

EQUIPMENT OPERATIONS & MAINTENANCE

RB Revamped-1 (RV1) Series Production Chokes Equipment Manual

1.0 **SCOPE**

- 1.1 Storage, installation, operating, and maintenance instructions and information for RB series production chokes.

2.0 **GENERAL INFORMATION**



Chokes operate under high pressures. Release all pressure and isolate valve before installing or maintaining the valves. Follow instructions as listed.

- 2.0 Taylor Valve Technology's RB series chokes are constructed upon the external sleeve and nozzle principle. Whereby flow restriction is effected by the relative position of external sleeve to the nozzle. The nozzle has a series of circular ports through which the flow passes. The external sleeve overlaps the ports during linear movement of the stem and therefore flow is controlled by the restriction produced. When the stem has reached its full travel, the choke is then in a fully open position. A "dead band" is encountered during opening which is a result of the overlap from fully closed to initiation or port intersection.
- 2.1 The RB series choke is distinguished by a bolted bonnet to body connection and linear travel. The RB series is available in sizes from 2" to an 8" nominal, 0 – 10,000 psig working pressure configuration. End connections are available in NPT, or API LP internally threaded, ANSI flanged, API 6A flanged, welded or clamp hub.

3.0 **STORAGE AND INSTALLATION**

- 3.1 Chokes are shipped in the closed position with the end connections and other sealing surfaces protected with corrosion inhibitors and plugs or covers. This protection shall not be disturbed until the choke is ready to be installed. Care in handling shall be observed in order not to damage fittings, actuators, positioners, and other accessory components including data plates. Unless provisions for proper testing by qualified personnel are available, the choke shall not be disassembled for any reason.
- 3.2 The choke shall be installed in-line referencing the direction of flow mark(s) found on the body. Chokes may be installed rotated any degree about the line axis as is convenient but under no circumstances shall a choke be installed contrary to the flow direction mark(s). Threaded connections shall receive a thorough inspection prior to makeup and any minor flaw addressed with a thread file or tap. A good grade of thread sealant such as API 5AC compound is recommended; however, if Teflon tape is applied, use one turn per joint and apply in the direction of the thread. Excessive wrapping with Teflon tape will result in the tape "bunching" and prohibiting proper makeup. Threaded joints should be made up power tight, but the use of "cheaters" and excessive torques should be avoided.
- 3.3 Flanged, welded or clamped connections shall receive a thorough inspection prior to makeup and any minor flaws addressed with a file or abrasive paper cloth. Bolts, nuts and gaskets should be of the proper size, quantity and grade for the application at hand. Do not attempt to omit bolts or use sub-size bolts or nuts. Lubricate ring grooves lightly with a good grade of petroleum oil but do not pack or fill groove as this will not permit proper gasket seating. Tighten bolting uniformly by addressing opposing bolts in a crossing sequence with loading applied incrementally. The gap between the flanges should be observed to determine if the flange faces are remaining relatively square and tightening adjusted accordingly. Do not over-tighten smaller bolts.
- 3.4 Welded end chokes, if not provided with extended inlets or outlets, shall be disassembled prior to preheat, welding, and post-heat operations to avoid thermal damage to internal components. Welding procedures and materials used shall be qualified and approved and shall be suitable for the materials to be joined. Upon reassembly, the choke shall be tested as described in Section 4.0 of this document.

4.0 **ON-SITE TESTING**

- 4.1 Subsequent to any repair or maintenance operation which breaches the body and/or bonnet closures or pressure boundaries, a hydrostatic test shall be performed. Testing shall be performed by qualified personnel.
- 4.2 Procedure:
 - 4.2.1 Close upstream and downstream line valve(s) to isolate choke under test.
 - 4.2.2 Open choke approximately halfway to perform a full body test or close choke fully to perform a seat closure test. Note: power actuated chokes shall be operated in accordance to this document and the respective actuator manufacturer's recommendations.
 - 4.2.3 Apply water or other suitable test media to rated working pressure of the choke via an appropriate line connection or open upstream isolation valve to supply system pressure and hold for three (3) minutes minimum. No visible leakage is allowed. Caution: do not exceed the working pressure of the lowest rated member of the equipment under test.
 - 4.2.4 Restore system to operating status as required.

5.0 **OPERATING**

- 5.1 **Operation:**
 - 5.1.1 Opening is performed by lifting the stem. On a manually actuated choke, this is done by turning the hand wheel in a clockwise or counter-clockwise direction. The desired opening in equivalent Cv is read from the calibration label attached to the side of the yoke on the manually actuated chokes. On the linear actuated chokes, indication is provided by the actuator company.
 - 5.1.2 Closure is performed by achieving stem travel in an opposing direction as described in 5.1.1
 - 5.1.3 The recommended range of percent of full open in which the choke is normally operated is 20%-80%. This range will provide the maximum trim life as well as a margin of greater flow should it be required.

6.0 **MAINTENANCE**

- 6.2.1 **Depressurizing System:**
 - 6.2.1.1 Close choke fully to permit system shut in. Close downstream isolation valve(s).
 - 6.2.1.2 Close upstream line valve(s) to isolate choke under test. Open choke approximately halfway to equalize upstream and downstream isolation zones.
 - 6.2.1.3 Bleed remaining pressure from isolation zone with the choke vent fitting located on the body opposite the inlet. **Caution: this operation will release potentially explosive and/or toxic media at high velocities. Proper precautions must be observed. Leave fitting open.**

REV. A

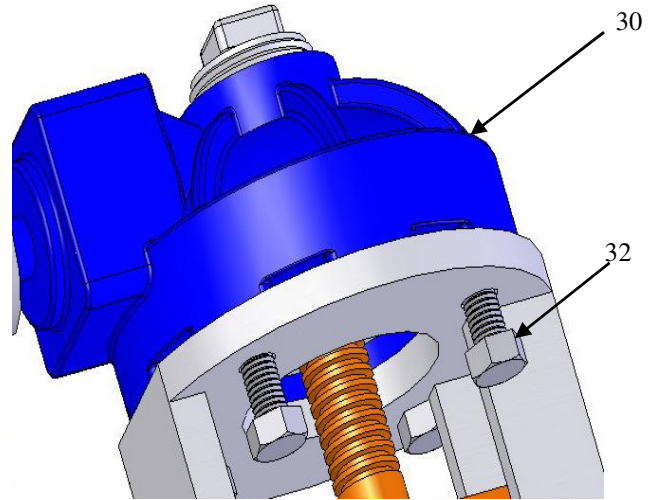
*Taylor Valve Technology
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Ph 405-787-0145
Fax 405-789-8198*

