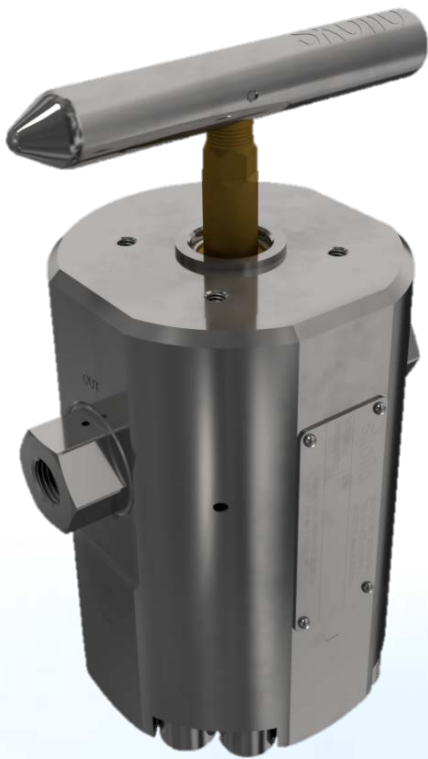




Surface CIMV, Low Flow, HTV 10,000 psi

SF10000HTVB



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

Product Overview

The SF1000HTVB is a pressure independent chemical injection and metering valve (CIMV), used in the petroleum industry to accurately control chemical injection rates. The SF1000HTVB 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 SF1000HTVB 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 internal orifice (the 'gate'), thus resulting in a constant flow rate through that orifice.

The pressure that is generated by flow through the gate 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 SF1000HTVB 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, higher 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.
- Prior to use, educate personnel in the proper installation, operation, and maintenance of this product.
- Only use replacement parts specified by SkoFlo.

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
GPD	Gallons Per Day
HTV	High Turn-Down Valve
LPH	Liters Per Hour
SHCS	Socket Head Cap Screw
psi	Pounds per Square Inch

HYDRAULIC RATINGS

! WARNING



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

! NOTICE



THE SF10000HTVB REQUIRES A MINIMUM DIFFERENTIAL PRESSURE ACROSS THE VALVE OF 300 PSI (20.7 BAR) TO ACHIEVE FULL RATED FLOW.

Max Working Pressure: 10,000 psi (689 bar)

Hydro-Pressure: 15,000 psi (1,034 bar)

Flow Ranges:

- 0.6 to 600 GPD (0.09 to 95 LPH)
- 25 to 2500 GPD (3.9 to 394 LPH)

Min Differential Pressure (DP) for Max Rated Flow: 300 psi*

* Lower flow rates require a lower DP

STORAGE

! NOTICE



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

The SF10000HTVB should be stored in a shelter and be protected from moisture and particulates. Storage temperatures shall be between -50°F and 158°F (-45°C and 70°C).

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

It is important not to store the SF10000HTVB 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 SF10000HTVB SHALL NOT BE INSTALLED SUBSEA.

1. Mounting

The SF10000HTVB can be panel or base mounted in any orientation. See Appendix B for more details.

If panel mounting, unscrew the handle fastener with a 2mm Allen wrench and remove the handle. Mount the valve, then replace the handle and tighten the fastener in place.

2. Hydraulic Installation

Install the SF10000HTVB so that the flow is in the proper direction. The IN (inlet) and OUT (outlet) connections are marked respectively. See Appendix B for details.

Install an inline filter upstream of the SF10000HTVB. Clean chemicals and proper filtering are very important. Omitting the filter can cause the valve to become plugged.

Table 1 lists the filter requirements for the various flow ranges. Note: if coarser filters are used, the adjustment handle may need to be periodically opened to flush out any debris.

Table 1 – Filter Specification

Flow Range	Filter Micron Size
0.6 to 10 GPD	40
10 to 700 GPD	80
> 700 GPD	200

A pulsation dampener is recommended to be installed on the inlet header supplying the SF10000HTVB 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 SF10000HTVB 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 SF10000HTVB (within 6 inches) to prevent damage to the piston cup seal and to prevent well fluids entering the valve. The 6-inch maximum is required to eliminate stored pressure build up during startup. 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 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 SF10000HTVB 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. Another method of calibrating the SF10000HTVB is with a 3-way valve and a line to a calibration beaker. Once the flow rate is set, the 3-way valve is switched to direct the chemical to the process (see Figure 1).

Since the SkoFlo valve regulates the flow independent of the pressure differential across it, the flow rate to the process is the same as the flow rate set using the beaker. Overall monitoring of the flow is done by taking inventory of the usage from the supply tank.

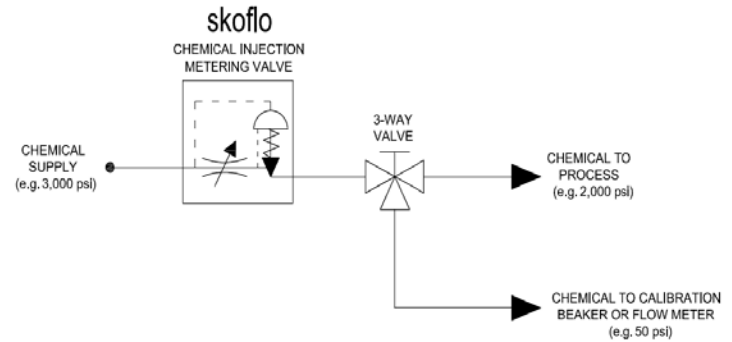




Figure 1 – Valve Calibration Schematic

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. General

Spares kits available for typical maintenance items are listed in Table 2. See Tables 3, 4, and 5 for part number guides.

Table 2 – SF1000HTVB Spares Kit Part Numbers

ITEM	PART NUMBER
Complete Rebuild Kit	31655-10-XXXX-XXXX-1S-XX-XX
Seal Kit	31664-10-XXXX-1S
Stem Assembly Kit	31625-10-XXXX-XXXX-XX-XX
Piston Assembly Kit	31623
Gate Pad	30512
Washer Spring Stack	30513
O-ring Installation Tool Kit	31624

Table 3 – SF1000HTVB Rebuild Kit Number Guide

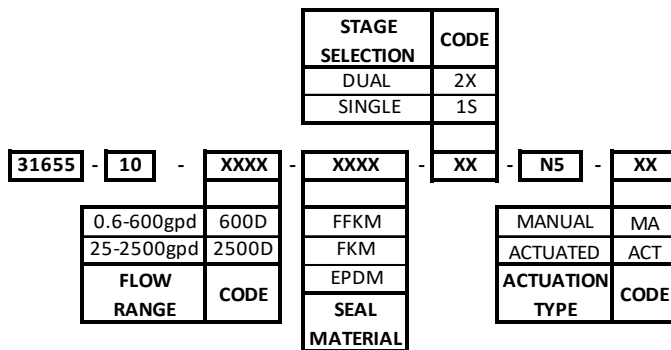


Table 4 – SF1000HTVB Seal Kit Number Guide

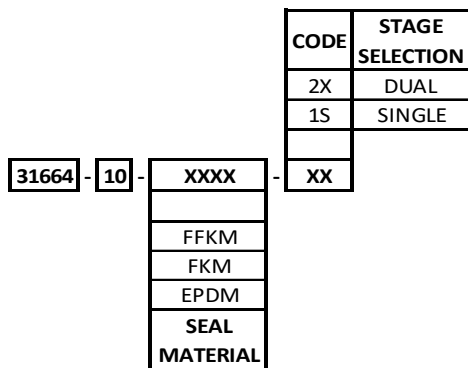


Table 5 – SF1000HTVB Stem Kit Number Guide

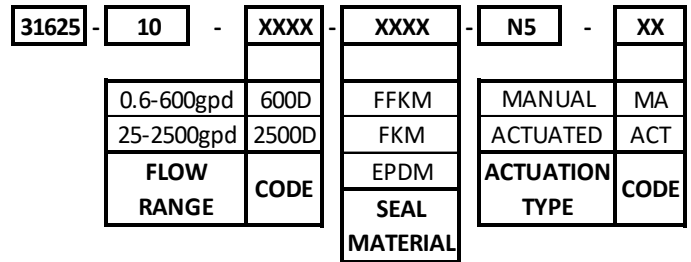


Table 6 - Maintenance Tool Requirements

Tools and Parts	Quantity
Vise	1
250 ft.lb [340 Nm] Torque wrench	1
50 ft.lb [68 Nm] Torque wrench	1
Socket extension	1
28mm socket	1
13mm socket	1
12mm socket	1
10mm Allen socket	1
Pliers	1
2mm Allen wrench	1
5mm Allen wrench (required for SF3 Actuator)	1
Brass Rod (3.5mm Diameter)	1
Hammer (required for SF3 Actuator)	1
9/16" wrench (required for SF3 Actuator with PDFM)	2
Circlip Pliers (.035" Tip Diameter)	1
HTVB O-Ring Installation Kit (P/N: 31624)	1
Brass Pick	1
Pick or small flat head electrical screwdriver	1
Parker Super Lube (or equivalent)	1
Dynatex Anti-Seize & Lubricating Compound (or equivalent)	1
Molykote G-4700 Lithium/Moly Grease (or equivalent)	1
Loctite 222 Low Strength Threadlocker (or equivalent)	1

