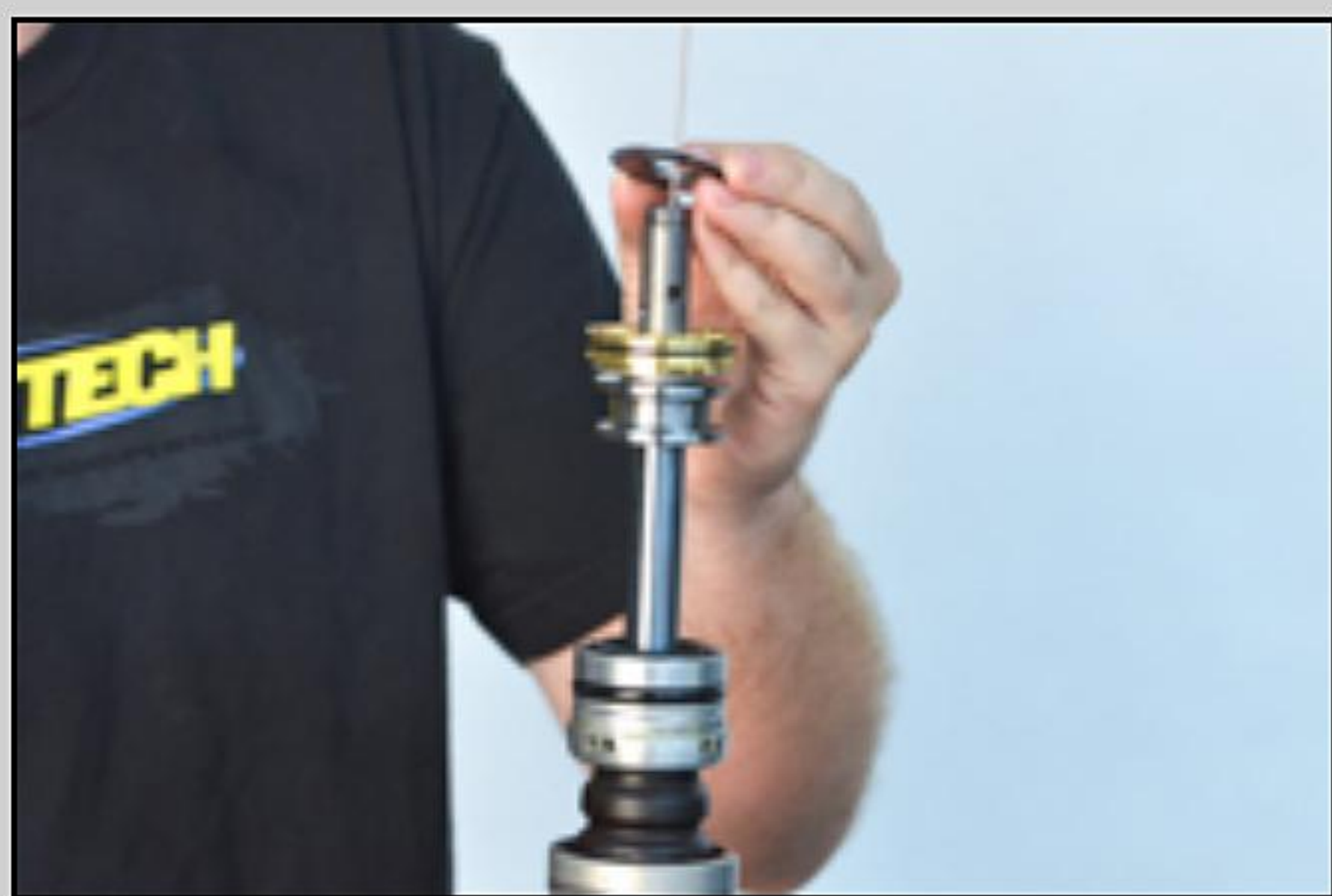
**Secondary Pistons NEVER have a Bleed Hole.**



V6- Install the Gold Valve with the compression side of the piston (larger shims) down towards the compression valving stack.

The rebound side of the piston (smaller shim side) is shown on the right. Note the compression side on the left has larger ports and uses larger diameter shims than the rebound side.





V7- Install the Primary Rebound Valving Stack in the **order** listed starting with the largest diameter shim and ending with the smallest diameter shim.

V8- **Make sure the Total Valving Stack Height is correct. Critical!!**

## PDS SHOCK TYPES

There are 3 types of WP PDS Shocks:

**Type 1 - Mono Shaft** - 1999 thru 2008 - SMGV 5046

**Type 2 - Secondary Piston Holder** - 2009 thru current - SMGV 5042

**Type 3 - Dual Diameter Piston** - used on KTM 85 SX models - SMGV 4633

Identify your Type and see it's section for further detail.

## TYPE 1 - MONO SHAFT

V9-TYPE 1

### PRIMARY VALVING STACK SETUP

Even though both pistons are on the same shaft the Primary Valve Stack Height is important. The top of the Primary Rebound Stack must not cover the feed holes in the shaft.

See V10-TYPE 1

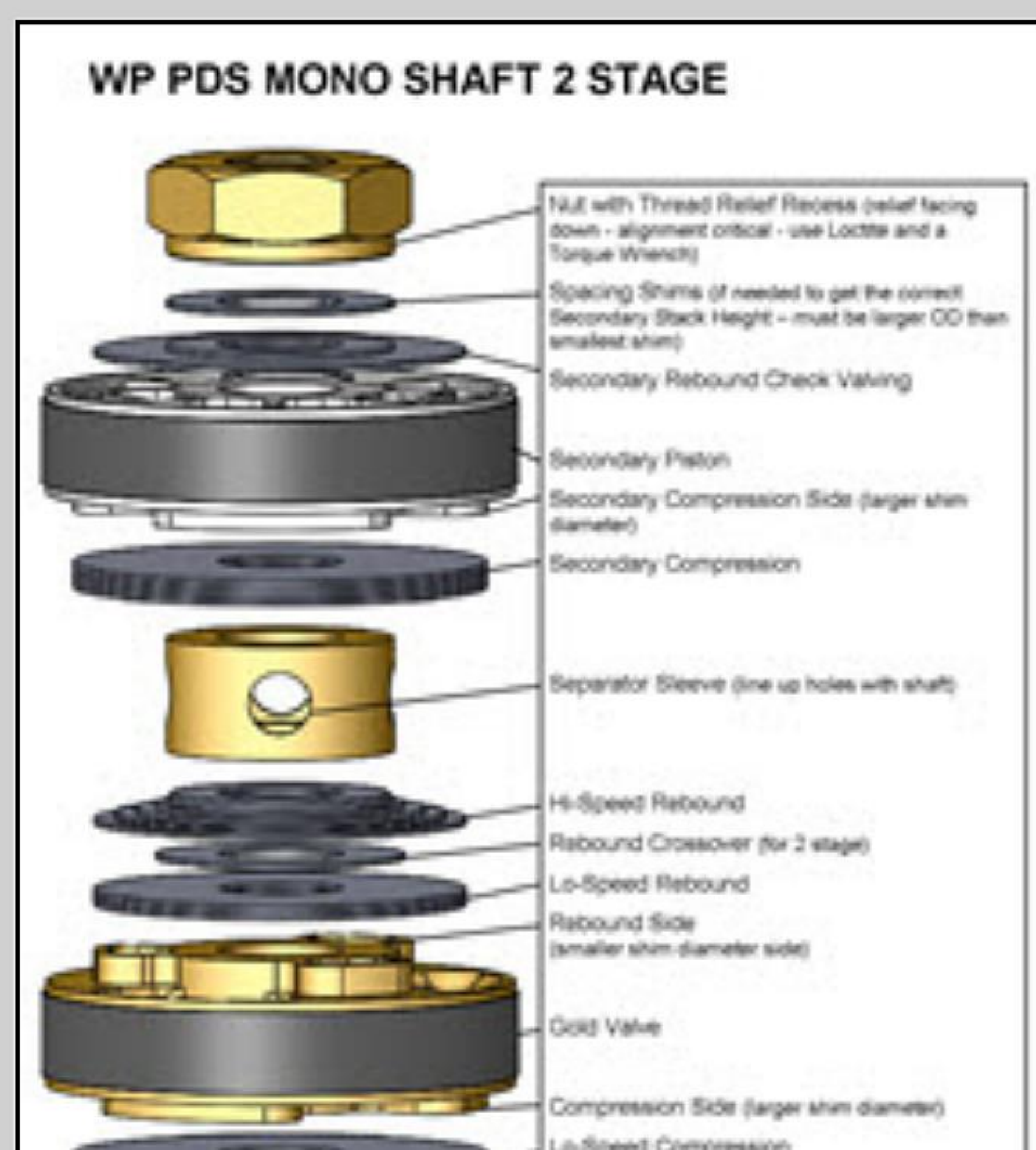
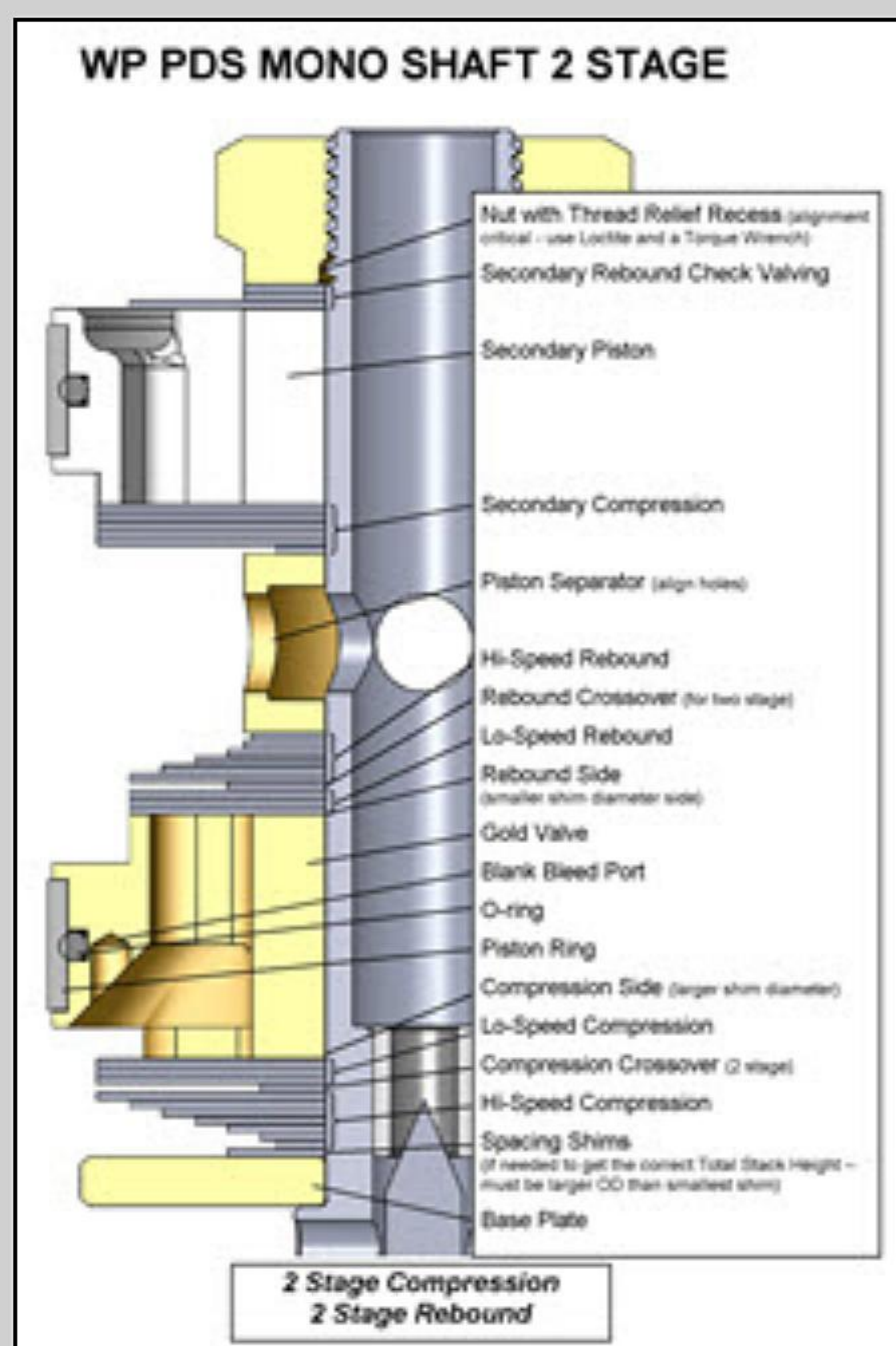
### SECONDARY VALVING STACK SETUP

