



Surface, Pressure Independent Flow Controller 15000psi

SF15000NHFA



Operations and
Maintenance Manual

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ABOUT SKOFLO

Our experience and track record speak for itself. SkoFlo has delivered over 20,000 valves since 1988. We are the only company that proves our products by testing in surface applications before deploying them subsea. The result is that SkoFlo products have amassed over 25 million continuous operating hours. This level of experience is unparalleled and provides the basis for being the solution provider to our served market.

GENERAL INFORMATION

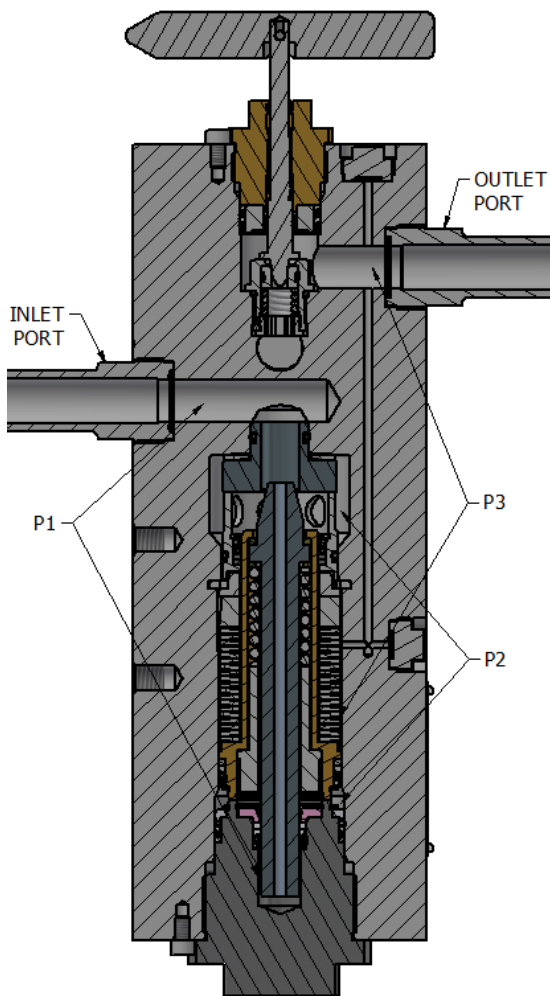


Figure 1 – SF15000NHFA Cross Section View

Product Overview

The SF15000NHFA is a pressure independent chemical injection and metering valve (CIMV), used in the petroleum industry to accurately control chemical injection rates. The SF15000NHFA regulates flow to counter pressure changes on the inlet and outlet of the unit. This is referred to as "pressure independence".

Pressure Independence

SkoFlo defines pressure independence as the percent (%) of reading change for each 1,000 psi (69 bar) change in supply or outlet pressure.

Pressure independence in the SF15000NHFA is a completely mechanical process, requiring zero power.

The principle of pressure independence is that the valve maintains a constant differential pressure (dP) across an orifice thus resulting in a constant flow rate through that orifice.

The pressure that is generated by flow through the orifice is applied to either side of a spring balanced piston that carries a regulating pin. The piston will travel to a position where the spring force equals the pressure force.

Minimum Differential Pressure

For the SF15000NHFA to provide pressure independent performance, a minimum differential pressure (min dP) is required across the valve to allow the spring-balanced piston to move to a truly balanced location.

In general, high flows and/or viscosities require a higher min dP across the valve. Refer to the product datasheet for specific information.

Guidelines for Using this Manual

The following instructions are provided to ensure a safe and proper installation and operation.

- Read all instructions prior to installation and operation of this product.
- Follow all warning and caution notes.
- Install this product as specified in the instructions provided by SkoFlo Industries, Inc.
- Prior to use, educate personnel in the proper installation, operation, and maintenance of this product.
- Only use replacement parts specified by SkoFlo Industries, Inc.

Warning, Caution, Notice

Throughout this manual there are steps and procedures which, if not followed, may result in a hazard. The following flags are used to identify the level of potential hazard.

! WARNING



WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH CAN CAUSE SEVERE INJURY, DEATH, OR SUBSTANTIAL PROPERTY DAMAGE IF THE WARNING IS IGNORED.

! CAUTION



CAUTION IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH CAN CAUSE INJURY OR PROPERTY DAMAGE IF THE WARNING IS IGNORED.

! NOTICE



NOTICE IS USED TO NOTIFY PEOPLE OF INSTALLATION, OPERATION, OR MAINTENANCE INFORMATION, WHICH IS IMPORTANT BUT NOT HAZARD RELATED.

Abbreviations and Acronyms

CIMV	Chemical Injection and Metering Valve
dP	Differential Pressure
GA	General Arrangement
GPM	Gallons Per Minute
NMFG	Needle Medium Flow Generation G
NPT	National Pipe Thread
SHCS	Socket Head Cap Screw
P/N	Part Number
psi	Pounds per Square Inch

HYDRAULIC RATINGS

! WARNING



REFER TO THE GENERAL SECTION OF THE PRODUCT DATASHEET FOR DESIGN PRESSURE DETAILS.

! NOTICE



THE SF1500NHFA REQUIRES A MINIMUM DIFFERENTIAL PRESSURE ACROSS THE VALVE OF 1000 PSI (69 BAR) OR *TBD* TO ACHIEVE FULL RATED FLOW, DEPENDING ON FLOW RATE CONFIGURATION AS SEEN IN TABLE 1.

Max Working Pressure: 15,000 psi (1034 bar)

Hydro-Pressure: 22,500 (1551 bar)

Table 1 – SF1500NHFA Flow Ranges and Min Differential Pressure

Flow Rate	Min Differential Pressure
0.5 – 20 GPM	1000 psi (69 bar)

STORAGE

! NOTICE



IT IS RECOMMENDED TO STORE THE ASSEMBLIES IN THE SHIPPING CRATE, IF POSSIBLE.

The SF1500NHFA should be stored in a shelter and be protected from moisture and particulates. Storage temperatures shall be between -40°F to 158°F (-40°C to 70°C)

Any open hydraulic connection will be furnished with plastic blanking plugs.

It is important not to store the SF1500NHFA with production chemicals in the unit. These chemicals can settle, possibly resulting in damage to the unit. SkoFlo recommends that the valve be stored with a mixture of glycol in water as the preservation fluid.

INSTALLATION

! WARNING



CHEMICAL COMPATIBILITY SHALL BE DONE AND CHECKED BEFORE USE, EXCEPT FOR MEG AND WATER MIXTURES.

! WARNING



THE SF1500NHFA SHALL NOT BE INSTALLED SUBSEA.

1. Mounting

The SF15000NHFA can be panel or side mounted. The SF15000NHFA can be panel mounted via the four M12x1.75 holes on the top of the valve, or the two M12x1.75 holes on each side. See Appendix B for more details.

If panel mounting, unscrew the handle fastener with a 4mm Allen wrench and remove the handle. Mount the valve, then replace the handle and tighten the fastener in place.

2. Hydraulic Installation

Install the SF15000NHFA so that the flow is in the proper direction. The IN (inlet) and OUT (outlet) connections are marked respectively. See Appendix B for details.

If the SF10000NHFA uses FKO hub connections, the hubs are shipped separately from the valve and will need to be installed in the inlet and outlet ports prior to use.

The tightening torque for the hubs is 250 ft-lb [339 Nm]. This torque value applies to all hub types.