DISASSEMBLY OF TAYLOR “RB REVAMPED-1 (RV1)” SERIES CHOKES

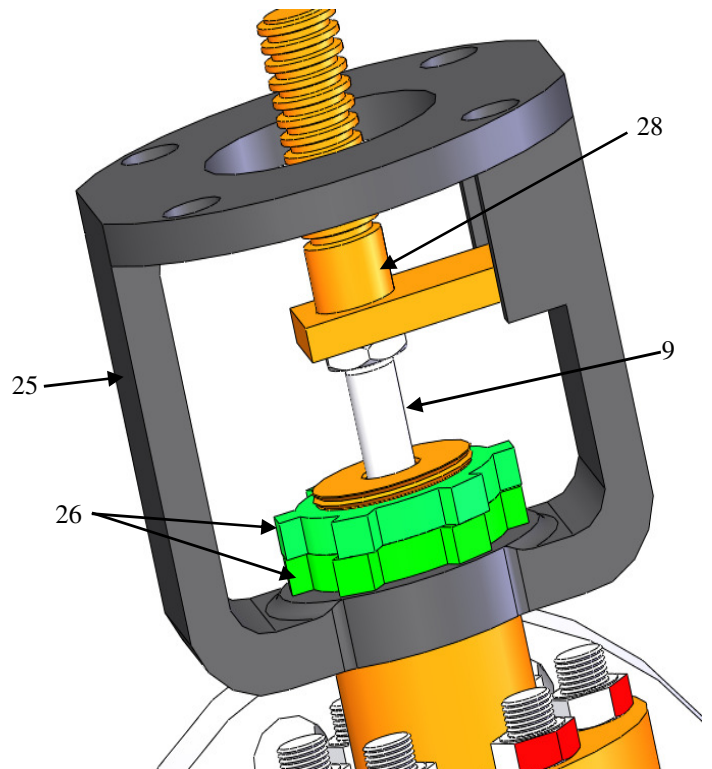
For Chokes Equipped With a Geared Handwheel Actuator:

Step 1 Before choke disassembly, be certain choke is fully closed. Anti-rotational device (28) should be down as far as possible to ensure complete shut off. Remove geared hand wheel actuator (30) by removing the four bolts (32) underneath the top surface of the actuator yoke. Unscrew the hand wheel actuator until it comes completely off the bracket.

The hand wheel (not shown) does not have to be removed to do this. It can be removed if desired by removing the attachment bolt and pulling the hand wheel off of the shaft.



Step 2 To begin disassembly of the top works, unscrew the yoke lock nuts (26) completely then raise it along with the yoke (25). Unscrew anti-rotational device (28) from choke stem (9) by turning counter-clockwise. The yoke must be raised in sequence w/ the removal of the anti-rotational device. If stem spins when trying to unscrew anti-rotational device, use vice grips to hold stem in place. Do not use grips on any part of stem that travels through U-cup packing.

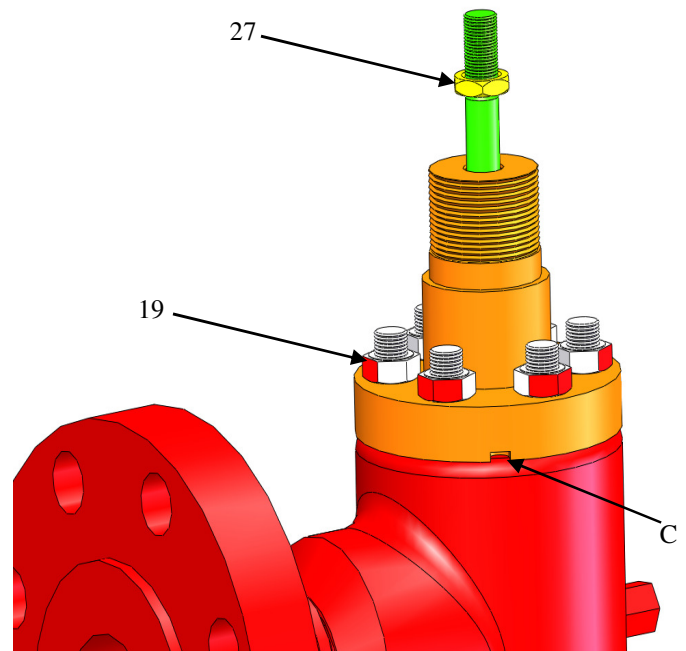


REV. A

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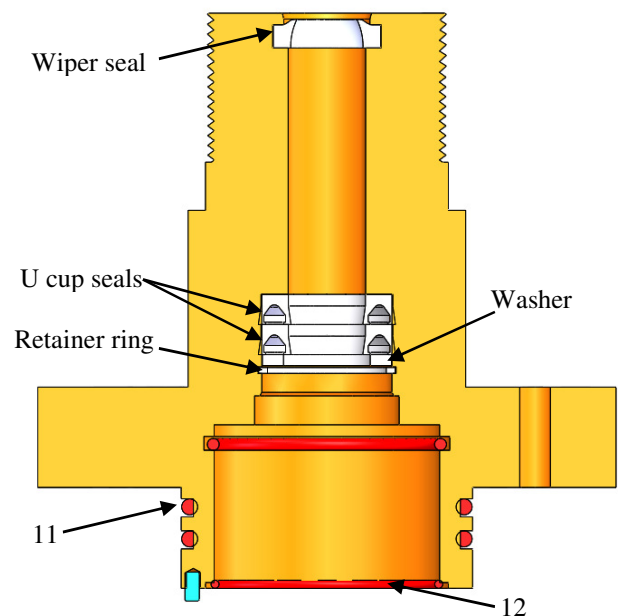
Step 3 Remove bonnet nuts (19). Use pry notches (C) to pry bonnet off body. After bonnet is broken loose from the body, then slide it straight up over the stem to remove completely from choke.

