

CLAMP BOLT TORQUE TABLE				
Clamp Size	Stud Bolt Size	Stud Bolt Length (in.)	Average Torque	
			ft-lb	N-m
1	1/2-13UNC	3.50	17	23
1 1/2	5/8-11UNC	5.00	35	48
2	3/4-10UNC	5.25	55	75
2 1/2, 3	3/4-10UNC	6.00	55	75
4	7/8-9UNC	7.00	90	122
5	1-8UN	8.00	140	190
6	1 1/8-8UN	9.38	205	278
8	1 1/4-8UN	10.50	290	393
10, x14	1 3/8-8UN	14.13	630	854
12, x16	1 3/4-8UN	16.00	870	1180
14, x20	2-8UN	16.25	1300	1760
x24	2 1/4-8UN	27.00	1870	2535
16	2 1/2-8UN	22.00	2570	3490

For high piping loads and/or misalignments, the torques listed above can be increased by up to two times. Please contact us for unlisted clamp size torque values.

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ASSEMBLY

Step 1 – Inspect

Parts should be inspected prior to assembly to ensure that they are free of nicks, scratches, and other damage that may have occurred during shipping or handling in the field. Particular attention should be given to the critical sealing surfaces on the seal ring and hub faces.

Step 2 – Clean Surfaces

All parts should be clean and free of any debris, dirt, residue, or other foreign material prior to proceeding with assembly. If required, light oil or MoS2 spray can be used to lubricate the seal ring.

Step 3 – Lubricate

Lubricate the studs and clamps at the hub/clamp interface and the nut contact spherical surfaces with a high-pressure lubricant such as a nickel-based, anti-seize compound.

Step 4 – Stretch Pipe

The pipe needs to be stretched a sufficient amount to provide enough clearance to enable the insertion of the seal ring (dimension “C” in the Seal Ring section of the BlueLock Clamp Connector Catalogue).

Step 5 – Install Seal Ring

Install the seal ring between the hub surfaces, taking care not to damage the leading edges of the seal ring.

Step 6 – Install Clamp Assembly

- Equal spacing should be maintained between both sides of the clamp halves during assembly and torquing.
- install the nuts so that the spherical radius engages the clamp.

Step 7 – Torque Bolting

The studs should be torqued in an “X” pattern alternating from side to side. The bolting should be torqued as per the Clamp Bolt Torque Table values. Sharply strike the clamp with an appropriately weighted hammer to overcome the high hub/clamp friction force and facilitate the assembly. After every strike, the bolts should be torqued to the values in the table to the left. The assembly is complete when the torque doesn’t change after the clamp is struck.



Step 8 – Inspect

- Ensure that the clamp halves are equally spaced.
- Ensure that a minimum of two full threads are exposed on each stud end.
- Ensure that the seal ring rib is in full contact against the hub face around the entire circumference.

Step 9 – Test System

Test the connector and piping system as appropriate and required by piping design codes & local requirements (e.g., pressure test).

Step 10 – Retorque Studs

Studs should be retorqued to the levels above if required after the pressure test.

DISASSEMBLY

Step 1 – De-pressurize the Line

Purge the line of pressure and process fluid prior to disassembly.

Step 2 – Slacken Nuts

- Gradually slacken the nuts until they are just loose. **Do not remove them from the studs.**
- If the clamp segments remain bound to the hubs, strike both segments on the inner surface of the lugs with an appropriately weighted hammer until the clamps are slackened.
- Continue slackening the nuts and clamps alternately per the previous two steps until the clamps are loose.

Step 3 – Remove Nuts and Clamps

CAUTION: Prior to removing the nuts and clamps, ensure that no residual pressure remains in the line.

- Only completely remove the nuts and clamps when the clamps move freely and do not bind against the hubs.
- After the clamps and fasteners are removed, carefully pry the hubs apart to remove the seal ring.
- Handle the seal ring with care.

MAINTENANCE

- The studs should be retorqued after the first temperature/pressure excursion.
- Regular inspection of the connector and stud torques should be part of a preventative maintenance and inspection program.

BlueSky
Process Solutions

BlueLock™
Installation, Operation,
& Maintenance Guide



DESCRIPTION

BlueLock Clamp Connector

The BlueLock clamp connector is a highly reliable, self-energized, pressure-energized, easy to assemble, all-metal sealed connector. It is designed for use in piping systems which require high-integrity seals in applications that may involve corrosive, erosive, high temperature/pressure, and cyclic conditions.

The clamp connector is made up of the following components: (2) hubs, (1) seal ring, (2) clamps, (4) studs, and (8) nuts.

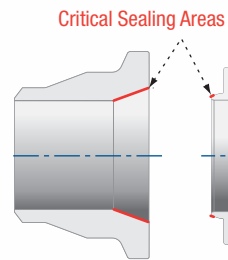
The seal ring is a metal-to-metal gasket interfaced with a hub sealing surface to ensure a high-integrity and reliable seal. The connector configuration ensures that the seal ring is elastically loaded during assembly, providing a self-energized and pressure-energized seal.



