DANIEL®
SENIOR ORIFICE FITTING
DATA SHEET

FASTENER TORQUE GUIDE

NOVEMBER 2022

Important safety instructions

The Daniel Orifice Fittings technical guide contains several bolted joint assemblies. To ensure proper operation of these joints, Daniel personnel sequentially apply a specific torque to each fastener. This guide contains product specific fastener assembly information and must be used together with procedures contained in the latest edition of the Owner and Operator Manual for the product under repair and the associated repair instruction sheet. Use this information when repairing the fitting or installing spare parts. The latest edition of the Daniel Senior Fitting Owner and Operator Manual can be found at the following website: https://daniel.com/differential-pressure/senior-dual-chamber-orifice-fittings/

NOTICE

Installing, operating, maintaining or repairing a Daniel product improperly could lead to serious injury or death from explosion or exposure to dangerous substances.

To reduce this risk:

- Comply with all product information in the documents listed above, and with all local and national codes.
- Do not allow untrained personnel to work with this product.
- Use Daniel parts and work procedures specified on this instruction sheet.

General fastener torque information

Service conditions impact the tightness and strength of fastener joint assemblies.

Some, but not all of these service conditions are:

- Time in service or storage
- Temperature cycles
- Vibration
- Mechanical loads
- Pressure loads
- Fastener thread condition (dirt/corrosion)
- Condition of joint assembly components (fasteners, gaskets, sealing surface conditions)
- Fastener lubrication and coatings

It is impossible for Daniel personnel to know all the variable conditions (some listed above) that your fitting will see in actual service. Only the owner or user, after careful consideration of a fitting's service conditions, can specify a torque value to achieve an adequate seal.

The fastener assembly information provided here includes suggested torque values and sequencing instructions. Owners and users of the Senior fitting should use this information to establish a starting point for applying torque to fasteners in service, or in repair, to achieve an adequate seal. Therefore, owners and operators are ultimately responsible for joint assembly torque specifications and these values are only a reference.

General gasket replacement information

To achieve the best possible results when replacing a gasket, the owner or user should:

Procedure

1. Remove the old gasket and clean the sealing surface of all debris. For best results use a scraper, a liquid gasket remover, and a wire brush.
2. Immediately inspect the sealing surface for damage.
3. If the gasket sealing surface is damaged, then repair it so that the sealing surface finish is clean and flat.
4. Never reuse an old gasket.
5. Center the new gasket on to the sealing surface. Careful centering of the gasket is important. For the valve seal gasket, make sure the orientation of the gasket is correct.
6. Take care when placing the new gasket onto the sealing surface to ensure that it is not pinched or otherwise damaged.
7. Inspect the fasteners for damage.
8. Run the nuts or bolts down by hand. This gives an indication that the threads are satisfactory (if the nuts will not run down by hand, then there is probably some thread defect).
9. If a fastener is damaged, replace it.
10. Lubricate fastener threads and all load bearing surfaces (underside of bolt heads, nuts, washers), using only lubricants specified or approved by your company. Apply the lubricant in a consistent manner as a thin, uniform coating (avoid "lumps" of lubricant as this may reduce the efficiency). Ensure lubricant does not contaminate either flange or gasket faces.
11. Assemble the unit.
12. Use a calibrated torque wrench to ensure correct initial loading.
13. Tighten the screws or nuts to compress the gasket uniformly using the suggested torque values and sequencing patterns provided here.

Sealing bar gasket replacement information

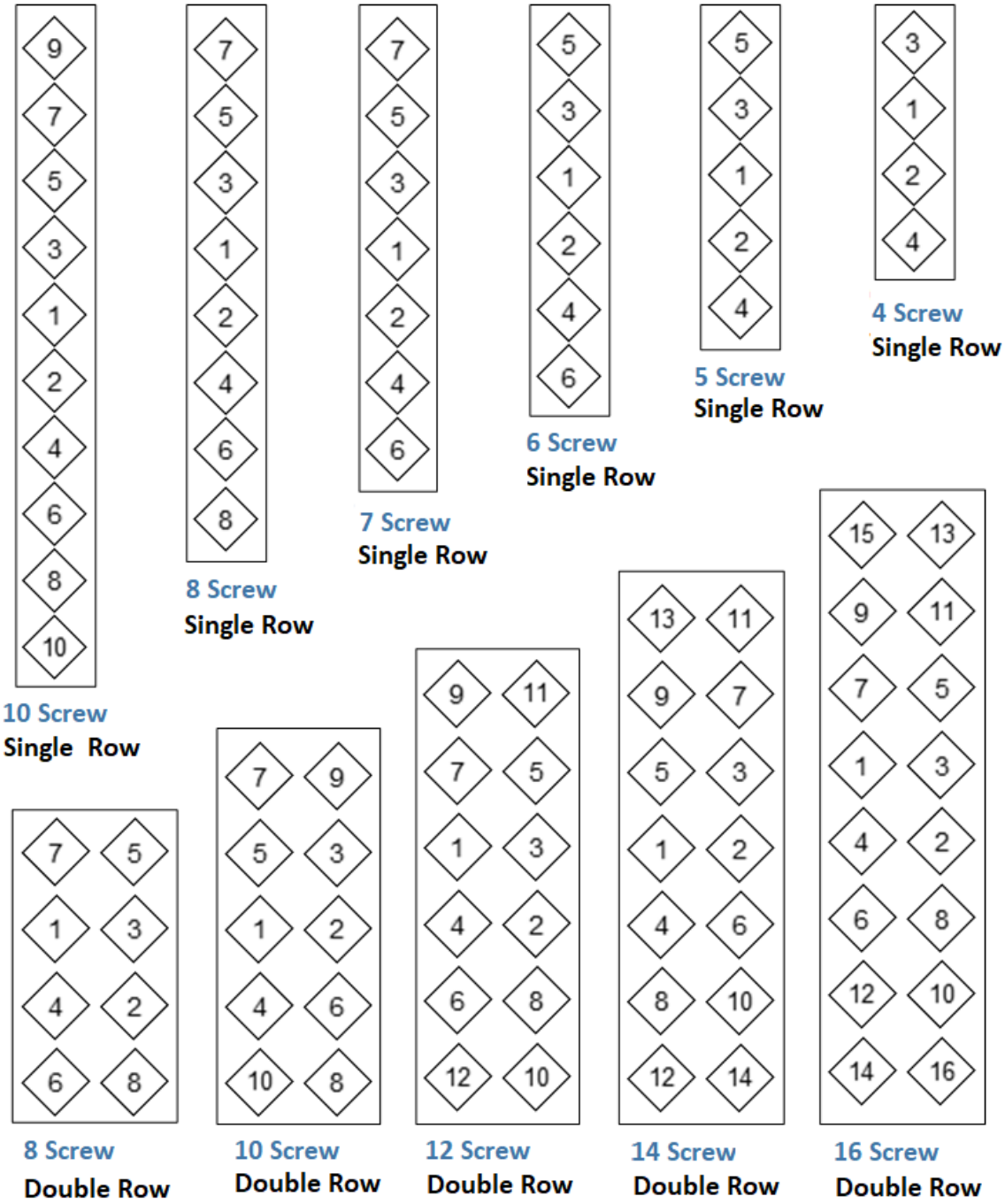
Use the torque values and sequencing information below as a starting point to achieve an adequate seal.