Install an inline filter upstream of the SF15000NHFA. Clean chemicals and proper filtering are very important. Omitting the filter can cause the valve to become plugged. A 200 micron size filter is recommended. Note: if coarser filters are used, the adjustment handle may need to be periodically opened to flush out any debris.

A pulsation dampener is recommended to be installed on the inlet header supplying the SF15000NHFA for improved longevity and set point consistency. A bladder type pulsation dampener is preferred over a piston type. Reactive dampeners that use baffles will do little to dampen the pressure over the full flow range of the valve.

The SF15000NHFA is not a positive shut off device, therefore, a valve on the inlet or outlet will be required to meet shut off specifications. The preferred location of the shut off valve is on the outlet of the SkoFlo valve to minimize the shock to internal parts during start up.

A check valve shall be installed immediately downstream of the SF15000NHFA (within 5 feet) to prevent well fluids entering the valve. Check valve cracking pressure is recommended to be under 10 psi to enhance longevity of check valve seats.

An example of a typical chemical injection system is given in Appendix A.

3. Start Up Procedures

- 3.1 Open the supply isolation valve to the SkoFlo valve slowly (> 1 second). This will allow pressures within the unit to equalize slowly; the valve will stabilize quickly.
- 3.2 Turn the rate adjustment handle clockwise until you are at the desired flow rate.
- 3.3 Always start at a flow rate above the desired flow and decrease to the desired setting (turn handle clockwise to decrease flow rate).
 - For the most consistent set point results, rotate handle ½ a turn clockwise to reach the set point.
- 3.4 The flow controller is now set, and further adjustments are not required.

4. Adjustment and Calibration

The SF15000NHFA is a pressure independent flow control device. Once the valve is set at a desired flow rate, that flow rate is maintained even though the pressure conditions upstream and/or downstream of the valve may change considerably.

The flow rate can be set using an inline flow meter, however, it must be capable of withstanding the process pressure.

MAINTENANCE

! WARNING



ANY SERVICE REPAIR SHALL BE PERFORMED BY TRAINED PERSONNEL.

! NOTICE



IF ANY ABNORMALITIES ARE FOUND THROUGHOUT THE MAINTENANCE, PLEASE REPORT TO THE RESPECTIVE ENGINEERS.

5. Spare Kits and Tools

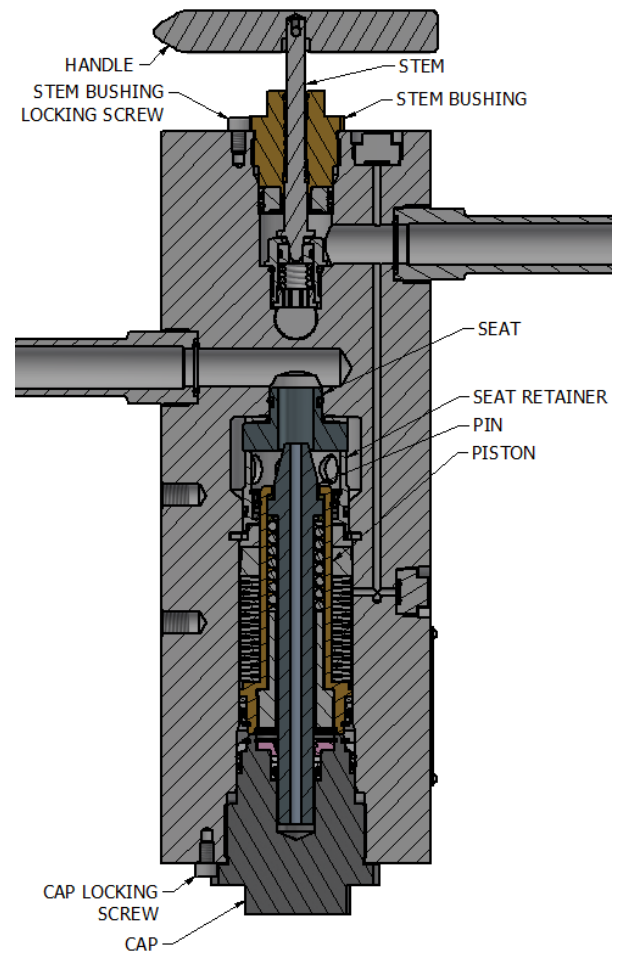
Spares kits available for typical maintenance items are listed in Table 2.

Table 2 – SF15000NHFA Spares Kit Part Numbers

ITEM	P/N
FFKM Seal Kit	31821
Stem Kit	31822
Piston and Seat Kit	31823
Outer Spring Kit	31824
Tool Kit	31835

Table 3 – Tools and Parts

Tools and Parts
Vise with minimum 5" opening
Torque wrench (up to 250 ft.lbs)
Various wrenches
Various hex sockets
7/8 in Deep Hex Socket
3/8 in Hex wrench
1-5/16 Socket for 3/4" NPT hub
Brass hooked rod
Parker Super Lube (or equivalent)
Dynatex Anti-Seize and Lubricating Compound (or equivalent)
Pliers
Needle Nose Pliers
Flat head Screwdriver (2)
31825 – Tool, Installation, Seal Retainer, NHFA

**Figure 2 – Valve Components****6. Replacing the Stem Assembly**

- 6.1 Remove SkoFlo valve from system.
- 6.2 If this is a manual valve, unscrew the shoulder bolt (71007037) in the handle and pull the handle (30435) off the stem. – *4mm Allen Wrench*
- 6.3 If this is an actuated valve, unscrew the set screw at the top of stem, then remove the dowel pin and square drive. – *2mm Allen Wrench*

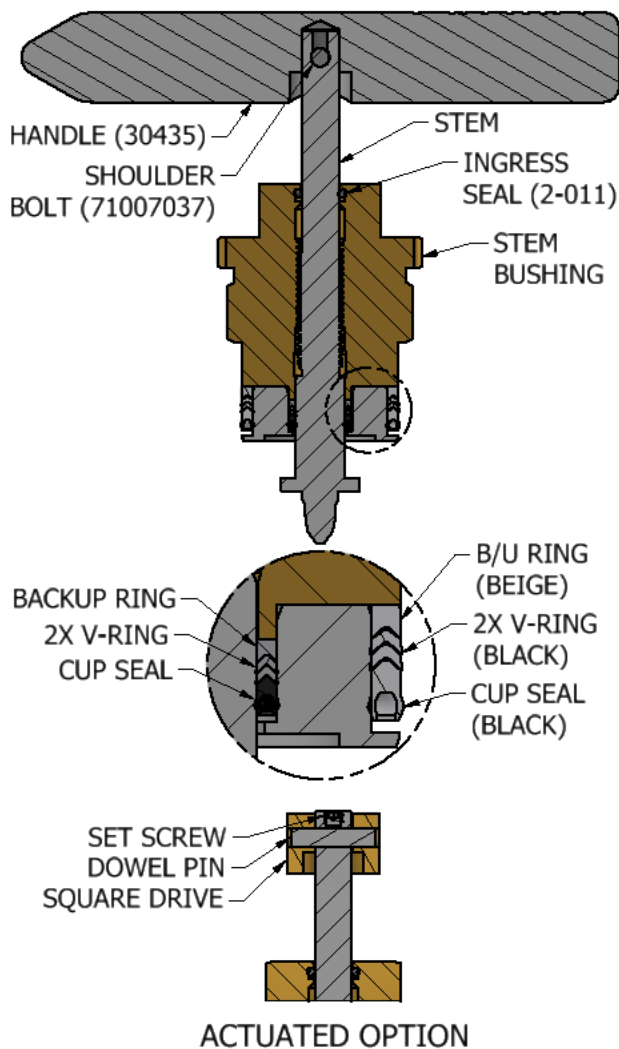


Figure 3 – Stem Assembly

- 6.4 Remove the stem bushing retaining screw (71006192) – *5mm Allen Wrench*
- 6.5 Unscrew the stem bushing (31774) and pull the stem and nut out of the body. The stem bushing, stem seal retainer, and stem will remain together during this step. – *1" Wrench*
- 6.6 Rotate the stem clockwise to release it from the stem bushing and stem seal retainer.
- 6.7 Lubricate the replacement Chevron Seals with *Parker Super Lube or similar*.
- 6.8 Install each cup seal onto the stem seal retainer spring side down, followed by the two black v-rings and lastly the beige backup ring, with the ridged side facing the v-rings. Orientation per Figure 3.
- 6.9 Using a brass pick, install the ingress O-ring to the stem bushing.