CRITICAL SURFACES

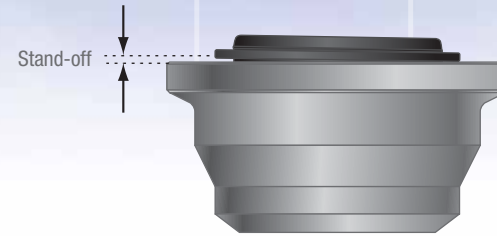
Storage and Handling

If a hub is welded onto a spool piece or equipment and is left unassembled for a prolonged period of time, protect the hub's critical surface against rust by applying a corrosion-inhibiting grease. The hub face should also be covered to protect the critical surface against accidental damage. **IMPORTANT: The grease must be carefully and thoroughly wiped off prior to assembly of the clamp connector. Care should be taken to ensure that the critical surface is not scratched by hard debris that might have adhered to the grease during storage.**



- Care should be taken not to damage these areas during handling
- Never scrape these surfaces with metal objects or abrasives
- Since the seal rings are often reused, it is important that used seal rings be carefully stored after disassembly

SEAL RING STAND-OFF



The seal ring stand-off dimension is a measure of the amount of deflection of the seal ring lips during assembly, which creates the initial self-energized seal.

The stand-off dimension, in conjunction with an examination of the hub and seal ring sealing surfaces to ensure that they are free of damage, is used to evaluate the reusability of the seal ring.

Seal Ring Size	Stand-Off (in.)		Seal Ring Size	Stand-Off (in.)	
	New Seal Rings	Minimum for re-use		New Seal Rings	Minimum for re-use
4	0.016	0.004	87	0.123	0.060
5	0.016	0.005	94	0.130	0.062
7	0.016	0.006	97	0.134	0.065
11	0.020	0.010	102	0.137	0.070
14	0.017	0.008	112	0.150	0.072
16	0.020	0.010	120	0.156	0.075
20	0.022	0.010	122	0.160	0.077
23	0.025	0.013	130	0.168	0.080
25	0.027	0.014	134	0.176	0.082
27	0.030	0.014	137	0.178	0.083
31	0.030	0.015	140	0.185	0.084
34	0.036	0.016	152	0.194	0.085
40	0.039	0.020	160	0.200	0.086
46	0.044	0.022	170	0.212	0.100
52	0.050	0.025	180	0.224	0.105
62	0.093	0.030	192	0.238	0.110
67	0.104	0.040	210	0.248	0.115
72	0.104	0.040	232	0.282	0.130
76	0.108	0.042	244	0.296	0.135
82	0.115	0.050	264	0.320	0.150
84	0.119	0.055	292	0.340	0.155

SAFETY FIRST

BlueSky engineers its products according to the highest safety standards. BlueSky can provide training and assistance to engineering, construction, maintenance, and operations personnel as required. Care should be taken when working with any pressure- or fluid-retaining components.

Consideration should be given to the following prior to initiation of the installation:

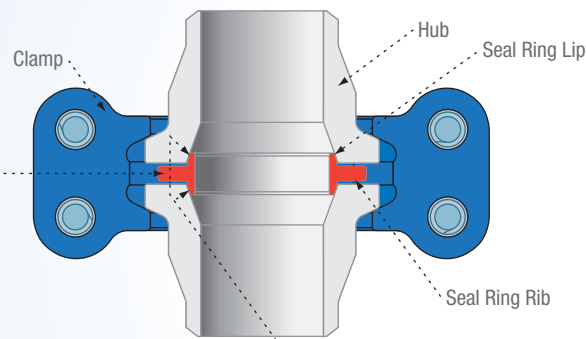
- Specific site conditions and safety rules.
- Required personal protective equipment (e.g., safety shoes, protective clothing, protective eyewear, and hard hats).
- Procedure to eliminate potential environmental releases and exposure to contents of the system. Pipelines should be appropriately drained, vented, and prepared.



Contact BlueSky if you have any questions about the design and/or installation of our products.

BlueLock Sealing Technology

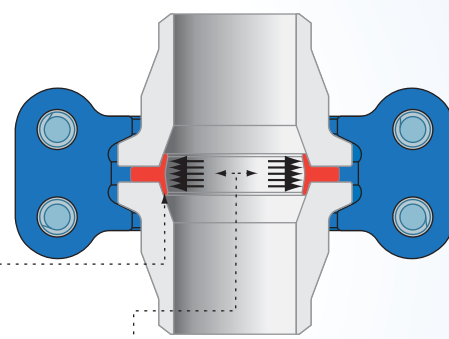
Position prior to clamping



1. The rib of the seal ring is clamped between the hub faces. The rib of the seal ring assists with proper alignment as the connector is clamped together.

2. The seal ring lips engage the inner hub surface. The rib controls the amount of seal ring lip deflection within the elastic range.

Final position after clamping



3. The seal ring lips deflect inwards to achieve a highly reliable metal-to-metal seal.

4. Internal pressure acts on the inside face of the seal ring lips and pressure energizes the seal to enhance the reliability of the metal-to-metal seal. This feature is significantly superior to traditional flanges in which pressure acts directly on the flange faces, forcing them apart and impacting the integrity of the seal.

PIPE PREPARATION AND WELDING

The BlueLock clamp connector may be integrated with a wide variety of piping systems.

Care should be taken during welding to protect the critical sealing surfaces from any damage, such as scratching and weld spatter. Proper grounding and heat input should be ensured to prevent any arcing across the hub faces or distortion. Assembled clamp connectors should never be welded.

Welding should be performed according to applicable codes and standards. Hubs should be aligned properly to ensure proper engagement of the seal ring and hub faces.

