Lovejoy Disc Coupling
SXCST Series

NOTE: Read entire Installation and Maintenance Instructions before beginning work.

⚠ 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.

Contact with moving parts and/or rotating shafts poses a risk of serious injury. Proper guards in accordance with OSHA and American Society of Mechanical Engineers standards must be installed on all power transmission equipment. Power transmission equipment should not be started if proper guarding is not in place. Observe all required lock out/tag out procedures when servicing power transmission equipment.

Installation and service should only be performed by qualified personnel.

1.0 Introduction

The following document is intended to aid in the installation of Lovejoy power transmission products. Lovejoy, LLC 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 the coupling is installed. Correct installation and alignment practices will help to ensure longer coupling life, trouble free operation, and a safer operating environment for the coupling. Operational conditions could possibly have changed prior to installation. Please thoroughly review all instructions in this document prior to installing the coupling and placing it in operation. Always follow proper safety guidelines and practices during every phase of the installation. This installation document is part of the purchased product. Retain for future reference.

2.0 Safety

The purchaser of this equipment must assure the equipment is properly assembled, installed, safeguarded, operated, and maintained. Never operate beyond the original equipment manufacturer's specifications. 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, inspect product in accordance with the instructions described in this document. Install proper guards and any suitable safety equipment or procedures as may be necessary, or as may be specified in safety codes. Safety equipment, coupling guards, and shields are not provided by, nor are they the responsibility of Lovejoy, LLC

3.0 Product Inspection

Prior to installation examine the coupling, components, and all hardware for damage that may have occurred as a result of shipping or handling. Refer to the component list to ensure all parts as ordered are present.

Table 1. Component List

Size	Hubs	Mounting (Guard) Ring	Two Piece Split Spacer	Disc Pack	Disc Pack Bolts & Nuts	Hub Bolts
090-6	2	2	1	2	12	12
110-6	2	2	1	2	12	12
132-6	2	2	1	2	12	12
158-6	2	2	1	2	12	12
185-6	2	2	1	2	12	12
202-6	2	2	1	2	12	12
228-6	2	2	1	2	12	12
255-6	2	2	1	2	12	12
278-6	2	2	1	2	12	12
302-6	2	2	1	2	12	12
325-6	2	2	1	2	12	12
345-6	2	2	1	2	12	24
380-6	2	2	1	2	12	24
410-6	2	2	1	2	12	24
440-6	2	2	1	2	12	24

Note: SXCST Series Disc Couplings are shipped unassembled. For maximum protection, store the coupling and all components in the original packaging. Repackage any components and protect them from environmental exposure if extended delays are expected before starting installation.

Measure all parts prior to installation to ensure correctness of parts to meet the application requirements such as the hub bore diameter, shaft diameter, shaft separation, bolt lengths,

and key sizes. Measure the Distance Between Shaft Ends (BSE) dimension from the end of one shaft to the end of the other shaft (see application coupling drawing supplied by Lovejoy Engineering). All sleeves, seals, hub bores, keys, and keyways must be checked for raised metal, nicks, burrs, dents, gouges, etc.

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

4.0 Tools Required

- Calipers
- Sockets and appropriate open-end wrenches
- Calibrated Torque Wrench
- Alignment Equipment
- Oven or heating device for interference fit hubs
- Allen Key

5.0 Component Preparation

Prior to installing, thoroughly clean all exposed surfaces of the coupling and components, including hubs, sleeves, spacers, and any sub-assemblies to remove any protective coatings normally applied by Lovejoy at the factory. These coatings are applied as corrosion protection for the coupling surfaces 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 suffice for this cleaning.

6.0 Hub Installation

6.1 Prior to removing any existing disc coupling, record the Distance Between Shaft Ends (BSE) between the driver and driven equipment and compare this value with the BSE of the Lovejoy SXCST disc coupling in Table 4 to verify the fit of the coupling.

