S-Flex Endurance™

# Spacer and Half Spacer 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

Lovejoy offers S-Flex Endurance spacer style couplings in two configurations, a half spacer version, or a full spacer version. Both versions add an assortment of shaft separation options to the standard S-Flex Endurance coupling line. In addition, the spacer style subassemblies provide the capability of treating the S-Flex Endurance coupling as a 'dropout' style coupling for ease of maintaining the equipment or replacing the sleeve.

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 (Spacer Style)**

| Flange Size 5SC - 14SC | Standard Flanges[3] | Spacer Hubs | Spacer Flange | Sleeve[1] | Cap Screws w/Washers |
|---|---|---|---|---|---|
| Half Spacer[2] | 1 | 1 | 1 | 1 | 4 |
| Full Spacer | 0 | 2 | 2 | 1 | 8 |

**Notes:** 1. Split sleeves may have retaining ring.
2. Half spacer couplings have one side with a standard flange and one side with a spacer arrangement.
3. Includes hardware.

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 spacer 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, hex socket, 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 spacers hubs, flanges, spacer 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, spacer flanges, spacer hub 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 specific BSE for the coupling based on spacer sub assembly combinations.

**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 different than the specified BSE for the Lovejoy S-Flex Endurance coupling, then the spacer hubs may be mounted overhanging equally off the driver and driven shafts so that the distance between the ends of the hubs matches the specific BSE for the coupling as purchased. The amount of shaft engagement should be equal to or greater than the diameter of the shaft.

**3.6** Lovejoy machines the bore in all Lovejoy S-Flex Endurance spacer hubs 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.

**3.7** Lovejoy machines the bore in all Lovejoy S-Flex Endurance spacer hubs 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.

**3.8** Lovejoy machines the bore in all Lovejoy S-Flex Endurance spacer hubs 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 spacer 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 spacer hub. Woodruff keys are usually shorter and may not transmit the same amount of torque.

**4.3** Insert the spacer bolts and lock washers in the spacer hubs starting on the end opposite the pilot prior to placing the spacer hubs on the shafts. Equipment obstructions or shaft lengths may not allow space for these bolts to be installed once mounted on the shafts.

**4.4** Slide the appropriate flange or spacer hub on each of the shafts over the keys and align the face of the hub with the end of the shaft. Lovejoy S-Flex Endurance flange and spacer hubs 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 the first spacer hub to the torque value specified in Table 2. Do not tighten the set screws in the flange hub (half spacer) or second spacer hub (full spacer) at this time to allow for possible axial adjustments later.

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

**4.5** If the shaft separation is not equal to the BSE dimension for the coupling as purchased, the spacer hubs or flange may need to overhang off the end of the shafts equally on both sides. The amount of shaft engagement in the spacer hub should be equal to or greater than the diameter of the shaft.

**4.6** If installing a standard bushing style flange hub, refer to the specific S-Flex Endurance Installation Guide for Standard and Bushing Style couplings. This Installation Guide can be found at the Lovejoy website (lovejoy-inc.com/resources).

**4.7** If the equipment is not already in place, carefully move the equipment together until the separation between the shaft ends is equal to the BSE of the coupling as purchased.

**4.8** When installing a half spacer style coupling, insert the sleeve into the spacer flange. If this is a two piece sleeve, hang the ring in one of the grooves in the sleeve and not into the center slot for operation. This allows for checking alignment in a later step. Place the pilot end of the spacer flange against the spacer hub, thread the spacer bolts into the flange, and hand tighten. The standard flange (half spacer) may need to be moved back on the shaft to allow clearance for the sleeve and spacer flange and should be moved back against the sleeve so that the sleeve serrations mesh with the flange. Use care not to apply any excess pressure on the sleeve.


