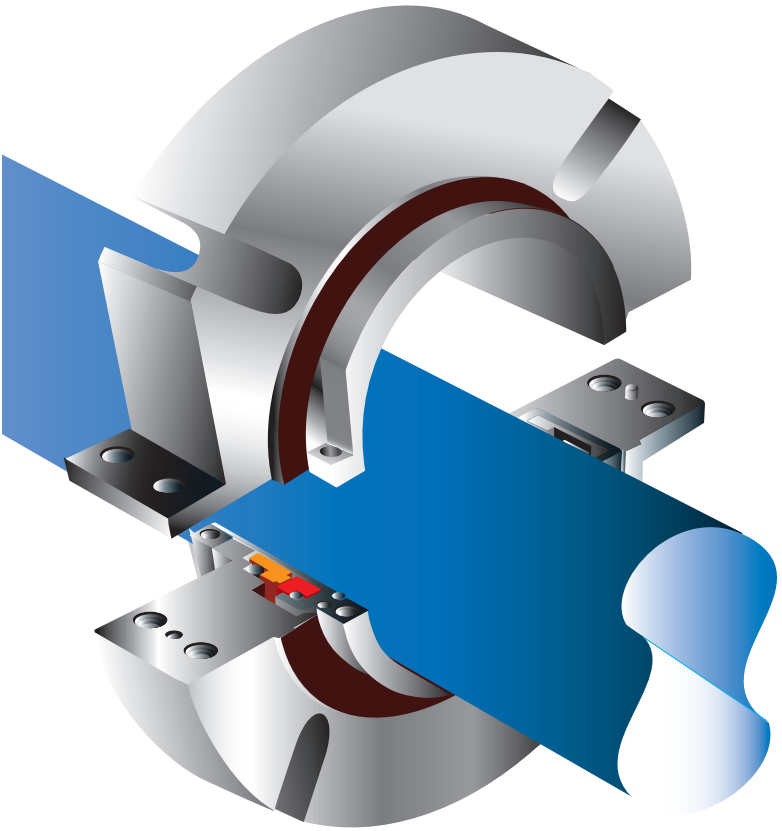
Flex-A-Seal™

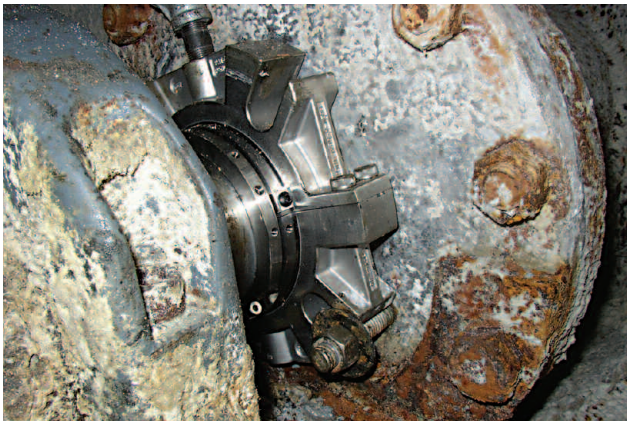
Style 85

World's Only Split Cartridge Seal

(US Patent no. 5662340)



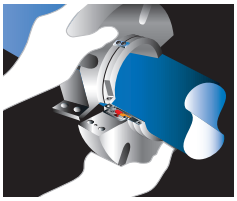
for difficult installations

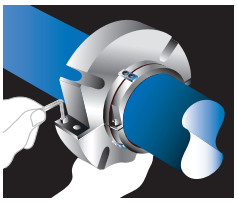


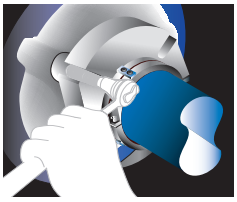
For Difficult Installations

Flex -A-Seal developed the Style 85 Split Cartridge Seal to provide the easiest installation found anywhere in the world. After simply attaching two halves over the shaft, the seal mounts to the equipment like any other cartridge seal. It does not get any easier than that! The Style 85 is the only split seal in the world in which just two pieces are handled, eliminating the need to touch sensitive lapped faces. Both sealing faces are secured safely in cartridge halves and cannot be cocked, chipped or scarred.