- For all Lovejoy Disc Style Couplings, Lovejoy supplies 'inch' dimensioned straight hub bores with a keyway machined to the industry accepted ANSI/AGMA 9002-B04 Standards' tolerance for interference fit unless otherwise specified. Tapered and spline bores may require special manufacturing and installation consideration.
- For all Lovejoy Disc Style Couplings, Lovejoy supplies 'metric' dimensioned straight hub bores with a keyway machined to the industry accepted ISO 286-2 Standards' tolerance for interference fit unless otherwise specified.

6.2 Once all necessary measurements have been taken and all components are verified as correct, remove the existing coupling and dress the shafts of the driver and driven equipment.
6.3 If the final BSE is the same as the specified BSE of the Lovejoy SXCST disc coupling, the hubs can be mounted flush with the ends of the driver and driven equipment shafts.
6.4 If the final BSE is different than the specified BSE of the Lovejoy SXCST disc coupling, the hubs must be mounted on the driver and driven equipment shafts with the correct distance from the ends of the shafts.

Note: Hubs will be mounted on the driver and driven shafts with the hub flanges facing toward the equipment.

6.5 Tapered and spline bores may require special manufacturing and installation consideration.
6.6 Straight Bore (Clearance Fit): Install the keys in the shaft. The key(s) should have a snug side-to-side fit with a small clearance over the top of the key. To maintain dynamic balance, the key(s) should fit exactly lengthwise and should never be shorter than the length thru bore (LTB) dimension of the hub. Align the key(s) in the shaft, then slide the hub onto the shaft. The key(s) should be flush with the end of the shaft and face of the hub.
6.7 Straight Bore (Interference Fit): This is the default type of bore supplied by Lovejoy for disc coupling hubs. This installation is similar to Clearance Fit hubs except that these hubs need to be heated prior to sliding the hubs onto the shafts. When installing Interference Fit hubs, make sure clearance exists over the top of the key(s); otherwise, when the hub cools, the hub keyway will rest on the key and produce high stresses in the keyway that could cause the coupling to fail. To maintain dynamic balance, the key(s) should fit exactly lengthwise and should never be shorter than the length thru bore (LTB) dimension of the hub. Align the key(s) in the shaft, then slide the hub onto the shaft. The key(s) should be flush with the end of the shaft and face of the hub.
6.8 Prior to mounting the hub, heat the hub uniformly to a temperature of at least 350º F (177º C) but no greater than 450 º F (232 º C) using an oil bath, induction heater, or oven.

NOTE: Hubs may discolor when heated. This is normal.

CAUTION

Failure to follow this caution may result in damage to the coupling components.

Do not spot heat the hub in single areas or distortion of the hub could occur. Do not exceed 450º F (232º C) during the heating process. Excessive heat can soften, or anneal the hub, reducing the strength of the steel thus affecting the performance characteristics of the hub.
When heating hubs using oil or oven method, do not rest the hubs on bottom of oil container or on floor of the oven.
If there is not a minimum of .005" (0.13mm) clearance between the top of the key and the hub keyway, then the hub cools, the keyway will rest on the key creating high stresses in the hub that could cause the hub to fail.

6.9 Mount the hubs on the proper shafts and ensure the face of the hub is even with the end of the shaft. Line up the key with the end of the shaft and face of the hub. Once mounted on the shaft, allow the hubs to cool completely before continuing.

7.0 ASSEMBLY

7.1 Once hubs have been properly installed on the shafts, move the equipment into position and the align shafts (see Machinery Alignment Section of this document). Ensure the distance between the surfaces of the hubs equals the recommended BSE value specified in the chart located in Table 4.

- If the hubs were mounted flush with the ends of the driver and driven shafts, then position the equipment so that the actual shaft separation matches the BSE specified in Table 4.
- If the hubs were not mounted flush with the end of the driver and driven shafts, then position the equipment with the distance between the mounting rings' flange faces equal to the length of the split spacer.
- For either condition, the distance between the mounting rings flange faces must be the same as the length of the split spacer.

