**GENERAL NOTES:**

1. WELD & INSPECT PER AWS D1.6-2017. USE OF ASME IX WELD PROCEDURES AND QUALIFICATIONS IS ACCEPTABLE.

2. LOAD TEST CABLE ASSEMBLY AS FOLLOWS:
   - LOAD TEST WITH REPORT - VERIFY SWAGED CROSBY BUTTON SLIDING RESISTANCE IS AT LEAST 400LBS EACH DIRECTION.
   - LOAD TEST WITH REPORT - VERIFY EACH END FITTING CAN WITHSTAND AT LEAST 600LB TENSION.

3. RED VALVE FILLING DIRECTIONS:
   - EVACUATE LINE SET TO NEAR ZERO TORR WITH ULTRA-HIGH VACUUM PUMP.
   - CLOSE THE BELLOWS VALVE.
   - CONNECT A OIL FILLED CONTAINER TO THE BELLOWS VALVE INLET.
   - OPEN THE BELLOWS VALVE, AND LET THE OIL ENTER THE RED VALVE SYSTEM.
   - DO NOT LET AIR ENTER THE RED VALVE SYSTEM.
   - CLOSE THE BELLOWS VALVE.
   - INSTALL THE SWAGELOK PLUG.
   - VERIFY RED VALVE / DWYER SYSTEM RESPONSE BY TESTING.

4. FIELD ROUTE PUMP MOTOR POWER CABLE AND THE RED VALVE TUBING THRU THE EXTERNAL SLOT ZONE OF THE SHIELD DISKS. DO NOT LET THE CABLE OR TUBING PARTS PROTRUDE OUTSIDE THE DIAMETER OF THE SHIELD DISKS. BEND AND ASSEMBLE TUBING AS PER SWAGELOK DIRECTIONS.

5. THE ESTIMATED WEIGHT OF THE COMBINED ASSEMBLY IS 11,500 LBS WHEN EMPTY.

6. APPLY VINYL LABEL TO THE COMBINED ASSEMBLY AS SHOWN.
   BLACK LETTERS ON YELLOW BACKGROUND - SIZED TO BE LEGIBLE WITHOUT MAGNIFICATION.
   "PUMP COLUMN ASSEMBLY SUPPLEMENT"
   "HILINE 2309-WRP-209-C"
   "ASSEMBLY WEIGHT: _____XXX_____ LBS" (XXX = USE AS-BUILT WEIGHT ON LABEL)

7. SECURE HOSES USING STAINLESS STEEL ZIP TIES OR EQUIVALENT TO KEEP THEM FROM BEING DAMAGED BY ANY MOVING PARTS SUCH AS THE CABLES RUNNING TO THE BOTTOM BALL VALVE, OR THE ROTATING EQUIPMENT ASSOCIATED WITH THE PUMP.