No Measurements
No Shims
No Special Tools
No Glue







The design of the Style 85 is like no other split seal on the market. While most split seals are mounted outside the stuffing box and designed to function like an outside seal, the Style 85 was engineered as a split, internal, hydraulically balanced, stationary seal, mounted outside the stuffing box. These features allow the centrifugal force to keep the solids away from the seal faces while maintaining the ability to handle higher speeds, internal pressures and misalignment. No need to worry about solids, as the springs are protected and out of the product to eliminate clogging. The static shaft sleeve "o" ring is positioned outside of the stuffing box to assure a good sealing surface, even on worn packing sleeves!

Peace of Mind

Unlike most cartridge seals on the market, the Style 85 is the only split cartridge seal that can be fully assembled and pressure tested at the factory. This ensures the sealing integrity of each seal completely before it is sent to the field.

The Flex-A-Seal Style 85 Split Cartridge Seal …Fast, Simple and Reliable!

Materials of Construction

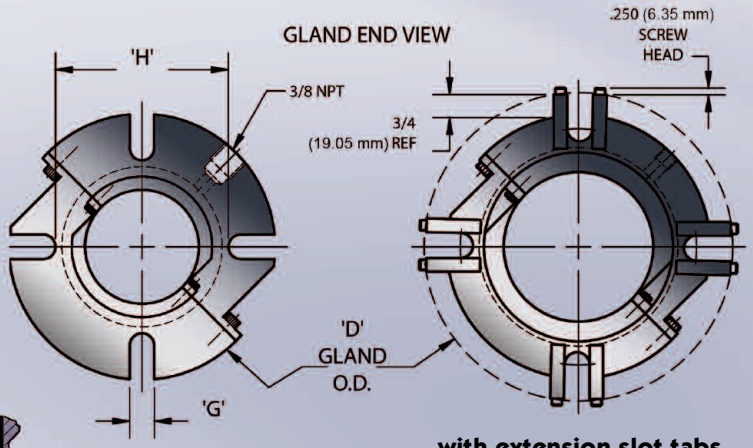
Stationary Gland Assembly	**316 Stainless Steel**
Rotating Sleeve Assembly	**316 Stainless Steel**
O Rings, Gaskets	**Viton (standard) consult factory for AFLAS® or Fluoraz® option**
Rotating Face	**Silicon Carbide**
Stationary Face	**Carbon or Silicon Carbide**
Springs	**Hastelloy C®**
Screws	**316 Stainless Steel**

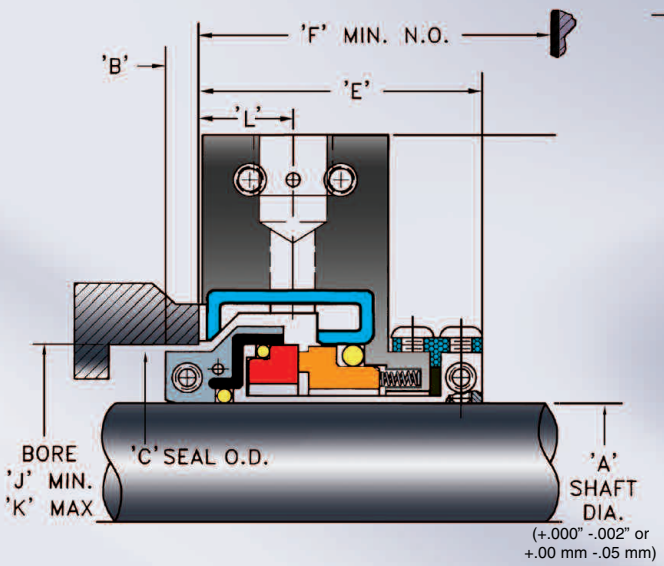
Registered Trademarks:
Viton® - Dupont Performance Elastomers
Aflas® - Asahi Glass Co.
Fluoraz® - Green Tweed
Hastelloy C® - Cabot Stellite Division