- 6.10 While holding the stem seal retainer and stem bushing together, screw the replacement stem into the stem seal retainer and stem bushing through the bottom of the retainer.
- 6.11 Place the handle onto the replacement stem such that the set screw lines up with the hole of the stem.
- 6.12 Place the set screw into the handle and tighten.
- 6.13 Screw stem bushing to body until fully seated, adjust the stem bushing to align the cutout on the bushing with the locking screw. – *5mm Allen Wrench*

7. Replacing the Trim Seals

- 7.1 Follow steps 6.1 - 6.3 to remove the stem assembly.
- 7.2 Remove the stem trim assembly (see Figure 4). Use care to avoid damage to the internal surfaces of the SkoFlo valve. – *7/8" Deep Hex Socket*
- 7.3 Remove the O-ring on the outside of the trim holder.
- 7.4 Unthread spring retainer. (LH thread) Remove spring and trim from trim holder.

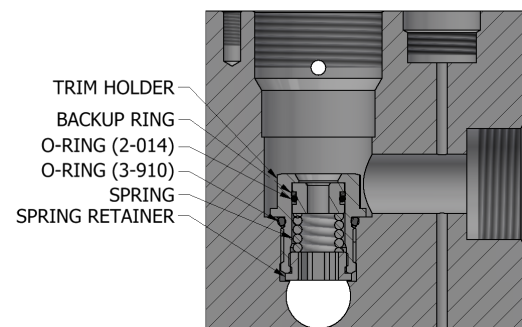


Figure 4 – Trim Removal

- 7.5 Remove the old O-ring and backup ring from the trim.
- 7.6 Lubricate the replacement O-rings with *Parker Super Lube or similar*.
- 7.7 Install the O-rings and backup ring per Figure 4. Make sure the backup ring is on the same side as the trim chamfer.
- 7.8 Insert trim inside trim holder, making sure the backup ring side goes in first. Follow with spring.

- 7.9 Tighten spring retainer (LH thread) until tight – *3/8in Hex Wrench*
- 7.10 Torque hex plug to 62 ft.lbf [84Nm]. – *7/8in Deep Socket & Torque Wrench*

8. Replacing Cap Seals

- 8.1 Remove SkoFlo valve from system.
- 8.2 Unscrew and remove the base cap locking screw (71006192) – *5mm Allen Wrench*
- 8.3 Unscrew and remove the base cap (31748). – *1.75" Wrench*
- 8.4 Remove the inner retaining ring (71007704). – *small flat head screwdriver*
- 8.5 Remove the internal backup ring and cup seal.
- 8.6 Lubricate the replacement cup seal (71007635) with *Parker Super Lube or similar*.

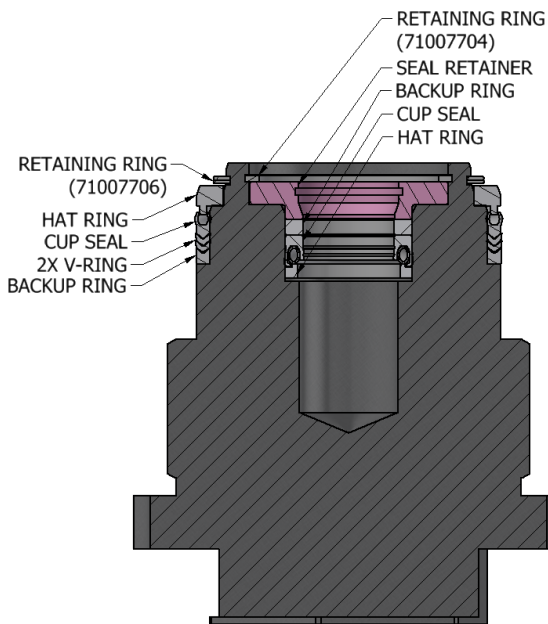


Figure 5 – Base Cap

- 8.7 Install the hat ring with the flat portion facing towards the hex.
- 8.8 Install the cup seal into the base cap with the spring side facing towards the hex.
- 8.9 Install the backup ring.
- 8.10 Install the retaining ring (71007704).
- 8.11 Remove the outer retaining ring (71007706). – *small flat head screwdriver*

- 8.12 Remove the external backup ring and Chevron Seal.
- 8.13 Lubricate the replacement Chevron Seal (71007707) with *Parker Super Lube or similar*.
- 8.14 Lubricate replacement Chevron Seal with *Parker Super Lube or equivalent*.
- 8.15 Install the beige backup ring so that the ridged side faces up. Install the two black v-rings making sure they are nested with the backup ring. Lastly, install the cup seal with the spring side facing up. Orientation per Figure 5.
- 8.16 Install the outer retaining ring (71007706).
- 8.17 Go to 14 Closing the valve.

9. Replacing Piston Seals

- 9.1 Follow steps 8.1 - 8.3.
- 9.2 Carefully pull out the piston assembly, outer springs, and outer spring spacer(s), being careful to not disturb the order and orientation of parts (see Figure 6).
- 9.3 Remove seal retaining ring (71007706), hat ring, cup seal, and backup ring (71007636).
- 9.4 Lubricate new piston cup seal with *Parker Super Lube or equivalent*.
- 9.5 Slide backup ring onto piston, then the cup seal, then the hat ring. Be sure to orient the seals correctly – the spring side of the cup seal should face out, the hat ring ridged edge should face the cup seal spring (see Figure 6).
- 9.6 Install the retaining ring (71007706).