You must measure the available travel for the Nut.

The shims should be guided with the straight, non-threaded part of the shaft and should not be on the thread.

**The nut must not run out of thread onto the straight portion of the shaft.**

See V14-TYPE 1



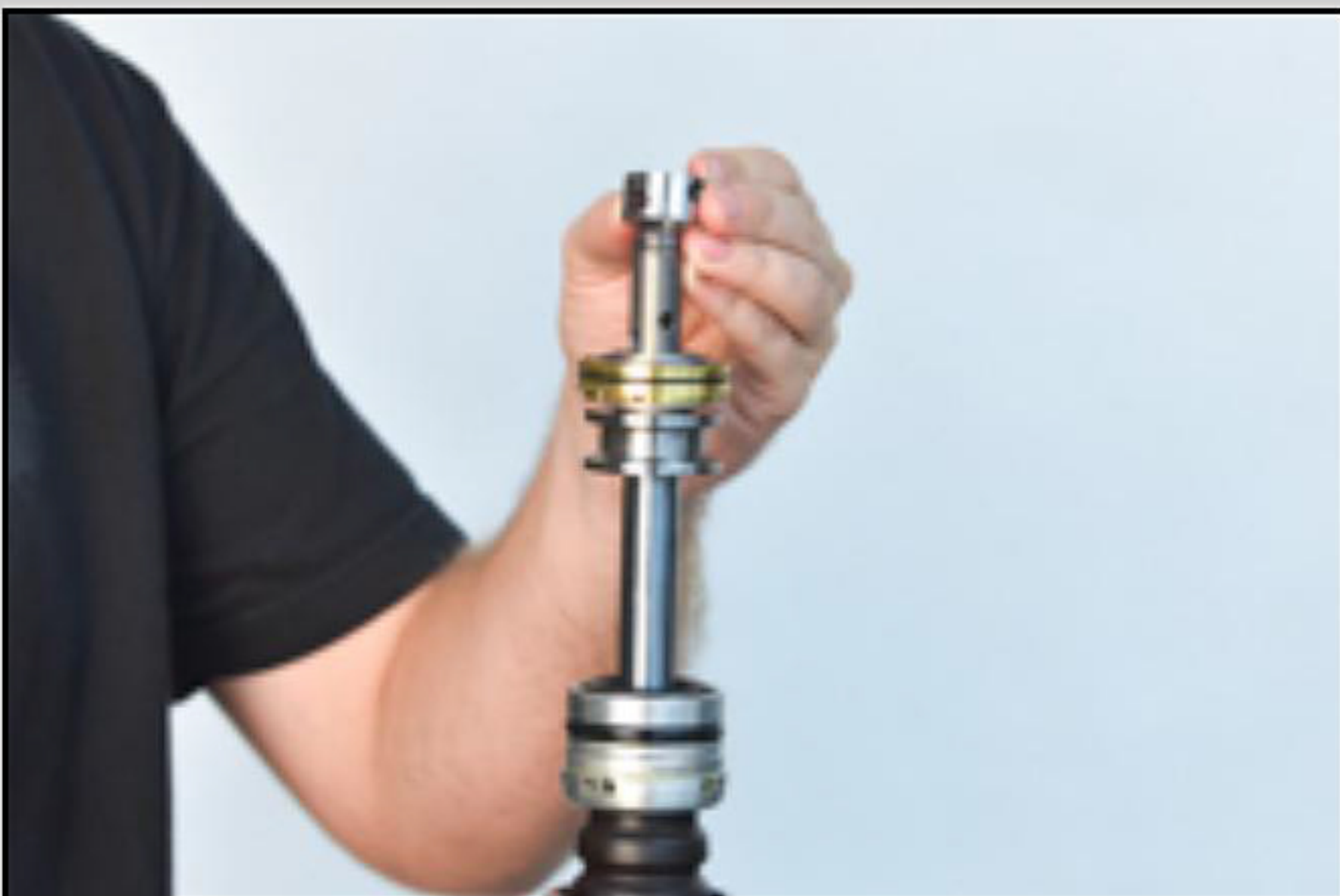




V10-TYPE 1- On Type 1 (early) Mono Shaft Shocks, make sure the height of the Primary Rebound Stack is below the feed holes in the shaft.



V11-TYPE 1- Insert the Separator Sleeve between the primary and secondary valving.



V12-TYPE 1- Align the holes in the sleeve with the holes on the shaft.



V13-TYPE 1- Install the Secondary Compression Valving starting with the smallest diameter shim and ending with the