Operating Conditions

Seal Size	Temp.	Speed	Pressure
1 3/4" - 3" (45mm - 75mm)	**350°F (175°C)**	**3600 RPM**	**250 PSI (17 bar)**
3 1/8" - 3 3/4" (80mm - 95mm)	**350°F (175°C)**	**1800 RPM**	**200 PSI (14 bar)**
3 7/8" - 4 3/4" (100mm - 120mm)	**350°F (175°C)**	**800 RPM**	**150 PSI (10 bar)**
5" and above (125mm and above)	**350°F (175°C)**	**875 RPM**	**100 PSI (7 bar)**

*** Maximum temperature / pressure / speed indicates operating extremes independently and does not imply the seal will function at these extremes at the same time. Contact Flex-A-Seal Engineering if in doubt.**





with extension slot tabs

IMPERIAL (All sizes in inches)

Size	A	B	C	D	E	F	G	H	J	K	L
-24	1.500	.250	2.187	5.25	2.125	2.500	.562	3.125	2.250	2.625	.656
-27	1.687	.250	2.437	5.50	2.125	2.500	.562	3.375	2.500	2.875	.656
-28	1.750	.250	2.437	5.50	2.125	2.500	.562	3.375	2.500	2.875	.656
-30	1.875	.250	2.562	5.50	2.125	2.500	.562	3.344	2.625	3.000	.656
-31	1.937	.250	2.625	5.44	2.125	2.500	.562	3.563	2.687	3.125	.656
-32	2.000	.250	2.687	5.44	2.125	2.500	.562	3.563	2.750	3.125	.656
-34	2.125	.250	2.812	6.00	2.125	2.500	.687	3.688	2.875	3.375	.656
-35	2.188	.250	2.937	6.25	2.125	2.500	.687	3.813	3.000	3.375	.656
-36	2.250	.250	3.062	6.25	2.125	2.500	.687	3.937	3.125	3.500	.656
-38	2.375	.250	3.187	6.25	2.125	2.500	.687	4.062	3.250	3.500	.656
-39	2.438	.250	3.312	6.44	2.125	2.500	.687	4.125	3.375	3.625	.656
-40	2.500	.250	3.312	6.44	2.125	2.500	.687	4.125	3.375	3.625	.656
-42	2.625	.250	3.347	6.44	2.125	2.500	.687	4.438	3.500	3.875	.656
-43	2.688	.250	3.562	7.82	2.125	2.500	.687	4.438	3.625	4.125	.656
-44	2.750	.250	3.562	7.82	2.125	2.500	.687	4.438	3.625	4.125	.656
-46	2.875	.250	3.687	7.82	2.125	2.500	.687	4.812	3.812	4.250	.656
-47	2.938	.250	3.812	7.88	2.125	2.500	.687	4.938	3.937	4.375	.656
-48	3.000	.250	3.812	7.88	2.125	2.500	.687	4.938	3.937	4.375	.656
-52	3.250	.281	4.188	8.25	2.437	2.812	.812	5.188	4.250	4.750	.812
-54	3.375	.281	4.312	8.25	2.437	2.812	.812	5.313	4.375	4.875	.812
-55	3.438	.281	4.437	8.50	2.437	2.812	.812	5.437	4.500	5.000	.812
-56	3.500	.281	4.437	8.50	2.437	2.812	.812	5.437	4.500	5.000	.812
-58	3.625	.281	4.562	8.63	2.437	2.812	.812	5.562	4.625	5.125	.812
-60	3.750	.281	4.625	8.82	2.437	2.812	.812	5.688	4.687	5.125	.812
-62	3.875	.281	4.812	8.82	2.437	2.812	.812	5.813	4.875	5.250	.812
-64	4.000	.281	4.937	8.82	2.437	2.812	.812	5.813	5.000	5.375	.812
-68	4.250	.281	5.188	9.25	2.437	2.812	.812	6.063	5.250	5.750	.812
-70	4.375	.281	5.312	9.25	2.437	2.812	.812	6.437	5.375	5.875	.812
-72	4.500	.281	5.406	9.69	2.437	2.812	.812	6.500	5.500	6.000	.812
-76	4.750	.281	5.656	9.75	2.437	2.812	.812	6.938	5.750	6.250	.812
-79	4.938	.375	6.188	10.75*	3.062	3.812	.937	7.312	6.312	6.750	.923
-80	5.000	.375	6.188	10.75*	3.062	3.812	.937	7.312	6.312	6.750	.923
-82	5.125	.375	6.375	11.00*	3.062	3.812	.937	7.812	6.500	7.250	.923
-84	5.250	.375	6.375	11.00*	3.062	3.812	.937	7.812	6.500	7.250	.923
-88	5.500	.375	6.688	11.50*	3.062	3.812	.937	7.813	6.812	7.375	.923
-92	5.750	.375	6.938	12.00*	3.062	3.812	.937	8.156	7.062	7.625	.923
-100	6.250	.375	7.438	12.50*	3.062	3.812	.937	8.656	7.562	8.125	.923
-104	6.500	.375	7.688	12.25*	3.062	3.812	.937	8.813	7.812	8.375	.923
-108	6.750	.375	7.938	12.50*	3.250	4.000	.937	9.312	8.062	8.625	.923
-112	7.000	.375	8.188	12.75*	3.250	4.000	.937	9.562	8.312	8.750	.923
-136	8.500	.375	9.688	14.25	3.250	4.000	1.000	11.000	9.812	10.250	.923