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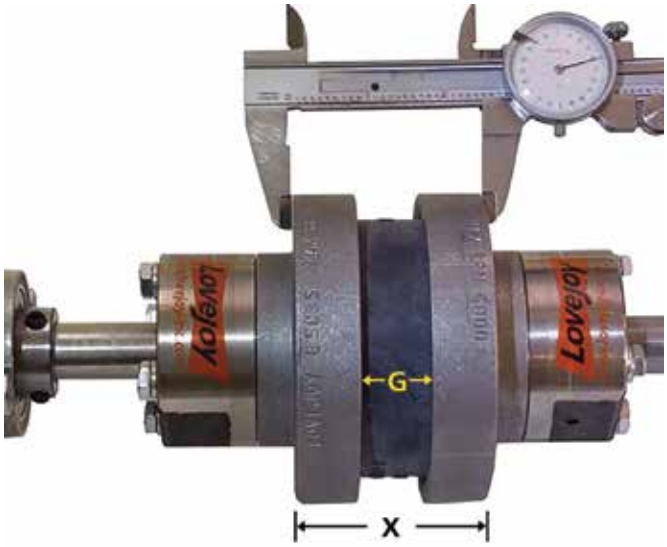
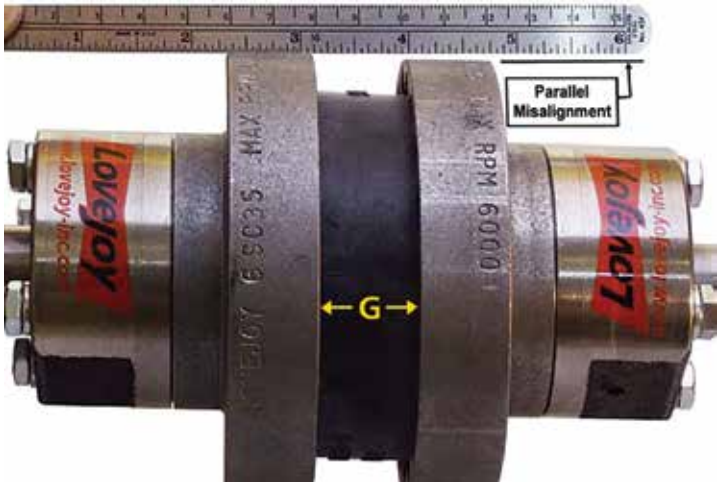
**4.9** When installing a full spacer style coupling, insert the sleeve between the two spacer flanges. If this is a two piece sleeve, hang the ring in one of the grooves in the sleeve and not into the center slot for operation. This allows for checking alignment in a later step. Place the pilot end of the spacer flange against the spacer hub. Thread the spacer bolts into the flange and hand tighten. One spacer hub may have been moved back on the shaft to allow clearance for the center subassembly, but can now be moved against the other spacer flange. Use care not to apply excess pressure on the sleeve.




**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 4.




**4.11** 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 all the spacer bolts to the torque value specified in Table 3 using the industry standard procedure for tightening bolts. Tighten first to 50% of the specified torque, then 75%, then the final torque.

**4.13** Using a calibrated torque wrench tighten the set screws on the second hub to the torque value specified in Table 2.

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

**4.15** Recheck alignment and tightness on the set screws and bushing retaining bolts (B-Style) if applicable.

**4.16** 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.

## 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 coupling and equipment back in service.

**5.2** Loosen the set screws on one spacer hub. Then loosen all the spacer bolts on both sides of the center dropout subassembly. Move the hub back on the shaft until the sub assembly is free of the spacer hub pilot and carefully lower the subassembly from between the two spacer hubs.

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

**5.3** Inspect the sleeve to determine if there are any other issues with the equipment that might need to be resolved prior to replacing the sleeve. See step 5.1 for a description of a couple common failure symptoms.

**5.4** Replace the sleeve with a sleeve of the same material unless approved your local Lovejoy products reseller, or by Lovejoy Technical Support team.