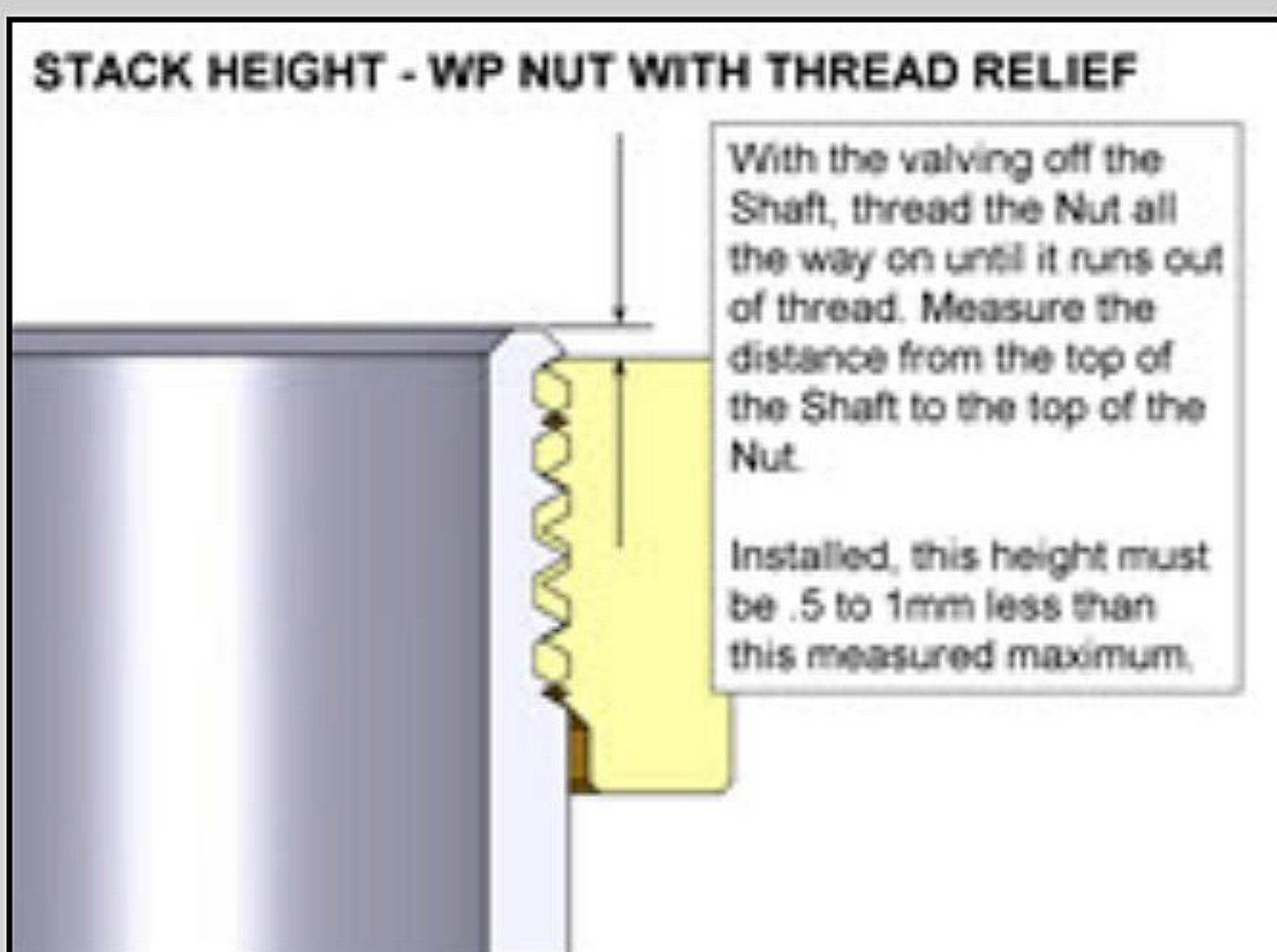






largest. Install the Secondary Piston with the compression (larger shim) side of the piston facing downward.

Reinstall the stock Secondary Rebound Valving/Check Valving on the shaft.



**V14-TYPE 1- Make sure the Total Valving Stack Height is correct. Critical!!**

The shims should be guided with the straight, non-threaded part of the shaft and should not be on the thread.

**The nut must not run out of thread onto the straight portion of the shaft.**

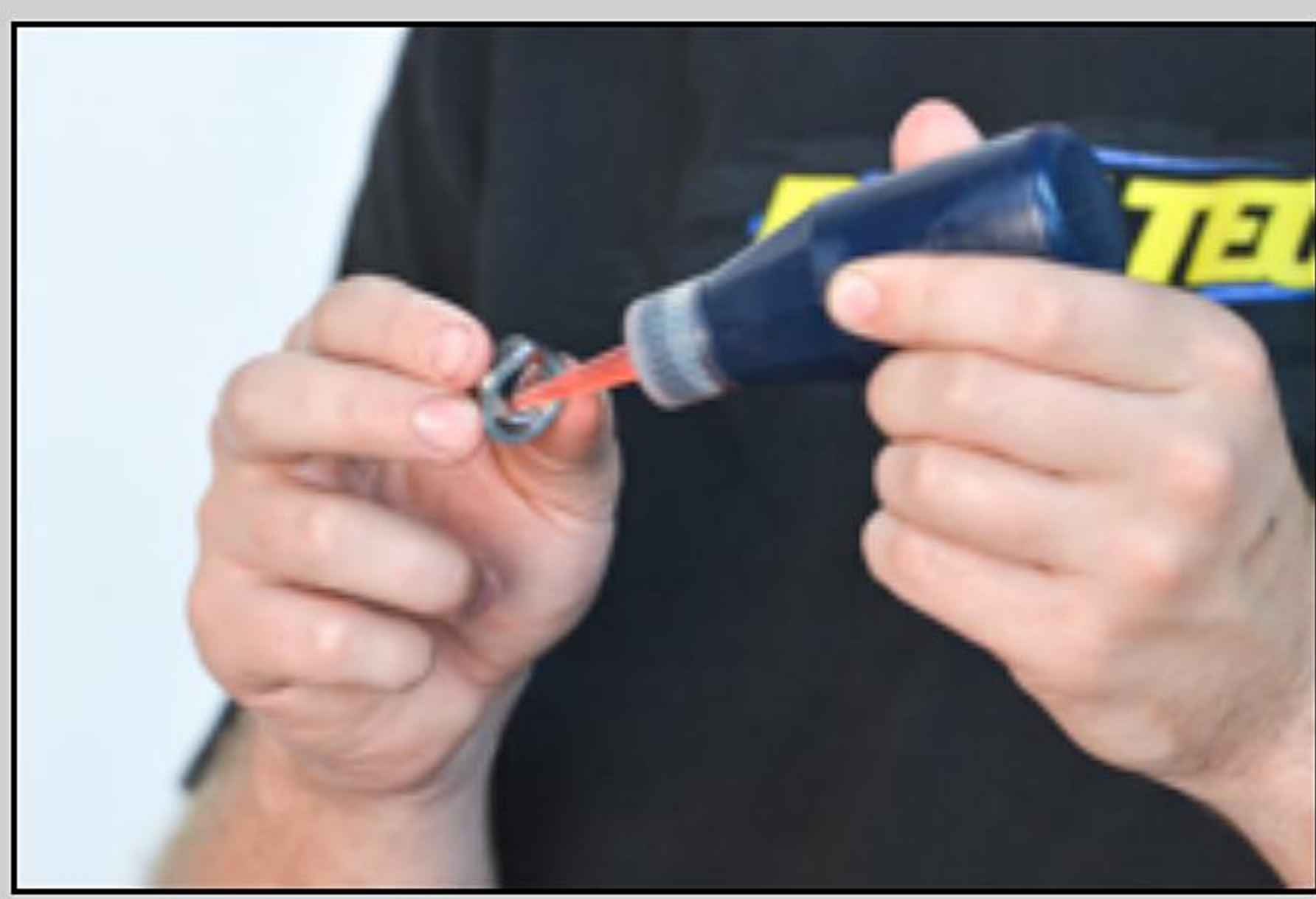
With the valving off the Shaft, thread the Nut all the way on until it runs out of thread. Measure the distance from the top of the Shaft to the top of the Nut.

Installed, this height must be .5 to 1mm less than this measured maximum.

This height adjustment is done with Spacing Shims. If needed, they should be added just below the Nut.

**Spacing Shims must be larger in diameter than the smallest shim in the stack.**





V15-TYPE 1- Apply Loctite to the shaft nut and install it. It is directional. There is a thread recess on the bottom side. It is critical the Total Valve Stack Height is correct.



V16-TYPE 1- When reassembling the valving assembly, position the spacer so the feed ports on the sleeve are aligned with the ports on the shaft while the shaft nut is torqued.

**Install and torque the shaft nut to the proper setting (see the DVS) using a torque wrench. Use Loctite. This is critical!**

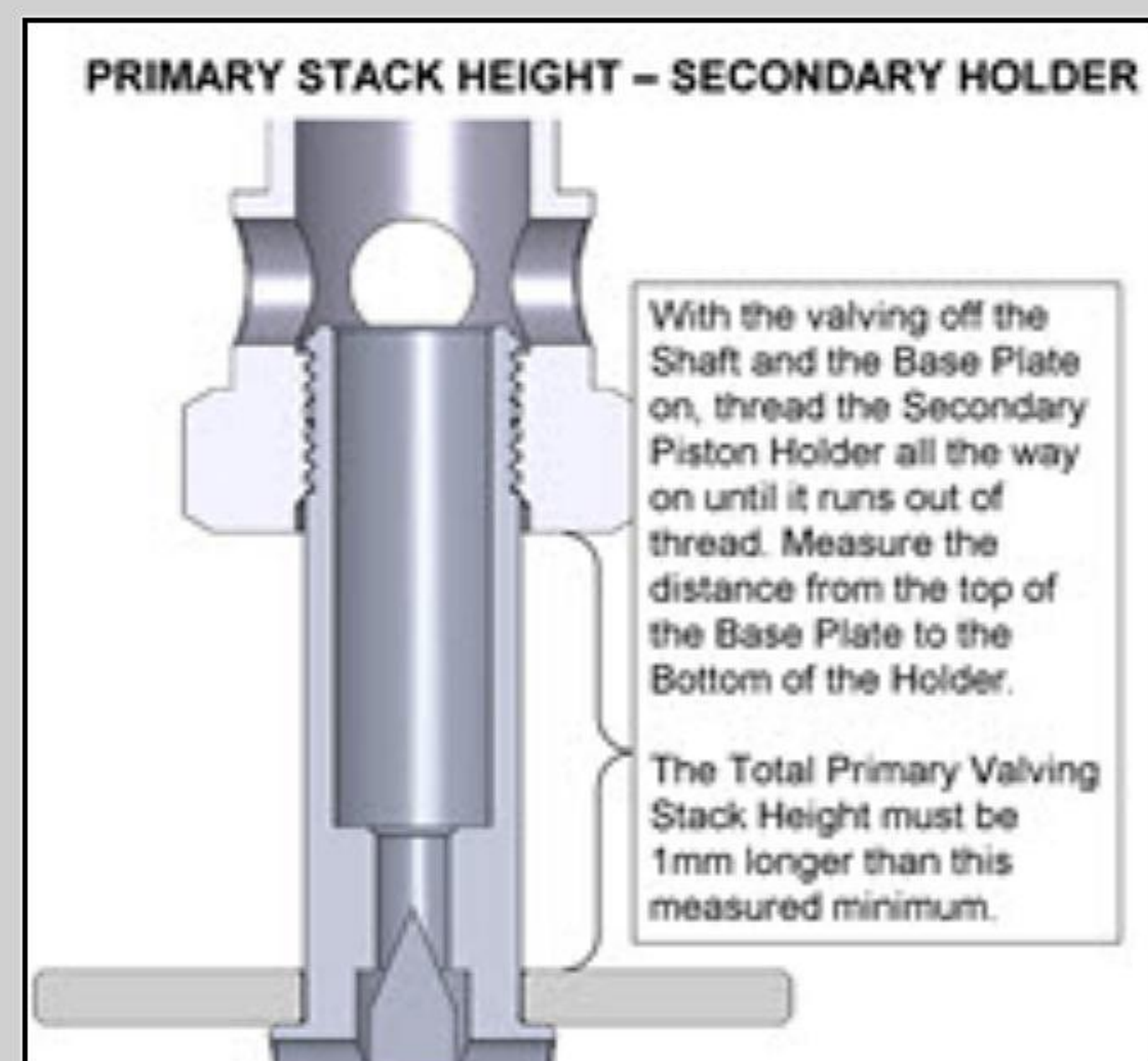
Double check the Nut to End-o-Shaft Height.