METRIC (All sizes in mm)

Size	A	B	C	D	E	F	G	H	J	K	L
-30	45	6.35	65.1	140	54	64	14.3	84.9	66.68	76.20	16.7
-32	48	6.35	68.2	140	54	64	14.3	90.5	68.85	79.38	16.7
-32	50	6.35	68.2	140	54	64	14.3	90.5	68.85	79.38	16.7
-36	55	6.35	77.8	159	54	64	17.4	100.0	79.40	88.90	16.7
-40	60	6.35	84.1	165	54	64	17.4	104.8	85.73	95.25	16.7
-42	65	6.35	85.0	165	54	64	17.4	112.8	88.90	98.40	16.7
-44	70	6.35	90.5	197	54	64	17.4	112.8	92.08	104.77	16.7
-48	75	6.35	96.8	203	54	64	17.4	125.4	100.00	111.10	16.7
-52	80	7.14	106.4	210	62	72	20.6	131.8	108.00	120.65	20.6
-56	87	7.14	112.7	216	62	72	20.6	138.1	114.30	127.00	20.6
-58	90	7.14	115.9	219	62	72	20.6	141.3	117.50	130.20	20.6
-60	95	7.14	117.5	222	62	72	20.6	144.5	119.05	130.18	20.6
-64	100	7.14	125.4	224	62	72	20.6	147.6	127.00	136.52	20.6
-76	120	7.14	143.7	248	62	72	20.6	176.2	146.05	158.75	20.6
-80	125	9.50	157.2	273*	77.8	96.8	23.8	185.7	160.30	171.40	23.4

***Sizes use extension slot tabs**

Additional sizes available upon request

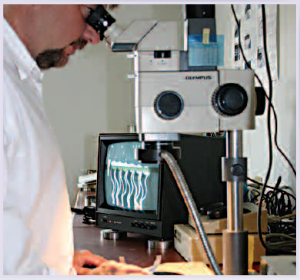
Fast, Simple and Reliable

Split seals are designed for environments where conventional seals routinely take many hours to disassemble and reassemble rotary equipment, but the fully split cartridge seal design of the Flex-A-Seal Style 85 is easier to install than conventional seals and other component split seal designs, making this seal ideal for hard to access equipment such as:

- Pumps
- Mixers
- Agitators

The Style 85 is commonly used in many industries:

- Chemical Processing
- Food Processing
- Industrial
- Mining
- Pharmaceutical
- Power Generation
- Petrochemical
- Pulp and Paper
- Refining
- Water and Waste Treatment



Flex-A-Seal™

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FLEX-A-SEAL STYLE 85 vs. CHESTERTON 442C™

MAKE THE RIGHT SPLIT SEAL CHOICE

The Flex-A-Seal Style 85 and the Chesterton 442C™ are often presented as options for the same applications and industries. A.W. Chesterton now markets the 442C™ seal as a "cartridge split mechanical seal" which they claim is "easy to install and is engineered to enhance sealing reliability like no other cartridge split seal" on the market (Form No. EN23193 442C Seal Brochure 04/16.) To clear up any confusion and to give you all the facts, we have prepared this outline with information taken from both the Flex-A-Seal and Chesterton split seal installation instructions.