In Table 1, the torque values are to help users establish a starting point to provide adequate assembly and in-service clamping force in most applications. These values are for reference only. These torque values reflect new, heat treated, alloy steel (AISI 4140) screws.

Table 1: Clamping Bar Screw Size and Suggested Torque Values for Sealing Bar Gasket Replacement

Screw size	Suggested starting torque range lbf·ft (N·m)		Maximum torque lbf·ft (N·m) *Do Not Exceed this Value*
	Lower limit	Upper limit	
1/2" - 13	75 (101)	120 (163)	130 (176)
5/8" - 11	120 (163)	195 (264)	265 (359)

Figure 1: Torque pattern sequences



Top / body flange gasket replacement information

In addition to the General gasket replacement information, users should uniformly tighten the nuts that compress the Top / Body flange gasket using the suggested starting torque values, sequencing patterns and application rates provided here to achieve an adequate seal.

Tighten each nut using the following application rate:

- Install nut – apply less than 20% of the suggested torque
- Second pass – apply 20% to 30% of the suggested torque
- Third pass – apply 30% to 70% of the suggested torque
- Fourth pass – apply 100% of the suggested torque
- Fifth pass – apply 100% of the suggested torque four (4) hours after Fourth pass

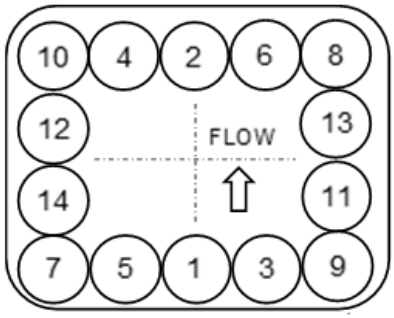
In Table 2, values are for reference only. Daniel provides the torque values in this table to help users establish a starting point to achieve an adequate unit assembly clamping force. Torque values reflect dry, new studs and nuts in a controlled factory environment.

Table 2: Top / Body B7M and B7 studs sizes and suggested starting torque values

B7M Stud size (All trims except "A")	Suggested starting torque range lbf·ft (N·m)		B7 Stud size ("A" trim only)	Suggested starting torque range lbf·ft (N·m)	
	Lower limit	Upper limit		Lower limit	Upper limit
5/8" - 18	86 (117)	96 (130)	5/8" - 18	113 (153)	126 (170)
3/4" - 16	148 (201)	165 (223)	3/4 " - 16	195 (264)	216 (293)
7/8" - 14	234 (317)	260 (352)	7/8" - 14	307 (416)	341 (463)
1" - 14	353 (478)	392 (531)	1" - 14	463 (627)	514 (697)
1-1/8" - 12	497 (674)	552 (748)	1-1/8" - 12	652 (884)	724 (982)
1-1/4" - 8	653 (886)	726 (984)	1-1/4" - 8	858 (1163)	953 (1292)
1-1/4" - 12	686 (930)	762 (1033)	1-1/4" - 12	900 (1220)	1000 (1356)
1-3/8" - 12	917 (1244)	1019 (1382)	1-3/8" - 12	1338 (1842)	1338 (1814)
1-5/8" - 8	1472 (1996)	1635 (2217)	1-5/8" - 8	1932 (2620)	2146 (2910)