**BILL OF MATERIALS**

| -040 | -030 | -020 | -010 | DESCRIPTION | SPECIFICATION | ITEM NO: |
|---|---|---|---|---|---|---|
| | | | X | PUMP COLUMN ASSEMBLY SUPPLEMENT | | 1 |
| | | X | 1 | GUARD | | 2 |
| | X | | 1 | CABLE ASSEMBLY | | 3 |
| X | | | | | | 4 |
| | | | | | | 5 |
| | | | 1 | IX SHIELDED ASSEMBLY | HILINE DRAWING 2309-WRP-209-SHIELD | 6 |
| | | | 1 | PUMP ASSEMBLY | HILINE DRAWING 2309-WRP-209-PUMP | 7 |
| | | | 4 | HEX BOLT, 1"-8UNC, 3" L | ASTM A194, GR.B7 | 8 |
| | | | 4 | BELLEVILLE SPRING LOCK WASHER, STEEL, ZINC-PLATED, FOR 1" SCREW SIZE, 1.030" ID, 2-1/4" OD, ROCKWELL C40 | MCMASTER 90127A122 | 9 |
| | | | | | | 10 |
| | | 1 | | TOP RING - BAR OR PLATE | ASTM A240 OR A276, 304 AND/OR 304L | 11 |
| | | 1 | | BOTTOM PLATE - 1/4" THICK | ASTM A240, 304 AND/OR 304L | 12 |
| | | 11 | | ROLLED RING - 3/4" BAR, 14" ID | ASTM A276, 304 AND/OR 304L | 13 |
| | | 110 | | CAGE BAR - 5/8" BAR, 11-3/4"L | ASTM A276, 304 AND/OR 304L | 14 |
| | | 26 | 26 | CAGE TAB, 11GA | ASTM A240, 304 AND/OR 304L | 15 |
| | | | 46 | SHCS, ALLOY STEEL WITH SPLIT LOCK, 1/4-20 X 3/4" L, 180KSI TENSILE | (MCMASTER 90342A128) | 16 |
| | | | 36 | HEX NUT, 1/4-20, CARBON STEEL | SAE J995 GR.5 | 17 |
| | | | | | | 18 |
| | | | 1 | SHOULDER BOLT, ALLOY STEEL, 1/2" SHOULDER DIAMETER, 1-1/2" SHOULDER LENGTH, 3/8"-16 THREAD | MCMASTER 91259A716 | 19 |
| | AR | | | WIRE ROPE, 3/16" | 6X31 OR 6X19 IWRC, GALV STEEL | 20 |
| | 1 | | | CROSBY BUTTON | CROSBY S409-1040215 | 21 |
| | 2 | | | CABLE TERMINATION | (MCMASTER 3474T452) | 22 |
| | | | | | | 23 |
| | | | AR | TUBE, 1/4"OD X 0.035 WALL | ASTM A269, 300 SERIES SST | 24 |
| | | | AR | TUBE UNION, 1/4" | SS-400-6 | 25 |
| | | | 1 | TUBE ADAPTER, 1/4" NPT X 1/4" TUBE | SS-400-1-4 | 26 |
| | | | 1 | TUBE TEE, 1/4" TUBE RUN, 1/4" FNPT BRANCH | SS-400-3-4TTF | 27 |
| | | | 1 | PRESSURE TRANSMITTER, 0-300 PSIG | DWYER IS626, 0-300 PSIG RANGE | 28 |
| | | | 1 | BELLOWS VALVE, 1/4", TUBE FITTING ENDS | SS-4BG | 29 |
| | | | 1 | TUBE PLUG, 1/4" | SS-400-P | 30 |
| | | | AR | PURE SILICONE OIL | CLEARCO PSF-50 | 31 |
| | | | | | | 32 |
| | | | | | | 33 |
| | | | | | | 34 |
| | | | | | | 35 |

TROY I. STOKES STATE OF WASHINGTON 52247 REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Troy I. Stokes
DN: cn=Troy I. Stokes, o=HiLine, ou, email=troy.stokes@hilineeng.com, c=US
Date: 2023.12.31 23:40:03 -08'00'

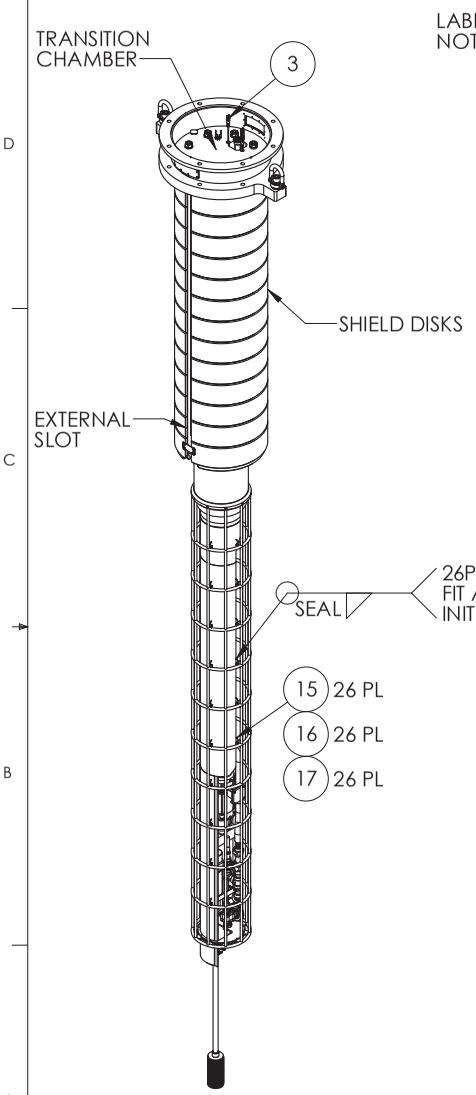
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/8
ANGULAR: 1 DEG
TWO PLACE DECIMAL ±0.12
THREE PLACE DECIMAL ±0.032
FINISH: 125 RMS