First, let's define the term **cartridge seal**. According to both the *Guideline for the Use of Technical Terms in the Sealing Industry* (1995) published by the Society of Tribologists and Lubrication Engineers and *Mechanical Seals for Pumps: Application Guidelines* (rev. 2006) by Hydraulic Institute, a cartridge seal is:

> **A completely self-contained unit, including seal, gland, sleeve, mating ring, etc., which is preassembled and preset before installation.** *(underscore added)*

Here are pictures of the Style 85 and the 442C™. The 442C™ has no sleeve; therefore by these authorities' definition, it is not a cartridge seal design or a self-contained unit. This means any preassembly and presets done by A.W. Chesterton before the seal is shipped could be compromised when an operator begins the installation at your facility.

FAS Style 85: Fully split cartridge sleeve
Fully preset and preassembled

Chesterton 442™: No sleeve, four (4) separate components needing individual installation

The next two pages analyze the installation instructions for both the 442C™ and Style 85 in a side-by-side comparison. Our intent is for you to make your own decision – based on the facts - as to which split seal is easier to install.

Once you review the data, we believe you will quickly understand why the Flex-A-Seal Style 85 fully split cartridge mechanical seal *is* the right choice for -

- **Sealing Integrity**
- **Superior Performance**
- **Easy Installation**

FLEX-A-SEAL STYLE 85 vs. CHESTERTON 442C™

MAKE THE RIGHT SPLIT SEAL CHOICE

	AW CHESTERTON 442C™	FLEX-A-SEAL STYLE 85
Installation guide and steps	19 steps AWC Form No EN14068 Rev 7	7 steps FAS SK1070
Number of components	19 components, many of which need to be handled by the operator during installation. AWC Form No EN14068 Rev 7: 3.1 Parts Identification, Figure 1 Preparation sections 4.0.3, 4.0.5, 4.0.6-12, Installation sections 5.0.1, 5.0.4, 5.0.6-18	17 component parts which are secured and contained within the seal assembly. Only two self-contained seal halves to handle at installation FAS SK1070: section IV.1
Additional components needed for assembly	• Hex keys • Lubricant • Rotary holder installation spacer • Gland installation tool • Cleaning wipes for seal faces. AWC Form No EN14068 Rev 7: sections 3.1, Figure 2 and 4.2	• Hex keys • Lubricant FAS SK1070: section I
Sealing integrity	Operator must handle/touch components such as faces and O-rings during installation process, increasing the potential for damage. AWC Form No EN14068 Rev 7 - Preparation sections 4.0.7-10, 12 Installation sections 5.01.1, 5.0.8, 5.0.10-11 In addition, the operator is tasked with ensuring components are properly placed and/or handled during installation. AWC Form No EN14068 Rev 7 - Holder gaskets 4.0.4, Spring lifter 4.0.11, Seal faces 5.0.4, 5.0.8, 5.0.10, 5.0.13, and Gland gasket 5.0.16 Sealing integrity compromised??	No need to handle faces and O-rings – they are already positioned and secured in the cartridge halves. Assembled and pressure tested at the factory; the seal is intact when it arrives on-site ready for installation. We build the seal so you don't have to! Sealing integrity ensured!

FLEX-A-SEAL STYLE 85 vs. CHESTERTON 442C™

MAKE THE RIGHT SPLIT SEAL CHOICE

	AW CHESTERTON 442C™	FLEX-A-SEAL STYLE 85
Operator responsibility	1. Disassembling seal for installation, ensuring all components are in their correct location within the seal. AWC Form No EN14068 Rev 7: sections 4.0.1 - 12 2. Lubricating parts: sections 4.0.4, 4.0.7, 5.0.1, 5.0.10 3. Installation & removal of spacers and guides: sections 4.0.3, 5.0.6, 5.0.9, 5.0.16 4. Cleaning seal faces: 5.0.8, 5.0.11 5. Ensuring all 9 "Caution" and "Important" installation notes are addressed (see below)	1. not applicable 2. Lubrication of sleeve O-ring FAS SK1070 section III.A.1 3. not applicable 4. not applicable 5. Only 2 notes to address (see below)
"Cautions" and "Important" installation notes	AWC Form No EN14068 Rev 7 - 4.0.1: Do not glue O-rings or gaskets 4.0.3: Do not push on rotary faces 4.0.4: Set screws may cause damage 5.0.1: Dirt particles on seal faces, do not rotate rotary holder 5.0.2: Do not use rotary holder spacers as handles 5.0.3: Do not rotate rotary holder on the shaft 5.0.4: Do not push directly on seal face 5.0.8: Do not push on seal face 5.0.10: Dirt particles on seal faces TOTAL: 9	FAS SK1070 - III.A.1: Do not get lube on split ends of O-rings IV.3: Do not over-tighten gland studs TOTAL: 2