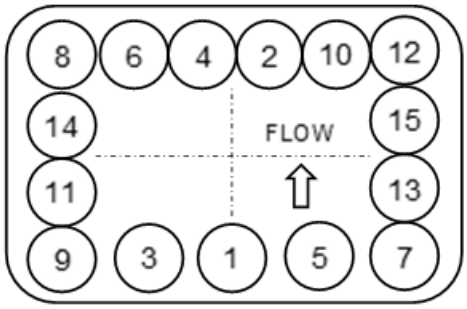
Top/Body flange gasket torque requirements

Figure 2: 2" 150-1500



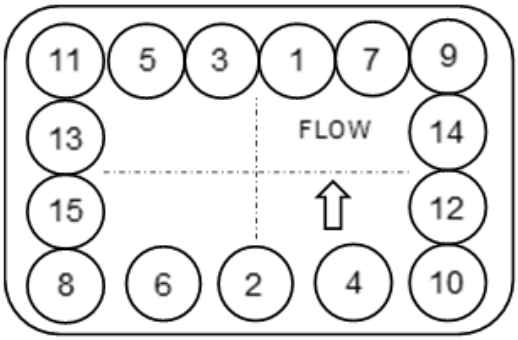
- Ø 5/8” Studs (150-600)
- Ø 3/4” Studs (900-1500)

Figure 3: 3" 150-1500



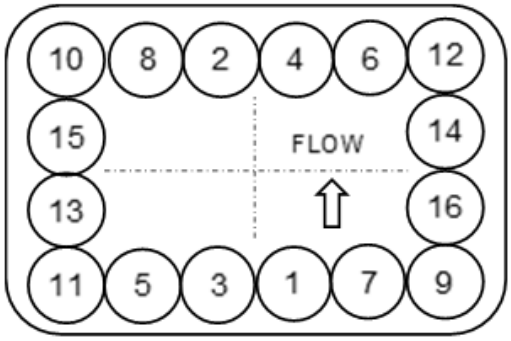
- Ø 5/8” Studs (150-600)
- Ø 3/4” Studs (900-1500)

Figure 4: 4" 150-900



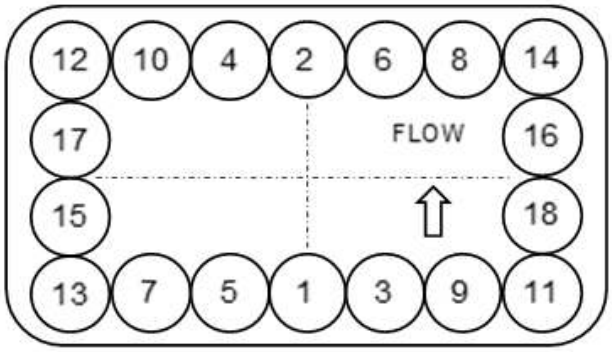
- Ø 3/4” Studs

Figure 5: 4" 1500



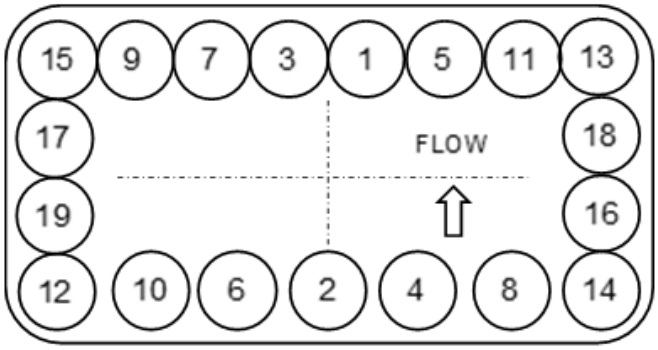
- Ø 1” Studs

Figure 6: 6" 150-1500



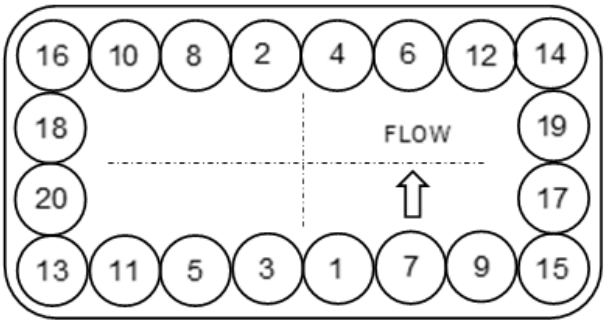
- Ø 3/4” Studs (150-900)
- Ø 1” Studs (1500)