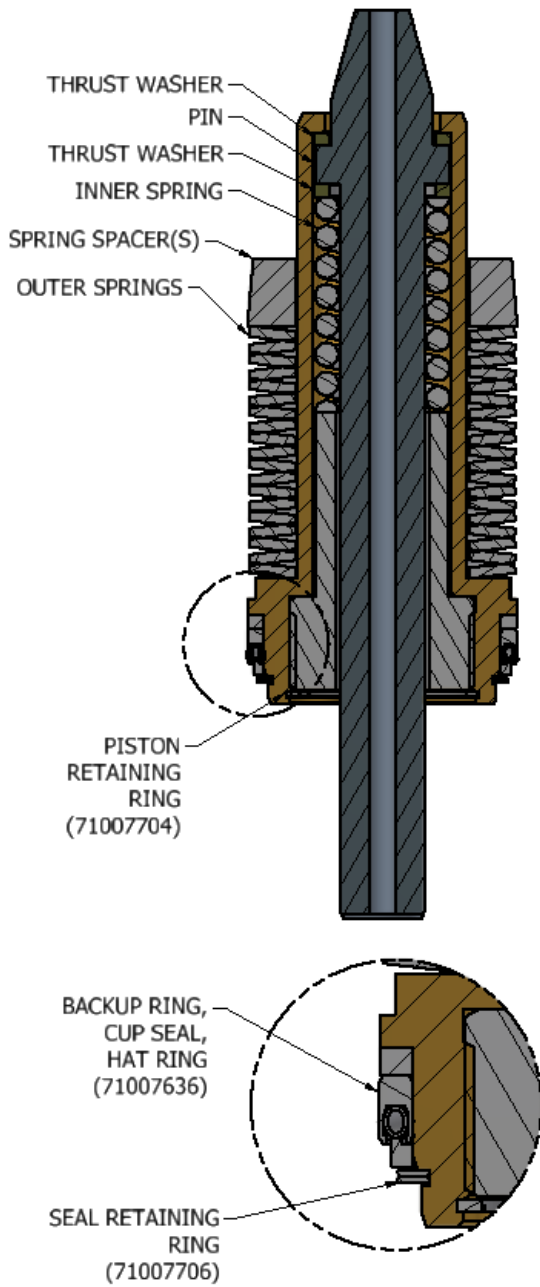


Figure 6 – Piston Assembly

9.7 Go to 14 Closing the valve.

10. Replacing Outer Springs

- 10.1 Follow steps 9.1 - 9.2.
- 10.2 Remove the outer springs (71006181).
- 10.3 Place replacement outer springs onto the piston assembly such that they oppose each other – concave to concave, convex to convex (see Figure 7).



Figure 7 – Spring Orientation

- 10.4 Place replacement spring spacer(s) onto the piston assembly (see Figure 6).
- 10.5 Go to 14 Closing the valve.

11. Replacing Inner Springs

- 11.1 Follow steps 9.1 - 9.2
- 11.2 Remove piston retaining ring (71007704) – *small flat head screwdriver*
- 11.3 Using Plug Installation tool (29488), remove piston plug.
- 11.4 Remove inner spring, pin, and 2x thrust washers from inside of piston.
- 11.5 Install one thrust washer, followed by the pin, followed by another thrust washer, followed with the inner spring.
- 11.6 Using Plug Installation tool (29488), torque piston plug to 30 ft.lb.
- 11.7 Install piston retaining ring (71007704)

12. Replacing Seat Retainer Seals

- 12.1 Follow steps 9.1 - 9.2.
- 12.2 Remove Pressure Tap Plug (31792)
- 12.3 Take Seat Retainer Tool Assembly (31825) and place bushing down in the bore per figure below. – *Needle Nose Pliers*
- 12.4 Place Anchor through the Pilot bore in body, then place fastener through bushing and torque until hand tight. See Figure 8– *M5 Hex Wrench*

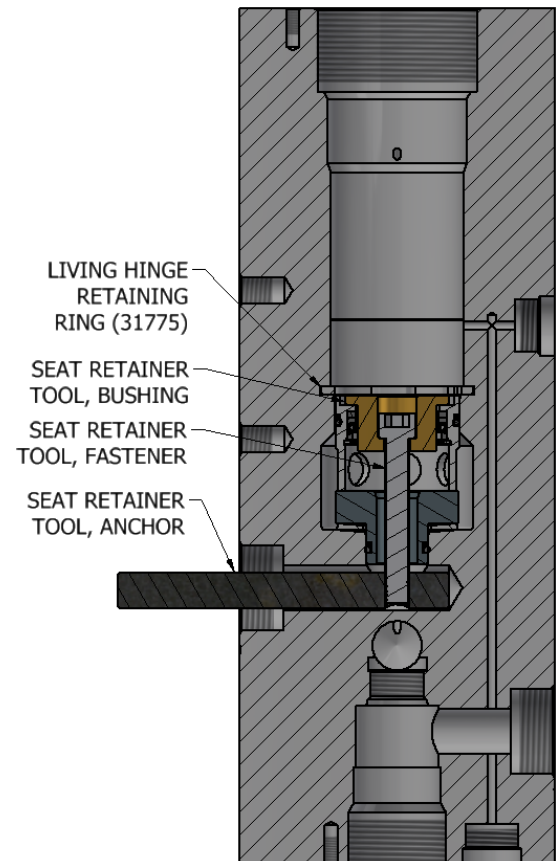


Figure 8 – Seat Retainer Tool

- 12.5 Remove the retaining ring (31775) using the two slots in the retaining ring. – *Flat Head Screwdriver (2)*
- 12.6 Remove the Seat Retainer Tool (31825)
- 12.7 Position two brass hooked rods into the cross holes in the seat retainer and use pliers to remove, being careful not to scratch the cup seal. See Figure 9. – *Brass hooked rods*

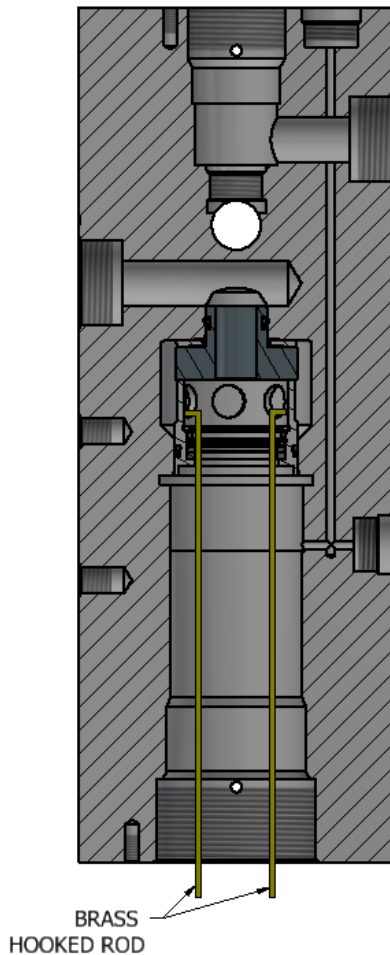


Figure 9 – Seat Retainer Removal

- 12.8 Remove the old external O-ring and backup ring.
- 12.9 Remove internal snap ring (71007705), hat ring, cup seal, and backup ring. – *small flat head screwdriver*
- 12.10 Lubricate the replacement cup seal with *Parker Super Lube or equivalent*.

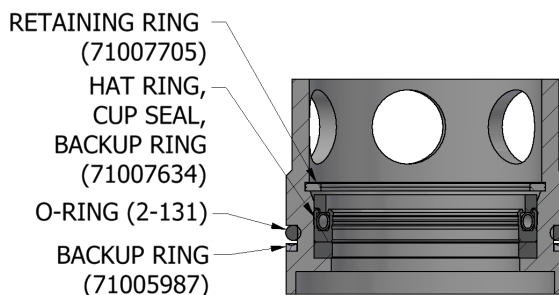


Figure 10 – Seat Retainer Assembly

- 12.11 Install the replacement backup ring, then the replacement cup seal with spring side visible.
- 12.12 Install the hat ring with the raised ridge against the cup seal spring.
- 12.13 Install the replacement retaining ring (71007705)
- 12.14 Lubricate the replacement O-rings with *Parker Super Lube or equivalent*.
- 12.15 Install the backup rings so that the contour faces the O-ring. Install the replacement backup rings and O-rings per Figure 10.
- 12.16 Go to 14 Closing the valve.