***Note:** Unscrew the top hex nut (27) before pulling out the bonnet



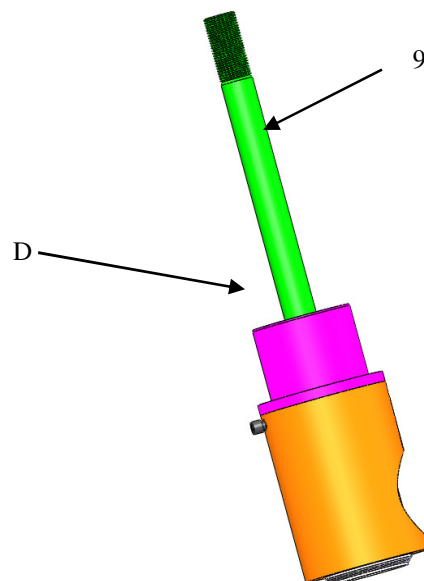
Step 4 Next, packing components can be removed from the bottom by using a pick to remove the retainer ring from the groove and then by simply using your fingers to remove the washer and U cup seals. The wiper can be removed from the top.

Step 5 Remove and inspect the O-rings (11, 12), U cup seals and wiper seal used on bonnet. If the O-rings, U cup seals, wiper seal or O-ring glands show signs of wear or damage, replace them as necessary.



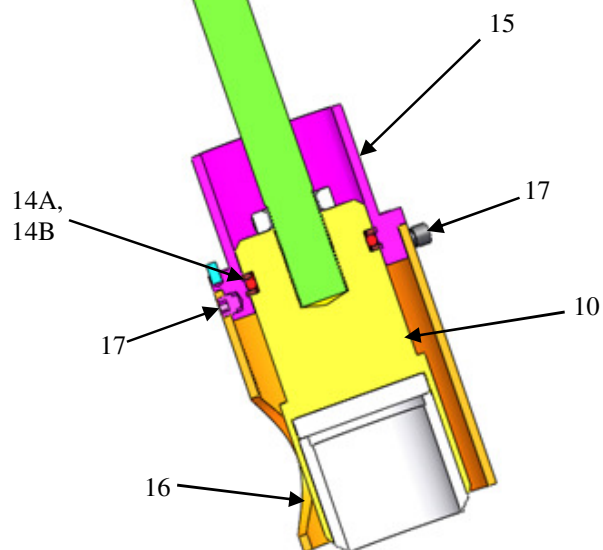
REV. A

Step 6 To remove stem/sleeve assembly (D) grab stem (9) and lift straight up until assembly comes out of the choke.



Step 7 After internal assembly is removed from choke, begin disassembly by removing the two set screws (17) which hold the sleeve guide (15) and cage (16) together. Upon removal of set screws, the cage and sleeve guide will come apart and slide off the external sleeve assembly (10). Inspect each part for wear and/or damage. Inspect O-ring (14A Qty1) & back up ring (14B Qty2) on external sleeve assembly for RB 2" choke.

On RB 3", 4" & 6" the O-ring (14A Qty1) will be on the sleeve guide (15). Check for any wear or damage. Replace if necessary.

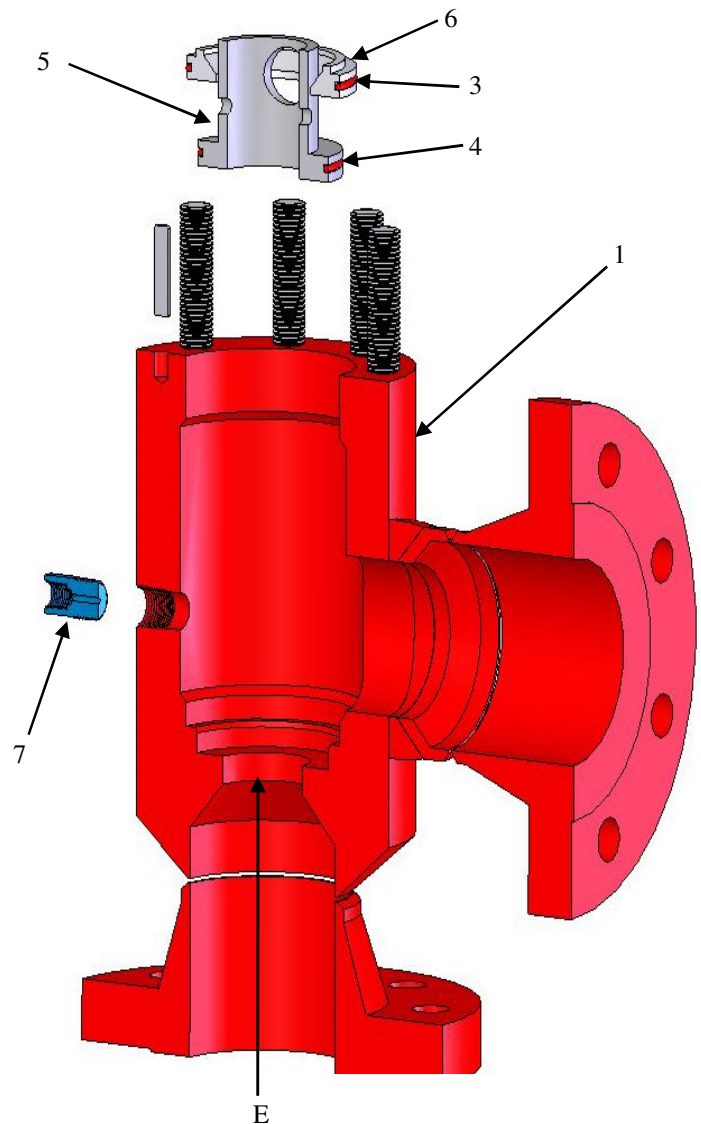


REV. A

Step 8 The last remaining sub-assembly is the body (1). Remove the nozzle (5) and seat (6) from the body by laying choke on its side and using a plastic rod and rubber mallet to tap each out from underneath (E). Check seat and nozzle O-rings (3, 4) for damage or wear, and replace if necessary.