Figure 7: 8" 150-600



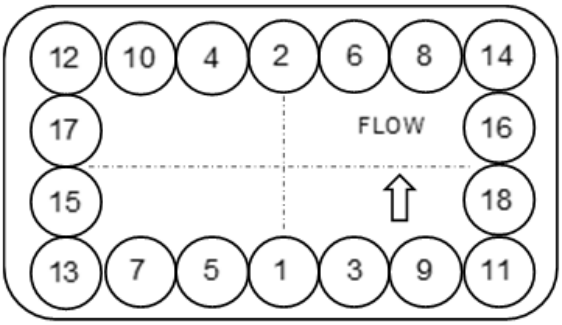
- Ø 3/4” Studs

Figure 8: 8" 900



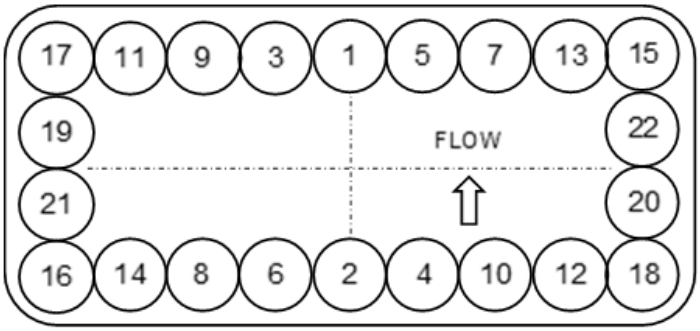
- Ø 1” Studs

Figure 9: 8" 1500



- Ø 1/8" to 1-1/8" Studs

Figure 10: 10" 150-1500 and 12" 150-600



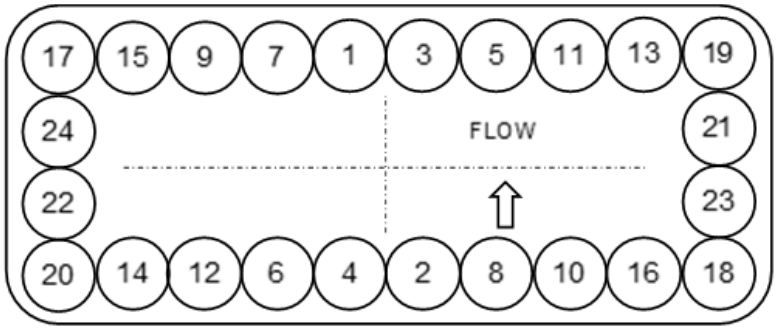
10" 150-1500

- Ø 3/4” Studs (150-600)
- Ø 1” Studs (900-1500)

12" 150-1500

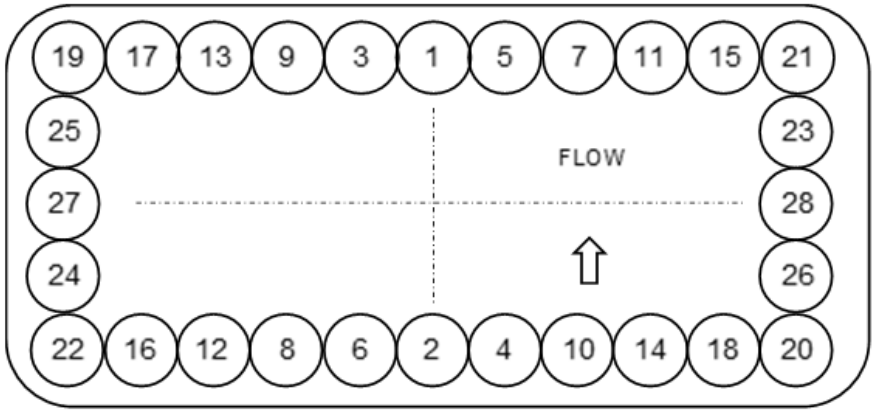
- Ø 3/4” Studs (150-600)
- Ø 1-1/8” Studs (900-1500)

Figure 11: 14" 150-900



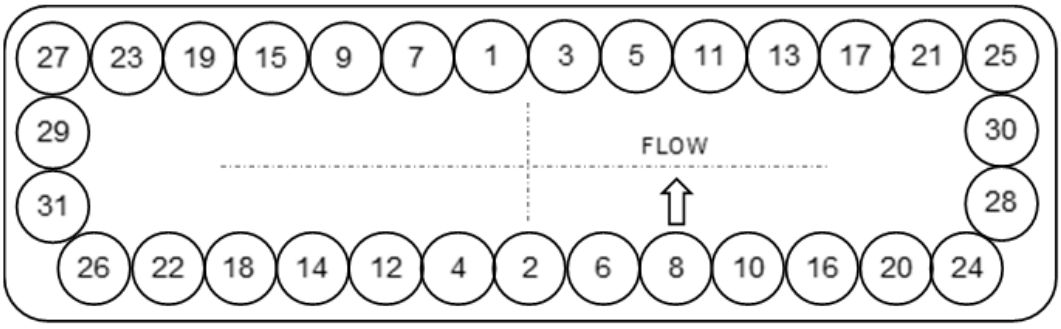
- Ø 3/4" Studs (150-300)
- Ø 7/8" Studs (600-900)