6. Disassembling the SF1000HTVB

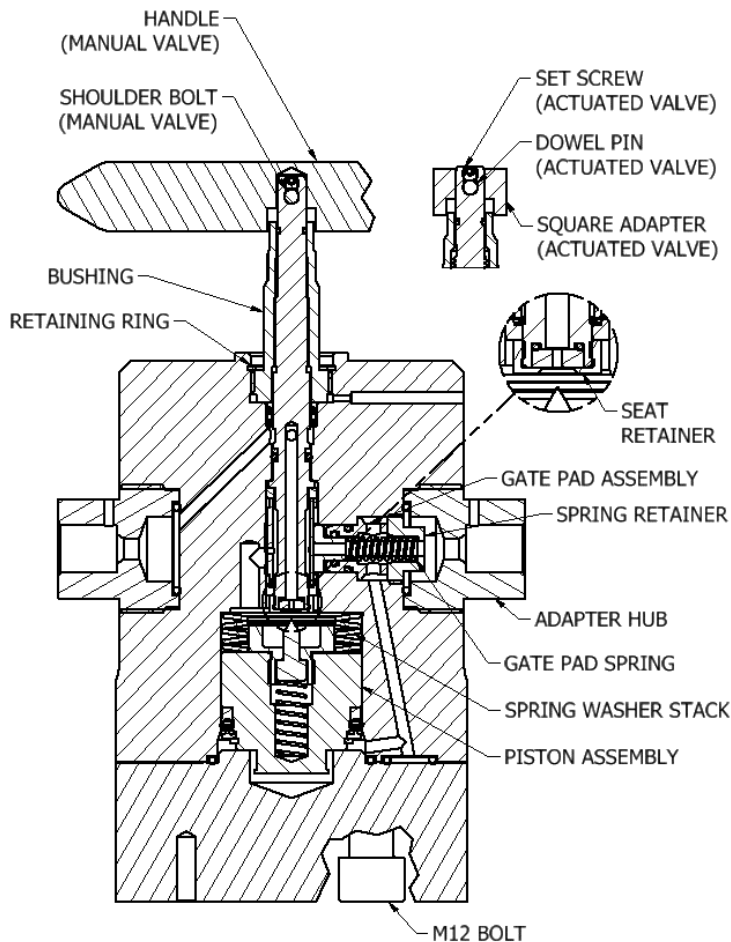


Figure 2 – SF1000HTVB Cross-Section

- 6.1 Remove the valve from the system. If applicable, see Section 13 for information on unpairing the valve from an SF3 Actuator.
- 6.2 Rotate the handle clockwise until you reach the bottom stop.
- 6.3 Remove the handle or square adapter
 - 6.3.1 For Manual valves:
 - 6.3.1.1 remove handle fastener – *2mm Allen wrench*
 - 6.3.1.2 Remove handle.
 - 6.3.2 For Actuated valves:
 - 6.3.2.1 Remove set screw – *2mm Allen wrench*.
 - 6.3.2.2 Remove dowel pin. If necessary, hold the square drive in a vise and tap the dowel pin out – *3.5mm dia rod, hammer*.

- 6.3.2.3 Remove the square adapter.

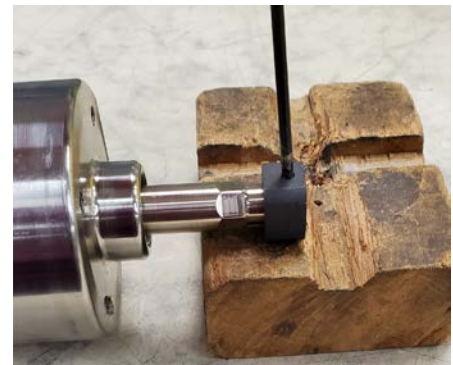


Figure 3 – Square Adapter Removal

- 6.4 Secure the valve in a vise with the inlet hub facing up.
- 6.5 Unscrew the adapter hub (31405) – *28mm socket*.
- 6.6 Unscrew the spring retainer (31404) – *12mm socket*.
- 6.7 Remove the spring and gate pad assembly – A brass rod can be used to aid pad assembly removal.



Figure 4 – Gate Pad Assembly Removal

- 6.8 Resecure the valve in vise with the base facing up.
- 6.9 Unscrew the 8x M12 bolts and remove the base – *10mm Allen socket*.
- 6.10 Remove the piston assembly and washer springs. Set the piston down pin side up to protect the tip of the pin – *pliers*.



Figure 5 – Piston Assembly Removal

! NOTICE



IT IS CRITICAL THAT THE GATE PAD IS REMOVED BEFORE THE STEM. FAILURE TO DO SO WILL RESULT IN DAMAGE TO THE STEM GUIDE RINGS.

- 6.11 Place a 12mm socket over the seat retainer (31409) and rotate counter-clockwise until you can withdraw the old stem assembly from the body – *12mm socket, socket extension.*



Figure 6 – Stem Assembly Removal

- 6.12 Remove valve from vise.
 6.13 Remove the retaining ring (71007136) that retains the stem bushing and discard – *Circlip pliers (.035" Tip Diameter).*
 6.14 Resecure the valve in a vise with the stem bushing facing out.
 6.15 Unscrew the bushing from the body – *13mm socket.*

7. Replacing the Stem Assembly Seals

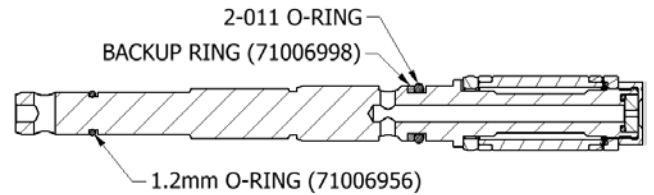


Figure 7 – Stem Assembly Seals

- 7.1 Screw the O-ring installation tool onto the stem as shown in Figure 8 – *PN 31479 (Actuated) or 31480 (Manual)*



Figure 8 – Stem O-Ring Tool with Seals

- 7.2 Apply O-ring lube to the 2-011 O-ring.
 7.3 Carefully slide the 2-011 O-ring over the stem into the O-ring groove. Minimize stretching.
 7.4 Carefully slide the backup ring (71006998) over the stem into the O-ring groove. Reform the backup ring into the groove as needed.
 7.5 Remove O-ring installation tool.
 7.6 Apply O-ring lube to the 1.2mm O-ring (71006956).
 7.7 Slide the 1.2mm O-ring over the stem into the O-ring groove.

8. Replacing the Piston Cup Seal

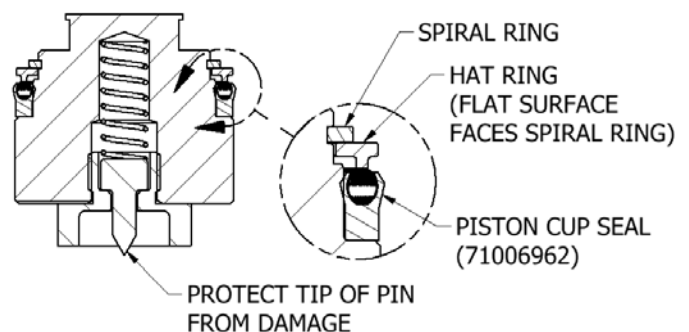


Figure 9 – Piston Assembly

- 8.1 Remove the spiral ring from the piston assembly – *pick or small screwdriver*.
- 8.2 Remove the cup seal from the piston and discard.
- 8.3 Apply O-ring lube to the new piston cup seal (71006962)
- 8.4 Press the cup seal all the way on to the piston. Protect the tip of the pin from damage during cup seal installation by placing a rag between the pin and the bench. Note: the hat ring can be flipped over to aid installation. See Figure 10.



Figure 10 – Installing Piston Seal

- 8.5 Orient the hat ring over so the flat side faces the spiral ring. See Figure 9 for more details.
- 8.6 Install the spiral ring on the piston.

9. Replacing the Gate Pad and Gate Pad Assembly Seals

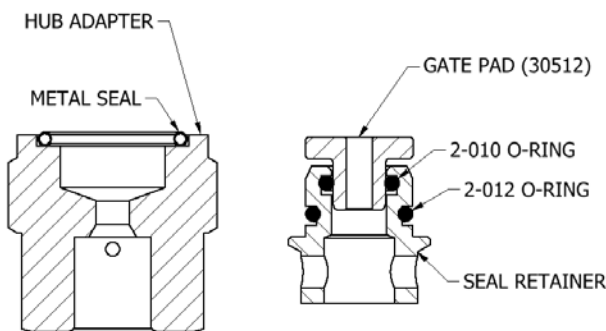


Figure 11 – Gate Pad Assembly Cross Section

- 9.1 Remove the two O-rings from the gate pad seal retainer and discard – *pick with bent tip*.
- 9.2 Install 2-010 O-ring into gate pad seal retainer. This will be easier if you do not lubricate it first.

