S-Flex Endurance™

Standard and Bushing Style Couplings

VIDEOS AVAILABLE

Installation videos of standard, bushing style and half spacer style S-Flex Endurance™ couplings are available at **www.lovejoy-inc.com/resources**

Introduction

The following document is intended for the explicit use of Lovejoy customers to aid in the installation of Lovejoy power transmission products. The information may be considered privileged and should only be disseminated as an active part of conducting business with Lovejoy, Inc.

Although the coupling may have been properly specified during the design and selection process before the coupling was ordered, operational conditions could possibly have changed prior to installation. Lovejoy, Inc. provides the information and technical support necessary to ensure the appropriate coupling selection was made relative to the product specifications and limitations of Lovejoy's power transmission products. The end user is ultimately responsible for verifying the suitability of the final coupling selection based on the actual service conditions at the time of the coupling installation.

Correct installation and alignment practices will extend the coupling life, support proper operation, and establish a safer operating environment for the coupling. Please thoroughly review all of the following instructions prior to installing this coupling and placing it in operation. Safety guidelines and practices should always be followed during every phase of the installation.

1.0 Product Inspection

Prior to installation, the coupling should be examined for signs of damage resulting from shipping or handling. Refer to the following chart to ensure all the ordered parts are present.

Table 1 – Components
(Standard S-Flex Endurance and Bushing Style)

Flange Size	Flanges	Sleeve[1]	Bushings	Cap Screws
4J - 6J	2	1	n/a	n/a
5S - 16S	2	1	n/a	n/a
6B - 16B	2	1	2 (QD®)	6
6T - 16T	2	1	Customer Supplied[2]	

Notes: 1. Split sleeves may have retaining ring.
2. Taper-Lock® bushings supplied by the customer.

For maximum protection, the coupling and all components should be stored in the original packaging. All parts should be measured prior to installation to ensure correctness of parts to meet the application requirements; such as the hub bore diameter, shaft diameter, shaft separation, key sizes, etc. The BSE (shaft separation) dimension should be measured from the end of one shaft to the end of the other shaft, not to hub faces or pilots.

Lovejoy manufactures couplings based on the shaft details provided by the purchaser. Lovejoy is not responsible for inaccurate or incomplete information supplied by the purchaser. Check all shaft dimensions.

It is the responsibility of the purchaser to assure the interface connections (flanges, bolts, keys, hydraulic fits, etc.) between the coupling and connected equipment are capable of handling the anticipated loads.

WARNING

Failure to observe the following warnings could cause the power transmission product to break and parts to be thrown with sufficient force to cause serious injury or death.

Selection. Do not exceed catalog ratings. Refer to the Lovejoy catalog for proper selection, sizing, horsepower, torque range, and speed range of these products.

Installation. Proper maintenance, handling, and shop practices are critical. Follow all installation instructions included with the product and provided by your equipment manufacturer, and all applicable federal, state, and local regulations concerning the safe operation and maintenance of manufacturing equipment.

Operation. Avoid sudden shock loads during start up and operation.

Do not operate a coupling assembly with improper alignment or bolt torque or with damaged or worn elastomeric elements. Inspect the assembly for these conditions shortly after initial operation and periodically thereafter.

The coupling assembly should operate quietly and smoothly. If the coupling assembly vibrates or makes a beating sound, shut down the equipment immediately and recheck the alignment.

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Before beginning the coupling installation, make sure the machinery is made safe. Disconnect and lock out all power to the equipment. No part of the installation should be performed on moving, non secure, or unstable equipment.

2.0 Required Tools

- Calibrated Torque Wrench and Allen sockets
- Alignment Equipment (Calipers and straight edge)
- Appropriate tooling for repositioning equipment

3.0 Coupling and Component Preparation

3.1 All exposed surfaces of the coupling and components, including hubs, flanges, sleeves, retaining rings, screws, and any other Lovejoy supplied parts should be thoroughly cleaned prior to installation to remove any protective coatings that may have been applied by Lovejoy as corrosion protection during shipping. All coupling parts, equipment components, shafts, and keyways must be clean and free of any foreign materials prior to attempting assembly or installation. A clean cloth dampened with a nonflammable solvent should be sufficient for this cleaning.

3.2 All components, flange bores, shafts, keys, and keyways must be checked for raised metal, nicks, burrs, dents, gouges, etc., and should be dressed or repaired accordingly prior to installation.