13. Replacing Seat Seals

- 13.1 Follow steps 12.1 - 12.7.
- 13.2 Carefully remove the seat (see Figure 10). – *Brass hooked probe*
- 13.3 Remove the old O-ring and backup ring.
- 13.4 Lubricate the replacement O-ring with *Parker Super Lube or equivalent*.

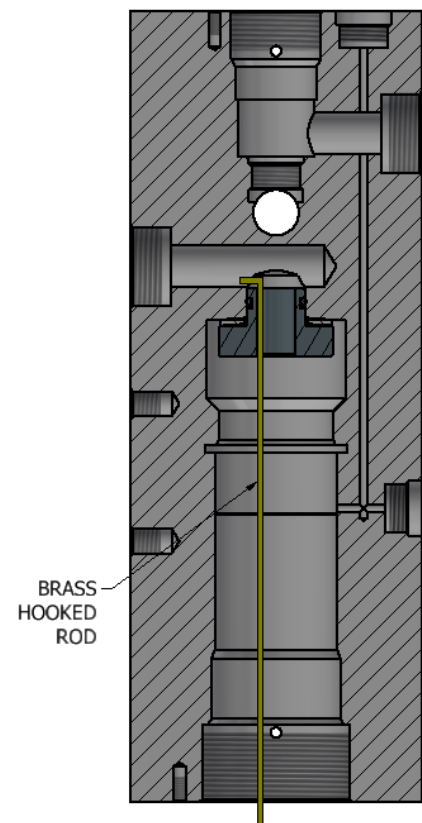


Figure 11 – Seat Removal

- 13.5 Install the backup ring so that the concave contour faces the O-ring. Install the backup ring and O-ring per Figure 12.

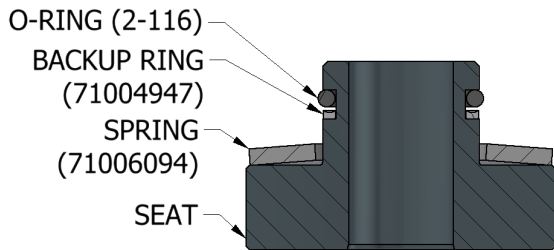


Figure 12 – Seat Assembly

- 13.6 Insert the seat into the body by slowly pushing with a tool which will not chip the ceramic seat. Orient the seat with smallest diameter end into the body (see Figure 11).

- 13.7 Go to 14 Closing the valve.

14. Closing the valve

- 14.1 If needed, ensure that the seat is placed in the valve per Figure 11.
- 14.2 If needed, re-install seat retainer so that the internal seals are facing the seat.
- 14.2.1 Take Seat Retainer Tool Assembly (31825) and place bushing down in the bore per Figure 8. – *Needle Nose Pliers*
- 14.2.2 Place Anchor through the Pilot bore in body, then place fastener through bushing and torque until hand tight. See Figure 8 – *M5 Hex Wrench*
- 14.2.3 Take replacement snap ring (31775), coil up, and place it in bore so it is sitting on the seat retainer tool bushing. Open up the snap ring with two long flat head screwdrivers using the two slots in the snap ring, ensuring it is evenly seated in the snap ring groove. Slightly loosen the Seat retainer tool fastener so the snap ring does not spring back. – *Flat Head Screwdriver (2), M5 Hex Wrench*
- 14.2.4 Remove the seat retainer tool (31825)
- 14.3 If needed, re-install piston with large springs (see Figure 6 – Piston Assembly, Figure 7 – Spring Orientation).
- 14.4 Screw base cap into body until fully seated, adjust the base cap to align the cutout on the

- cap with the locking screw. Install the base cap locking screw. – *5mm Allen Wrench*

15. Replace small hex plug seal

- 15.1 Remove hex plug (31785) (see Figure 13). – *3/8in Socket & Torque Wrench*
- 15.2 Remove the old Cup Seal (71007711).
- 15.3 Lubricate the replacement Cup Seal with *Parker Super Lube or equivalent* and place onto hex plug.
- 15.4 Torque hex plug to 39 ft.lbf [53Nm]. – *3/8in Socket & Torque Wrench*

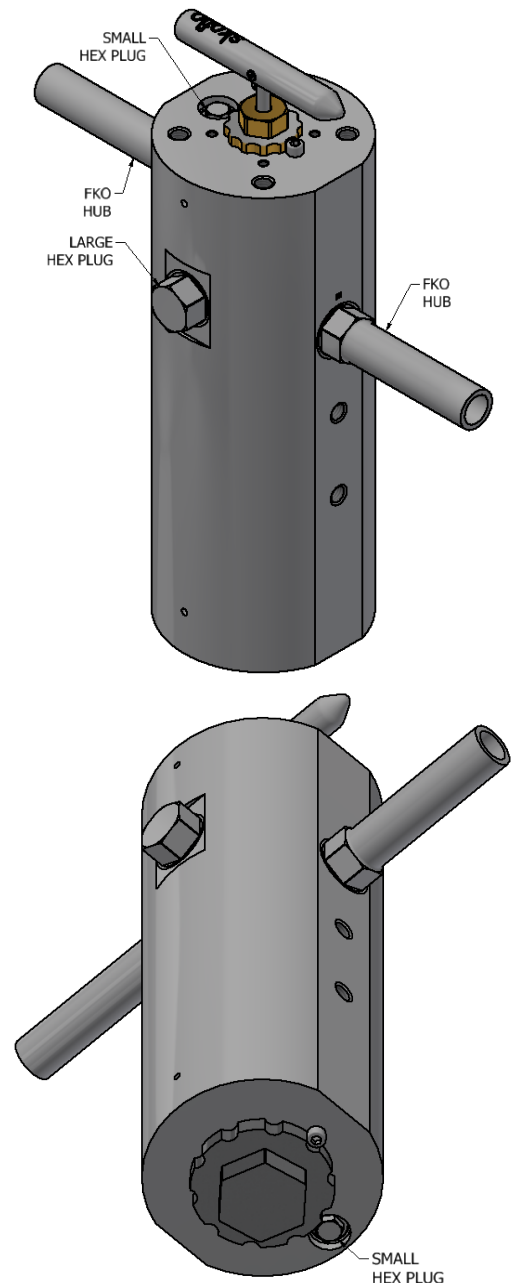
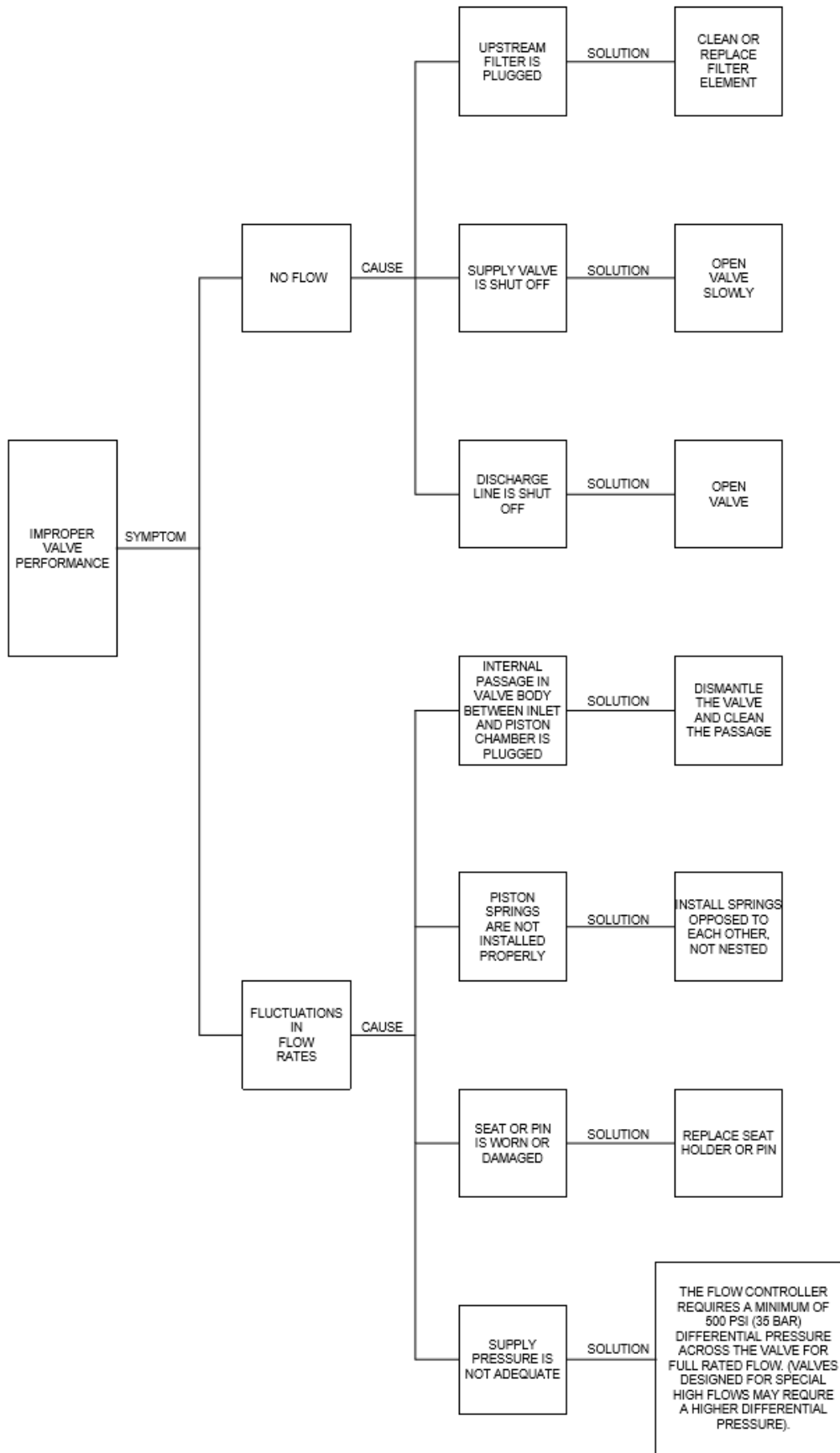