NOTE: NOZZLE IS VERY BRITTLE. DO NOT DROP! BE SURE TO CATCH THE NOZZLE AND SEAT WHEN THEY ARE TAPPED OUT.

Step 9 Unscrew the vent valve (7) and replace if necessary.



The valve is now completely disassembled. Re-assemble in the reverse order using the following assembly instructions.

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ASSEMBLY OF TAYLOR “RB REVAMPED-1 (RV1)”

SERIES CHOKES

REV. A

Step 1 Prepare the body sub assembly (1) by wiping the body clean of debris with a shop rag. Make sure all threads are clean and dry.

Step 2 Apply Loctite to each stud (2) and fasten to body. Be certain each stud "bottoms out" inside body threads.

Step 3 Lightly lubricate the seat and nozzle O-rings (3, 4) with grease or motor oil and install on the nozzle (5) and seat (6) in the O-ring groove at the bottom of each piece.

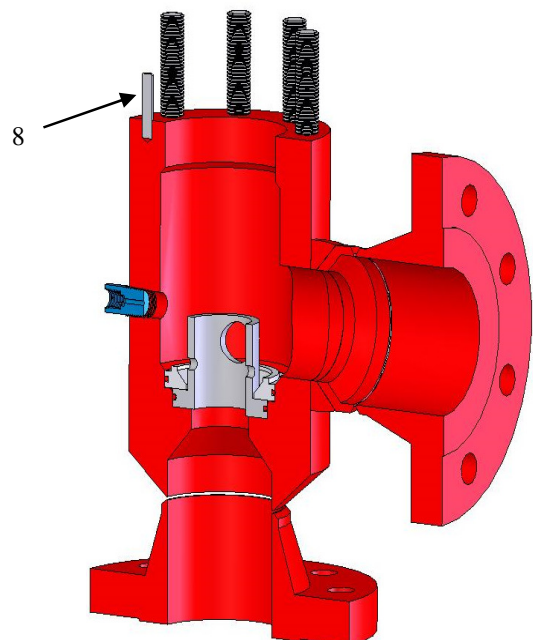
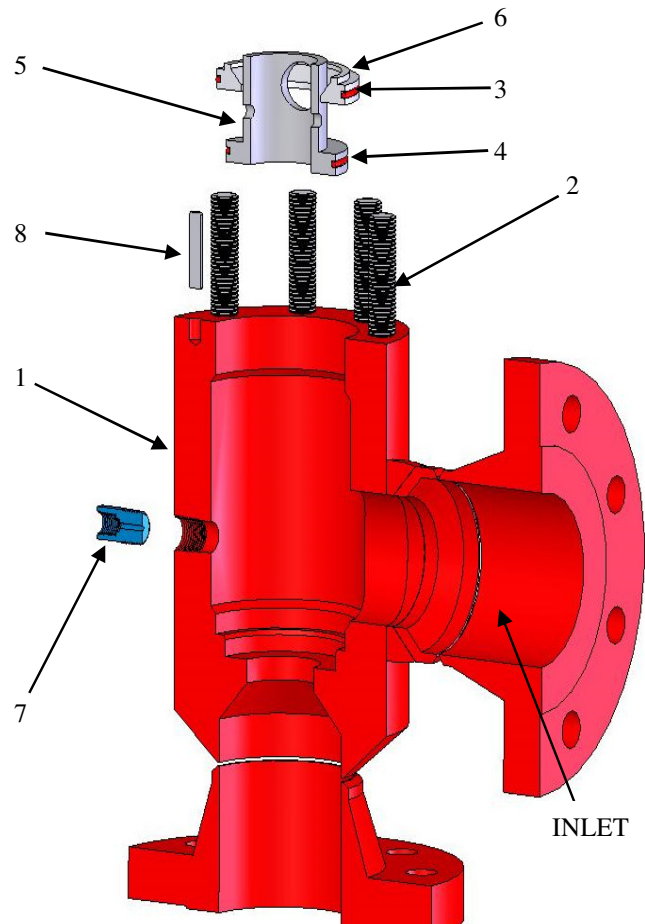
Note: Nozzle is very fragile. **DO NOT DROP!**

Step 4 Insert the nozzle into the body and **align either of the small holes in the nozzle parallel to the inlet of the valve.** With a shop rag over a plastic rod, **LIGHTLY** tap the nozzle into place with a rubber mallet.

Step 5 Insert seat into the body and place on shoulders of nozzle. If seat gets slightly hung up on top bore of body, tap through lightly with a rubber mallet. **Do not** allow seat to fall on nozzle. Catch with your free hand when it falls through. With a shop rag over a plastic rod, **LIGHTLY** tap the seat into place with a rubber mallet.

Step 6 Wrap the vent valve (7) threads approximately 3 times with Teflon tape, thread it into the threaded hole on the side of the body and tighten to hand tight plus 1 ½ to 2 turns with a wrench.

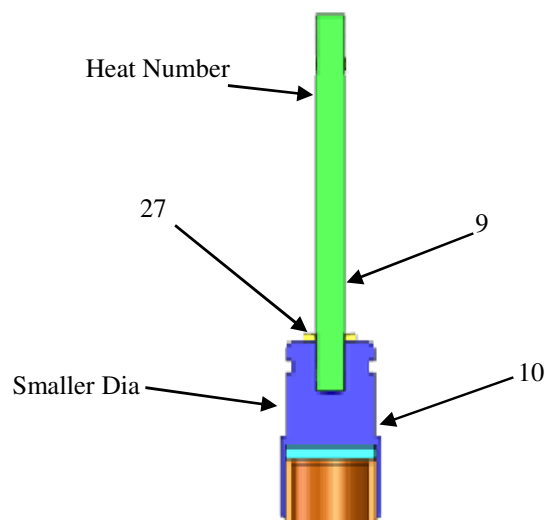
Step 7 With a pin driver install the locator dowel pin (8) into the pin hole located opposite the inlet flange as shown.