FLEX - A - SEAL

STYLE 85
INSTALLATION INSTRUCTIONS
U.S. PATENT NO. 5,662,340

I. CONTENTS OF BOX

BEFORE STARTING: REVIEW ASSEMBLY DRAWING FOR ANY SPECIAL ASSEMBLY NOTES.
MAKE SURE YOU HAVE THE FOLLOWING PARTS. (SEE FIGURE 1)

CARTRIDGE HALF ASSEMBLY	2	SMALL SHOULDER SCREWS	4
ALLEN WRENCH(S)	SEE NOTE	LARGE SHOULDER SCREWS	4

NOTE: ONLY (1) 1/8" ALLEN WRENCH IS REQUIRED FOR SIZES 1 3/4" TO 3".
1/8" AND 3/16" ALLEN WRENCHES ARE REQUIRED FOR SIZES 3 1/8" TO 4 3/4"
1/8" AND 1/4" ALLEN WRENCHES ARE REQUIRED FOR SIZES 5" TO 6 1/2" (ABOVE 6 1/2" MAY REQUIRE ADDITIONAL 3/16" WRENCH)

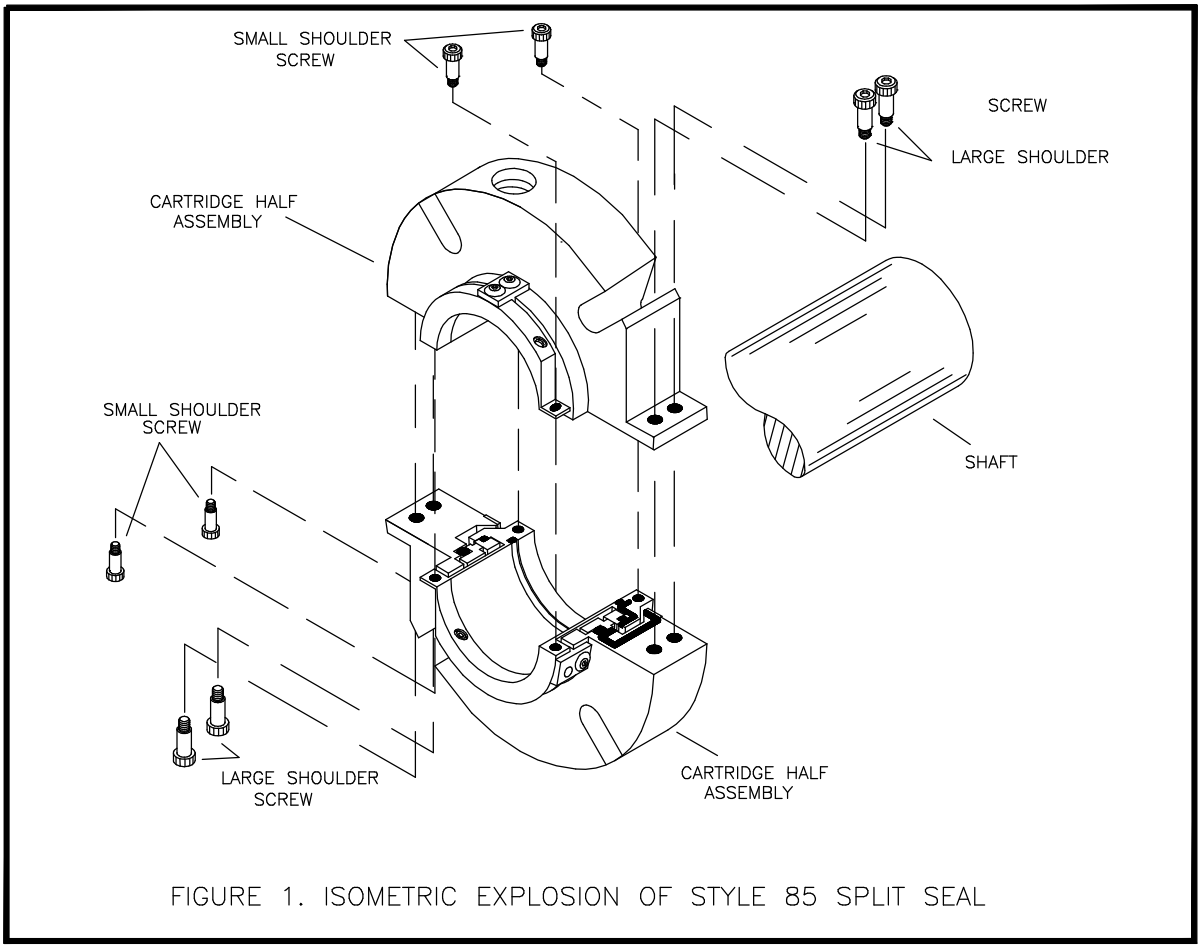

FIGURE 1. ISOMETRIC EXPLOSION OF STYLE 85 SPLIT SEAL

II. PREPARATION OF EQUIPMENT FOR SEAL INSTALLATION

A. REMOVE OLD SEAL/PACKING METHOD. CLEAN SHAFT AND STUFFING BOX FACE. THESE SURFACES MUST BE FREE OF PAINT, RUST AND BURRS TO PROVIDE A SUITABLE SEALING SURFACE.

B. CHECK SHAFT FOR EXCESSIVE WEAR AND RUNOUT. FOR BEST SEALING RESULTS, THE RUNNOUT BETWEEN THE SHAFT AND BOX FACE SHOULD NOT EXCEED .005".

III. INSTALLATION OF STYLE 85 SPLIT CARTRIDGE SEAL.

A. PREPARING SEAL FOR INSTALLATION.