7.2 With the hubs installed on the shafts and oriented as shown in the drawing at the end of this document, the disc packs can be mounted to the hubs.
7.3 Apply a light coating of grease to the flat face on each side of the disc pack bushings. This is necessary to keep the disc packs from binding while the locknuts are being tightened to the recommended torque settings. Without the lubricant, the bushings could twist causing the disc packs to buckle halfway between the bushings. Remove and reinstall the disc packs if excessive waviness or leaf separation occurs in the disc packs when tightening the bolts to the specified torque.
7.4 Mount the disc packs to each hub by inserting the three bolts for each disc pack through the flange face on the hub then through the disc pack. Then hand tighten the three locknuts against the disc pack bushings. Do not torque the locknuts at this time. Do not use power tools to tighten nuts onto disc pack bolts as this may cause friction welds.
7.5 Install the mounting rings to each disc pack by inserting the three bolts for each disc pack through the mounting ring, then the disc pack, and hand tighten the three locknuts. Do not torque the locknuts at this time.
7.6 Tighten all the disc pack bolts and locknuts to the torque settings specified in Table 2. Either the hub side or the mounting ring side of the disc pack may be tightened first. Torque all three locknuts on same side of the disc pack before tightening locknuts on the opposite side to the specified torque.

Note: If room permits, always tighten the locknut, not the bolt since part of the tightening torque is needed to overcome friction. Normally additional friction is encountered when turning the bolt and more effort goes towards overcoming friction than into stretching the bolt.

7.7 Properly seat the bolt before tightening the locknut. Drawing the bolt through the flange and bushing by tightening the locknut could result in insufficient preloading of the bolt.
7.8 Locknuts should be tightened to the recommended torque specification in the following steps:
7.8.1 Alternate tightening the locknuts to 25% of the recommended value in a crisscross pattern and continue tightening the locknuts by increasing the tightening torque by 25% in a crisscross pattern until reaching the recommended torque value.
7.8.2 Check the first locknut to verify it meets the torque specification. If it does not meet the specification continue tightening the locknuts in a crisscross pattern until reaching the recommended torque value.
7.9 Mount the bottom half of the split spacer by inserting all the spacer bolts and hand tighten each of the locknuts. Do not torque the locknuts at this time.
7.10 Mount the top half of the split spacer by inserting all the spacer bolts and hand tighten each of the locknuts. Do not torque the locknuts at this time.
7.11 Torque bolts on both sides of the split spacer following the tightening procedure in the following section.

8.0 SPACER BOLT TIGHTENING PROCEDURE

Tighten the spacer bolts per the following steps to the recommended torque as specified in Table 3:

8.1 Alternate tightening bolts in a crisscross fashion to one half of the torque value as specified in Table 3.

8.2 Once all bolts have been tightened to half of the torque tightening value, follow the same crisscross pattern and torque to the final torque value as specified in Table 3.

8.3 Finally, check the first bolts tightened to assure they have maintained the proper torque value after all locknuts have been tightened, if it does not meet the torque value specified in Table 3, follow the same crisscross pattern and torque all bolts again.

9.0 MACHINERY ALIGNMENT

Optical methods of alignment (such as Laser) are highly recommended. The useful life of any Disc Coupling is directly influenced by the operating misalignment. It is common knowledge that the better the alignment, the longer the coupling life. Even after the coupling has been placed in service, the alignment should be checked periodically. Even when a coupling is well aligned at installation, subsequent settling of foundations, shifting of equipment, etc., may cause the alignment to deteriorate. Realignment of the equipment may not be necessary if all eight of the Disc Pack Width (PW) measurements defined in step 9.5 are within acceptable limits. If the equipment can be realigned without much movement of the equipment (Only adding a few adjustment shims to the corners of the equipment), then the disc coupling may remain in place during the alignment procedure. If major equipment movement is required, such as removing all adjustment shims from one or more corners of the equipment, then the disc spacer and disc packs should be removed prior to the alignment procedure and reinstalled after the equipment is aligned.