- 9.3 Apply O-ring lube to the new 2-012 O-ring and install on the gate pad seal retainer.
- 9.4 Apply O-ring lube to the gate pad shaft.
- 9.5 Insert the gate pad into the seal retainer.
- 9.6 Look inside seal retainer to verify O-ring was not cut.
- 9.7 Remove the metal seal from the gate pad plug and discard. Take care not to scratch the sealing surface – *brass pick*.
- 9.8 Apply O-ring lube to the new metal seal and install in adapter hub.

10. Replacing Stem Seals

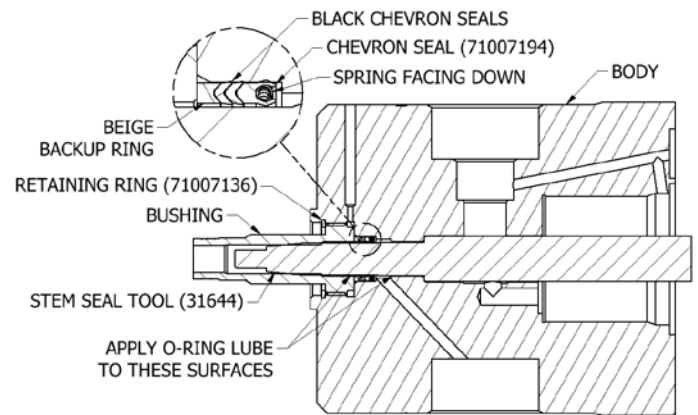


Figure 12 – Stem Seal Cross Section

- 10.1 Apply O-ring lube to stem seal tool. See Figure 12
- 10.2 Insert stem seal tool fully into body.
- 10.3 Apply O-ring lube to a new chevron seal.
- 10.4 While holding stem seal tool in place, install a new chevron seal (71007194) over the stem seal tool. See Figures 12 and 13 for orientation of the chevron seal.



Figure 13 – Stem Seals

- 10.5 Use the O-ring press tool to push seals fully into gland. Screw in hand tight. See Figure 14 – *O-ring Press Tool (30643)*



Figure 14 – O-ring Press Tool

- 10.6 Remove the O-ring press tool and check that the chevron seal is correctly installed and not cut.
- 10.7 Apply a small amount of low strength Loctite to the external threads of the stem bushing.
- 10.8 Screw the stem bushing into the body. Tighten hand tight. Note: the body must be held in a horizontal position during this step to allow the stem seal tool to move out of the way as the bushing is screwed in.
- 10.9 Remove the stem seal tool.
- 10.10 Torque bushing to 40 ft.lbf [54 Nm] – *Torque wrench, 13mm socket.*
- 10.11 Install the retaining ring (71007136) – *Circlip Pliers*

! WARNING



THE RETAINING RING MUST BE REINSTALLED TO PREVENT THE STEM BUSHING FROM BACKING OUT, WHICH COULD LEAD TO A HIGH-PRESSURE LEAK.

11. Valve Reassembly

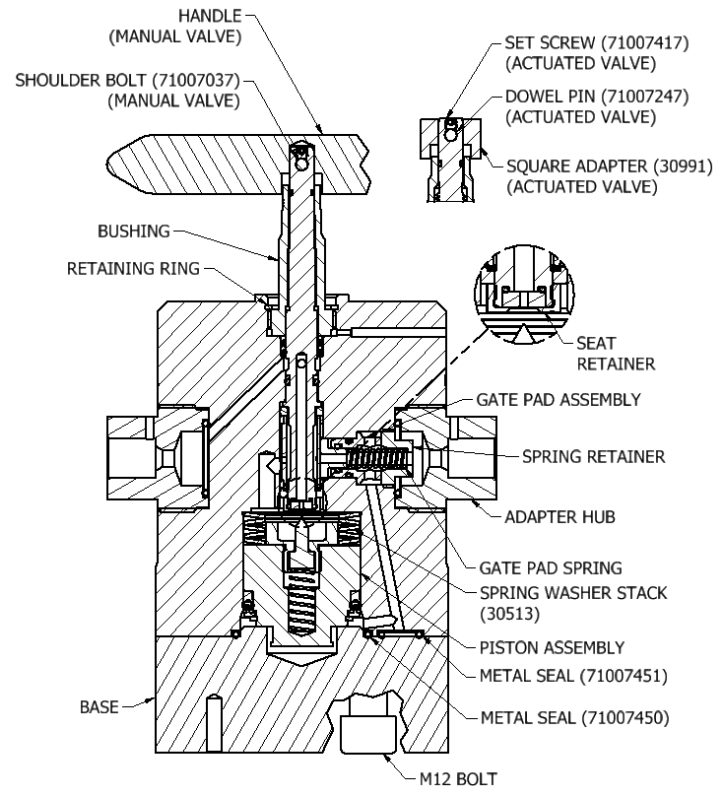


Figure 15 – SF1000HTVB Cross-Section

- 11.1 Apply a generous coating of lithium grease to the stem threads.
- 11.2 Apply O-ring lube to stem sealing surface. See Figure 16.



Figure 16 – Stem Sealing Surface

- 11.3 Align gate profile with gate pad bore. Pushing on the seat retainer, insert stem fully into body.
- 11.4 Screw stem clockwise via seat retainer until you reach the top stop. Once the handle hole emerges from the bushing you can use a rod through the handle hole to finish screwing in the stem – *12mm socket, ø3.5mm rod.*
- 11.5 As the gate becomes visible in the gate pad bore, align the gate profile with the gate pad bore; use your thumb to keep it aligned as you screw in the stem.

- 11.6 Verify that the gate profile is visible in the gate pad bore and the gate guide ring is not visible. Note: ceramic gate does not have a top guide ring.
- 11.7 Place the valve in a bench vise stem facing down.
- 11.8 Stack the spring washers, alternating dish up and dish down. See Figure 17.

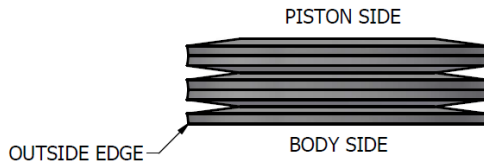


Figure 17 – Spring Stack Arrangement

- 11.9 Insert this stack into the valve body. The outside edge must be facing down into the body. See Figure 13.
- 11.10 Apply O-ring lube to the piston cup seal.
- 11.11 Insert the piston subassembly into the body, pin side down. Press down on the piston with the heel of your hand until the piston contacts the springs.
- 11.12 Remove the metal seals from the bottom of body and discard. Take care not to scratch the sealing surface – *brass pick*.
- 11.13 Apply O-ring lube to the new metal seals and install in the metal seal glands in the bottom of the body.
- 11.14 Place the base onto the valve.
- 11.15 Apply anti-seize to the 8X M12 socket head cap screws (SHCS) and install in the base.
- 11.16 Gradually torque the 8 fasteners in a star pattern (in opposite pairs). It may take a couple of passes to compress the metal seal spring. – *10mm T handle hex key*
- 11.17 Tighten SHCS in opposite pairs. Torque to 40 ft.lbf [54 Nm]. – *10mm hex key, torque wrench*
- 11.18 Double check all the fasteners are torqued correctly by working clockwise through all 8. – *10mm hex key, torque wrench*

- 11.19 Verify that the gate profile is visible in the gate pad bore and the gate guide ring is not visible (if applicable).

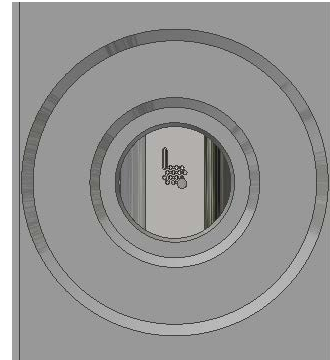


Figure 18 – Gate View Through Gate Pad Hole

- 11.20 Secure the body in a bench vise with gate pad bore facing up.
- 11.21 Insert gate pad subassembly into gate pad bore, gate pad first.
- 11.22 Insert gate pad coil spring.
- 11.23 Screw in spring retainer – *12mm socket*.
- 11.24 Coat adapter hub threads with anti-seize.
- 11.25 Install adapter hub and torque to 180 ft.lbf [244 Nm]. – *28mm hex, Torque Wrench*

12. Handle Installation

- 12.1 Manual Valve
 - 12.1.1 Place handle on stem and align the holes.
 - 12.1.2 Insert shoulder bolt and tighten, be careful not to shear the hex – *2mm hex key*.
- 12.2 Actuated Valve
 - 12.2.1 Place square drive adapter on stem, aligning holes.
 - 12.2.2 Insert dowel pin into hole– *ø3.5mm rod, hammer*.
 - 12.2.3 Center dowel pin in square drive – *ø3.5mm rod, hammer*.
 - 12.2.4 Insert SHSS into end of stem and tighten – *2mm hex key*.