3.3 Prior to removing any existing coupling, establish and record the Distance Between Shaft Ends (BSE), between the driver and driven shafts and compare this value with the BSE dimension for Lovejoy S-Flex Endurance Couplings in Table 5 to verify fit of the coupling.

3.4 Once all necessary measurements have been taken and all components are verified as correct, remove any existing coupling and dress the shafts on the driver and driven equipment.

3.5 If the actual shaft BSE is the same as the specified BSE value for the Lovejoy S-Flex Endurance coupling (see Table 5), then the flanges can be mounted flush with the ends of the driver and driven shafts.

3.6 If the actual shaft BSE is different than the specified BSE for the Lovejoy S-Flex Endurance coupling, then the flanges must be mounted on the driver and driven shafts so that the dimension between the flange faces matches the 'G' dimension as specified in Table 5.

3.7 Lovejoy machines the bore in all Lovejoy S-Flex Endurance style flanges with 'inch' dimensioned straight bores and keyways to meet the industry accepted ANSI/AGMA 9002-B04 Standards' tolerance for common keyways and clearance fit bores unless otherwise specified. Tapered and spline bores may require special manufacturing and installation consideration.

3.8 Lovejoy machines the bore in all Lovejoy S-Flex Endurance style flanges with 'metric' dimensioned straight bores and keyways to meet the industry accepted ANSI/AGMA 9112-A04 Standards' tolerance for common keyways and clearance fit bores unless otherwise specified. Tapered and spline bores may require special manufacturing and installation consideration.

3.9 Lovejoy machines the bore in all Lovejoy S-Flex Endurance style flanges with taper bores using tolerances and specifications as supplied by the customer. Taper bores will be tested with plug gauges usually supplied by the customer or included in the cost of the coupling.

4.0 Coupling Installation

4.1 Identify which type sleeve will be used for this installation. The sleeves will be one piece, single split, or two piece split with a retaining ring. The standard black sleeves are an EPDM material, the black sleeves with a green dot are neoprene, and the orange sleeves are Hytrel®.

4.2 Prior to mounting the hubs, place the keys in the shaft keyways. The key should fit snuggly in the keyway with minimal side to side movement. Standard keys should be the same length or slightly longer than the keyway in the flange. Woodruff keys are usually shorter and may not transmit the same amount of torque.

Note: If using a standard bushing style flange for QD® or Taper-Lock® bushings, skip to Step 4.5.

4.3 When installing standard flanges, slide the appropriate flange on each of the shafts over the keys and align the face of the flange with the end of the shaft. Lovejoy S-Flex Endurance flanges are machined with a clearance, or slip fit and should slide onto the shaft with little or no difficulty. Using a calibrated torque wrench, tighten both set screws in one flange to the torque value specified in Table 2. Lightly tighten the set screws in the second flange to allow for possible axial adjustments after the equipment has been moved.

Note: Flanges must be mounted on the driver and driven shafts with the serrations facing each other.

4.4 If the shaft separation is not equal to the BSE dimension as specified in Table 5, the flanges may need to overhang off the end of the shafts equally on both sides. If the flanges are hanging off the shafts, the amount of shaft engagement in the flange should be equal to or greater than the diameter of the shaft.

Note: if NOT using bushings, skip to Step 4.7.

4.5 When installing standard bushing style flange, insert the bushing into the flange and thread the retaining screws into the tapped holes; but, do not tighten the screws until the flanges are mounted on the shafts. Slide the flange onto each of the shafts over the keys and align the face of the flange with the end of the shaft.

4.6 Tighten the retaining screws on the bushings evenly using the industry standard procedure to the torque specified in Table 3. Tighten each retaining screw first to 50% of the specified torque, then 75%, then to the final torque as specified, using a calibrated torque wrench. Tighten screws to the torque value specified in the instructions provided with the bushing, or refer to the torque values specified in Table 3. When tight, the flange on the bushing should not come in contact with the S-Flex Endurance flange. There should be a gap between the face of the flange and the bushing of approximately 1/8" to 1/4".

DO NOT over tighten the screws on the QD® or Taper-Lock® bushings. If the screws are too tight, this could damage the S-Flex Endurance flange.