## TYPE 2 - SECONDARY PISTON HOLDER

V17-TYPE 2

This type uses a Secondary Piston Holder. Both the Primary and the Secondary stacks must be setup independently.

### PRIMARY VALVING STACK SETUP



Make sure you don't "run out of thread" onto the straight portion of the shaft when tightening the Secondary Piston Holder.

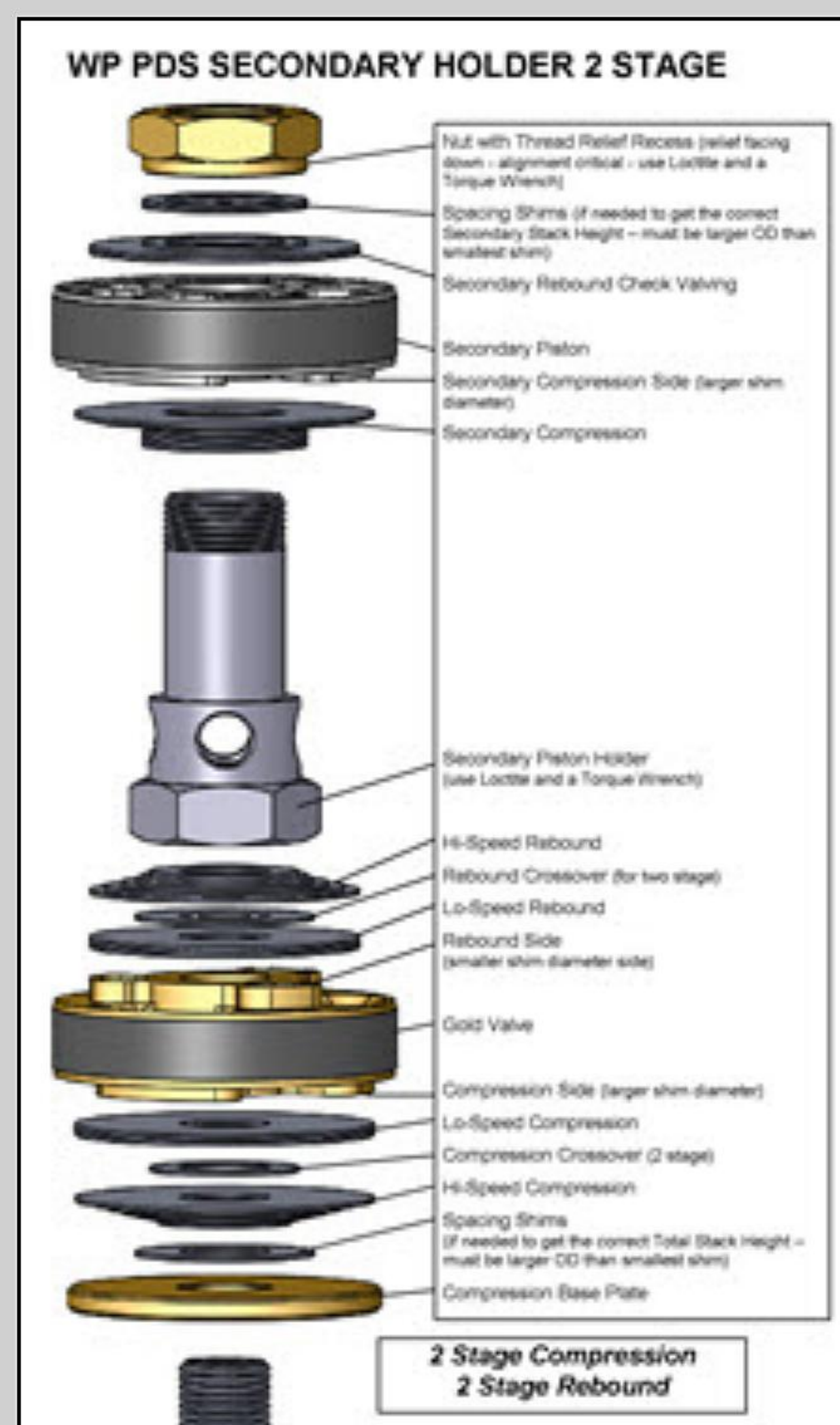
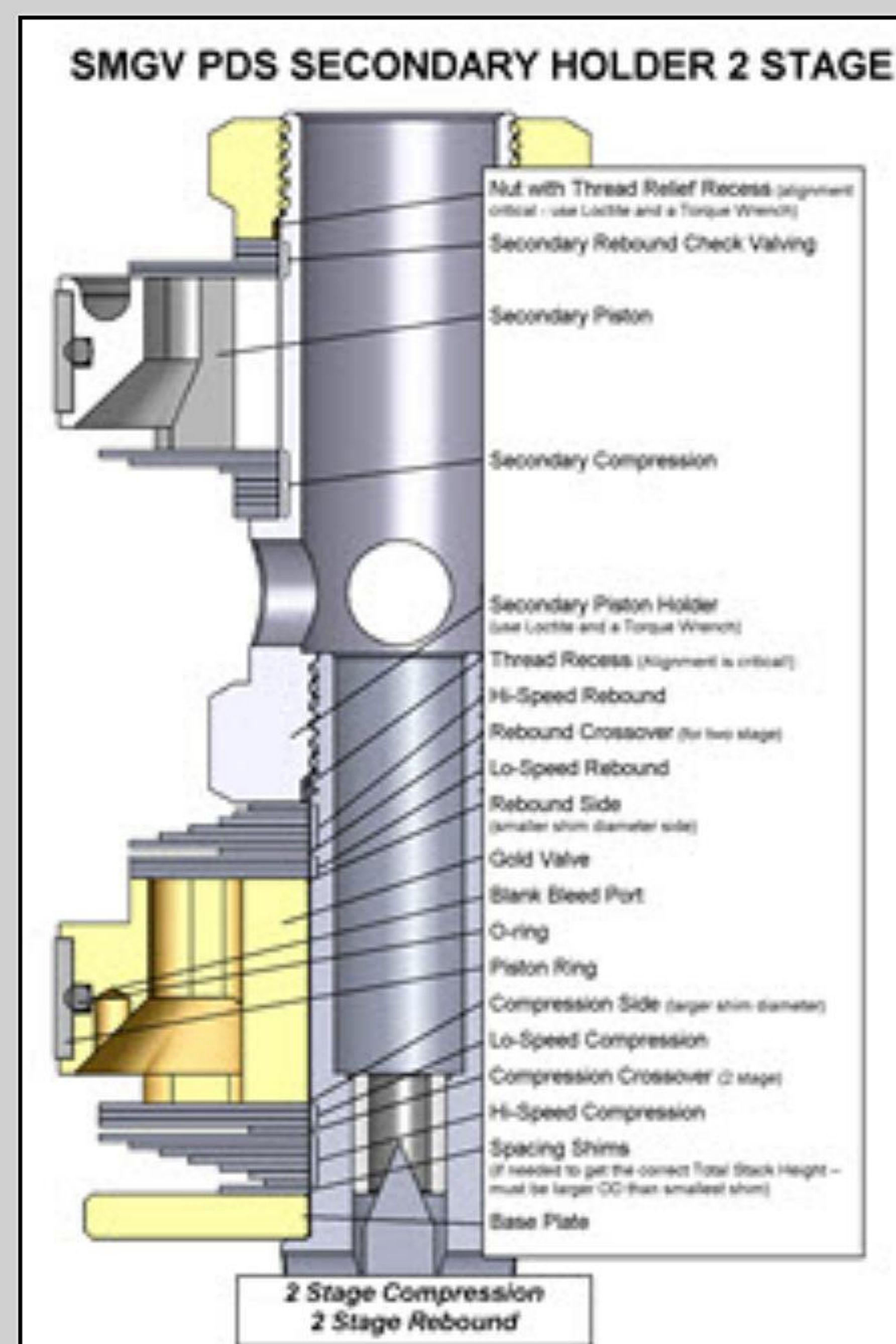
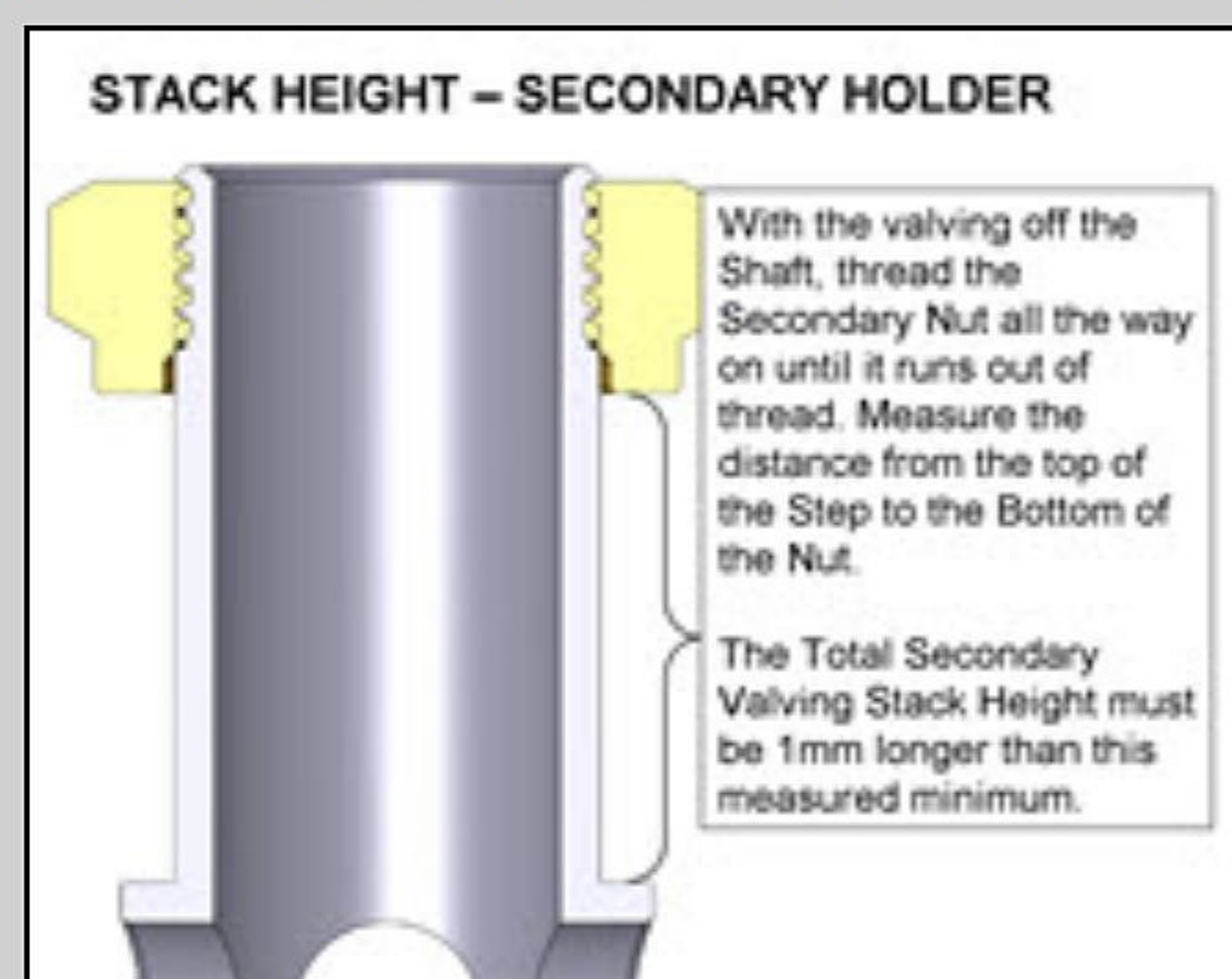
**With the valving off the Shaft and the Base Plate on, thread the Secondary Piston Holder on all the way until it runs out of thread. Measure the distance from the top of the Base Plate to the Bottom of the Holder.**