13. Disconnecting Valve From the SF3 Actuator

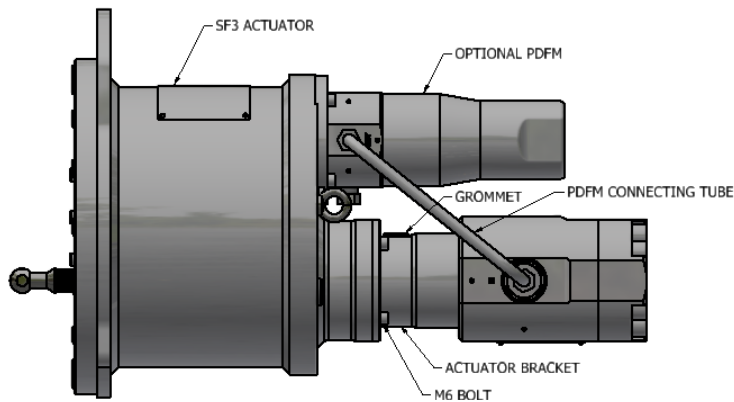


Figure 19 – SF1000HTVB with SF3 Actuator

13.1 If unit does not have a PDFM skip to step 13.5

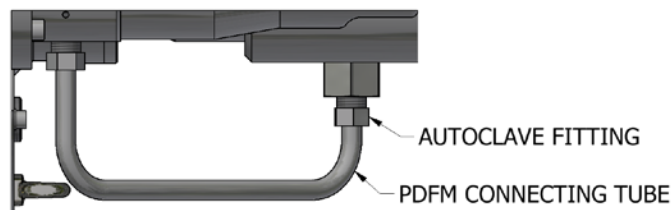


Figure 20 – PDFM Connecting Tube

- 13.2 Unscrew the nut from each fitting – $5/8$ " wrench.
- 13.3 Pull the tube out straight out from the fittings.
- 13.4 Note the orientation of the actuator bracket grommet to the SF3 Actuator and valve for reference when reassembling.
- 13.5 Unscrew the 4X M6 bolts attaching the actuator bracket to the SF3 Actuator.
- 13.6 Pull Disconnect the valve from the actuator.
- 13.7 Unscrew the 4X M6 bolts attaching the actuator bracket to the SF1000HTVB.
- 13.8 Remove the bracket from the valve.

14. Reconnecting the SF1000HTVB to the SF3 Actuator

- 14.1 Apply a thin layer of anti-seize to the valve square.
- 14.2 Remove the grommet from the actuator bracket.
- 14.3 Apply anti-seize to 8X M6 bolts.
- 14.4 Orient the valve and actuator bracket as they were prior to disassembly.

- 14.5 Insert 4X M6 SHCS in the bracket holes.
- 14.6 Tighten fasteners in opposite pairs – 5mm hex key.
- 14.7 With the SF1000HTVB and actuator bracket oriented as they were prior to disassembly, align the square drive with the actuator drive shaft. Rotate valve as necessary. Note: the square drive can be viewed through the grommet hole.
- 14.8 Slide the square drive into the drive shaft.
- 14.9 Realign the fastener holes.
- 14.10 Insert 4X M6 SHCS into the bracket.
- 14.11 Tighten fasteners in opposite pairs – 5mm hex key.
- 14.12 Install the grommet in actuator bracket.
- 14.13 Reinsert the PDFM connecting tube to the fittings in the valve and PDFM. Note: the shorter end of the tube goes to the valve.
- 14.14 Tighten the autoclave nuts – $5/8$ " wrench.
- 14.15 After reconnecting the valve to the SF3 actuator, the actuator must be recalibrated. See the appropriate SF3 Actuator and PDFM user guide for more details.

FREQUENTLY ASKED QUESTIONS

Table 7 – Frequently Asked Questions

ALL CIMVs	
Question	Answer
CIMV Shutoff Ability	SkoFlo CIMVs are not shut off devices. Separate isolation valves should be used for shutting off the flow.
Protection Against Reverse Flow	A check valve shall be installed immediately downstream of the valve (within 6 inches) to prevent seal damage.
Minimum Differential Pressure to Operate	See CIMV specification sheet that was supplied with the CIMV to determine minimum required pressure drop.
Excessive Pressure Drop	For flows above 100 US gallons per day (15.8 LPH), pressure drops across the CIMV should not exceed 3,000 psi (207bar) for extended periods to avoid cavitation, which could lead to erosion of the throttling components. As a general rule, the outlet pressure must be greater than or equal to the pressure drop to avoid cavitation.
Fluid Cavitation	Fluid cavitation occurs primarily when CIMV pressures (and secondarily fluid viscosity and velocity) cause a drop below the fluid vapor pressure. When the SkoFlo CIMV enters its cavitation region, energy release from vapor compression at the pin/seat interface may cause premature wear.
Chemical Filming	Historically, chemical filming has not been experienced in SkoFlo HTD/HTV models. Chemical filming is dependent on chemical composition selection by the user. Injected chemicals would need to have an affinity to ceramic to film. Currently, there are no known chemicals that have this affinity.
Blowout Proof Stem	The stem design is blowout proof.

TROUBLESHOOTING

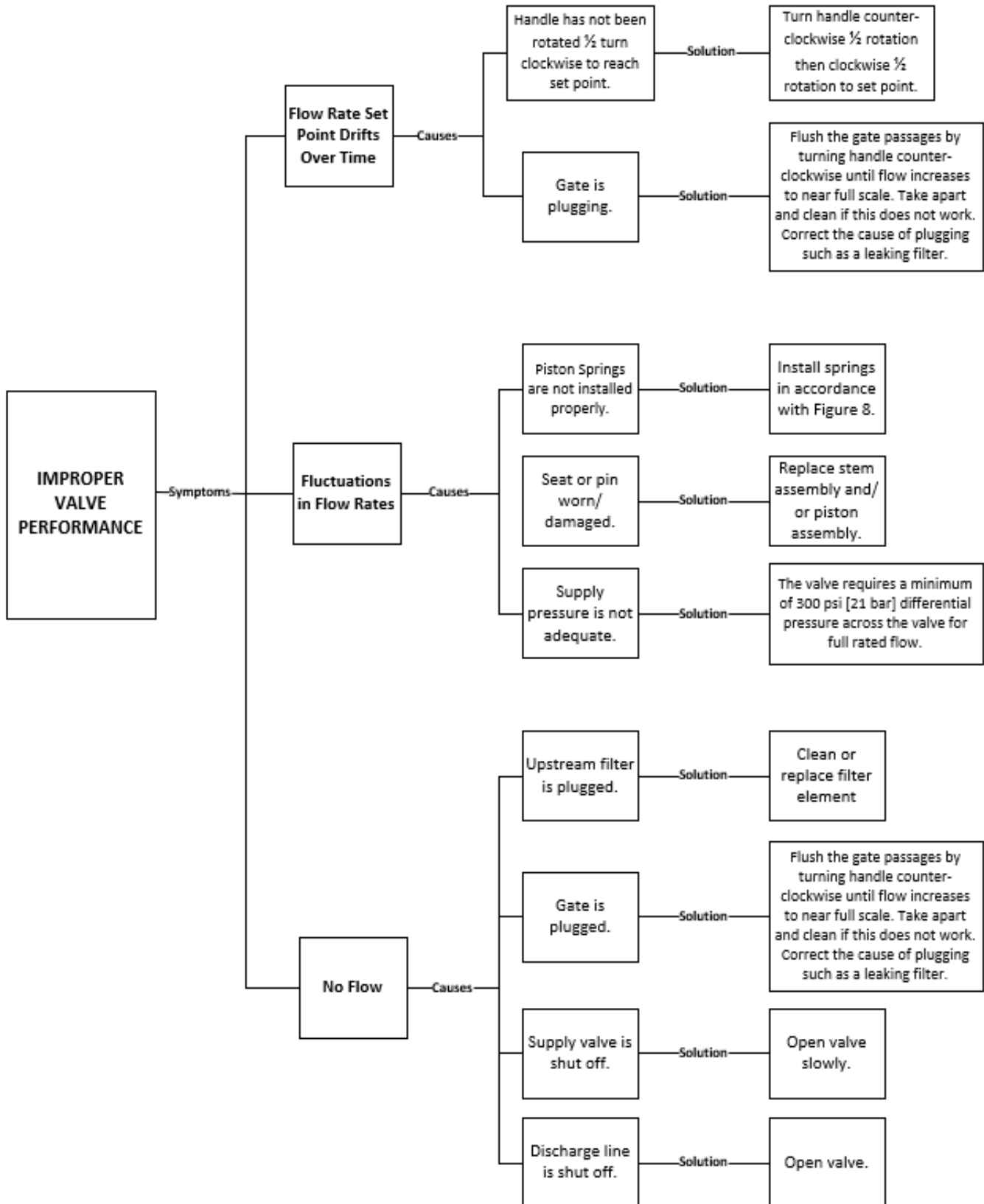
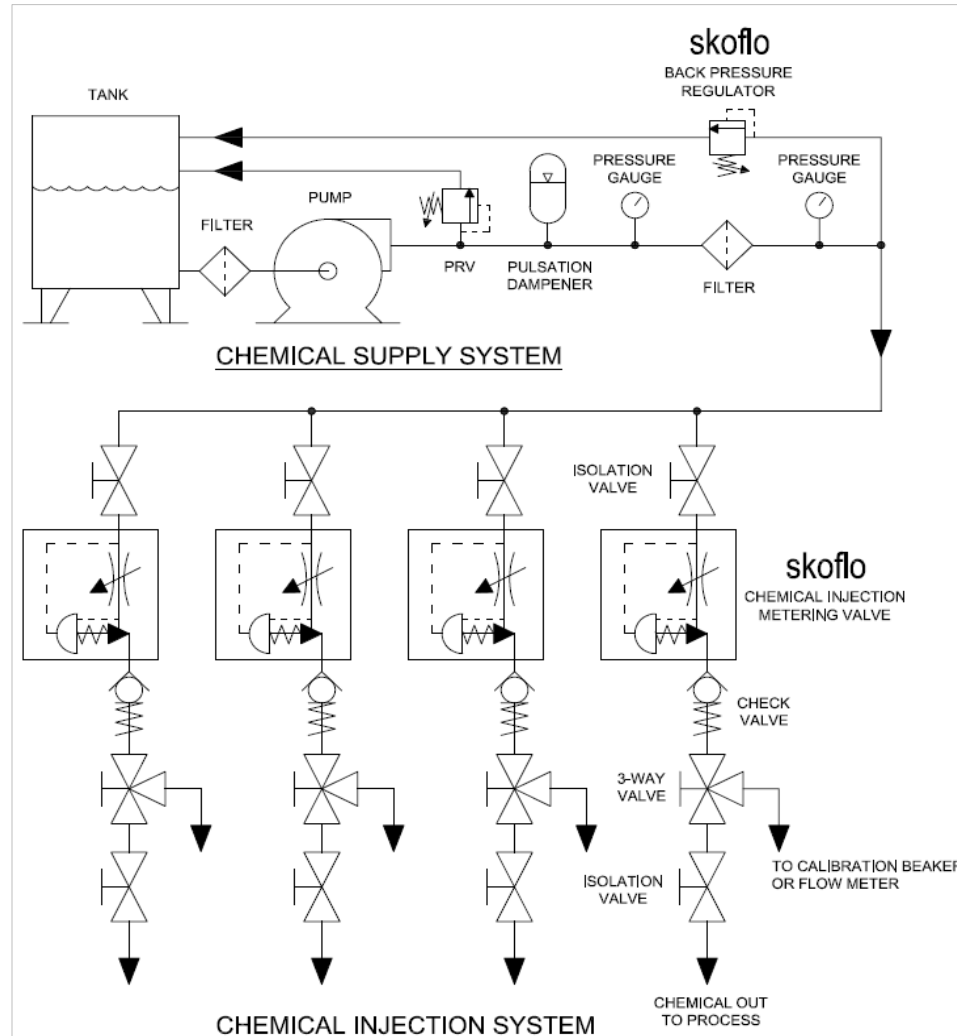