4.7 For couplings with a single piece sleeve, or single split sleeve, insert the sleeve into one of the flanges prior to moving the equipment together.

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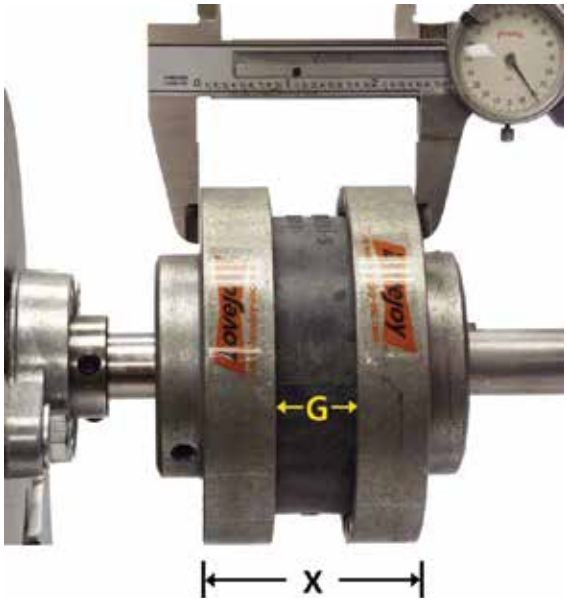
4.8 For couplings with a two piece sleeve and retaining ring, hang the ring in one of the grooves around the sleeve, not into the final position. This would inhibit the ability to perform the alignment inspection. Insert the sleeve into one of the flanges prior to moving the equipment together.

4.9 Carefully move the equipment together until the serrations on the sleeve mesh with the other flange. The face of the flanges should just barely touch the sleeve. If the flanges are pressed too tightly against the sleeve, the coupling will lose some capability to accommodate misalignment.



4.10 Measure the coupling width at the outside of the flanges (see picture above) and compare with Table 4 to ensure this measurement falls within the X-Min and X-Max range. If it falls outside the X-Min and X-Max, realign the equipment to correct this condition. 'G' should match the value specified in Table 5.

4.11 Next, lay a straight edge across the top of the flanges (see picture above) and note the space between the straight edge and the second flange. This parallel misalignment should be less than the 'Parallel' value listed in Table 4. If it exceeds this amount, realign the equipment to correct this condition. This will also work for angular misalignment.

4.12 Using a calibrated torque wrench tighten the set screws on the second flange to the torque value specified in Table 2.

4.13 If this is a two piece split spacer sleeve, slide the ring into the center grooves to lock the ring and sleeve into place for operation.

4.14 Recheck alignment and tightness on the set screws and bushing retaining bolts (B-Style).

4.15 Remove any tooling and material away from the shafting and coupling. Install the appropriate coupling guard per OSHA requirements and remove the Lockout / Tagout kit from the power supply. The equipment can then be started up and tested. The coupling and equipment should run smoothly. If vibration is detected it could indicate there is an issue with alignment or other problems. This could point to problems related to the motor, coupling, or driven equipment and should be resolved prior to placing this coupling into operation.

Contact your local authorized Lovejoy sales representative prior to replacing the sleeve with a material that is different from the original sleeve.

5.0 Maintenance (Sleeve Replacement)

5.1 Most sleeve failures are signature, or classical types of failures that visually offer clues as to the cause of failure. Always inspect the existing sleeve to ensure there are no obvious equipment issues that could lead to a premature failure of a replacement sleeve. For example, if the serrations are worn off the old sleeve, there could be issues with misalignment. If the old sleeve is torn, particularly a diagonal tear in the sleeve, this could indicate the coupling is being subjected to an over-torque condition. These issues will need to be corrected prior to placing the equipment back in service.

5.2 Loosen the set screws on one flange. Move the flange back on the shaft until the sleeve is free of the serrations in the flange.

5.3 If this is a B-Style flange, loosen the retaining screws that draw the bushing into the tapered bore. You may need to remove two of the screws and reinsert these screws into the threaded holes in the bushing. When you evenly tighten these screws, they should press against the coupling flange and force the bushing to release. You should then be able to move the flange and bushing back on the shaft until the sleeve is free of the serrations in the flange.

5.4 If the sleeve is a one piece sleeve, and is being replaced with a one piece sleeve, separate the equipment until there is enough space between the shaft ends to remove the sleeve.