Figure 12: 14" 1500



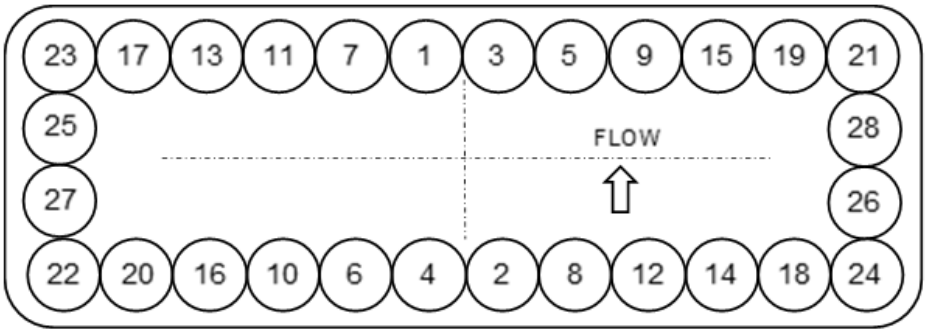
- Ø 1-1/4" Studs

Figure 13: 16" 150



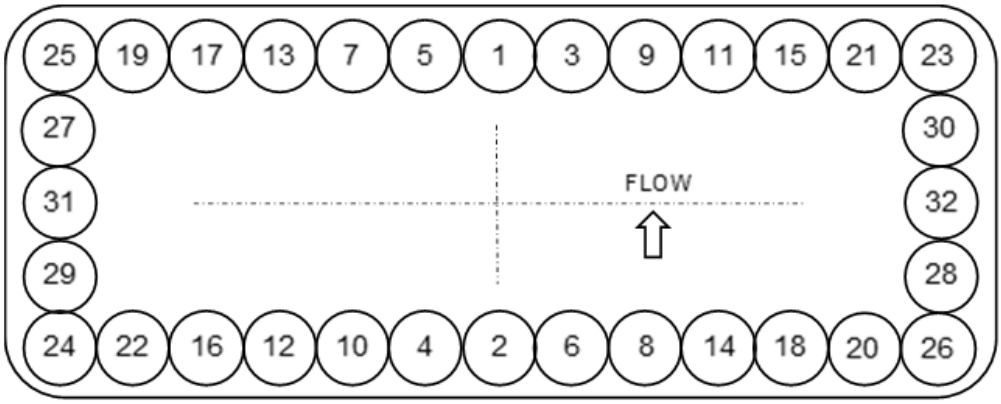
- Ø 3/4" Studs

Figure 14: 16" 300 i.e. 300-600-900



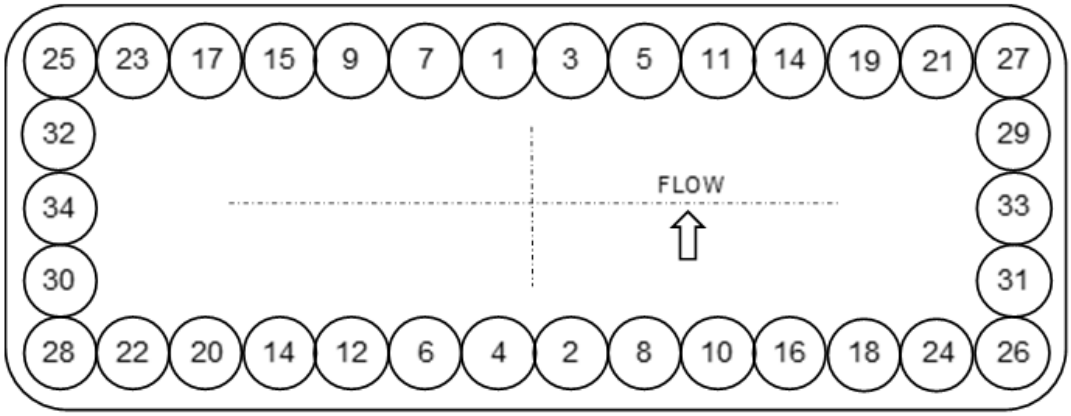
- Ø 1” Studs

Figure 15: 16" 1500



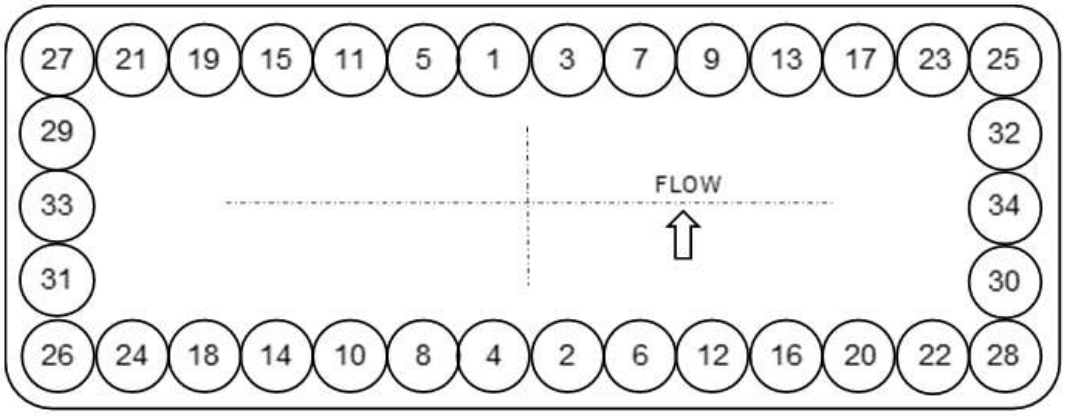
- Ø 1-1/4" Studs

Figure 16: 18" 150-600



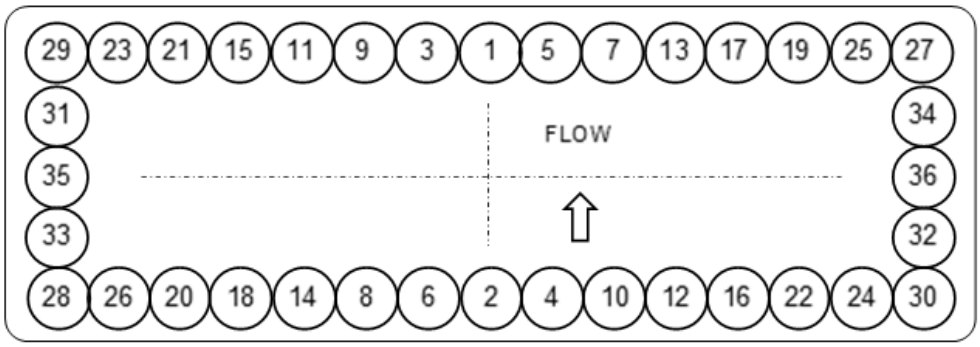
- Ø 3/4” Studs (150)