Figure 21 – Troubleshooting

APPENDIX A – A TYPICAL CHEMICAL INJECTION SYSTEM



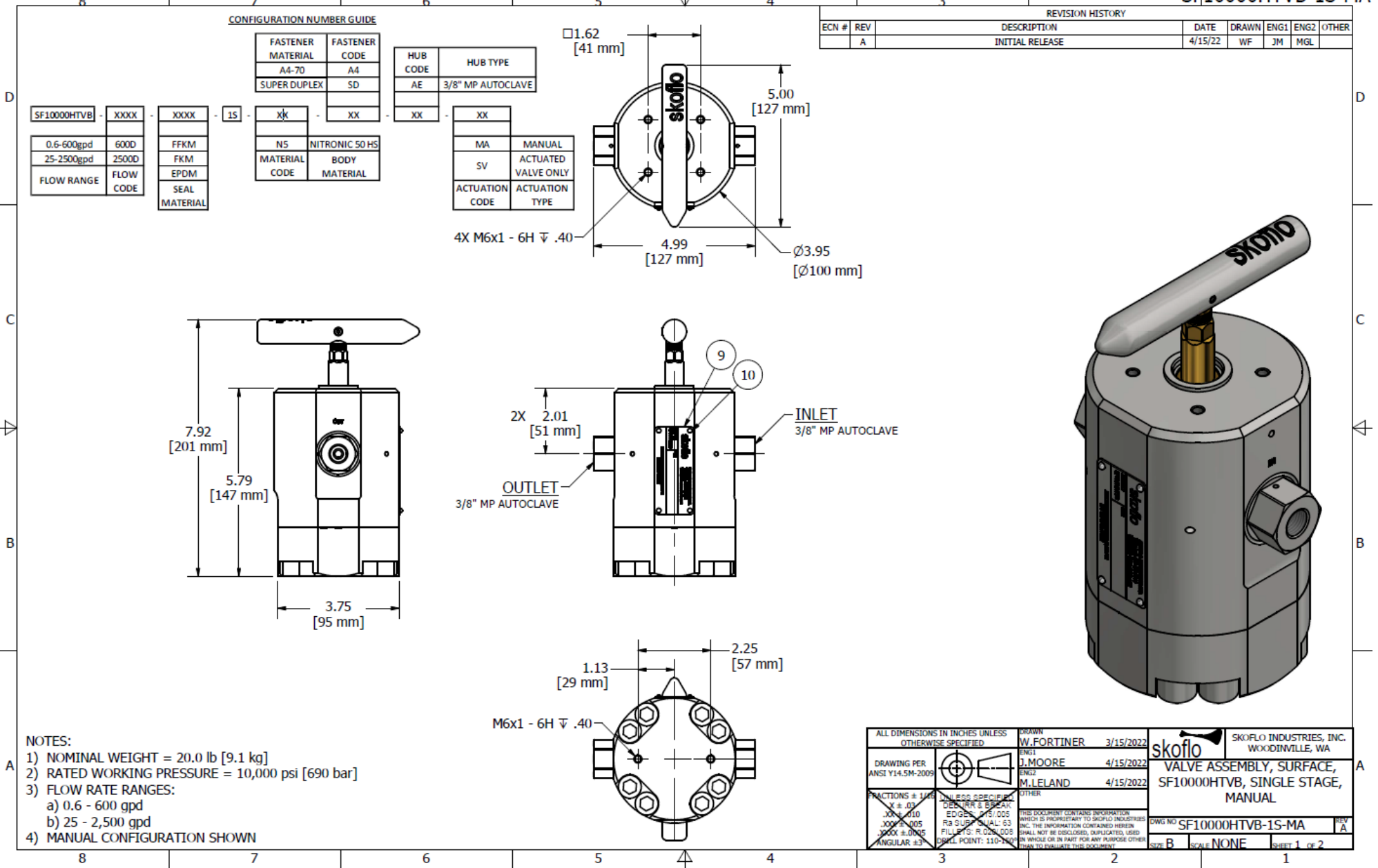
NOTES

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 6 inches of the SkoFlo CIMV.