5.5 If replacing the sleeve with a split sleeve, the equipment may not need to be moved. An existing one piece sleeve may need to be cut to remove the sleeve from the coupling. A new split sleeve can then be pulled open to allow the sleeve to slip over the shafting.

5.6 To reassemble this coupling, start at Step 4.8 of the Coupling Installation section and repeat the remaining steps.

Check the axial, angular, and parallel alignment to ensure the equipment is within the recommended limits for this coupling. This may prevent possible damage to the coupling or equipment due to stresses placed on the coupling by poorly aligned equipment.

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Table 2 – S-Flex Endurance Couplings Set Screw Torque

Coupling Size	Type J Flanges		Type S Flanges	
	Each flange has 2 set screws at 90°			
	Set Screw Size	Tightening Torque ft-lbs	Set Screw Size	Tightening Torque ft-lbs
3	1/4 - 20	7	–	–
4	1/4 - 20	7	–	–
5	1/4 - 20	7	1/4 - 20	7
6	5/16 - 18	13	5/16 - 18	13
7	–	–	3/8 - 16	23
8	–	–	3/8 - 16	23
9	–	–	1/2 - 13	50
10	–	–	1/2 - 13	50
11	–	–	1/2 - 13	50
12	–	–	1/2 - 13	50
13	–	–	5/8 - 11	100
14	–	–	5/8 - 11	100
16	–	–	5/8 - 11	100

Table 3 – S-Flex Endurance Type B Couplings Cap Screw Torque

Coupling Size	Type B Flanges		
	Each QD® bushing has 3 screws at 120°		
	Bushing Screw Size	Tightening Torque ft-lbs	Bushing Size
6	10-24 x 1	5	JA
7	10-24 x 1	5	JA
8	1/4-20 x 1-3/8	9	SH
9	1/4-20 x 1-7/8	9	SD
10	5/16-18 x 2	15	SK
11	3/8-16 x 2	30	SF
12	1/2-13 x 2-3/4	60	E
13	9/16-12 x 3-5/8	75	F
14	9/16-12 x 3-5/8	75	F
16	5/8-11 x 4-1/2	135	J

Table 4 – Maximum RPM and Allowable Misalignment

Sleeve Size	Maximum RPM	EPDM and Neoprene Misalignment Types JE, JN, E, and N				Hytrel® Misalignment Type H		
		Parallel	Angular	X-Min	X-Max	Parallel	Angular	X (+/- .015)
3	9,200	0.010	0.035	1.188	1.223	–	–	–
4	7,600	0.010	0.043	1500	1.543	–	–	–
5	7,600	0.015	0.056	1.938	1.994	–	–	–
6	6,000	0.015	0.070	2.438	2.508	0.010	0.016	2.500
7	5,250	0.020	0.081	2.563	2.644	0.012	0.020	2.625
8	4,500	0.020	0.094	2.938	3.032	0.015	0.025	3.000
9	3,750	0.025	0.109	3.500	3.609	0.017	0.028	3.562
10	3,600	0.025	0.128	4.063	4.191	0.020	0.032	4.125
11	3,600	0.032	0.151	4.875	5.026	0.022	0.037	4.938
12	2,800	0.032	0.175	5.688	5.863	0.025	0.042	5.750
13	2,400	0.040	0.195	6.625	6.820	0.030	0.050	6.688
14	2,200	0.045	0.242	7.750	7.992	0.035	0.060	7.812
16	1,500	0.062	0.330	10.250	10.580	–	–	–

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Table 5 – Flange and Shaft Separation

Flange Size	G Flange Separation		BSE[1] Shaft Separation	
	in	mm	in	mm
3 J	0.44	11	0.44	11
4 J	0.63	16	0.63	16
5 J	0.75	19	0.75	19
5 S	0.75	19	0.13	3
6 J	0.88	22	0.88	22
6 S	0.88	22	0.22	6
7 S	1.00	25	0.26	78
8 S	1.13	29	0.19	5
9 S	1.44	378	0.24	6
10 S	1.63	41	0.29	7
11 S	1.88	48	0.25	6
12 S	2.31	59	0.25	6
13 S	2.69	68	0.49	12
14 S	3.25	83	0.88	22
16 S	4.75	121	2.52	64

Note: 1. Minimum shaft separation all sizes is 1/8" and is dependent on room to slide hubs back on shafts.

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