REV. A

- Step 8 Apply Loctite to hex nut threads (27), then on the end opposite of the heat number, thread hex nuts as shown onto stem (9) leading with the coned end.

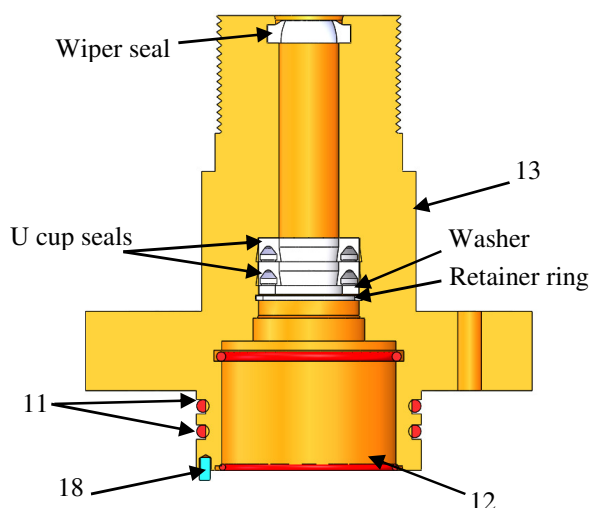
Apply Loctite to stem threads on the same end, and then fasten the stem into external sleeve assembly (10). To fasten the stem, secure external sleeve assembly by gripping the smaller diameter with a vice (grip securely but do not over-tighten and cause sleeve to deform). Next, clamp a vice grips on the top of the stem, no lower than 1 inch below the threads (heat number end). Fasten stem securely into external sleeve assembly.



- Step 9 Lightly lubricate the four bonnet O-rings (11, 12), U cup seals and wiper seal with grease or motor oil. Install two of the O-rings on the **outer** gland of the bonnet (13) and install the other two on the **inner** gland of the bonnet. Install the U cup seals with washer and retainer ring as shown on the bonnet (13). Install wiper seal as shown.

- Step 10 **For RB 2" choke** → Lightly lubricate O-ring (14) with grease or motor oil and install it in the O-ring groove on the **top** gland of the external sleeve assembly. Install the backup rings (white Teflon) on the top and bottom of O-ring 14 (Qty 2).

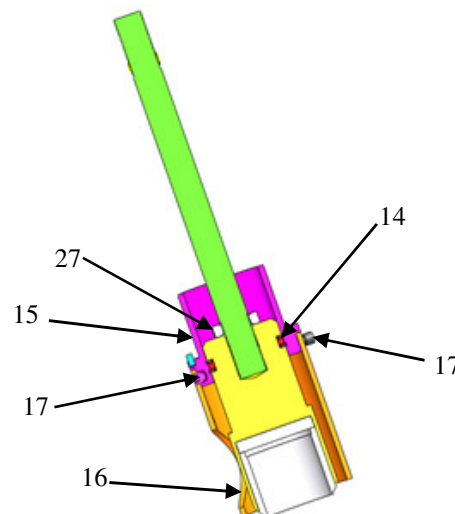
For RB 3", 4" & 6" choke → Lightly lubricate O-ring (14 Qty1) with grease or motor oil & install it in the O-ring groove of external sleeve guide (15).



- Step 11 Attach sleeve guide (15) and cage (16) around external sleeve assembly as shown using 2 set screws (17) with Loctite applied.

Note: The set screw holes on the cage and the sleeve guide are offset 170 degrees so that they will align only one way. See FIGURE 1 for illustration.

- Step 12 Using a pin driver, tap dowel pins (18) into hole on bottom of bonnet (13). With stake and hammer, stake each dowel pin twice on opposite side of each other to tighten them so they do not fall out of their designated holes.



REV. A

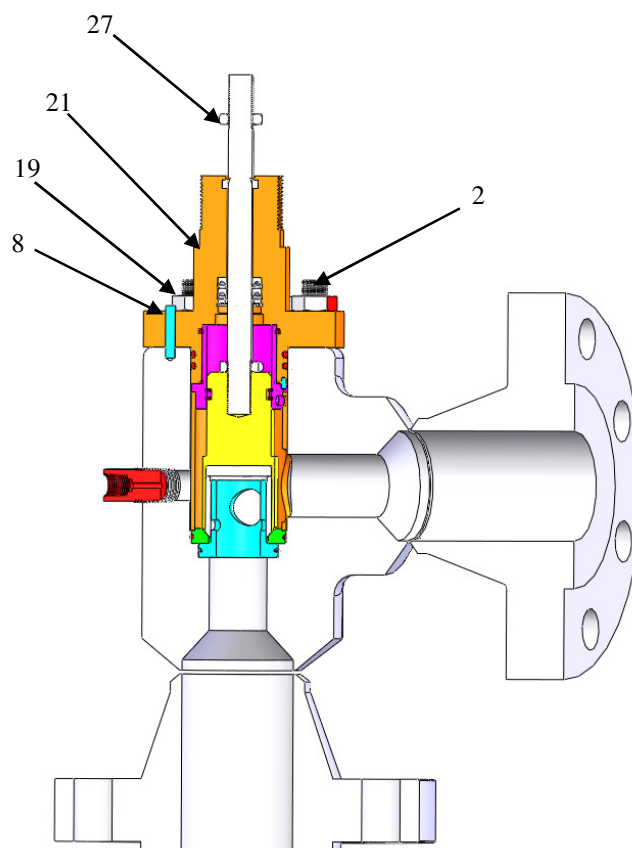
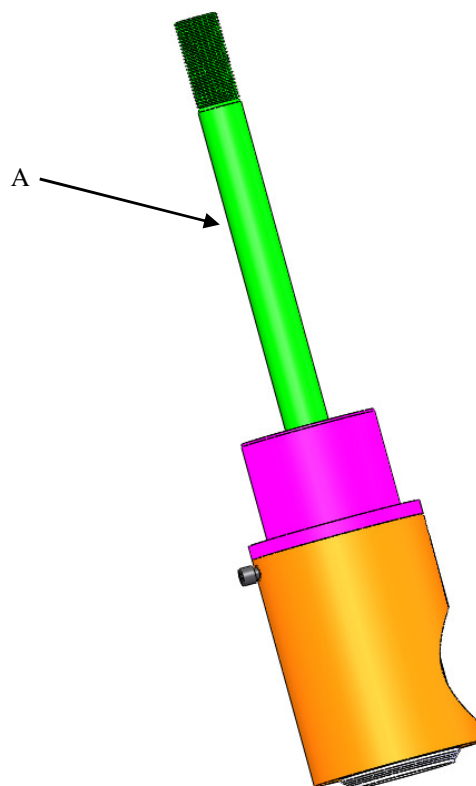
Step 13 Insert entire stem/sleeve assembly (Fig. A) upward in bonnet of choke. Once threads of stem approach U cup seals slowly turn the assembly (A) through seals. Be careful not to damage the U cup seals. Once the threads have cleared the seals the smooth cylinder of the stem will easily glide through. Align the large side orifice of the cage with the inlet of the body.