APPENDIX B – SF10000HTVB GA AND BOM DRAWINGS

SF10000HTVB-1S-MA



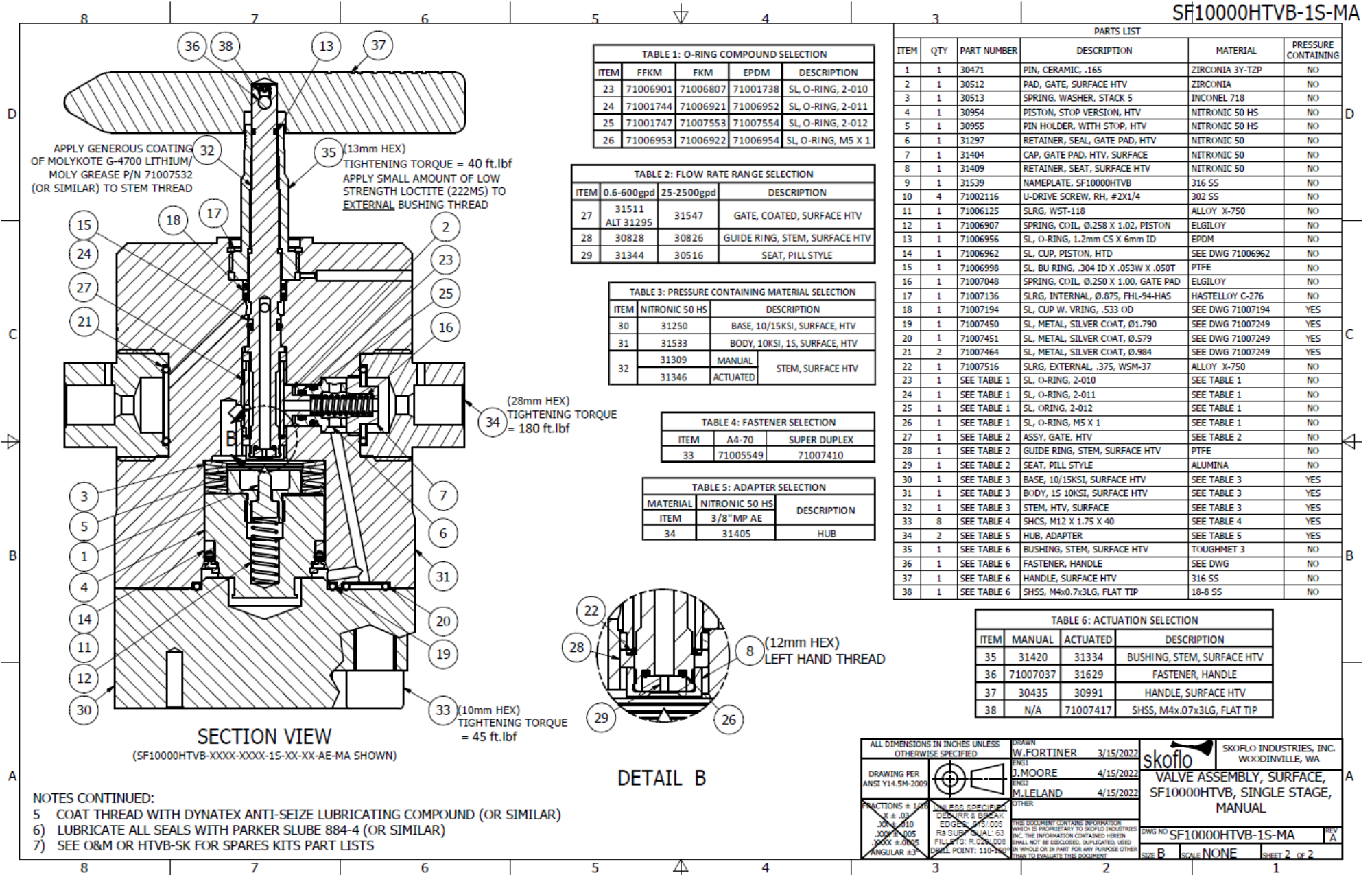


TABLE 1: O-RING COMPOUND SELECTION

ITEM	FFKM	FKM	EPDM	DESCRIPTION
23	71006901	71006807	71001738	SL, O-RING, 2-010
24	71001744	71006921	71006952	SL, O-RING, 2-011
25	71001747	71007553	71007554	SL, O-RING, 2-012
26	71006953	71006922	71006954	SL, O-RING, M5 X 1

TABLE 2: FLOW RATE RANGE SELECTION

ITEM	0.6-600gpd	25-2500gpd	DESCRIPTION
27	31511 ALT 31295	31547	GATE, COATED, SURFACE HTV
28	30828	30826	GUIDE RING, STEM, SURFACE HTV
29	31344	30516	SEAT, PILL STYLE

TABLE 3: PRESSURE CONTAINING MATERIAL SELECTION

ITEM	NITRONIC 50 HS	DESCRIPTION
30	31250	BASE, 10/15KSI, SURFACE, HTV
31	31533	BODY, 10KSI, 1S, SURFACE, HTV
32	31309	MANUAL
	31346	ACTUATED

TABLE 4: FASTENER SELECTION

ITEM	A4-70	SUPER DUPLEX
33	71005549	71007410

TABLE 5: ADAPTER SELECTION

MATERIAL	NITRONIC 50 HS	DESCRIPTION
ITEM	3/8" MP AE	
34	31405	HUB

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	PRESSURE CONTAINING
1	1	30471	PIN, CERAMIC, .165	ZIRCONIA 3Y-TZP	NO
2	1	30512	PAD, GATE, SURFACE HTV	ZIRCONIA	NO
3	1	30513	SPRING, WASHER, STACK 5	INCONEL 718	NO
4	1	30954	PISTON, STOP VERSION, HTV	NITRONIC 50 HS	NO
5	1	30955	PIN HOLDER, WITH STOP, HTV	NITRONIC 50 HS	NO
6	1	31297	RETAINER, SEAL, GATE PAD, HTV	NITRONIC 50	NO
7	1	31404	CAP, GATE PAD, HTV, SURFACE	NITRONIC 50	NO
8	1	31409	RETAINER, SEAT, SURFACE HTV	NITRONIC 50	NO
9	1	31539	NAMEPLATE, SF1000HTVB	316 SS	NO
10	4	71002116	U-DRIVE SCREW, RH, #2X1/4	302 SS	NO
11	1	71006125	SLRG, WST-118	ALLOY X-750	NO
12	1	71006907	SPRING, COIL, Ø.258 X 1.02, PISTON	ELGILOY	NO
13	1	71006956	SL, O-RING, 1.2mm CS X 6mm ID	EPDM	NO
14	1	71006962	SL, CUP, PISTON, HTD	SEE DWG 71006962	NO
15	1	71006998	SL, BU RING, .304 ID X .053W X .050T	PTFE	NO
16	1	71007048	SPRING, COIL, Ø.250 X 1.00, GATE PAD	ELGILOY	NO
17	1	71007136	SLRG, INTERNAL, Ø.875, FHL-94-HAS	HASTELLOY C-276	NO
18	1	71007194	SL, CUP W. VRING, .533 ID	SEE DWG 71007194	YES
19	1	71007450	SL, METAL, SILVER COAT, Ø1.790	SEE DWG 71007249	YES
20	1	71007451	SL, METAL, SILVER COAT, Ø.579	SEE DWG 71007249	YES
21	2	71007464	SL, METAL, SILVER COAT, Ø.984	SEE DWG 71007249	YES
22	1	71007516	SLRG, EXTERNAL, .375, WSM-37	ALLOY X-750	NO
23	1	SEE TABLE 1	SL, O-RING, 2-010	SEE TABLE 1	NO
24	1	SEE TABLE 1	SL, O-RING, 2-011	SEE TABLE 1	NO
25	1	SEE TABLE 1	SL, O-RING, 2-012	SEE TABLE 1	NO
26	1	SEE TABLE 1	SL, O-RING, M5 X 1	SEE TABLE 1	NO
27	1	SEE TABLE 2	ASSY, GATE, HTV	SEE TABLE 2	NO
28	1	SEE TABLE 2	GUIDE RING, STEM, SURFACE HTV	PTFE	NO
29	1	SEE TABLE 2	SEAT, PILL STYLE	ALUMINA	NO
30	1	SEE TABLE 3	BASE, 10/15KSI, SURFACE HTV	SEE TABLE 3	YES
31	1	SEE TABLE 3	BODY, 1S 10KSI, SURFACE HTV	SEE TABLE 3	YES
32	1	SEE TABLE 3	STEM, HTV, SURFACE	SEE TABLE 3	YES
33	8	SEE TABLE 4	SHCS, M12 X 1.75 X 40	SEE TABLE 4	YES
34	2	SEE TABLE 5	HUB, ADAPTER	SEE TABLE 5	YES
35	1	SEE TABLE 6	BUSHING, STEM, SURFACE HTV	TOUGHMET 3	NO
36	1	SEE TABLE 6	FASTENER, HANDLE	SEE DWG	NO
37	1	SEE TABLE 6	HANDLE, SURFACE HTV	316 SS	NO
38	1	SEE TABLE 6	SHSS, M4x0.7x3LG, FLAT TIP	18-8 SS	NO

TABLE 6: ACTUATION SELECTION

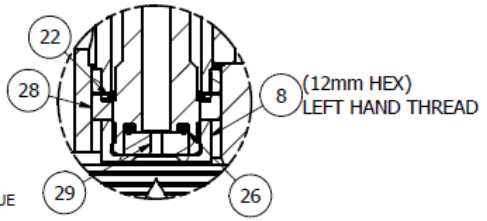
ITEM	MANUAL	ACTUATED	DESCRIPTION
35	31420	31334	BUSHING, STEM, SURFACE HTV
36	71007037	31629	FASTENER, HANDLE
37	30435	30991	HANDLE, SURFACE HTV
38	N/A	71007417	SHSS, M4x0.7x3LG, FLAT TIP