**5.5** To reassemble this coupling, start at step 4.8 and repeat the remaining steps in section 4.

**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 | Spacer Hubs | | Standard Flanges | |
|---|---|---|---|---|
| | Set Screw Size | Tightening Torque ft-lbs | Set Screw Size | Tightening Torque ft-lbs |
| **5** | 1/4 - 20 | 7 | 1/4 - 20 | 7 |
| **6** | 5/16 - 18 | 13 | 5/16 - 18 | 13 |
| **7** | 3/8 - 16 | 23 | 3/8 - 16 | 23 |
| **8** | 3/8 - 16 | 23 | 3/8 - 16 | 23 |
| **9** | 1/2 - 13 | 50 | 1/2 - 13 | 50 |
| **10** | 1/2 - 13 | 50 | 1/2 - 13 | 50 |
| **11** | 1/2 - 13 | 50 | 1/2 - 13 | 50 |
| **12** | 1/2 - 13 | 50 | 1/2 - 13 | 50 |
| **13** | 5/8 - 11 | 100 | 5/8 - 11 | 100 |
| **14** | 5/8 - 11 | 100 | 5/8 - 11 | 100 |

**Table 3 – S-Flex Endurance Type SC Spacer Couplings Cap Screw Torque**

| Coupling Size | SCH Cap Screw Size | SCHS Cap Screw Size | Tightening Torque ft-lbs |
|---|---|---|---|
| **5 SC** | 10-24 x 1-1/2 | – | 4 |
| **6 SC** | 1/4-20 x 1-3/4 | – | 9 |
| **7 SC** | 1/4-20 x 1-7/8 | – | 9 |
| **8 SC** | 5/16-18 x 2-1/4 | – | 18 |
| **9 SC** | 3/8-16 x 2-3/4 | 3/8-16 x 2-1/4 | 31 |
| **10 SC** | 7/16-14 x 3-1/4 | 7/16-14 x 2-1/2 | 50 |
| **11 SC** | 1/2-13 x 3-1/2 | 1/2-13 x 2-3/4 | 75 |
| **12 SC** | 5/8-11 x 4 | 5/8-11 x 3-1/2 | 150 |
| **13 SC** | 5/8-11 x 4-3/4 | 5/8-11 x 3-1/2 | 150 |
| **14 SC** | 5/8-11 x 5 | – | 150 |

**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 | | | 'G' Flange Separation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Parallel | Angular | X-Min | X-Max | Parallel | Angular | X (+/- .015) | in | mm |
| **5** | 7,600 | 0.015 | 0.056 | 1.938 | 1.994 | – | – | – | 0.75 | 19 |
| **6** | 6,000 | 0.015 | 0.070 | 2.438 | 2.508 | 0.010 | 0.016 | 2.500 | 0.88 | 22 |
| **7** | 5,250 | 0.020 | 0.081 | 2.563 | 2.644 | 0.012 | 0.020 | 2.625 | 1.00 | 25 |
| **8** | 4,500 | 0.020 | 0.094 | 2.938 | 3.032 | 0.015 | 0.025 | 3.000 | 1.13 | 29 |
| **9** | 3,750 | 0.025 | 0.109 | 3.500 | 3.609 | 0.017 | 0.028 | 3.562 | 1.44 | 37 |
| **10** | 3,600 | 0.025 | 0.128 | 4.063 | 4.191 | 0.020 | 0.032 | 4.125 | 1.63 | 41 |
| **11** | 3,600 | 0.032 | 0.151 | 4.875 | 5.026 | 0.022 | 0.037 | 4.938 | 1.88 | 48 |
| **12** | 2,800 | 0.032 | 0.175 | 5.688 | 5.863 | 0.025 | 0.042 | 5.750 | 2.31 | 59 |
| **13** | 2,400 | 0.040 | 0.195 | 6.625 | 6.820 | 0.030 | 0.050 | 6.688 | 2.69 | 68 |
| **14** | 2,200 | 0.045 | 0.242 | 7.750 | 7.992 | 0.035 | 0.060 | 7.812 | 3.25 | 83 |

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