**The Total Primary Valving Stack Height must be 1mm longer than this measured minimum.**

Adjust this height with Spacing Shims. If needed, they should be added just above the Compression Base Plate.

**Spacing Shims must be larger in diameter than the smallest shim in the stack.**

### SECONDARY VALVING STACK SETUP





This method is similar to the one outlined for the Primary Stack.

With the valving off the Shaft, thread the Secondary Nut all the way on until it runs out of thread. Measure the distance from the top of the Step to the Bottom of the Nut.

The Total Secondary Valving Stack Height must be 1mm longer than this measured minimum.

Adjust this height with Spacing Shims. If needed, they should be added just below the Nut. **Spacing Shims must be larger in diameter than the smallest shim in the stack.**

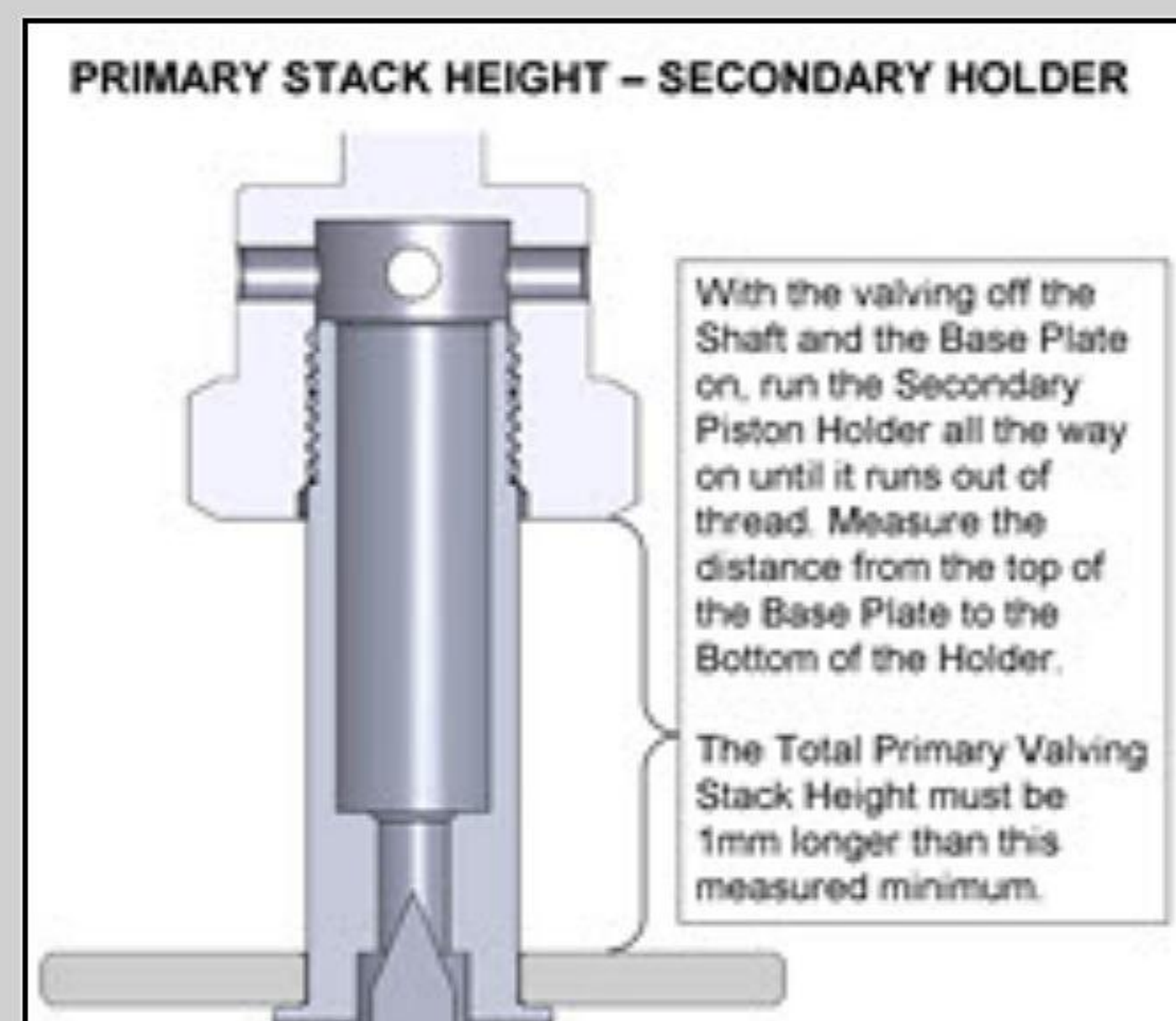
**Install and torque the shaft nut to the proper setting (see the DVS) using a torque wrench. Use Loctite. This is critical!**