Figure 13 – Hex and Hub

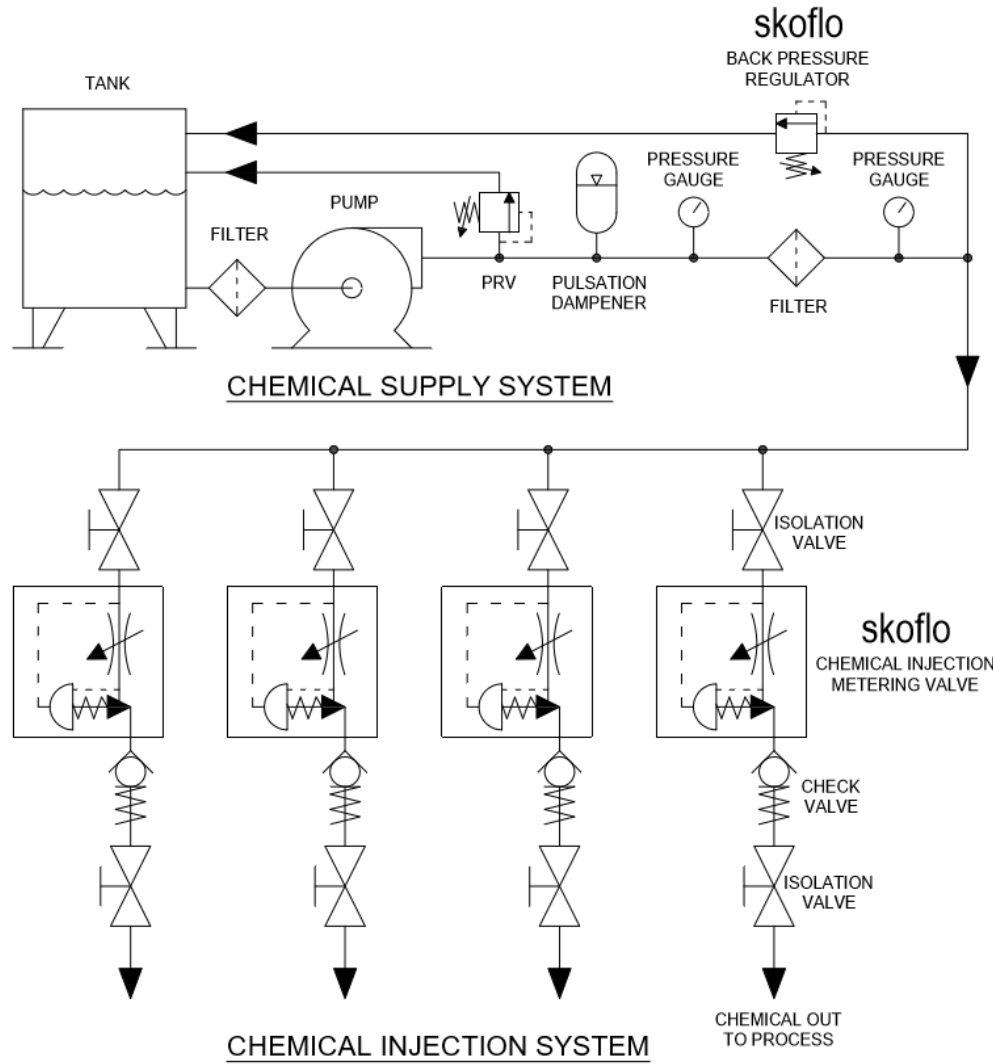
16. Replace hub seals and large hex plug seal

- 16.1 Remove the hubs or large hex plug (see Figure 13). – *Torque Wrench*
- 16.2 Remove the old Cup Seals (71007710). Take care not to scratch the sealing surface. – *Brass pick*
- 16.3 Lubricate the replacement Cup Seals to keep in place, with *Parker Super Lube or equivalent* and place onto hubs.
- 16.4 Screw the hubs and large hex plug into body.
- 16.5 Torque the hub and large hex plug to 250 ft.lbf [339 Nm]. – *1-1/8in Socket or Crowfoot Wrench & Torque Wrench*