Figure 17: 24" 150-300



- Ø 1” Studs

Figure 18: 20" 150-300 and 24" 600-900



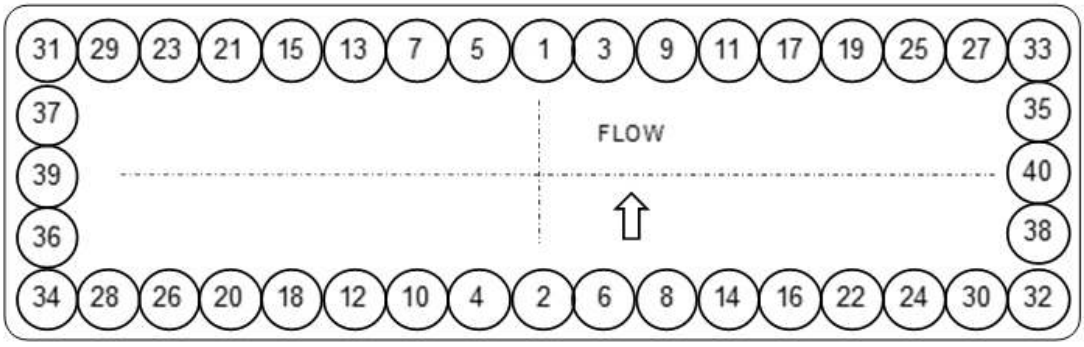
20" 150-300

- Ø 1” Studs

24" 600-900

- Ø 1-1/4" Studs

Figure 19: 20" 600-900, 26" 300, and 30" 900



20" 600-900

- Ø 1" Studs

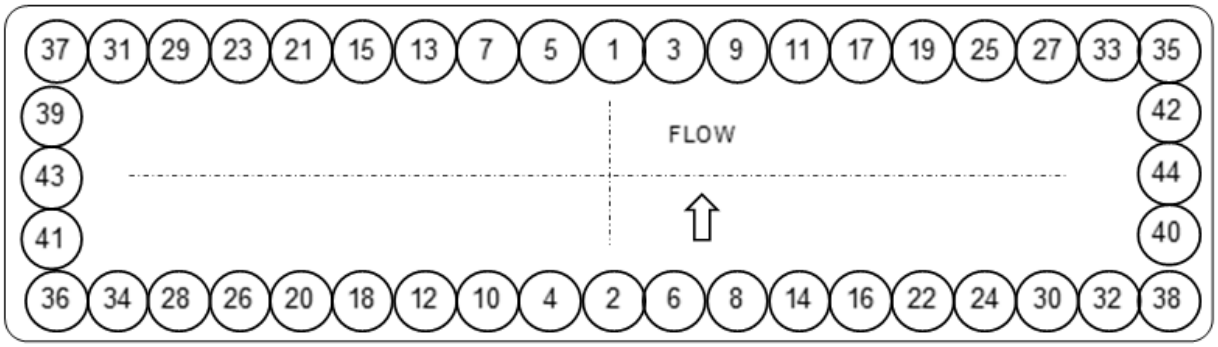
26" 300

- Ø 1-1/8" Studs

30" 900

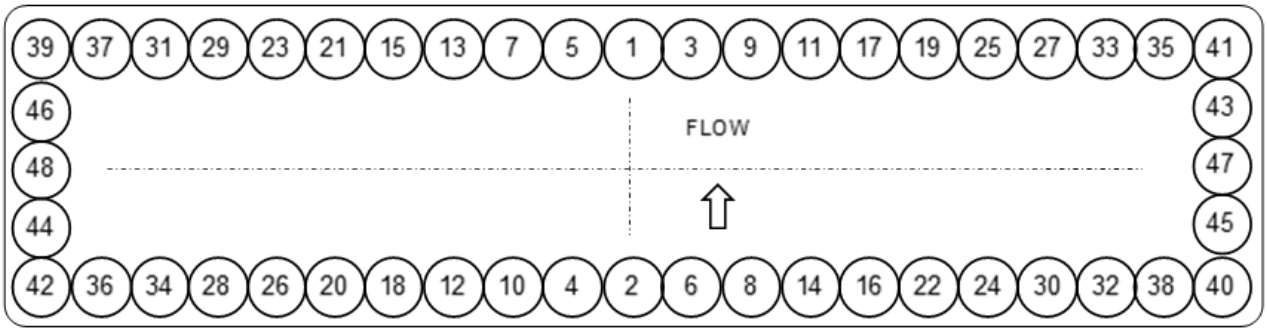
- Ø 1-1/4" Studs

Figure 20: 30" 150-600



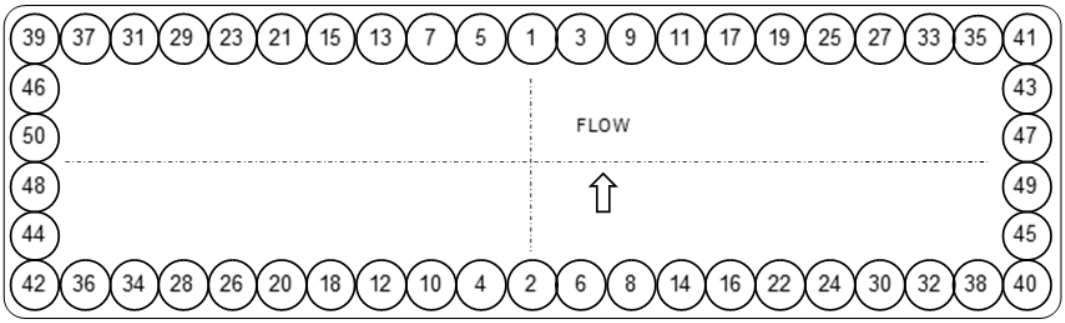
- Ø 1-1/8" Studs

Figure 21: 36" 150



- Ø 1-1/8" Studs

Figure 22: 36" 300-600



- Ø 1 - 1/4" Studs

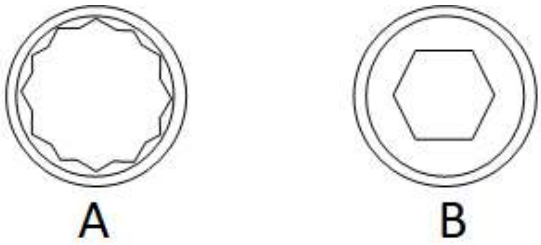
Valve seat gasket replacement information

In addition to the *General gasket replacement information*, users should uniformly tighten the screws that compress the valve seat gasket using the suggested starting torque values, sequencing patterns and application rates provided here to achieve an adequate seal.

Tighten each fastener at the following application rate:

- Install nut – apply less than 20% of the suggested torque
- Second pass – apply 20% to 30% of the suggested torque
- Third pass – apply 30% to 70% of the suggested torque