Step 14 Align indicator hole of bonnet with locator pin (8) on body and slide bonnet over stem to attach to body. Tap into place with rubber mallet if necessary. Lift up on stem to make sure external sleeve can move freely and does not bind up.

Note: *Apply a thin layer of grease to bottom of bonnet or top of body to prevent rusting between the two.*

Step 15 Thread nuts (19) onto studs (2) and tighten. Make sure to tighten bolts diagonal from each other (180 degrees apart) so bonnet tightens uniformly on body.

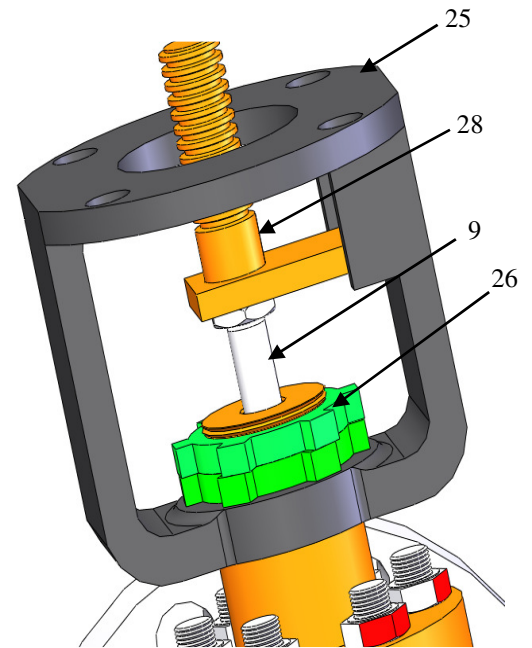
Step 16 After installing the bonnet assembly in the body thread the top hex nut (27).



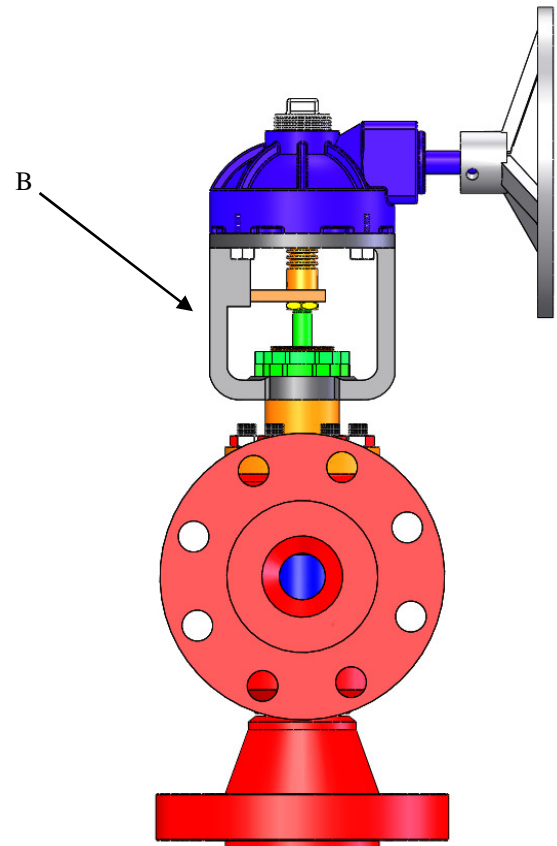
For Chokes Equipped With a Geared Handwheel Actuator:

REV. A

Step 17 Apply Loctite to choke stem threads. Slide yoke (25) and yoke lock nut (26) over stem and onto bonnet. Lift up on yoke, enabling anti-rotational device (28) to thread onto stem until it bottoms out on stem (9).



Step 18 Position the yoke so it is oriented to the valve as shown in the figure (B).