HILINE ENGINEERING & FABRICATION, INC.

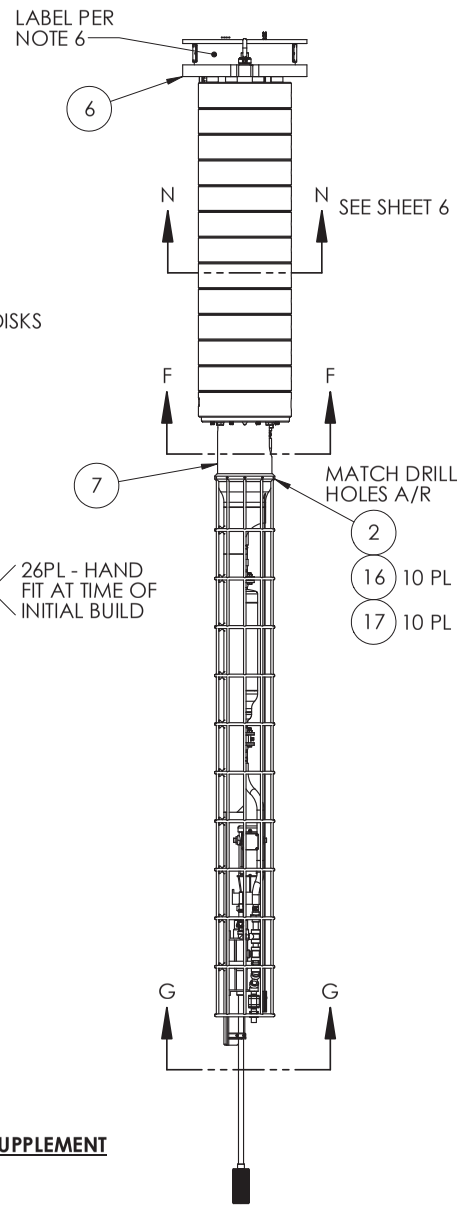
**PUMP COLUMN ASSEMBLY SUPPLEMENT**

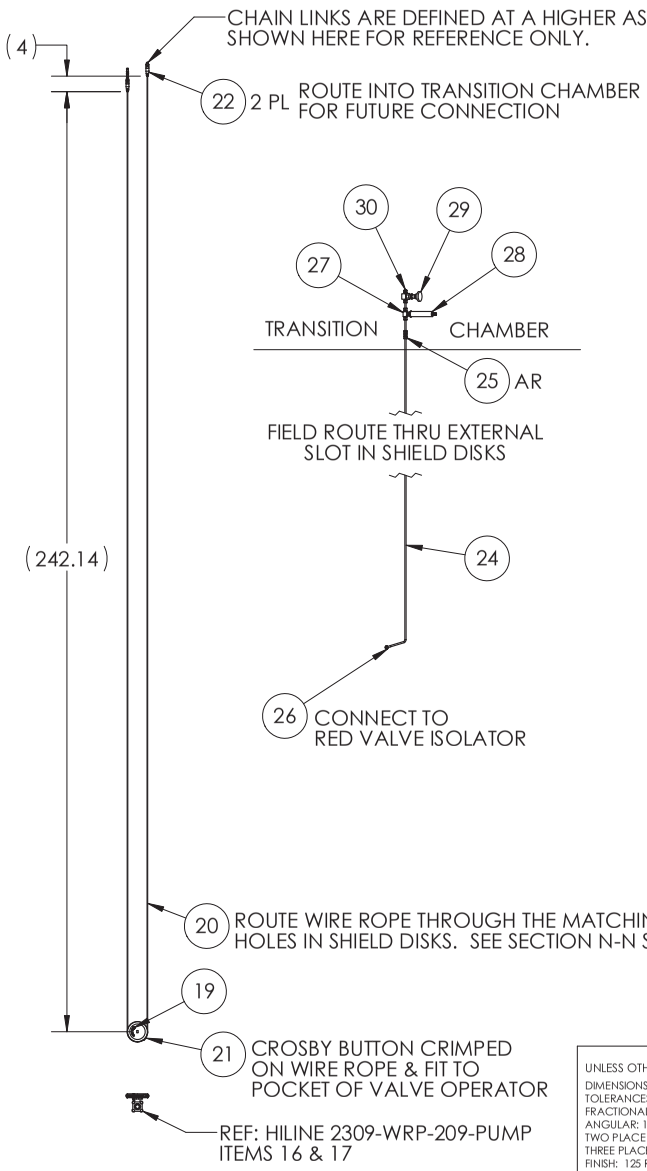
| SIZE | DWG. NO. | REV |
|---|---|---|
| B | 2309-WRP-209-C | D |