- Fourth pass – apply 100% of the suggested torque
- Fifth pass – apply 100% of the suggested torque four (4) hours after Fourth pass

Figure 23: Ferry head cap screw type and socket head cap screw type



A. Ferry head (12 point) cap screw type
B. Socket head cap screw type

Table 3: Ferry head and socket head suggested starting torque values

Screw type	Application	Part number	Screw size	Suggested starting torque range(1) lbf·ft (N·m)	
				Lower limit	Upper limit
Ferry head (12 point) cap screw	NACE	1-555-45-112	3/8" - 16	45 (61)	55 (74)
Ferry head (12 point) cap screw	Non-NACE	1-555-44-112	3/8" - 16	55(74)	70 (95)
Socket head cap screw	Non-NACE	1-555-35-112	3/8" - 16	50 (68)	65 (88)
Socket head cap screw	NACE	1-555-37-112	3/8" - 16	35 (48)	45(61)

(1) *The final torque required to achieve an adequate seal may be higher than the upper limit value provided in this table.*

Figure 24: 8 Screw Pattern (left) and 10 Screw Pattern (right)

Figure 25: 11 Screw Pattern (left) and 12 Screw Pattern (right)

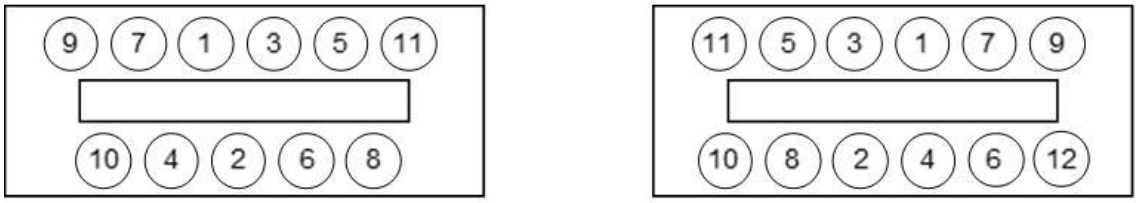


Figure 26: 14 Screw Pattern (left) and 16 Screw Pattern (right)