## TYPE 3 - DUAL DIAMETER PISTONS

### V18-TYPE 3

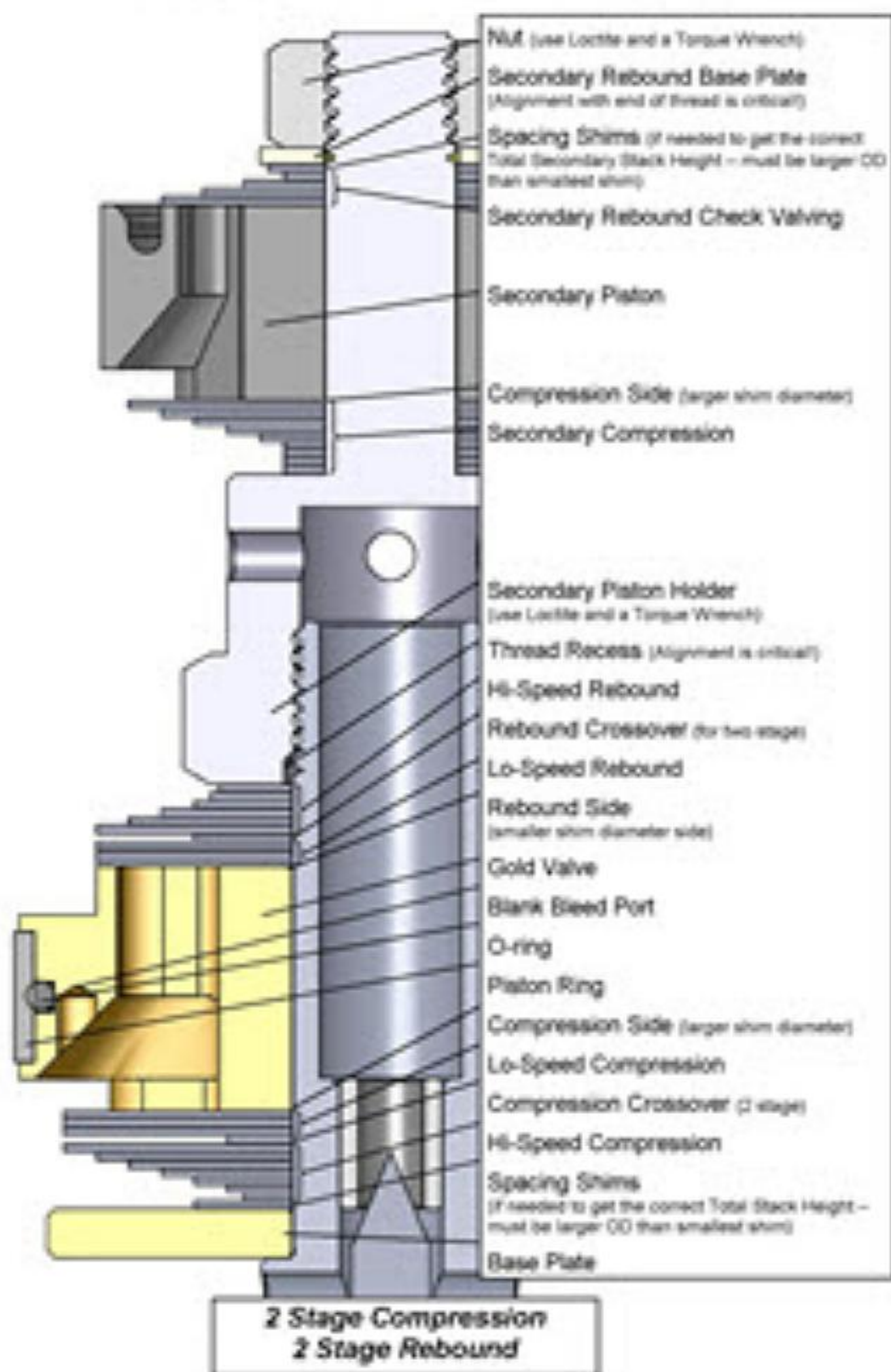
This type uses a Secondary Piston Holder. The Secondary Piston is smaller in diameter than the Primary. Both the Primary and the Secondary stacks must be setup independently.

### PRIMARY VALVING STACK SETUP



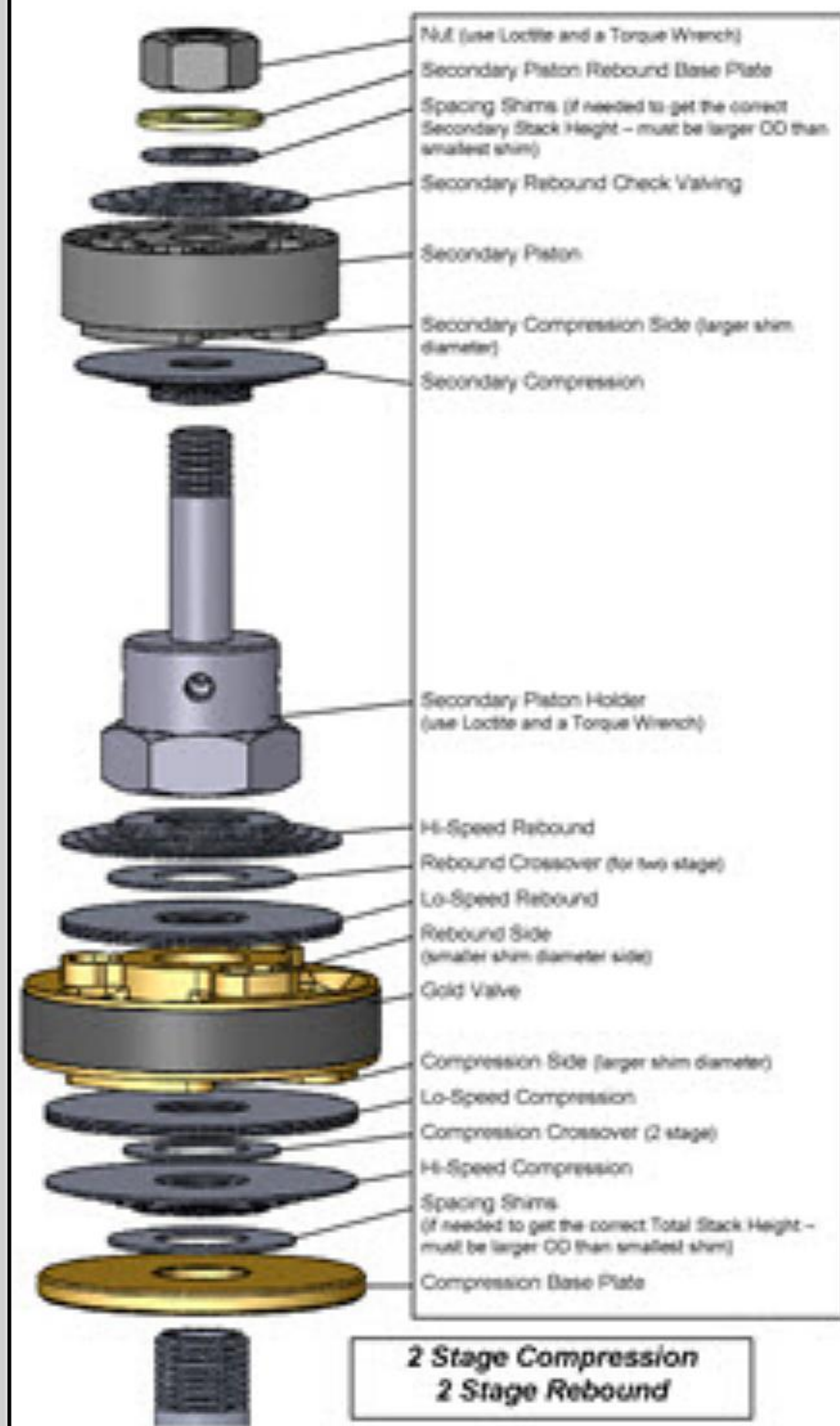
Make sure you don't "run out of thread" onto the straight portion of the shaft when tightening the Secondary Piston Holder.

### WP PDS DUAL DIAMETER 2 STAGE





## WP PDS DUAL DIAMETER 2 STAGE



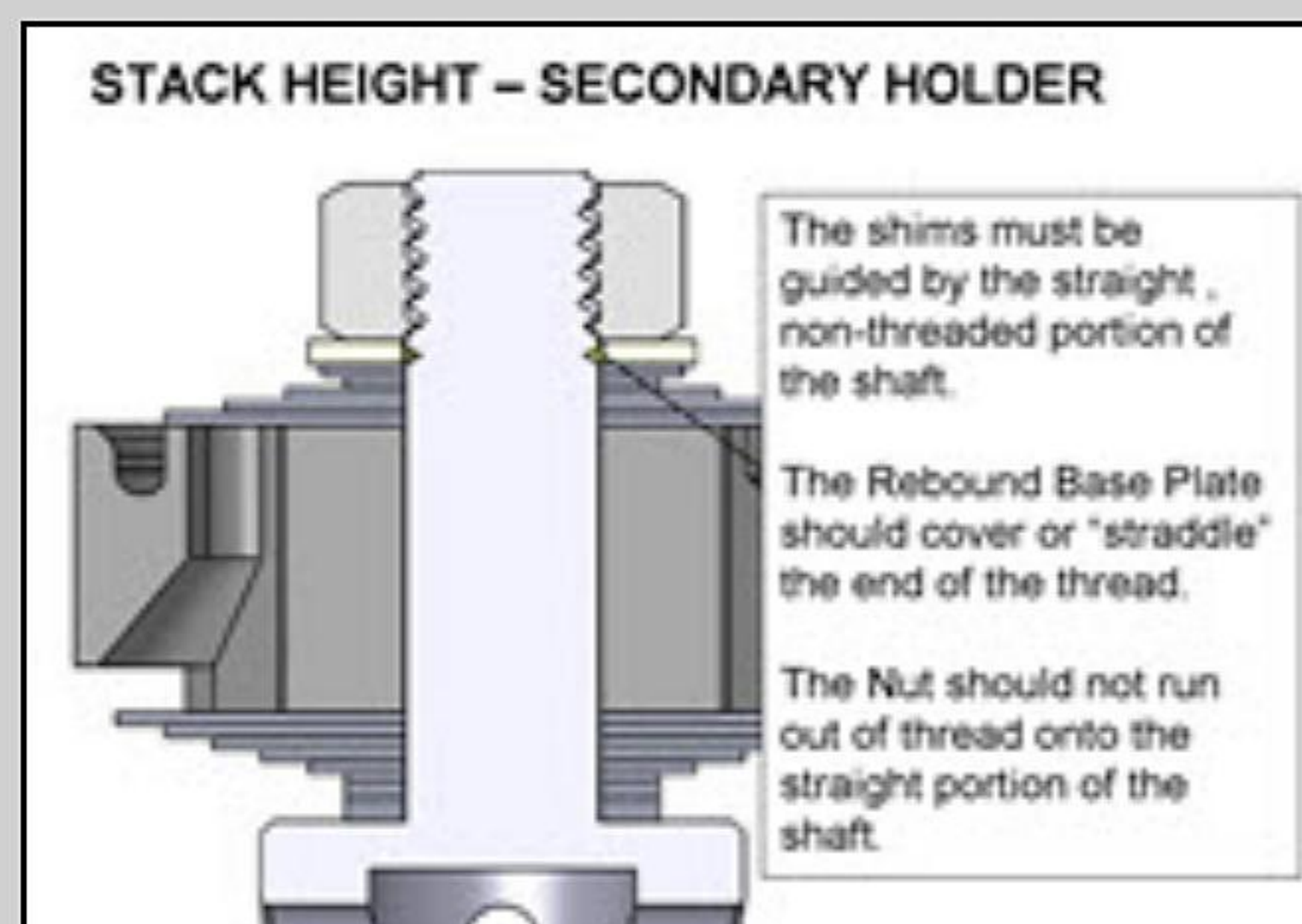
With the valving off the Shaft and the Base Plate on, thread the Secondary Piston Holder on all the way until it runs out of thread. Measure the distance from the top of the Base Plate to the Bottom of the Holder.

