



# S-Flex Couplings Standard and Bushing Style Installation Guide

## 1.0 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 ensure longer coupling life, trouble free operation, and 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. Proper safety guidelines and practices should always be followed during every phase of the installation.

This installation document is considered part of the purchased product and should be retained for future reference.

## 2.0 SAFETY:

Accidents involving rotating equipment may result in loss of life, serious bodily harm, or property damage. The purchaser of this equipment must assure that the equipment is properly assembled, installed, safeguarded, operated, and maintained. The coupling or equipment should never be operated under or subjected to conditions that exceed manufacturers' specifications.

Consult all applicable Federal, State, and local laws and regulations covering the safe operation and maintenance of equipment, including, without limitation, the USDOL-OSHA "Lockout / Tag-out" procedure set forth in 29 CFR 1910.147.

Because of the possible danger to persons or property from accidents which may result from the improper use or unapproved modifications of the product, this product must be installed, maintained and operated in accordance with the procedures, standards, and engineering specifications specified in the product literature. To assure safe operation, this product should be inspected in accordance with the instructions described in this document. Proper guards and any suitable safety equipment or procedures as may be necessary, or as may be specified in safety codes, should be installed by the user. Safety equipment, coupling guards, and shields are not provided by, nor are they the responsibility of Lovejoy, Inc.

Symbols and text format used in this document may contain safety information and will appear similar to the following:

	<b>Warning!</b> This symbol indicates safety measures which must be observed to avoid <b>personal injury</b> .
	<b>Caution!</b> This symbol indicates safety measures which must be observed to avoid <b>damage to coupling</b> .



## 3.0 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 and Bushing Style)**

Flange Size	Flanges	Sleeve <sup>1</sup>	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 <sup>2</sup>	

- 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 will not be 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.

### 3.0 PRODUCT INSPECTION (Continued):



**Warning!** 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.

### 4.0 REQUIRED TOOLS:

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

### 5.0 COUPLING AND COMPONENT PREPARATION:

**5.1 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.

**5.2 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.

**5.3 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 'G' dimension for Lovejoy S-Flex Couplings in Table-5 to verify fit of the coupling.

**5.4 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.

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

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

**5.7 Lovejoy machines the bore in all Lovejoy S-Flex 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.

**5.8 Lovejoy machines the bore in all Lovejoy S-Flex 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.

**5.9 Lovejoy machines the bore in all Lovejoy S-Flex 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.

### 6.0 COUPLING INSTALLATION:

**6.1 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.



**6.2 Prior to mounting the hubs**, place the keys in the shaft keyways. The key should fit snugly 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 6.5 .

**6.3 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 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.**

**6.4 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 6.7.

**6.5 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.



**6.6 Tighten the retaining screws on the bushings** evenly using the industry standard procedure to the torque specified in Table-2. Tighten each bolt first to 50% of the specified torque, then 75%, then to the final torque as specified. using a calibrated torque wrench. Tighten these 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 flange. There should be a gap between the face of the flange and the bushing of approximately 1/8" to 1/4".

**Caution!** **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 flange.

**6.7 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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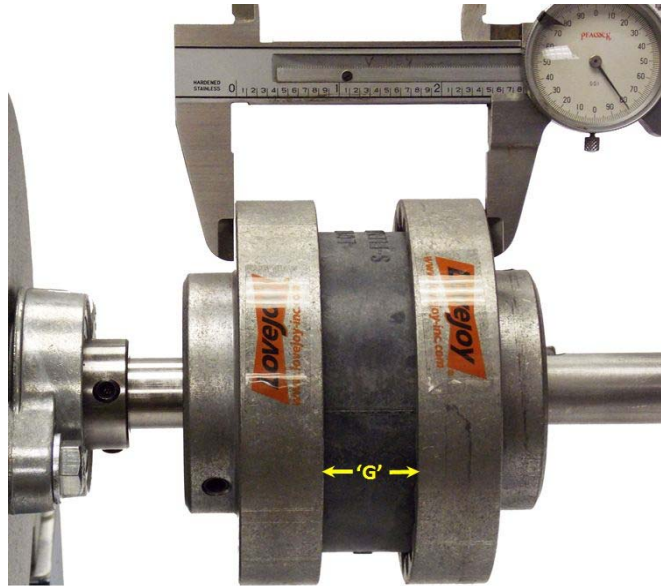
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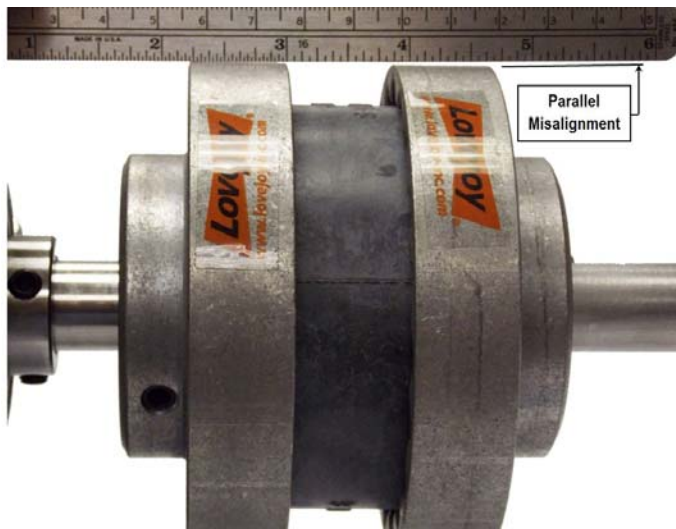
**6.8 For couplings with a two piece sleeve and retaining ring,** hang the ring in one of the grooves around the sleeve, not into the final position. This would inhibit the ability to perform the alignment inspection. Insert the sleeve into one of the flanges prior to moving the equipment together.

**6.9 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.

**6.10 Measure the coupling width at the outside of the flanges** (see picture below) 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.



**6.11 Next, lay a straight edge across the top of the flanges** 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.



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

**6.13 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.

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

**6.15 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.

**7.0 MAINTENANCE (SLEEVE REPLACEMENT)**

**7.1 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.

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

**7.2 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.

**7.3 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.

**7.4 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.

**7.5 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.

**7.6 To reassemble this coupling,** start at step 6.8 and repeat the remaining steps in section 6. 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 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	Set Screw Size	Tightening Torque
3	1/4 - 20	7 ft-lbs	--	--
4	1/4 - 20	7 ft-lbs	--	--
5	1/4 - 20	7 ft-lbs	1/4 - 20	7 ft-lbs
6	5/16 - 18	13 ft-lbs	5/16 - 18	13 ft-lbs
7	--	--	3/8 - 16	23 ft-lbs
8	--	--	3/8 - 16	23 ft-lbs
9	--	--	1/2 - 13	50 ft-lbs
10	--	--	1/2 - 13	50 ft-lbs
11	--	--	1/2 - 13	50 ft-lbs
12	--	--	1/2 - 13	50 ft-lbs
13	--	--	5/8 - 11	100 ft-lbs
14	--	--	5/8 - 11	100 ft-lbs
16	--	--	5/8 - 11	100 ft-lbs

**Table 3 - S-Flex Type B Couplings Cap Screw Torque**

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

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**Table 4 - Maximum RPM and Allowable Misalignment**

Sleeve Size	Maximum RPM	EPDM and Neoprene Misalignment Types JE, JN, E, and N				Hytrell 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	1.500	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	--	--	--

**Table 5 - Flange and Shaft Separation**

Flange Size	G' Gap Flange Separation		BSE <sup>1</sup> 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	7
8 S	1.13	29	0.19	5
9 S	1.44	37	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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