EDT: HEF-XXX | SHT 1 OF 6



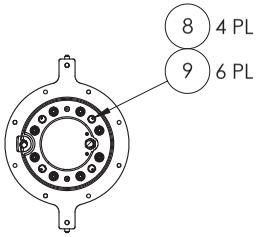

**ITEM 1 - PUMP COLUMN ASSEMBLY SUPPLEMENT**



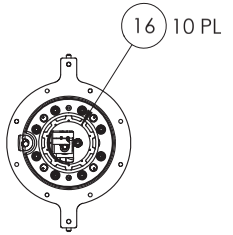




**ITEM 3 - CABLE ASSEMBLY**



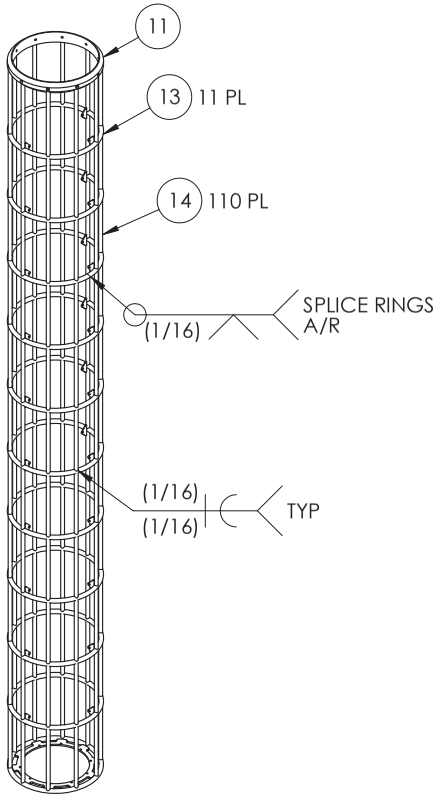

SECTION F-F



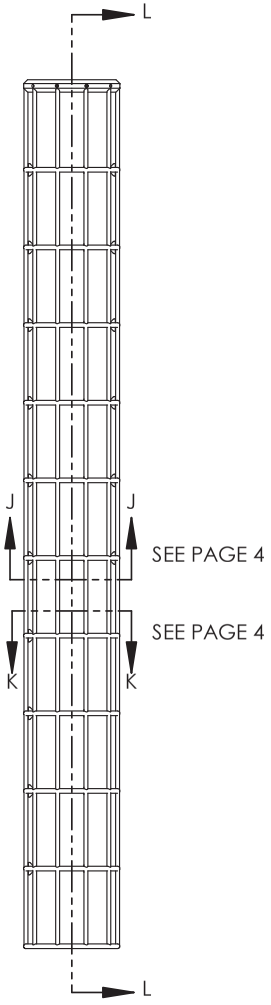

SECTION G-G

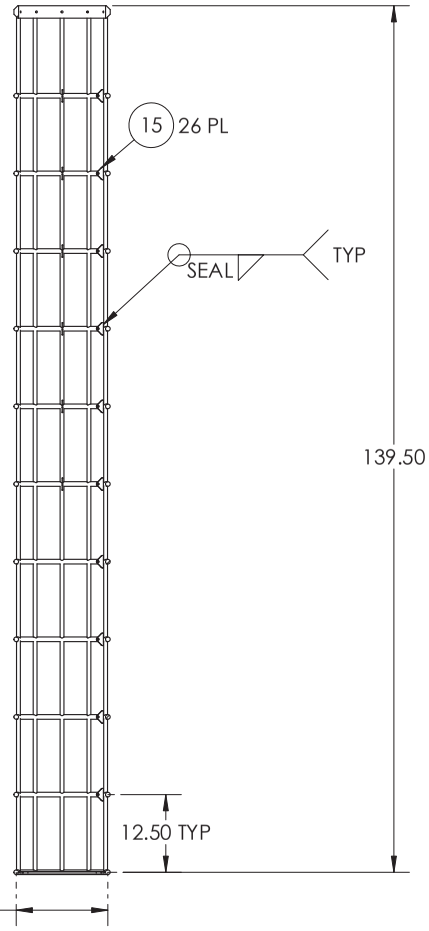
Digitally signed by Troy I. Stokes
DN: cn=Troy I. Stokes, o=HiLine, ou, email=troy.stokes@hilineeng.com, c=US
Date: 2023.12.31 23:40:15 -08'00'

| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/8 ANGULAR: 1 DEG TWO PLACE DECIMAL ±0.12 THREE PLACE DECIMAL ±0.032 FINISH: 125 RMS | HILINE ENGINEERING & FABRICATION, INC. | |