The Total Primary Valving Stack Height must be 1mm longer than this measured minimum.

Adjust this height with Spacing Shims. If needed, they should be added just above the Compression Base Plate.

Spacing Shims must be larger in diameter than the smallest shim in the stack.

## SECONDARY VALVING STACK SETUP



The shims should be guided with the straight, non-threaded part of the shaft. The Rebound Base Plate should cover or "straddle" the "step" at the end of the thread.

The nut should be fully engaged and must not run out of thread onto the straight portion of the shaft.

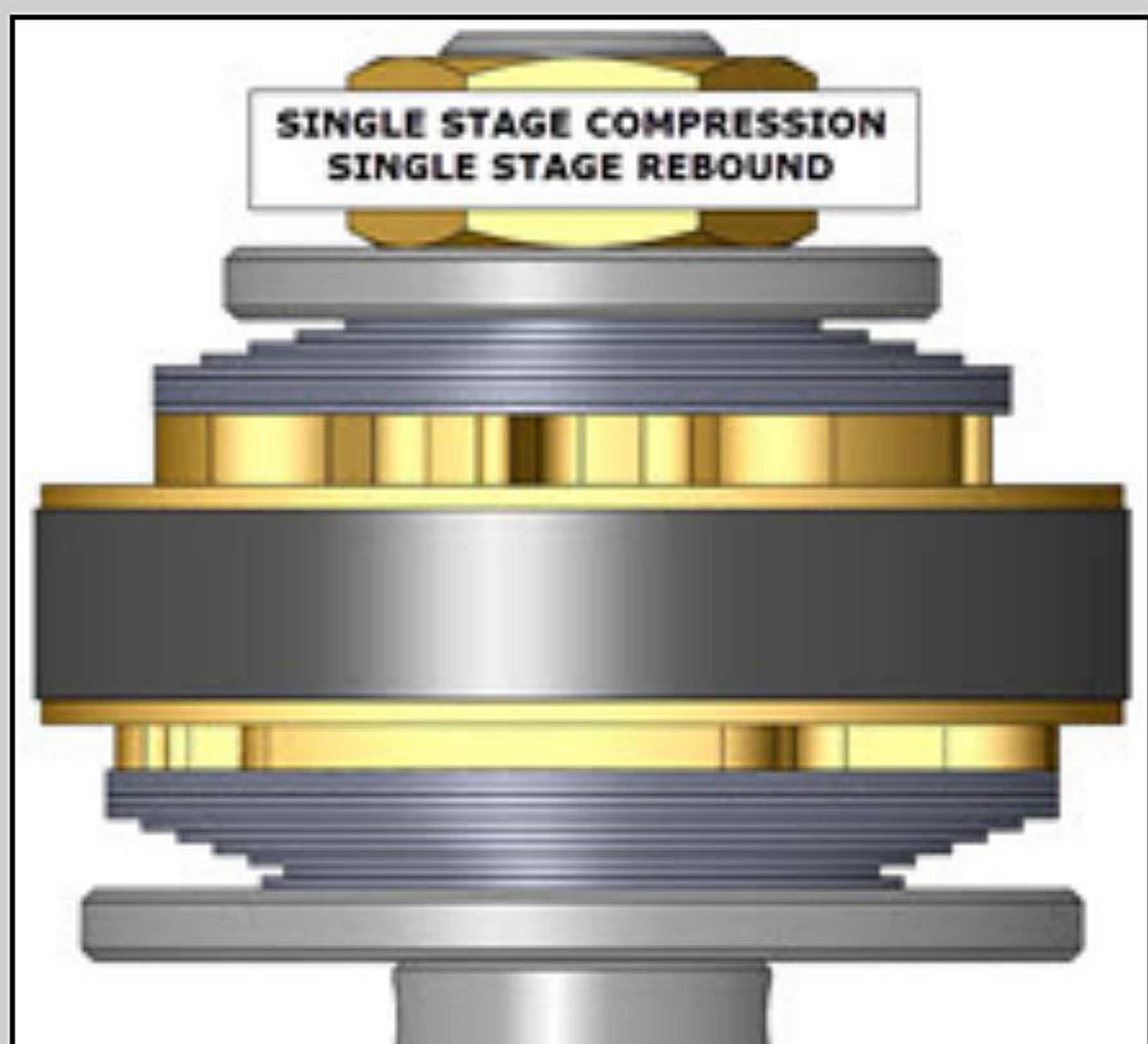
This height adjustment is done with Spacing Shims. If needed, they should be added just below the Rebound Base Plate.

Spacing Shims must be larger in diameter than the smallest shim in the stack.

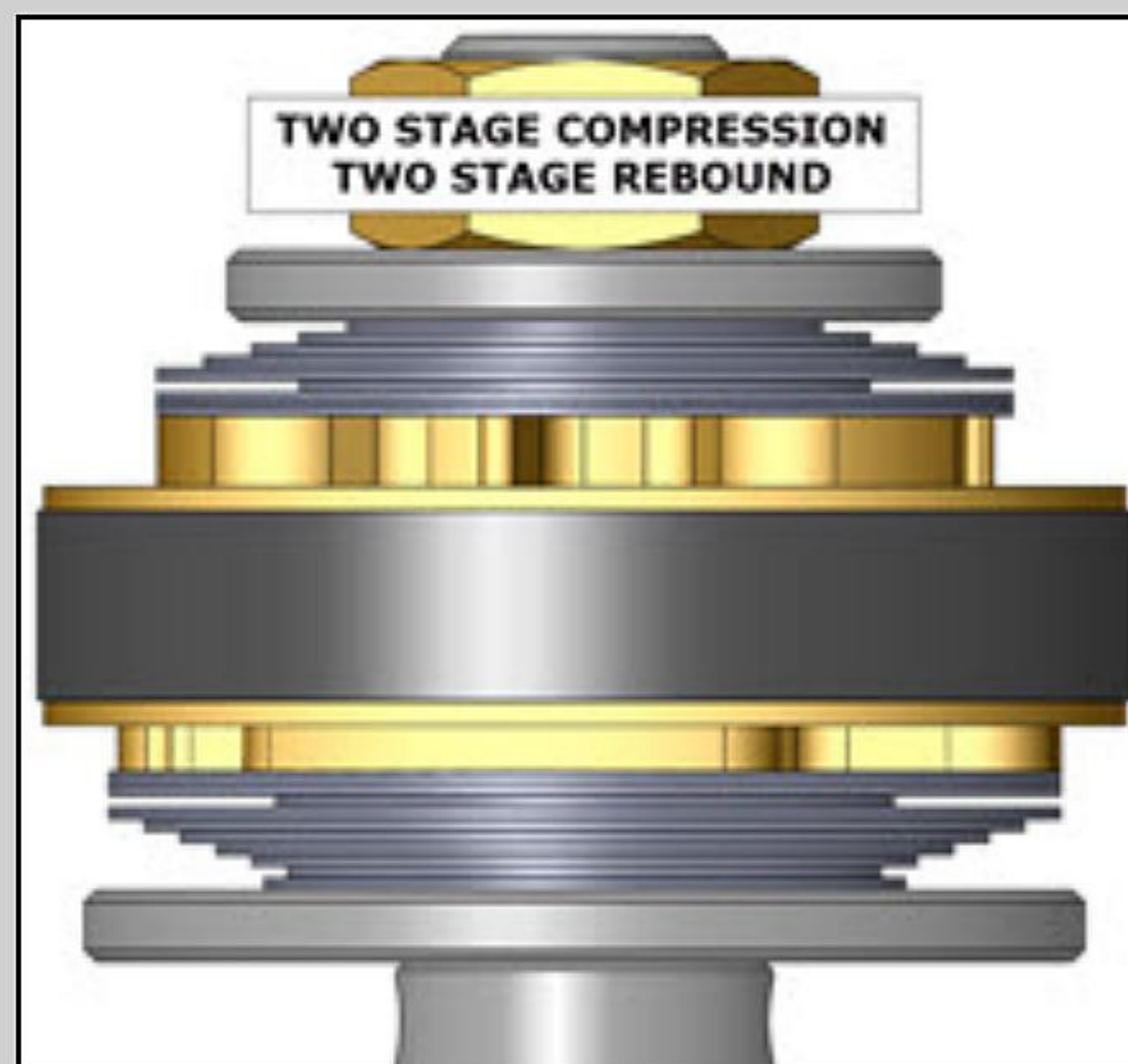
Install and torque the shaft nut to the proper setting (see the DVS) using a torque wrench. Use Loctite. This is critical!