REV. A

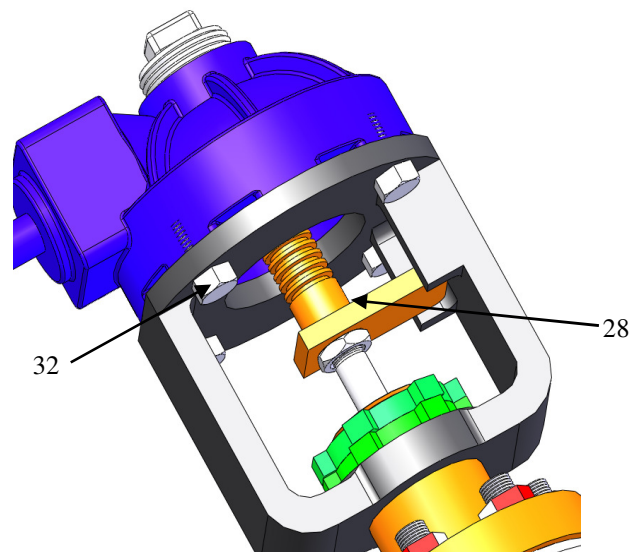
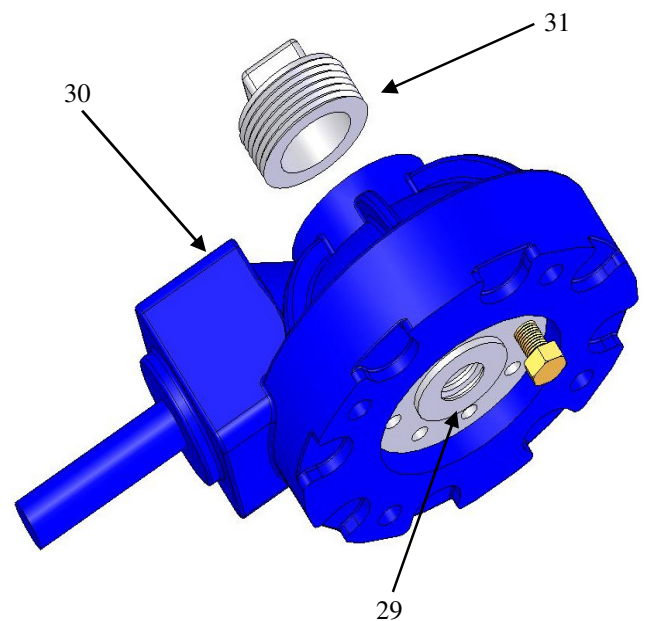
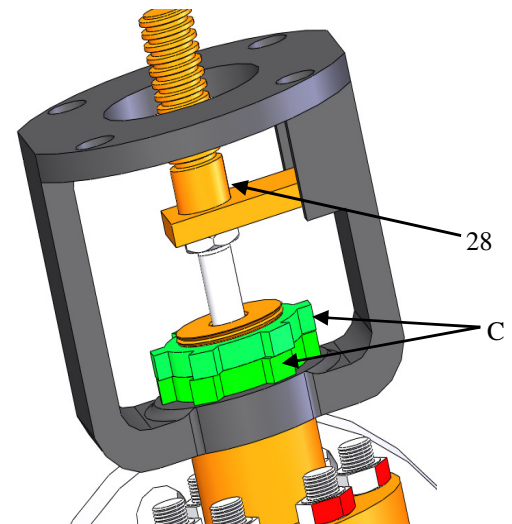
Step19 Lower yoke (25) and lock nut (26) onto bonnet shoulder. Fasten yoke lock nut to bonnet by first turning hand tight on bonnet threads. Next, have one person hold yoke in place and one person use a punch and mallet to hit notches (C) on lock nut until it is very tight.

Step 20 Attach stem adapter (29) to geared actuator (30) by applying Loctite to each provided bolt and fastening. Next, attach actuator plug (31) by applying anti-seize to plug and threading into actuator. Stem adapter to be installed with side stamped "top" oriented toward threaded gland in actuator.

NOTE: On RB4 Model, stem adapter fits in geared actuator so longest portion of shaft is protruding downward instead of upward into actuator.

Step 21 Grease the top of the anti-rotational stem (28) then thread geared actuator onto stem by turning counter clockwise until fairly tight and properly oriented. Apply Loctite to each geared actuator bolt (32) and fasten as shown.

NOTE: Ensure that geared actuator is oriented properly to choke as shown previously in Figure B.



REV. A

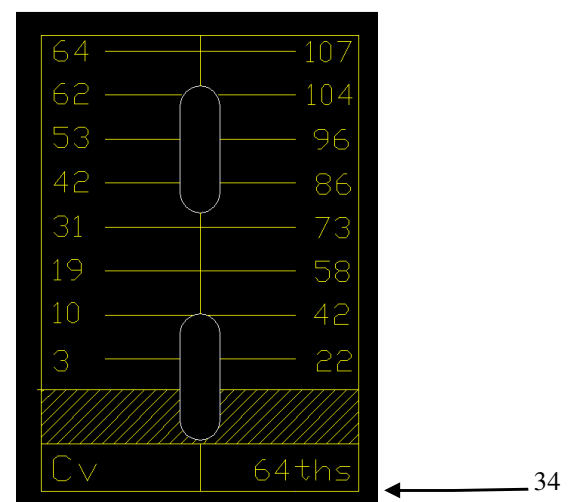
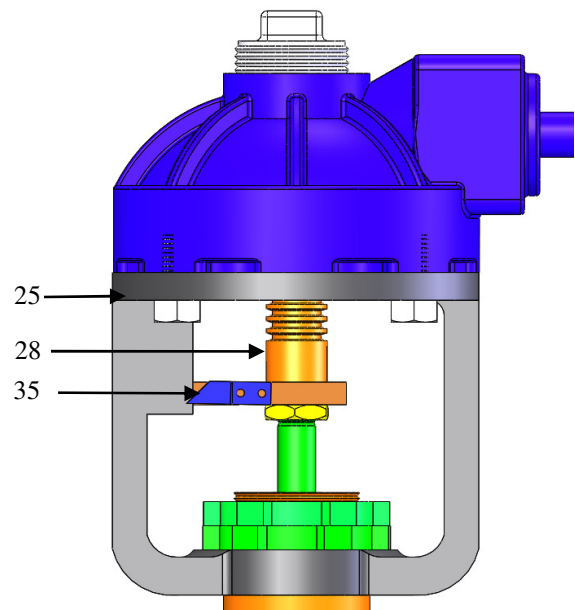
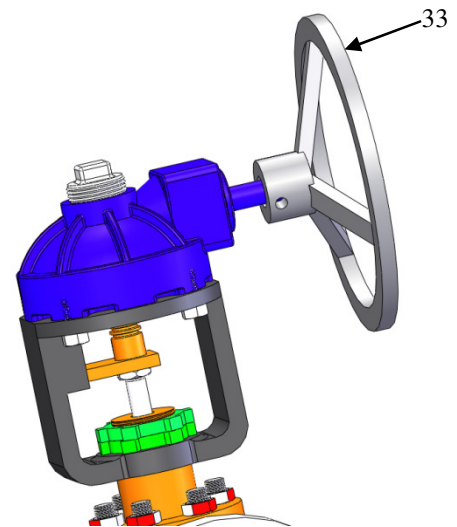
Step 22 Slide hand wheel (33) onto shaft by lining up wheel groove and shaft groove pin. Using a rubber mallet, tap the hand wheel onto the shaft until the holes on each line up. Insert bolt through wheel and shaft. Fasten the two together with a nut.