| | **PUMP COLUMN ASSEMBLY SUPPLEMENT** | |
| | SIZE B / DWG. NO. 2309-WRP-209-C | REV D |
| | EDT: HEF-XXX | SHT 2 OF 6 |

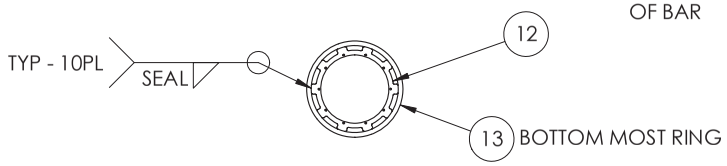



**ITEM 2 - GUARD**




SECTION L-L



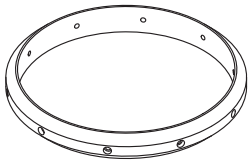

Digitally signed by Troy I. Stokes
DN: cn=Troy I. Stokes, o=HiLine, ou, email=troy.stokes@hilineeng.com, c=US
Date: 2023.12.31 23:40:26 -08'00'

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/8
ANGULAR: 1 DEG
TWO PLACE DECIMAL ±0.12
THREE PLACE DECIMAL ±0.032
FINISH: 125 RMS

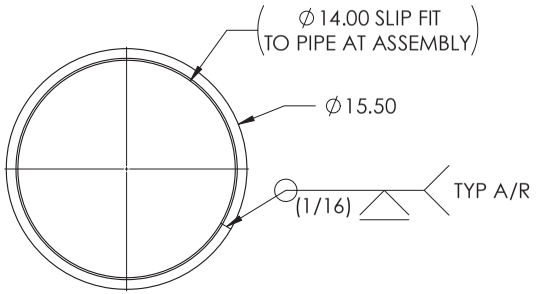
HILINE ENGINEERING & FABRICATION, INC.