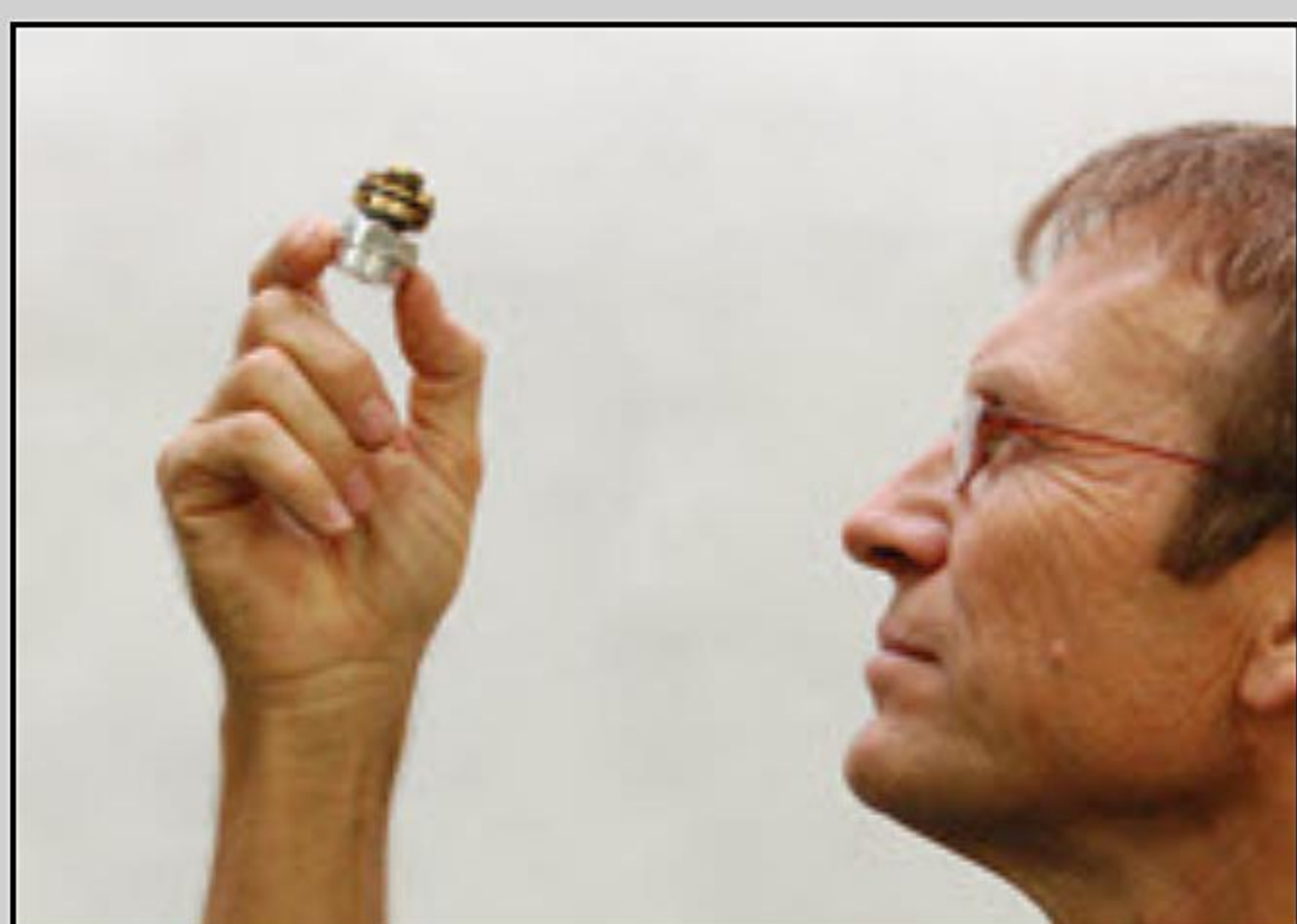
V19- **Single Stage Compression and Rebound** (shown on a non-PDS shock)



V19- **Two Stage Compression and Rebound** (shown on a non-PDS shock)



Notice the gap in the valving stack where the Crossover is. The Crossover Gap should be clearly visible.

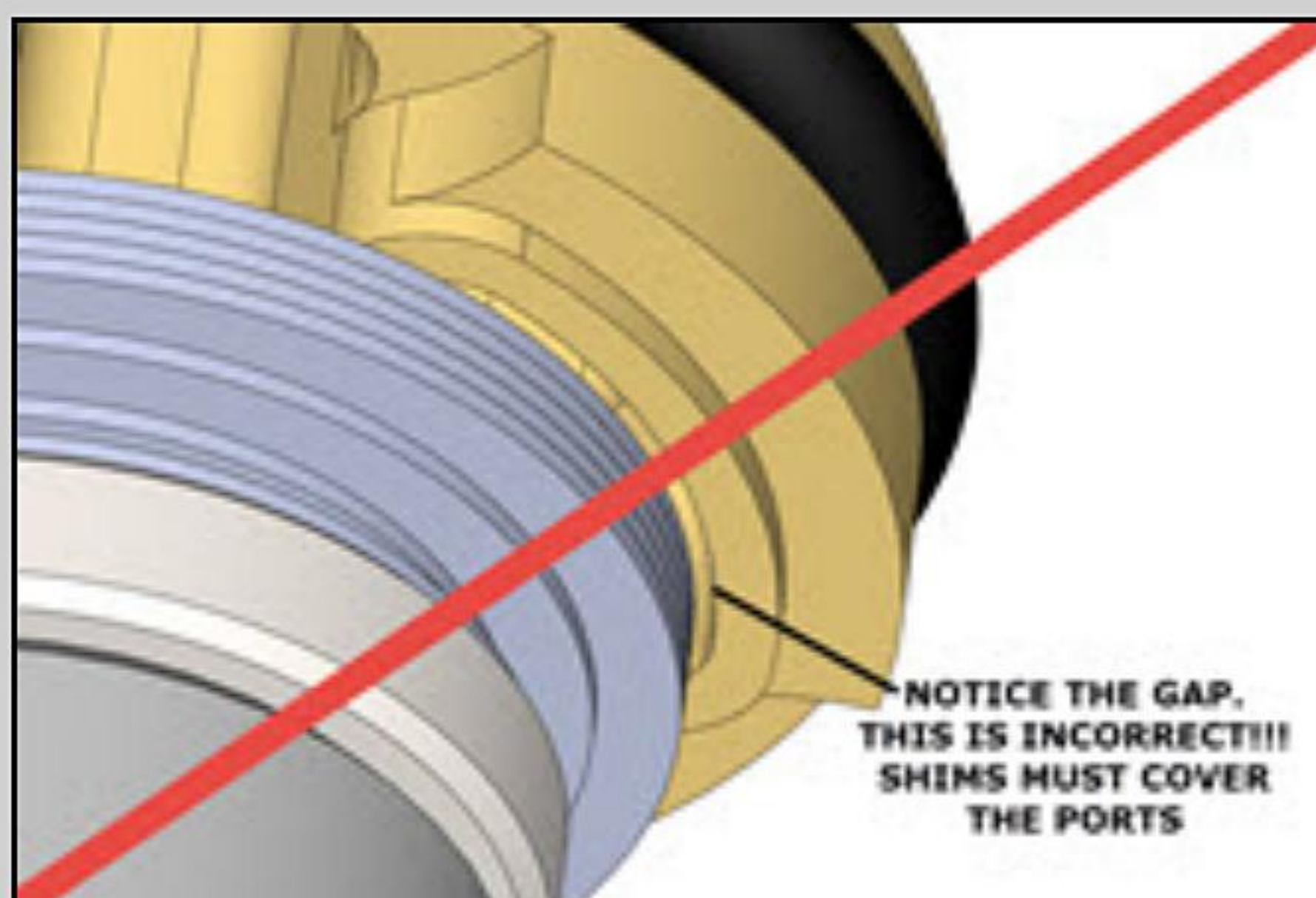


V20- Visually check your work.

Hold the completed valving assembly up to the light and look for any irregularities. Make sure the shims are laying flat on the piston surface. On two stage stacks check that the Crossover Gap is clearly visible.

If there are any problems, disassemble the stack and look for dirt, bent shims, or any other causes. Reassemble and inspect again.

You might be thinking that this looks like either a very tiny shock shaft or a fork compression valve. Well, you're right, it's a very tiny shock shaft. You get the idea.



V21- **Make sure the shims that go next to the Gold Valve completely cover the ports on both sides of the piston!** If the ports are not covered there will not be enough damping.

This could be caused by a number of reasons. Piston upside down, Compression and Rebound Stacks reversed on location or installed upside down.

Please call Tech Support if this occurs and you can't figure it out.



V22- Return to the main Rebuild instructions to complete the reassembly.