

## JP Kenny Connector Evaluation Data

JP Kenny gathered and assembled data for both ANSI and Taper-Lok flanged connections and developed a Rank Scale for final evaluation of each system. Results were as follows:

### Large Diameter Flanges: Technical Evaluation

		ANSI Flange	Rank	Taper Lok	Rank
1	Flange Material <sup>(1)</sup>	ASTM A350 LF 6	A	ASTM A350 LF 6	A
2	Gasket Material	RTJ gasket will be made from softer material than the flange material.	C	Gasket material is same as the flange material.	A
3	Bolt Material	ASTM A193 Gr-B7	A	ASTM A193 Gr-B7	A
4	Corrosion <sup>(2)</sup>		C	Lesser exposure to corrosion <sup>(2)</sup>	A
5	Bolt Tension	Requires higher bolt tension to keep the RTJ gasket in contact with the gasket groove.	B	Smaller bolt tension because the pressure energized seal and less likelihood of separation due to the tapered seal surfaces.	A
6	Bolt Diameter	Code specified bolt & bolt circle diameter.	B	Size optimized to fit pressure end load of flange and bending loads.	A
7 a	Make up gap	About 3/4" for 48" flange.	A	About 1 1/4" for 48" flange.	B
7 b	Misalignment	Zero misalignment capability.	B	Some misalignment capability because of the tapered gasket design.	A
8	Bending Moment Capacity	Smaller bending moment capacity because inability to misalign w/o breach of seal.	B	Higher bending moment capacity because of ability to misalign slightly and maintain full contact of seal surface around gasket diameter.	A
9	Bolt relaxation	Possible because the gasket is plastically deformed during make-up.	B	Less likelihood of relaxation because the gasket loads remain below 90% of yield.	A
10	Design Flexibility	No flexibility because the dimensions are specified by the code.	B	Flexible design, dimensions can be changed to match the requirements.	A
11	Flange Weight	Flange size is fixed by B16.47 or SP-44.	B	Smaller and lighter than ANSI flange.	A
12	Availability of misalignment flanges	Misalignment Flanges up to 10 degrees are available.	A	Taper Lok make flanges with max. 10 deg misalignment.	A
13	Susceptibility to damage	Mating flange may hit the projected half of the RTJ gasket.	B	Male flange has a projection that may hit the female flange.	C
14	Leak Test	Requires pipeline to be pressured.	B	Seal can be tested without pipeline pressure.	A
15	Pressure energized seal	No	B	Pressure acting against seal drives seal tighter into converging tapered seal surfaces.	A
16	Made up gap	Need to check for uniform made up gap.	B	Need to check for uniform made up gap.	B
17	Effect of Check Valve Clapper Impact Loads.	Bearing stress may exceed allowable.	B	Bearing stress is within allowable.	A
	<b>TOTALS</b>	<b>4 A's, 12 B's, and 2 C's</b>		<b>15 A's, 2 B's, and 1 C</b>	

<sup>(1)</sup> Flange material was changed to ASTM A694 F65.

<sup>(2)</sup> If Taper-Lok flanges are used, there is no galvanic corrosion problem. The ring is cut from similar/same chemistry material as the flanges, hence there is no dissimilar metal-to-metal contact between the ring and flange. If another flange design is used (such as Taper-Lok) which employs a ring material that is not low alloy steel (higher alloys such as stainless steel, or a nickel base alloy such as Inconel) there is a potential for a galvanic couple to be set up between the ring and the flange. In this scenario the ring would be the cathode and the flange would be the anode. This creates the potential for corrosion on the flange (internally) in the area around the ring. If they inlay the ring groove with the same material as the ring (Inconel 718 is very similar to 625 from an electrochemical standpoint) this will prevent the seal area from corroding which is critical. However, there will be a galvanic couple between the inlay (cathode) and the flange (anode). However the flange is large compared to the cathode (seat inlay) so the corrosion will be spread out over a large area and will be inconsequential.

There will be no galvanic corrosion externally anywhere. All the steel will be polarized to anode potentials. Internally there will only be the potential for corrosion in the water phase if there is one.