9.1 The Axial Displacement between shafts during installation should not exceed 20% of the allowable displacement specified in Table 4. This displacement is a function of the coupling size and the number of bolts utilized. The larger the size, the larger the allowable axial displacement. Axial displacement creates large stresses in the disc pack. For a long life, it is recommended that the axial spacing of the shafts should be positioned so that the disc pack is completely flat when the equipment is operating under normal conditions. This means there is a minimal amount of waviness in the disc pack when viewed from the side. This will result in a flexing element, or disc pack, that is properly centered and parallel to its mating flange faces. Move the connecting equipment or the hubs on their respective shafts to accomplish this.

9.2 Soft Foot: The equipment must sit flat on its base. Any "soft foot" must be corrected prior to placing the coupling in service.

9.3 Thermal expansion of the shafts should be carefully considered. Example: if the distance between shaft ends change by 0.015" (the shafts are coming closer to each other) as equipment heats up from cold to hot, the distance between shaft ends with the machinery still cold should intentionally be made larger by 0.015" when installing the coupling is installed.

9.4 Equipment should be checked for "Magnetic Centering" (Please see the Lovejoy Document "Magnetic Center Alignment" document available through Lovejoy Technical Support.

9.5 Measurements of the gap for the pack width (PW) should be made to ensure proper axial and angular alignment. This can be done with the disc packs in place. The PW dimension is the Gap between the mounting ring and the flange face on the hub (see the PW dimension in the drawing on page 5). These measurements should be taken using accurate calipers and the measurements should be recorded for each disc pack gap at four radial locations (approximately 3, 6, 9 & 12 O'clock) as the final step in the installation.

- If the PW dimensions at each suggested location on each disc pack gap are within the upper and lower limits specified in Table 4, the installation is complete.
- If the gap or PW dimensions as measured are not within the limits as specified in Table 4, calculate the average of the PW measurements for the driver and driven side of the coupling. Calculate the difference between the recorded average PW value and the recommended PW value in Table 4 for the driver and driven sides of the coupling. This represents the how much to adjust the hubs or equipment on each side of the coupling. A positive number indicates expanded disc packs and the need to move the hubs closer together. A negative number indicates compressed disc packs and the need to move the hubs further apart. Even though the hubs do not need to be moved, if there is at least one PW measurement that is beyond the upper or lower limit, the equipment will need to be realigned.

10.0 INSPECTION AND MAINTENANCE

For inspection or replacement of the disc packs see Lovejoy's "Disc Coupling Inspection & Maintenance Instructions" which can be found on the Lovejoy web site http://www.lovejoy-inc.com / Resources Tab / Installation Instructions Button / Technical Data Section.

Table 2. Lovejoy Disc Pack Bolts & Locknuts

Size	Socket Size		Clearance Hole		Torque Wrench	Bolt Torque			
	Bolt Size	Nut Size	Diameter	Diameter	Drive Size	Lubricated Threads		Dry Threads	
	mm	mm	in	mm	in	ft-lbs	Nm	ft-lbs	Nm
090-6	10	10	0.63	16	1/4	8	11	10	14
110-6	13	13	0.827	21	3/8	18	24	22	30
132-6	13	13	0.827	21	3/8	18	24	22	30
158-6	17	15	1.024	26	3/8	35	48	44	60
185-6	19	18	1.26	32	3/8	59	80	74	100
202-6	22	21	1.378	35	1/2	89	120	111	150
228-6	24	24	1.457	37	1/2	136	184	170	230
255-6	30	30	1.772	45	3/4	266	360	332	450
278-6	30	30	1.811	46	3/4	266	360	332	450
302-6	32	32	1.968	50	3/4	354	480	443	600
325-6	32	32	2.047	52	3/4	354	480	443	600
345-6	36	36	2.205	56	3/4	460	624	575	780
380-6	41	41	2.362	60	1	649	880	811	1100
410-6	46	46	2.677	68	1	885	1200	1106	1500
440-6	50	50	2.913	74	1	1180	1600	1475	2000

Note: Please be advised that the Clearance Hole Diameter of the coupling may be smaller than the Outside Diameter of some typical sockets. The socket's OD may have to be turned down to 0.76 mm (0.030") smaller than the coupling's clearance hole diameter. For additional information, please contact Lovejoy's Application Engineering.

