

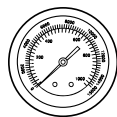
DISASSEMBLY PROCEDURE

1 De-pressurize the line in compliance with standing instructions

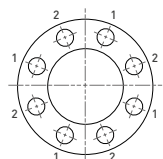
ALWAYS PROCEED WITH CAUTION !

Never take it for granted that the line has been de-pressurized. Re-pressurization of the line prior to or during disassembly is possible for many reasons.

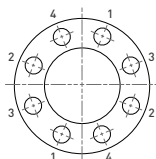
REFER TO THE RELEVANT HEALTH AND SAFETY INSTRUCTIONS FOR PROTECTIVE MEASURES.



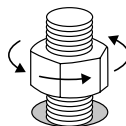
2 Start loosening the bolts gradually with steps of maximum 60 degrees rotation in each step in relevant criss-cross pattern



Bolting sequence criss-cross pattern (Ex. 1 - using 4 tools)



Bolting sequence criss-cross pattern Ex. 2 - using 2 tools



Continue this pattern until you are able to verify that the seal is broken and the sealing is loose. When you are satisfied that the seal is broken, proceed to loosen bolts further and remove bolts necessary to retrieve sealing.

FABRICATION - "Respect & Protect"

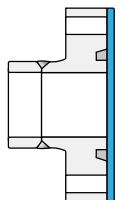
1 Respect sealing surfaces

- DO NOT use chains through flange bores or bolt holes.
- DO NOT allow weld spatter to damage sealing surfaces.
- DO NOT use earthing clamps on sealing surfaces.
- TAKE CARE when inserting and removing items through bore.
- Polish sealing surfaces after heat treatment.



2 Protect sealing surfaces

- Protect seats during and after fabrication.
- Apply anti-corrosion protection where necessary and re-fit.



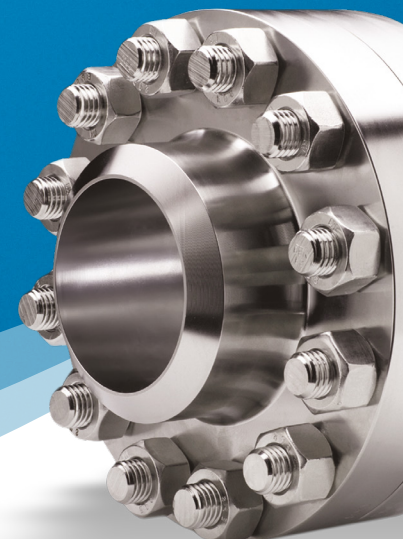
3 Corrosion protection

Vector SPO® Compact Flanges and bolts are supplied with various protective coatings. Additional corrosion protection may be required on assembled flanges to suit environmental conditions and/or to rectify coating damage during assembly.

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VECTOR SPO® COMPACT FLANGE

EN



Australia (Perth)	+61 8 9324 3880
Brazil (Rio De Janeiro)	+55 11 2176 2300
Malaysia (Kuala Lumpur)	+603 8723 3689
Norway (Drammen)	+47 32 20 93 00
UK (Aberdeen)	+44 1224 775 242
UK (Port Talbot)	+44 1639 822 555
USA (Houston)	+1 713 979 4444

ASSEMBLY - DISASSEMBLY POCKET GUIDE

VECTOR
SPO® compact flange

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V005-03-2016

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ASSEMBLY PROCEDURE

1 Protection

Keep the flange protection on as long as possible to avoid damage. After examining all sealing surfaces of the Vector SPO® Compact Flange for mechanical damage and rust (step 2), re-apply protection cover before further handling and alignment.

2 Verify and inspect components

Verify that all components are of correct material, type and size. Size of flange, material and required seal ring type and size are marked on the outside diameter of all loose flanges. On integral flanges on equipment, marking may vary. Make sure the correct size and material type of sealing is fitted (see Table 1). Sealing material is marked as shown. Examine all sealing surfaces for mechanical damage and rust. Run a fingertip over seal surfaces to detect any dents, scratches, gouges, etc.

3 Check for seal stand-off

Perform stand-off check for IX-sealing as follows:
Place the seal in the groove.
• If sealing can be rocked slightly: OK
• If sealing cannot be rocked (contact in groove bottom): REPLACE !

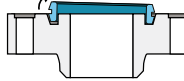
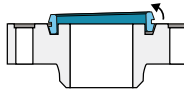
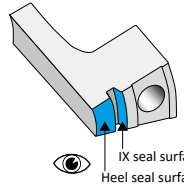
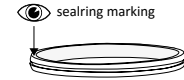
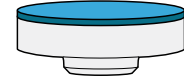
For stand-off check for HX-type refer to A&D procedure in SPO CF Designer's Manual.

4 Lubrication

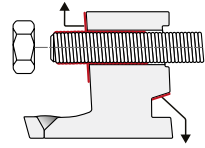
Lubrication of the seal ring groove is not required for coated seal ring. For uncoated seal rings use lubricant in seal groove. If torque tools are used, lubricate the stud threads and the nut-bearing interface on the flange on the tool side only.

5 Align Hubs

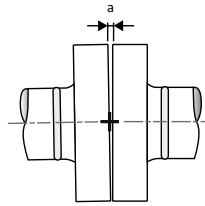
The flanges are to be aligned prior to seal ring installation such that the stud bolts can easily be inserted into the bolt holes. Approximate misalignment guidance is as follows:
Flange diameter < Ø300 mm: a ≤ 1.5 mm.
Flange diameter > Ø300 mm: a ≤ 1mm per Ø200mm



Lubricate bolt and nut bearing area at tool side if torque is used.