APPLY GENEROUS COATING OF MOLYKOTE G-4700 LITHIUM/MOLY GREASE P/N 71007532 (OR SIMILAR) TO STEM THREAD

(13mm HEX) TIGHTENING TORQUE = 40 ft.lbf
APPLY SMALL AMOUNT OF LOW STRENGTH LOCTITE (222MS) TO EXTERNAL BUSHING THREAD

(28mm HEX) TIGHTENING TORQUE = 180 ft.lbf

(10mm HEX) TIGHTENING TORQUE = 45 ft.lbf



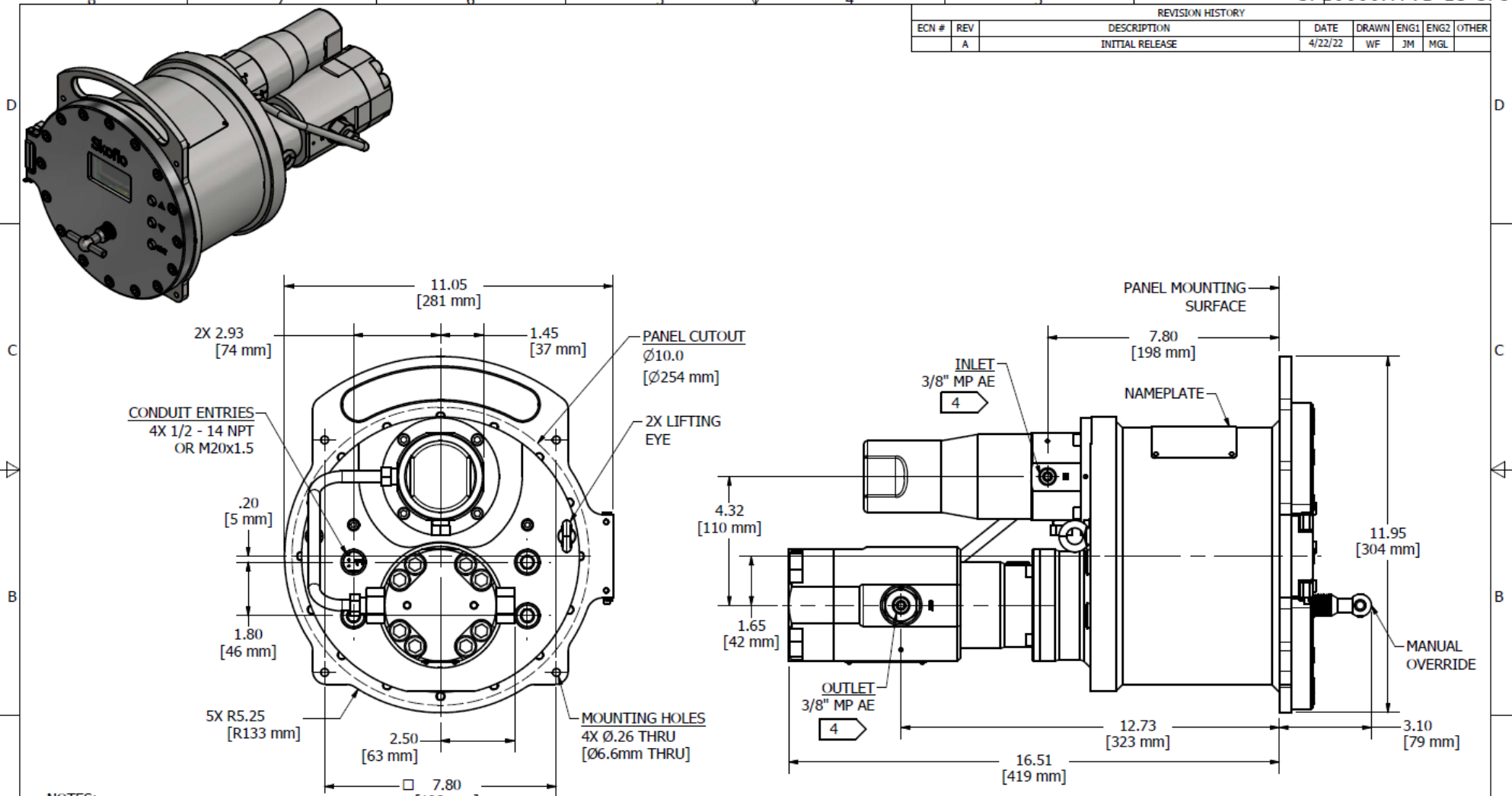
SECTION VIEW
(SF1000HTVB-XXXX-XXXX-1S-XX-XX-AE-MA SHOWN)

- NOTES CONTINUED:
- 5 COAT THREAD WITH DYNATEX ANTI-SEIZE LUBRICATING COMPOUND (OR SIMILAR)
 - 6 LUBRICATE ALL SEALS WITH PARKER SLUBE 884-4 (OR SIMILAR)
 - 7 SEE O&M OR HTVB-SK FOR SPARES KITS PART LISTS

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED	DRAWN W.FORTINER 3/15/2022	SKOFLIO INDUSTRIES, INC. WOODINVILLE, WA
DRAWING PER ANSI Y14.5M-2009	ENGI J. MOORE 4/15/2022 ENGI M. LELAND 4/15/2022	
FRACTIONS ± 1/16 X ± .01 XX ± .010 XXX ± .005 XXXX ± .0005 ANGULAR ±3	DECIMALS ± .005 EDGES ± .005 RA SURF. QUAL: 53 FILLETS: R.025, .005 DIM. POINT: 110-1100	THIS DOCUMENT CONTAINS INFORMATION WHICH IS PROPRIETARY TO SKOFLIO INDUSTRIES INC. THE INFORMATION CONTAINED HEREIN SHALL NOT BE DISCLOSED, REPLICATED, USED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN TO EVALUATE THIS DOCUMENT.
DWG NO: SF1000HTVB-1S-MA		REV: A
SIZE: B SCALE: NONE SHEET 2 OF 2		

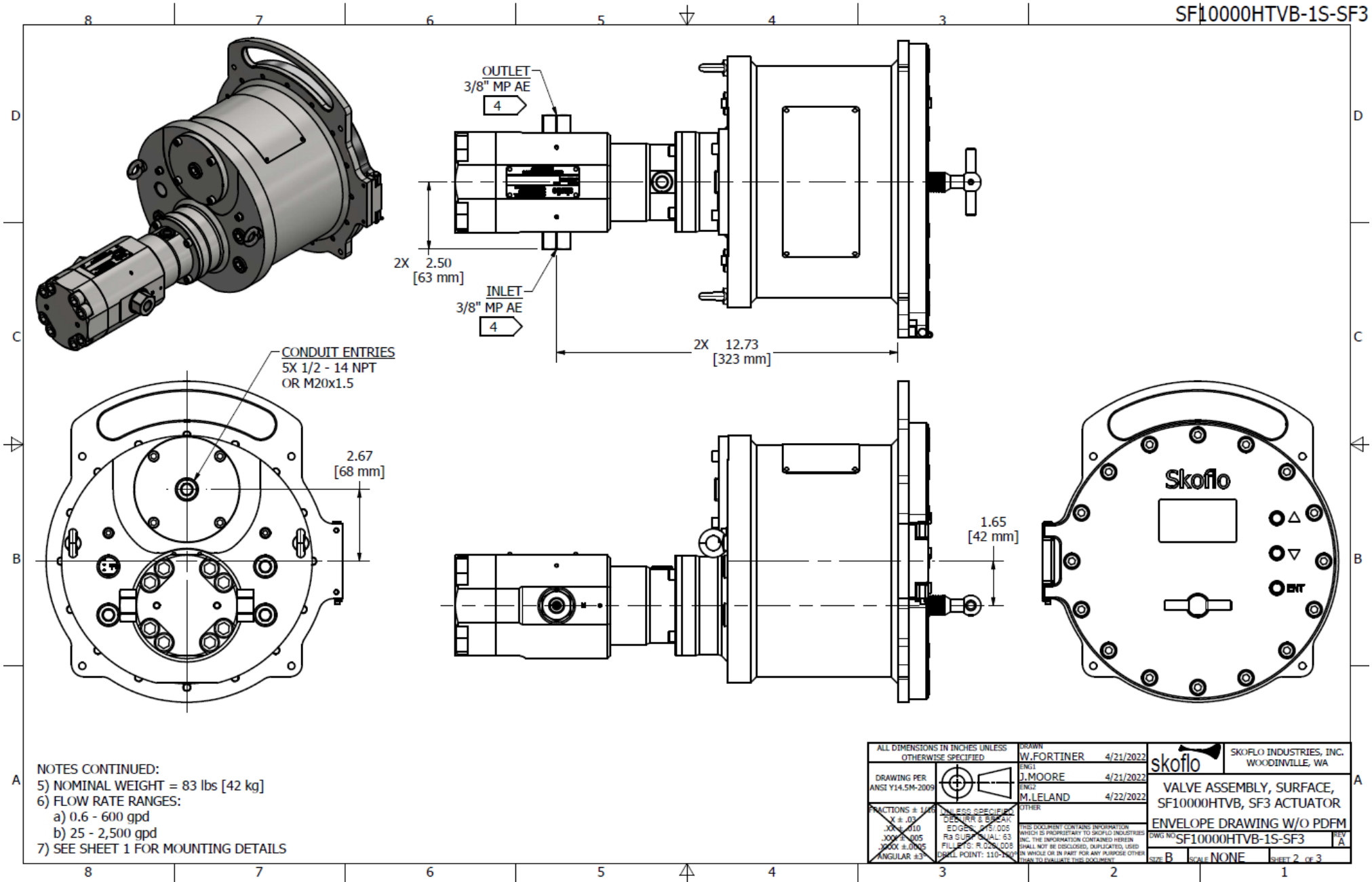
SF10000HTVB-1S-SF3

REVISION HISTORY							
ECN #	REV	DESCRIPTION	DATE	DRAWN	ENG1	ENG2	OTHER
	A	INITIAL RELEASE	4/22/22	WF	JM	MGL	



- NOTES:
- 1) NOMINAL WEIGHT = 94 lbs [43 kg]
 - 2) RATED WORKING PRESSURE = 10,000 psi [690 bar]
 - 3) FLOW RATE RANGES:
 - a) 0.6 - 600 gpd
 - b) 25 - 1,200 gpd
 - 4) ORIENTATION CAN BE ADJUSTED IN 180° INCREMENTS