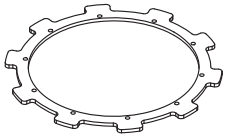
**PUMP COLUMN ASSEMBLY SUPPLEMENT**

| SIZE | DWG. NO. | REV |
|---|---|---|
| B | 2309-WRP-209-C | D |
| | EDT: HEF-XXX | SHT 3 OF 6 |

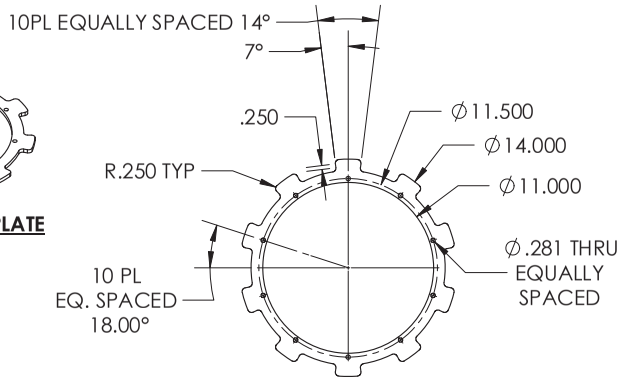


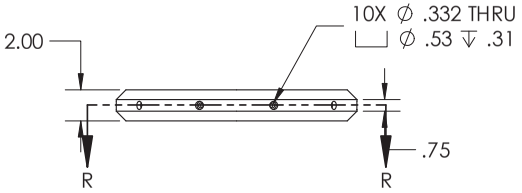
**ITEM 11 - TOP RING**

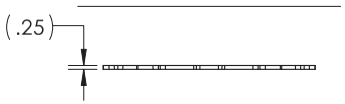


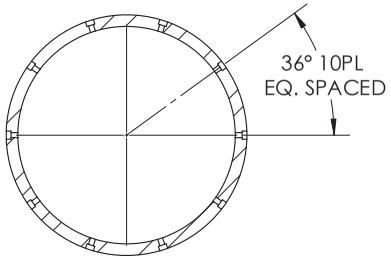



**ITEM 12 - BOTTOM PLATE**

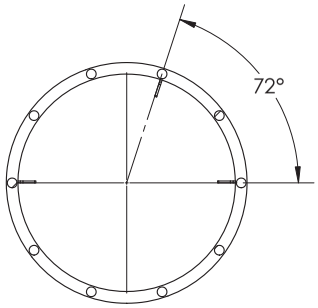


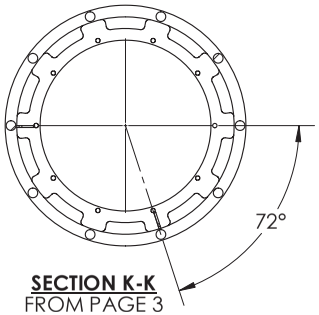




SECTION R-R



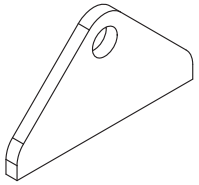

**SECTION J-J**
FROM PAGE 3