NOTE: Once again, refer to previous Figure B to make sure actuator is attached in correct orientation to the choke.

Step 23 Turn hand wheel until choke is in fully closed Position (anti-rotational device is as low as it can go).

Step 24 Attach indicator label (34) to flat side surface of yoke (25) using two set screws. Label should be on same side of choke as vent valve (7). Position the label so that its edge is flush with the outside edge of the yoke surface, and that the top surface of the anti-rotational device (28) is more or less flush with the first line of indicator label (34). Drill holes for the set screws in the middle of the screw hole channels. Drive the set screws in half way, make any necessary adjustments to the label, then drive screws in rest of way. Two calibration pointers (35) go on either side of the anti-rotational device (28) as shown.

Choke should now be fully assembled.



REV. A

TOOLS REQUIRED FOR ASSEMBLY/DISASSEMBLY

RB2

RATCHET WRENCH AND/OR IMPACT GUN
1 1/8", 3/4", 7/16", 1/4", SOCKETS
1 1/8", 3/4", 7/16" 1/4", -FACED WRENCHES
RUBBER MALLET
BALL PEAN HAMMER
PIN DRIVER (.175 O.D.)
PLASTIC ROD
5/32", 1/4" ALLEN WRENCHES
TEFLON TAPE
ANTI-SEIZE
THREAD LOCKING ADHESIVE (BLUE, RED)
GREASE
PACKING DRIVER
STACK PIN

RB3

RATCHET WRENCH AND/OR IMPACT GUN
1 1/4", 3/4", 7/16", 1/4", SOCKETS
1 1/4", 3/4", 7/16" 1/4" OPEN-FACED WRENCHES
RUBBER MALLET
BALL PEAN HAMMER
PIN DRIVER (.175 O.D.)
PLASTIC ROD
5/32", 1/4" ALLEN WRENCHES
TEFLON TAPE
ANTI-SEIZE
THREAD LOCKING ADHESIVE (BLUE, RED)
GREASE
PACKING DRIVER
STACK PIN

RB4

RATCHET WRENCH AND/OR IMPACT GUN
1 7/16", 3/4", 7/16", 1/4", SOCKETS
1 7/16", 3/4", 7/16" 1/4" OPEN-FACED WRENCHES
RUBBER MALLET
BALL PEAN HAMMER
PIN DRIVER (.175 O.D.)
PLASTIC ROD
5/32", 1/4" ALLEN WRENCHES
TEFLON TAPE
ANTI-SEIZE
THREAD LOCKING ADHESIVE (BLUE, RED)
GREASE
PACKING DRIVER
STACK PIN

RB6

RATCHET WRENCH AND/OR IMPACT GUN
2 1/8", 3/4", 7/8", 1/4", SOCKETS
2 1/8", 3/4", 7/8", 1/4" OPEN-FACED WRENCHES
RUBBER MALLET
BALL PEAN HAMMER
PIN DRIVER (.175 O.D.)
PLASTIC ROD
5/32", 1/4" ALLEN WRENCHES
TEFLON TAPE
ANTI-SEIZE
THREAD LOCKING ADHESIVE (BLUE, RED)
GREASE
PACKING DRIVER
STACK PIN

O-RING CHART

CHOKE

No.	R-B2	R-B3	R-B4	R-B6
3	2-140	2-241	2-249	2-367
4	2-032	2-237	2-246	2-363
11	2-228	2-242	2-251	2-369
12	2-032*/2-135*	2-152	2-243	2-363
14	2-221**	2-335***	2-342***	2-358***

*2-032 TO GO ON BOTTOM OPEN GROOVE OF BONNET

*2-135 TO GO IN TOP GROOVE OF BONNET

**TEFLON BACKUP RINGS ARE SAME O.D. AND I.D

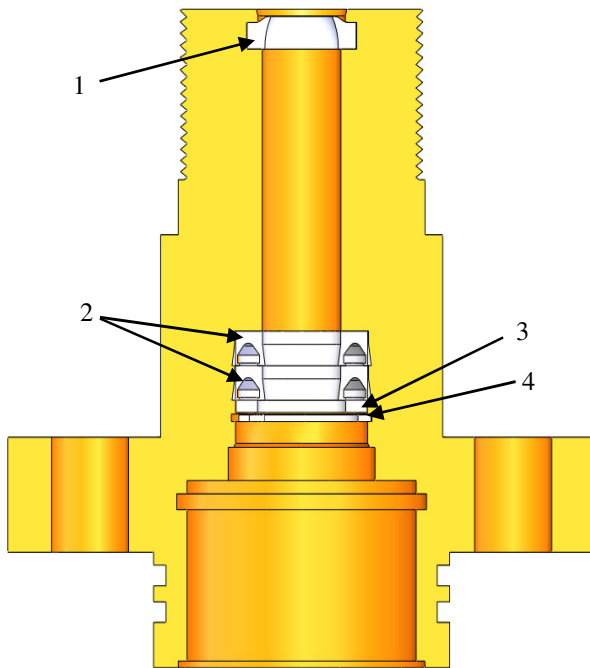
***O-RING THAT GOES ON THE EXTERNAL SLEEVE GUIDE GROOVE

PREPARED & APPROVED BY: SWAPNIL SANKAYE
02/16/16

REV. A

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RB U-CUP PACKING **INSTALLATION**



<u>ITEM</u>	<u>NUMBER</u>
Wiper Seal	1
U Cup Packing	2
Washer	3
Retainer ring	4

FIGURE 1