1. LUBE SLEEVE O'RING – *BE VERY CAREFUL NOT TO GET ANY LUBE ON ENDS OF O'RINGS WHERE THEY ARE SPLIT.*

2. PLACE ALLEN WRENCH(S), GLAND STUDS, CARTRIDGE HALF ASSEMBLIES, SMALL AND LARGE SHOULDER SCREWS NEXT TO WORK AREA.

OVER →

IV. ACTUAL ASSEMBLY OF SEAL (COUNT THE STEPS)!!

1. HOLD BOTTOM HALF UP AGAINST SHAFT. CAREFULLY ALIGN TOP HALF USING PINS MAKING SURE NEVER TO RELEASE PRESSURE OF BOTTOM HALF AGAINST THE SHAFT. START THE (4) LARGE SHOULDER SCREWS IN GLAND HOLES AND THE (4) SMALL SHOULDER SCREWS IN SLEEVE AND TIGHTEN ALL FINGER TIGHT.

2. USING ALLEN WRENCH(S), TIGHTEN ALL (8) SHOULDER SCREWS ALTERNATELY SO HALVES COME TOGETHER PARALLEL (SEE TABLE 1 FOR TORQUE SETTINGS).

3. PUSH SEAL FORWARD UNTIL IT CONTACTS THE STUFFING BOX FACE. PUT GLAND STUDS BACK IN AND TIGHTEN ALTERNATELY UNTIL 80–100 in–lbs OF TORQUE IS ACHIEVED. ***DO NOT OVER TIGHTEN*** (SEE FIGURE 2).

4. TIGHTEN CUP POINT SET SCREWS ALTERNATELY UNTIL SECURE.

5. REMOVE SETTING CLIPS AND TURN SHAFT TO CHECK FOR FREE ROTATION TO MAKE SURE NOTHING IS BINDING. IF BINDING, RECHECK INSTALLATION. (*HINT: **SAVE SETTING CLIPS FOR POSSIBLE REALIGNMENT REQUIREMENTS IN THE FUTURE***).