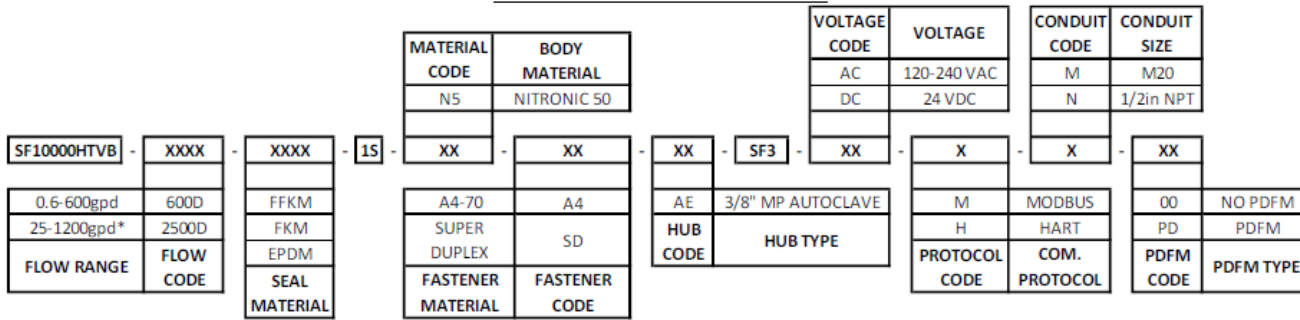
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED		DRAWN W.FORTINER 4/21/2022		SKOFLIO INDUSTRIES, INC. WOODINVILLE, WA
DRAWING PER ANST Y14.5M-2009		ENGT J. MOORE 4/21/2022		
FRACTIONS: 1/16 X: .03 X: .005 X: .0005 ANGULAR: #3	ALL EDGES TO BE CHAMFERED DECIMALS: 2 PLACES EDGES: .015, .005 RA SURF: .125, .063 FILLETS: R. 0.031, .016 DIM. POINT: 110-110	ENGR M. LELAND 4/22/2022	VALVE ASSEMBLY, SURFACE, SF10000HTVB, SF3 ACTUATOR	
THIS DOCUMENT CONTAINS INFORMATION WHICH IS PROPRIETARY TO SKOFLIO INDUSTRIES INC. THE INFORMATION CONTAINED HEREIN SHALL NOT BE DISCLOSED, DUPLICATED, USED IN WHOLE OR IN PART FOR ANY PURPOSES OTHER THAN TO EVALUATE THIS DOCUMENT.			ENVELOPE DRAWING W. PDFM SF10000HTVB-1S-SF3	
SIZE B SCALE NONE SHEET 1 OF 3				



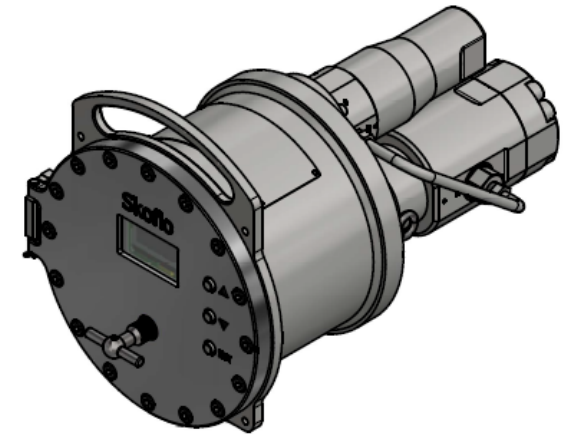
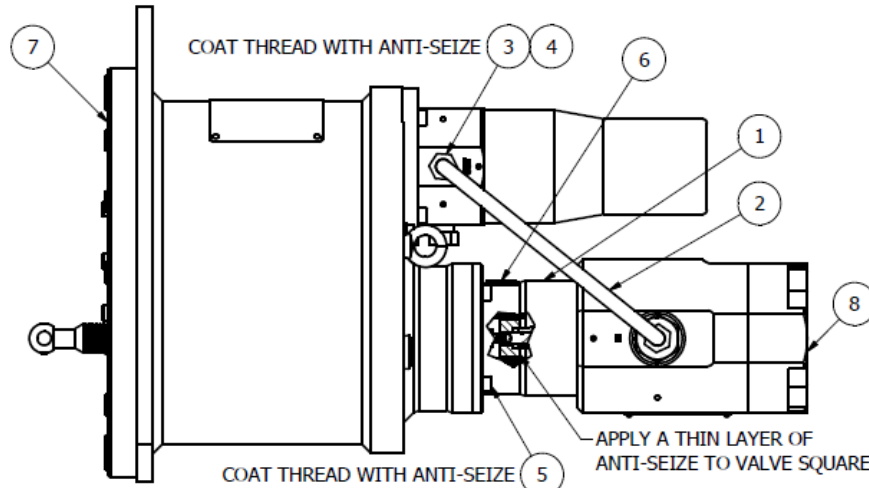
ITEM	PDFM	NO PDFM
2	1	0
3	2	0
4	2	0

PARTS LIST							
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	PRESSURE CONTAINING		
1	1	31634	BRACKET, SF3, 10/15K HTV	316 SS	NO		
2	SEE TABLE 1	31635	NIPPLE, BENT, SF10/15000HTVB-SF3	316 SS	YES		
3	SEE TABLE 1	71003288	NUT, PLUG, 3/8 AUTOCLAVE	316 SS	YES		
4	SEE TABLE 1	71006467	COLLAR, 3/8 MP, HiP 20-2L6	316 SS	YES		
5	8	71007430	SHCS, M6-1 X 16	316 SS	NO		
6	1	71007615	GROMMET, SNAP-IN, 15.5MM	TPE RUBBER	NO		
7	1	SEE DWG 31256	ASSY, ACTUATOR, SURFACE (31256-XX-X-X-S5-XX-XX)	SEE DWG 31256	YES		
8	1	SEE DWG SF10000HTVB-1S-MA	SUBASSEMBLY, SF10000HTVB, SINGLE STAGE, ACTUATED (SF10000HTVB-XXXX-XXXX-1S-XX-XX-XX-SV)	SEE DWG SF10000HTVB-1S-MA	YES		

CONFIGURATION NUMBER GUIDE



* WHEN NO PDFM IS SELECTED, MAX FLOW IS 2,500 gpd



NOTES CONTINUED:
 8 ACTUATOR CONFIGURATION MUST INCLUDE 5:1 GEAR RATIO OPTION AND 10,000 PSI PDFM (WHERE APPLICABLE)

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED	DRAWN: W.FORTINER 4/21/2022	SKOFLO INDUSTRIES, INC. WOODINVILLE, WA VALVE ASSEMBLY, SURFACE, SF10000HTVB, SF3 ACTUATOR BOM DRAWING DWG NO: SF10000HTVB-1S-SF3 SIZE: B SCALE: NONE SHEET: 3 OF 3
DRAWING PER: ANSI Y14.5M-2009	ENG1: J.MOORE 4/21/2022	
	ENG2: M.LELAND 4/22/2022	
FRACTIONS & 1/16 XX.XX.XX .XX.XX.XX .XX.XX.XX ANGULAR: 45	UNLESS SPECIFIED DIMENSIONS: 3 DECIMALS EDGES: R.005 Ra SURF: 32.0 FILLETS: R.005, 0.063 DRILL POINT: 110-110	THIS DOCUMENT CONTAINS INFORMATION WHICH IS PROPRIETARY TO SKOFLO INDUSTRIES, INC. THE INFORMATION CONTAINED HEREIN SHALL NOT BE DISCLOSED, DUPLICATED, USED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN TO EVALUATE THIS DOCUMENT.



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