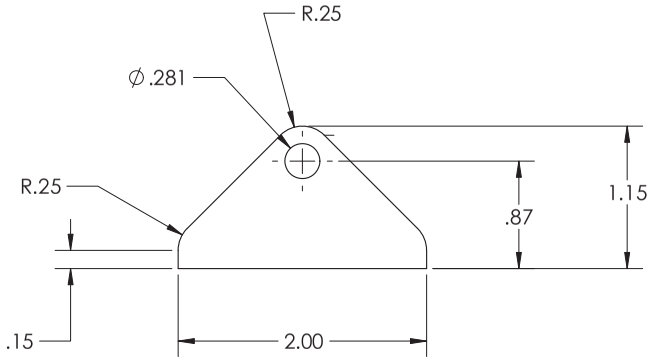

**SECTION K-K**
FROM PAGE 3

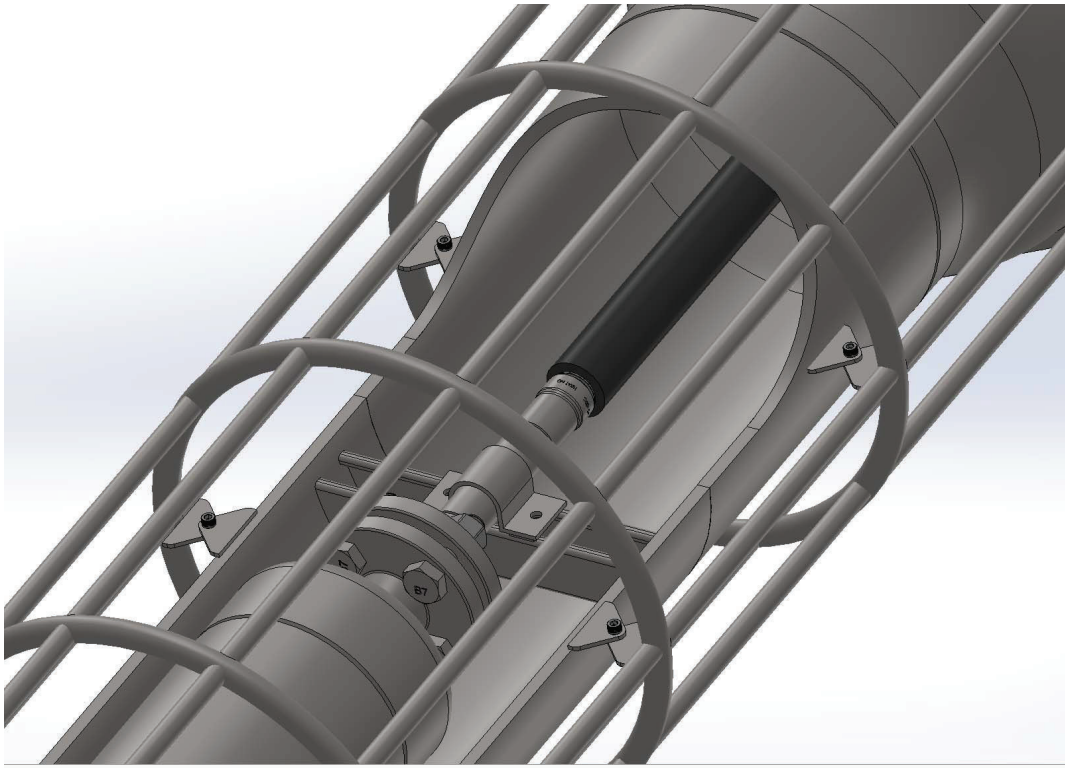
Digitally signed by Troy I. Stokes
DN: cn=Troy I. Stokes, o=HiLine, ou, email=troy.stokes@hilineeng.com, c=US
Date: 2023.12.31 23:40:37 -08'00'

| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ± 1/8<br>ANGULAR: 1 DEG<br>TWO PLACE DECIMAL ±0.12<br>THREE PLACE DECIMAL ±0.032<br>FINISH: 125 RMS | HILINE ENGINEERING & FABRICATION, INC. | |
| | **PUMP COLUMN ASSEMBLY SUPPLEMENT** | |
| | SIZE B / DWG. NO. 2309-WRP-209-C | REV D |
| | EDT: HEF-XXX | SHT 4 OF 6 |