Table 3. SXCST Spacer Bolts

Hub Size	Bolt Qty & Size		Tightening Torque Dry ft-lbs	Dry Nm	Lubricated ft-lbs	Lubricated Nm
090-6	12	M6 x 20	11	15	8.8	12
110-6	12	M8 x 25	26	35	21	28
132-6	12	M8 x 25	26	35	21	28
158-6	12	M10 x 30	51	69	41	55
185-6	12	M12 x 40	89	120	71	96
202-6	12	M14 x 45	140	190	112	152
228-6	12	M16 x 50	218	295	175	236
255-6	12	M20 x 60	428	580	343	464
278-6	12	M20 x 60	428	580	343	464
302-6	12	M22 x 70	575	780	460	624
325-6	12	--	--	--	--	--
345-6	24	--	Please consult with			--
380-6	24	--	Lovejoy Engineering			--
410-6	24	--	regarding these sizes			--
440-6	24	--	--	--	--	--

Table 4. Axial Tolerance

Size	Axial Misalignment ±ΔKa in	Axial Misalignment ±ΔKa mm	Angular Misalign Max Degree	BSE Shaft Separation in	BSE Shaft Separation mm	Disk Pack Width (PW) - Gap: Standard Pack Width (PW) PW in	PW mm	Tolerance + / - in	Tolerance + / - mm	PW + / - Dimensions: Low in	Low mm	High in	High mm
090-6	0.030	0.75	1.5°	0.46	11.6	0.295	7.5	0.003	0.08	0.292	7.43	0.298	7.58
110-6	0.041	1.05		0.68	17.2	0.331	8.4	0.004	0.11	0.327	8.30	0.335	8.51
132-6	0.051	1.30		0.38	9.7	0.331	8.4	0.005	0.13	0.326	8.27	0.336	8.53
158-6	0.061	1.55		0.50	12.7	0.441	11.2	0.006	0.16	0.435	11.05	0.447	11.36
185-6	0.073	1.85		1.23	31.2	0.551	14.0	0.007	0.19	0.544	13.82	0.558	14.19
202-6	0.075	1.90	1°	1.00	25.4	0.610	15.5	0.007	0.19	0.603	15.31	0.617	15.69
228-6	0.083	2.10		1.40	35.6	0.689	17.5	0.008	0.21	0.681	17.29	0.697	17.71
255-6	0.093	2.35		2.23	56.6	0.807	20.5	0.009	0.24	0.798	20.27	0.816	20.74
278-6	0.102	2.60		1.47	37.3	0.835	21.2	0.010	0.26	0.825	20.94	0.845	21.46
302-6	0.112	2.85		2.19	55.6	0.961	24.4	0.011	0.29	0.950	24.12	0.972	24.69
325-6	0.128	3.25		1.10	28.0	1.024	26.0	0.013	0.33	1.011	25.68	1.037	26.33
345-6	0.136	3.45		1.18	30.0	1.110	28.2	0.014	0.35	1.096	27.86	1.124	28.55
380-6	0.150	3.80		1.34	34.0	1.260	32.0	0.015	0.38	1.245	31.62	1.275	32.38
410-6	0.161	4.10		1.38	35.0	1.307	33.2	0.016	0.41	1.291	32.79	1.323	33.61
440-6	0.173	4.40		1.50	38.0	1.433	36.4	0.017	0.44	1.416	35.96	1.450	36.84