TROUBLESHOOTING



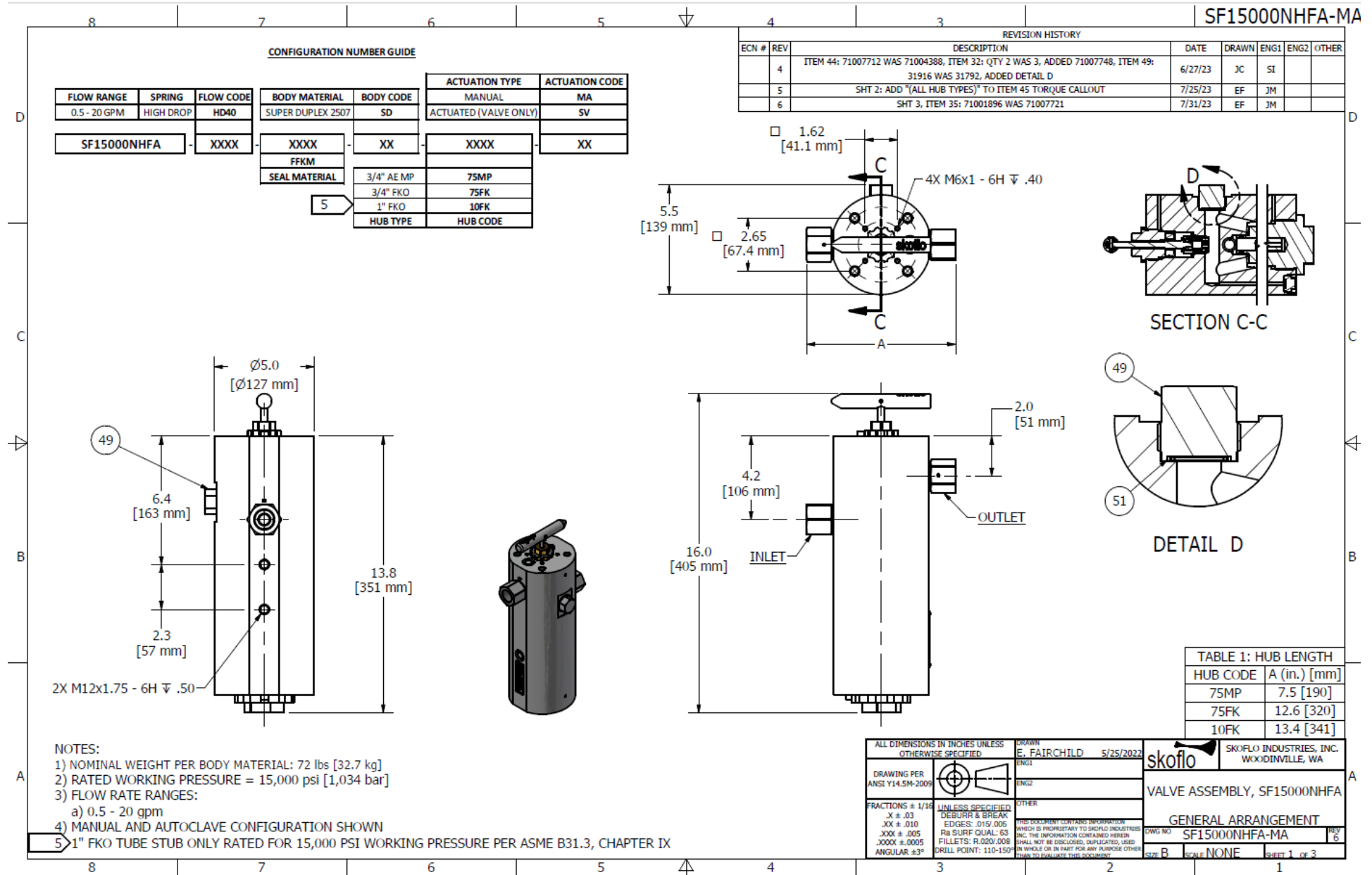
APPENDIX A – A TYPICAL CHEMICAL INJECTION SYSTEM

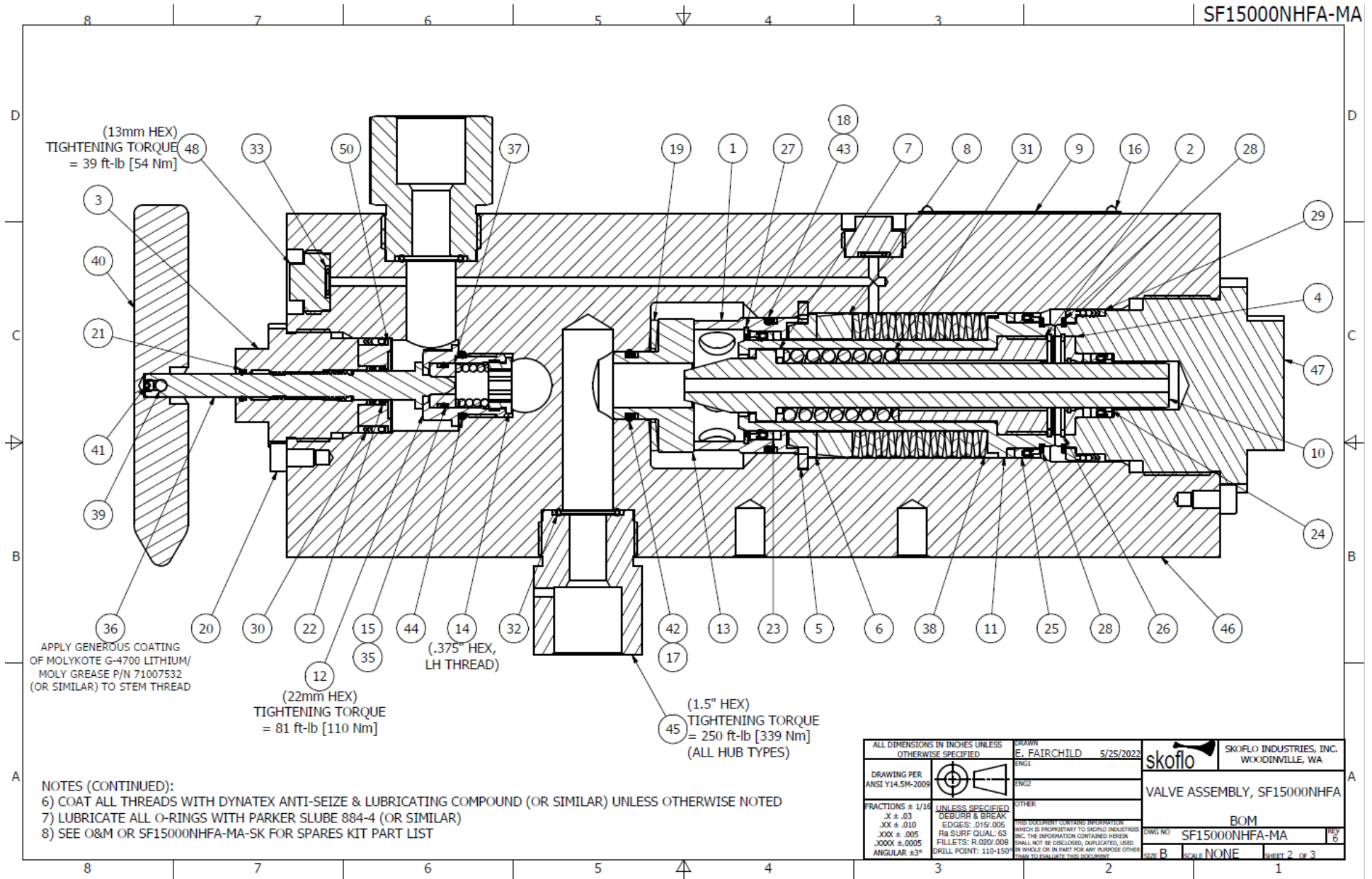


NOTES

Any number of injection points can be served by a single pump and header system. The only limitation is the flow capability of the pump.
 Check valve shall be installed within 5 feet of the SkoFlo valve.