**ITEM 15 - CAGE TAB**



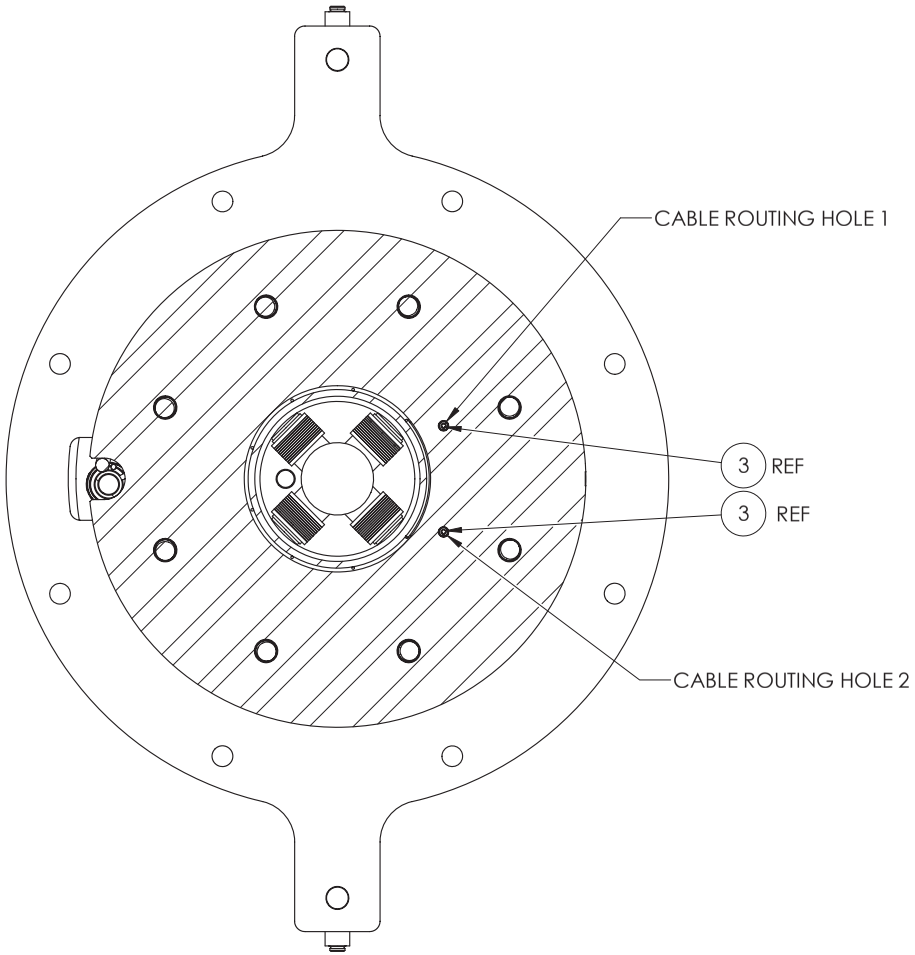



SCREEN SHOT SHOWING EXPECTED FITMENT
OF CAGE TABS TO PUMP STRONGBACK
AT TIME OF ASSEMBLY.

TROY L. STOKES
STATE OF WASHINGTON
32347
REGISTERED
PROFESSIONAL ENGINEER

Digitally signed by
Troy I. Stokes
DN: cn=Troy I.
Stokes, o=HiLine, ou,
email=troy.stokes@h
ilineeng.com, c=US
Date: 2023.12.31
23:40:47 -08'00'

| | |
|---|---|
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ± 1/8<br>ANGULAR: 1 DEG<br>TWO PLACE DECIMAL ±0.12<br>THREE PLACE DECIMAL ±0.032<br>FINISH: 125 RMS | HILINE ENGINEERING & FABRICATION, INC. |
| | **PUMP COLUMN ASSEMBLY SUPPLEMENT** |
| | SIZE B \| DWG. NO. 2309-WRP-209-C \| REV D |
| | EDT: HEF-XXX \| SHT 5 OF 6 |




**SECTION N-N**
FROM SHEET 2

Digitally signed by Troy I. Stokes
DN: cn=Troy I. Stokes, o=HiLine, ou, email=troy.stokes@hilineeng.com, c=US
Date: 2023.12.31 23:40:59 -08'00'

| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ± 1/8<br>ANGULAR: 1 DEG<br>TWO PLACE DECIMAL ±0.12<br>THREE PLACE DECIMAL ±0.032<br>FINISH: 125 RMS | HILINE ENGINEERING & FABRICATION, INC. | |
| | **PUMP COLUMN ASSEMBLY SUPPLEMENT** | |
| | SIZE: B | DWG. NO.: 2309-WRP-209-C / REV: D |
| | EDT: HEF-XXX | SHT 6 OF 6 |