6. PROPERLY CONNECT REQUIRED PIPING.

7. VENT ALL AIR FROM STUFFING BOX TO ENSURE PROPER LUBRICATION OF THE SEAL FACES. START EQUIPMENT USING THE MANUFACTURERS RECOMMENDED PROCEDURE.

SHOULDER BOLT PART NO.	RECOMMENDED TORQUE
FS11680	50 in–lbs
FS10050–03	50 in–lbs
FS10050–08	80 in–lbs
FS10050–09	100 in–lbs

Table 1. Reference Assembly Drawing for Shoulder Bolt Part NO.

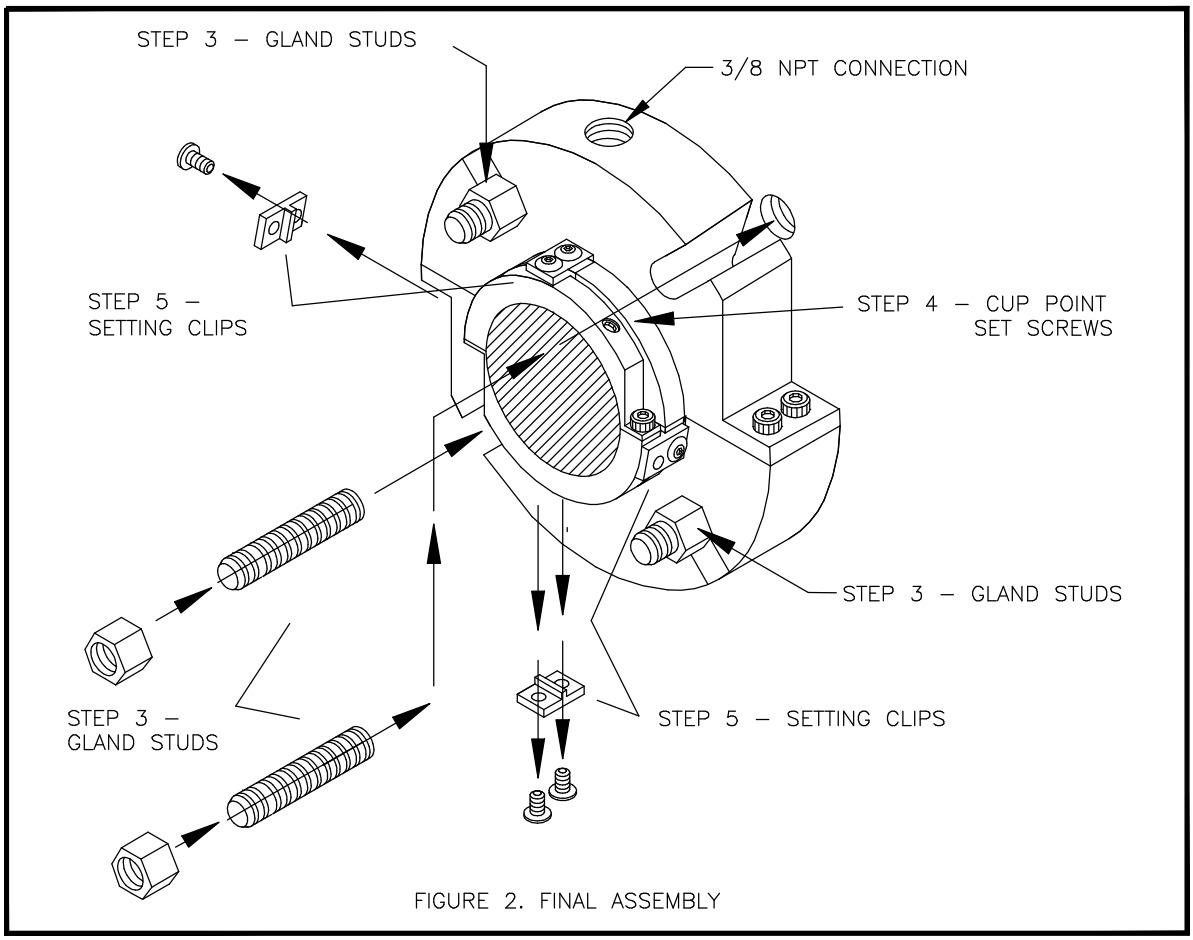

FIGURE 2. FINAL ASSEMBLY