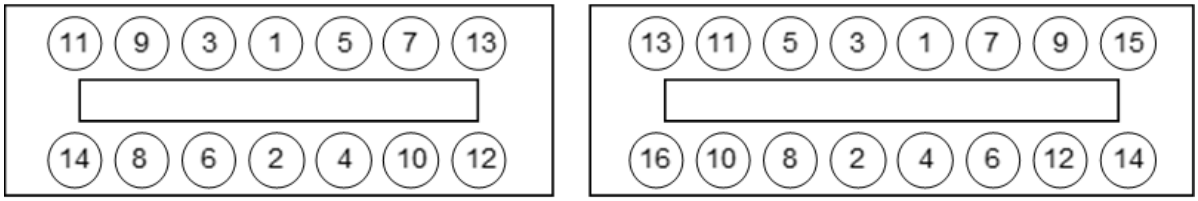


Figure 27: 18 Screw Pattern

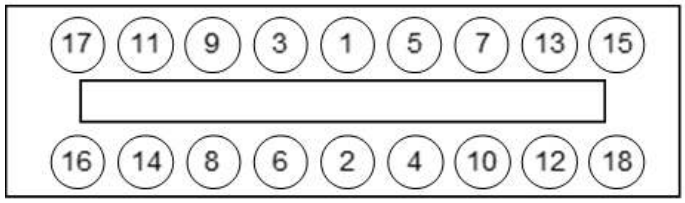


Figure 28: 20 Screw Pattern

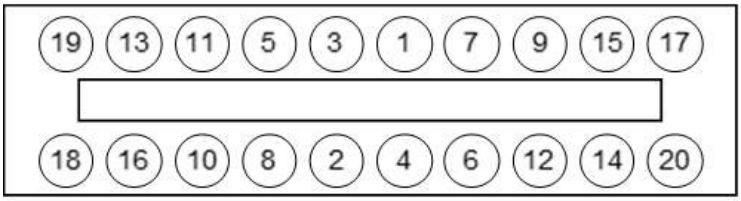


Figure 29: 24 Screw Pattern

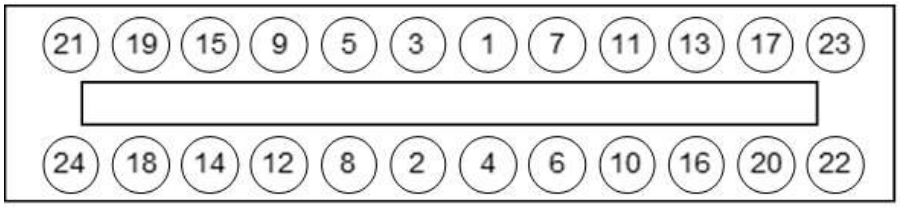


Figure 30: 26 Screw Pattern

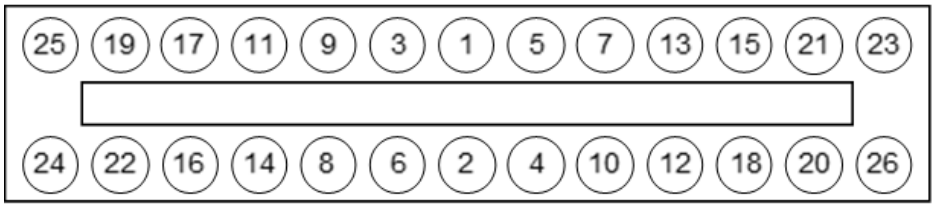


Figure 31: 30 Screw Pattern

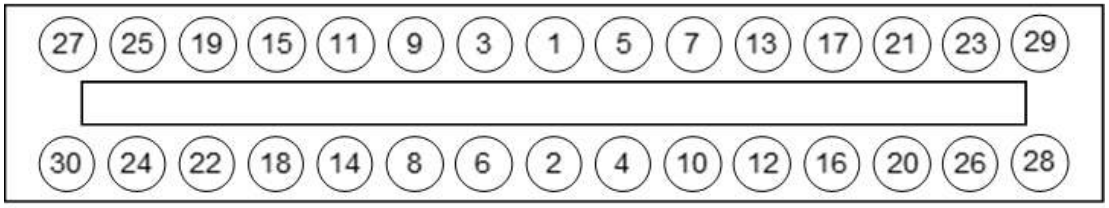


Figure 32: 34 Screw Pattern

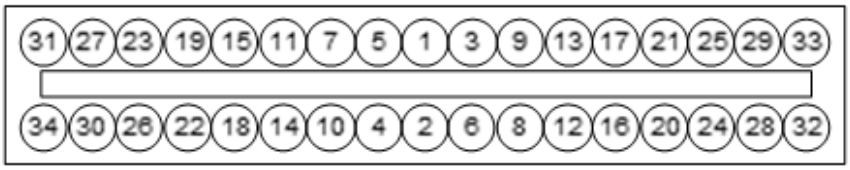


Figure 33: 38 Screw Pattern

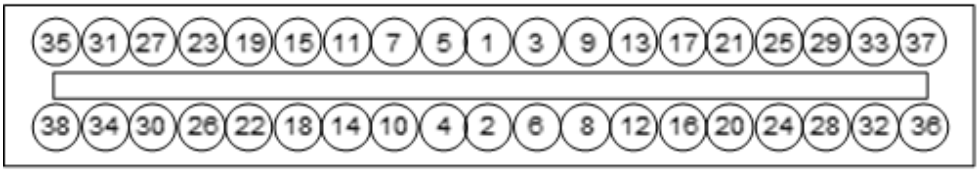


Figure 34: 44 Screw Pattern

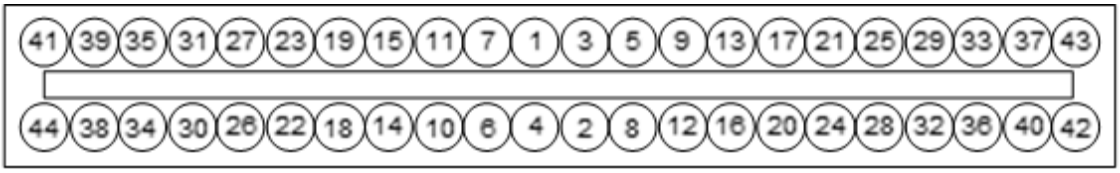
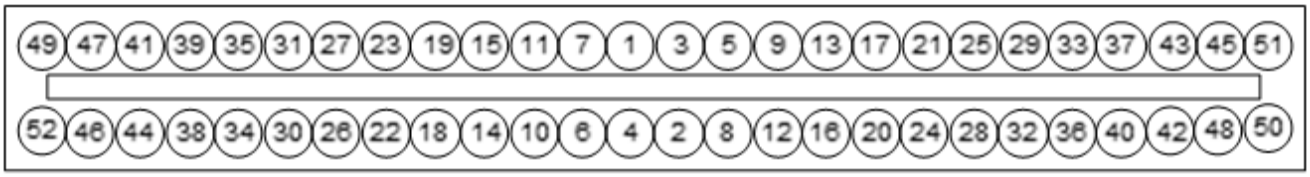


Figure 35: 52 Screw Pattern



With over 90 years of experience, Daniel is the only manufacturer that has the knowledge and experience to engineer and offer superior products that are trusted to provide the most reliable and accurate measurements in the global oil and gas industry.

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