APPENDIX B – SF15000NHFA BOM DRAWING





PARTS LIST					
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	PRESSURE CONTAINING
1	1	31768	RETAINER, SEAT, NHFA	SUPER DUPLEX 2507	NO
2	1	31769	RETAINER, SPRING, NHFA	SUPER DUPLEX 2507	NO
3	1	31770	BUSHING, STEM, NHFA	TOUGHMET 3	YES
4	1	31771	RETAINER, SEAL, Ø.625 PIN, NHFA	SUPER DUPLEX 2507	NO
5	1	31775	RETAINING RING, LIVING HINGE	SUPER DUPLEX 2507	NO
6	1	31776	COLLAR, RETAINING, 2" BORE, NHFA	SUPER DUPLEX 2507	NO
7	2	31788	WASHER, THRUST, COATED, Ø1"	SUPER DUPLEX 2507	NO
8	1	31789-X	WASHER, SPACER, PISTON SPRING	SUPER DUPLEX 2507	NO
9	1	31791	NAMEPLATE, SF15000NHFA	316 SS	NO
10	1	31794	PIN, Ø.625, NHFA, COATED	CARBIDE BC-6N	NO
11	1	31795	PISTON, Ø2.000, W / Ø.625 PUSHROD, NHFA, COATED	SUPER DUPLEX 2507	NO
12	1	31826	HOLDER, TRIM, NHFA, COATED	SUPER DUPLEX 2507	NO
13	1	31843	SEAT, Ø.625 BORE, 30°, SHORT LAND	CARBIDE BC-6N	NO
14	1	31846	RETAINER, SPRING, TRIM, NHFA	SUPER DUPLEX 2507	NO
15	1	71001756	SL, O RING, 2-014	FFKM	NO
16	4	71002116	U-DRIVE SCREW, RH, #2X1/4	302 SS	NO
17	1	71004947	SL, BU RING, 8-116	PEEK	NO
18	1	71005987	SL, BU RING, 8-131	PEEK	NO
19	1	71006094	SPRING, WASHER, Ø1.815 OD x Ø1.015 ID, .098 TH	INCONEL 718	NO
20	2	71006192	SHCS, M6-1 X 10	A4-80	NO
21	1	71006952	SL, ORING, 2-011	EPDM	NO
22	1	71007194	SL, CUP W. VRING, .533 OD	ASSEMBLY	YES
23	1	71007634	SL, CUP, Ø1.5005, HASTELLOY SPRING, X635032	CF-PTFE, HASTELLOY C-276	NO
24	1	71007635	SL, CUP, Ø.8755, HASTELLOY SPRING, X635029	25% GLASS FILLED PTFE	NO
25	1	71007636	SL, CUP, Ø 2 in, HASTELLOY SPRING, X635031	NITRONIC 50 HS	NO
26	2	71007704	SLRG, WH-137-LGY, ELGILOY	ELGILOY	NO
27	1	71007705	SLRG, INT, WH-156-LGY, ELGILOY	ELGILOY	NO
28	2	71007706	SLRG, EXT, WS-168-LGY, ELGILOY	ELGILOY	NO
29	1	71007707	SEAL, CHEVRON, 1.50, W/ GUIDE RING	PEEK, GLASS-FILLED	YES
30	1	71007708	SEAL, CHEVRON, 1.31 OD	PEEK, GLASS-FILLED	YES
31	1	71007709	SPRING, PISTON, HF, INNER, ELGILOY	ELGILOY	NO
32	2	71007710	SL, CUP, Ø.999 OD, FH024545	VARIOUS	YES
33	3	71007711	SL, CUP, Ø.440 OD, FH024546	ELGILOY	YES
34	1	71007720	SPRING, TRIM, NHFA	ELGILOY	NO
35	1	71001896	SL, BU RING, SCARF CUT, 2-014	PTFE	NO
36	1	SEE TABLE 2	STEM, NHFA	SEE TABLE 2	YES
37	1	SEE TABLE 2	TRIM, NHFA	SEE TABLE 2	NO
38	19	SEE TABLE 2	SPRING, OUTER	INCONEL 718	NO
39	1	SEE TABLE 3	FASTENER, HANDLE	18-8 SS	NO
40	1	SEE TABLE 3	HANDLE, NHFA	316 SS	NO
41	1	SEE TABLE 3	SHSS, M4xØ.7x3LG, FLAT TIP	18-8 SS	NO
42	1	SEE TABLE 4	SL, ORING, 2-116	SEE TABLE 4	NO
43	1	SEE TABLE 4	SL, ORING, 2-131	SEE TABLE 4	NO
44	1	SEE TABLE 4	SL, O-RING, 3-910	SEE TABLE 4	NO
45	2	SEE TABLE 5	ADAPTER, HUB, NHFA	SEE TABLE 5	YES
46	1	SEE TABLE 6	BODY, VALVE, NHFA	SEE TABLE 6	YES
47	1	SEE TABLE 6	CAP, PISTON, NHFA	SEE TABLE 6	YES
48	3	SEE TABLE 6	PLUG, PILOT, NHFA	SEE TABLE 6	YES
49	1	SEE TABLE 6	PLUG, PRESSURE TAP, NHFA, COATED	SUPER DUPLEX 2507	YES
50	1	SEE TABLE 6	RETAINER, CHEVRON SEAL, NHFA	SEE TABLE 6	YES
51	1	71007748	SL, CUP, Ø1.061 OD, FH024621	VARIOUS	YES

TABLE 2: FLOW RANGE SELECTION

ITEM	MATERIAL		DESCRIPTION
	SUPER DUPLEX 2507		
	FLOW CODE		
	HD40		
36	31774		STEM, NHFA
37	31847		TRIM, NHFA
38	71006181		SPRING, OUTER

TABLE 3: ACTUATION SELECTION

ITEM	ACTUATION		DESCRIPTION
	MANUAL	ACTUATED	
39	71007037	31629	FASTENER, HANDLE
40	30435	30991	HANDLE, NHFA
41	N/A	71007417	SHSS, M4x .07 x 3 LG, FLAT TIP

TABLE 4: SEAL SELECTION

ITEM	SEAL MATERIAL		DESCRIPTION
	FFKM		
42	71006254		SL, ORING, 2-116
43	71006000		SL, ORING, 2-131
44	71007712		SL, ORING, 3-910

TABLE 5: HUB SELECTION

ITEM	MATERIAL		
	SUPER DUPLEX 2507		
	HUB CODE		
	75MP	75FK	10FK
45	31851	31802	31793

TABLE 6: MATERIAL SELECTION

ITEM	MATERIAL		DESCRIPTION
	SUPER DUPLEX 2507		
46	31748		BODY, VALVE, NHFA
47	31772		CAP, PISTON, NHFA
48	31785		PLUG, PILOT, NHFA
49	31916		PLUG, PRESSURE TAP, NHFA, COATED
50	31773		RETAINER, CHEVRON SEAL, NHFA

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED		DRAWN E. FAIRCHILD 5/25/2022	SKOFLIO INDUSTRIES, INC. WOODINVILLE, WA
DRAWING PER ANSI Y14.5M-2009		ENGR	
FRACTIONS ± 1/16 X ± .03 XX ± .010 XXX ± .005 XXXX ± .0005 ANGULAR ±3°	UNLESS SPECIFIED DEBURR & BREAK EDGES: .015/.005 FIN SURF QUAL: 63 FILLET: R.020/.008 DRILL POINT: 110-150°	OTHER	BOM
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SIZE B		SCALE NONE	SHEET 3 OF 3



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