Lubricate groove seat face if seal is not PTFE coated



ASSEMBLY PROCEDURE continued

6 Insert Seal Ring

With the lower half of stud bolts in place the flanges can be separated and the seal ring inserted. If washers or spacers are required then they should be fitted to the studs that have been inserted. The use of a seal ring installation wire (or equivalent) is recommended. After the sealing has been positioned, the flanges can be carefully brought together until the seal ring is supported by the flange grooves. Hand tighten bolts to prevent flanges from separating and seal ring from dropping out. The seal ring installation wire can now be removed. All the other bolts, nuts and washers can now be inserted. At this stage they should not be tightened more than 10% of the preload or hand tight for the smaller studs.

7 Fitting

Insert the bolts. The stud bolts must protrude 2 threads from the nut at the opposite side where the tool is used. Remove the final misalignment of the flanges by tensioning the bolts starting where the gap is the biggest. (maximum 15% of final preload!)

8 Final Preloading

Personnel shall be skilled and qualified. Bolt preloading procedures must be qualified in tests. Tools and equipment must be the same as in the calibration tests. Please refer to full version of the installation and assembly procedure for details on qualification and calibration. Nuts shall be turned until no further movement is possible on last pre-tension cycle. Gap between the flanges at the wedge shall be fully closed to indicate correct pre-tension. Please consult Table 2 for more information on final bolt tension and torque values.

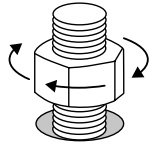
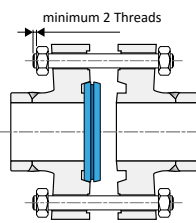
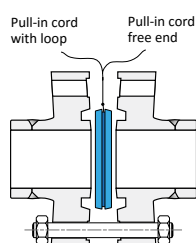


TABLE 2 - FINAL BOLT TENSION AND TORQUE VALUES (1)

Stud Bolt Size	Target Residual Preload (Notes 2 & 4)	Applied Tension, Tension Tool (Notes 2 & 4)	Applied Torque, Torque Tool	
			$\mu = 0.10$	$\mu = 0.12$
in	kN	kN	Nm	Nm
½ -UNC	44	-	84	98
¾ -UNC	71	-	164	192
¾ -UNC	106	134	291	341
¾ -UNC	147	186	465	544
1 -UNC	193	244	697	816
1 ¼ -8UN	255	323	1016	1194
1 ¼ -8UN	325	412	1420	1671
1 ¼ -8UN	405	512	1918	2261
1 ¼ -8UN	492	623	2532	2989
1 ¼ -8UN	589	745	3250	3840
1 ¼ -8UN	693	878	4108	4859
1 ¼ -8UN	807	1022	5085	6020
2 -8UN	929	1177	6205	7352
2 ¼ -8UN	1199	1519	8943	10611
2 ¼ -8UN	1503	1904	12348	14666
2 ¼ -8UN	1667	2111	14947	17768
3 -8UN	2004	2539	19538	23243
3 ¼ -8UN	2373	3006	24982	29739
3 ¼ -8UN	2773	3512	31285	37262
3 ¼ -8UN	3204	4058	38646	46051
4 -8UN	3666	4643	46987	56014

Notes :

- Bolting material : A193 B7, B16 and A320 L7
- Target minimum pre-stress is 75% of yield such that a minimum of 70% is secured taking into account uncertainty in the make-up procedure. Bolt root diameter used.
- Stress is 95% of yield in bolt.
- Washers may be necessary for some CL2500 and 5K, 7.5K (formerly CL4500i), as well as for Rigid Interface (RI) flanges to ensure minimum required bolt length to achieve sufficient residual preload.
- Values regarding L7M bolts can be found in the assembly section of the Vector SPO® CF designer's manual.

TABLE 1 : SEALRING MATERIAL GUIDELINES

(recommendations only, does not over-rule client specifications)

Sealing Material Type		Low Alloy	Stainless	High Strength Stainless	Duplex & Superduplex	Nickel Alloy
Grade marked on sealing		AISI 4130 AISI 4140	A182 F44 (6Mo)	A564 630 (17/4 PH)	A182 F51 A182 F55	Alloy 625 Alloy 718
FLANGE MATERIAL	MARKING DATA (Material Grade)					
Carbon / Low alloy steel	A694 F52, F60, F65, A350 LF2	●	●	● (2)	● (4)	● (4)
	as above + Alloy 625 cladding	●	●	●	● (4)	●
Stainless Steel	A182 F316, F304, F321	●	● (1)	●	● (3)	●
	A182 F44 (6Mo)	●	● (1)	●	● (3)	●
Duplex + S.Duplex	A182 F51, F53, F55, F61	●	●	● (2)	●	●
Nickel Alloy	Alloy 625, 800, 825	●	●	●	● (3)	●

Notes :

1. Recommended for cryogenic service below -100°C

2. Not recommended for sour service

3. Not recommended for service below -50°C

4. For H2S service refer to NACE MR0175

COLOUR CODING

- STOP : Avoid this material selection !
- USE WITH CAUTION : Check specification or seek metallurgical advice (see notes)
- GO : Good material selection