Lovejoy/Sier-Bath Gear Couplings

Lovejoy offers a variety of designs and models in its gear coupling family. From standard, off-the-shelf stock to new, high speed, special designs, Lovejoy can satisfy your gear coupling needs.

Continuous and Flanged Sleeve
The original Continuous Sleeve, or “C”, coupling offers a lightweight, compact, and simple design without compromising torque carrying capacity. The Flanged Sleeve, or “F”, coupling is available in exposed or shrouded bolt styles in which the number of bolts, size of bolts, and bolt circle are identical with industry standards. Within these two basic product lines, modifications and variations exist to serve a wide variety of applications such as extended distances between shaft ends, Mill Motors, limited end float, or vertical. Many designs can be created for unique applications as well.

WARNING
You must refer to page iv for Important Safety Instructions and Precautions for the selection and use of these products. Failure to follow the instructions and precautions can result in severe injury or death.
**Lovejoy/Sier-Bath Continuous Sleeve Series**

**Absorbs Misalignment, End-Float**
The basic principle of the Lovejoy/Sier-Bath Gear Coupling is similar to that of conventional flexible gear couplings. While it is desirable to align shafts as accurately as possible, the purpose of any flexible coupling is to absorb probable misalignment (angular and offset), and end-float. The Lovejoy/Sier-Bath Coupling accomplishes this through the rocking action of the hubs in the sleeve.

**Simplified Method of Closure**
The essential difference between the Lovejoy/Sier-Bath Coupling and conventional types is its simplified design. This is made possible by the advanced assembly and lubrication sealing arrangement, which eliminates the need for cumbersome flanges, bolts and nuts. BUNA N lubrication seals and steel snap rings hold in the lubricant and provide the means of assembly.

**Standard Types and Sizes**
Lovejoy/Sier-Bath Couplings are stocked in Standard, Mill Motor, Vertical, Floating Shaft and Spacer Types—sizes 7/8 to 12, to accommodate bores up to 12.50”. Load capacities range from 4 to 4,000 HP per 100 RPM.

**Special Types and Sizes**
Many special types have been manufactured, such as Brakedrum Type, Sliding Hub Type, Jordan Type, etc. Specifications on sizes larger than standard are available. Size range is virtually unlimited. Exceptional simplicity makes great design flexibility possible. Unusual requirements can also be met.

**Features and Benefits of Continuous Sleeve Type Couplings**
- Simple and inexpensive type of gear coupling.
- All steel sleeves and hubs.
- Reinforced rubber seals with steel snap rings to hold lubricant in place.
- Available as vertical and horizontal couplings.
- Wide variety of special variations available such as full-flex, flex–rigid, mill motor, floating shaft and spacer types.
- Standard configurations are available off-the-shelf.

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**Two Hubs — One Sleeve**
Major components are machined from medium carbon steel. Gear teeth are precision cut 20° pressure angle with minimum backlash and are smaller for even distribution of load, greater capacity, and longer life. Interference fit on bore is standard.

**Two Seals**
The seals are made of BUNA N with two reinforcing washers bonded to the inside faces which positively retain lubricant and seal interior against foreign matter. Seals are patented Lovejoy/Sier-Bath design and are tested.

**Two Snap Rings**
The spiral wound rings are made of oil hardened spring steel and securely hold the coupling together. Each ring is simple to install and remove yet withstands over 100,000 pounds of end-thrust.
Lovejoy/Sier-Bath Flanged Sleeve Series
Misalignment and End-Float Capability

The Lovejoy/Sier-Bath Flanged Sleeve gear coupling is a flexible coupling that compensates for angular misalignment, parallel misalignment, and end float. Angular and parallel misalignment, and combinations thereof, will result in angular misalignment at the gear mesh. Lovejoy/Sier-Bath Flanged Sleeve couplings can accommodate $1\frac{1}{2}^\circ$ of relative angular misalignment in each gear mesh up to size 5$\frac{1}{2}$. Sizes 6 and larger can accommodate $\frac{3}{4}^\circ$ of angular misalignment at each gear mesh. The hub teeth are fully crowned to provide for a larger contact area and lower stresses under misaligned conditions. The crowned tooth design also avoids the end loading that occurs on straight teeth under misalignment.

Features and Benefits of Flanged Sleeve Couplings
- Patented Vari-Crown® tooth form for long life.
- Standard 20° pressure angle.
- Heat treated bolts for greater strength.
- Bolts and nuts are coated for corrosion resistance and ease of maintenance.
- Interchangeable with industry standards.
- Large bore and torque capacities.
- Piloted gear fit for higher speeds and less vibration.
- Interference fit on bore is standard.

Standard and Special Types and Sizes
The standard Flanged Sleeve series is offered in exposed and shrouded bolt patterns through size 5$\frac{1}{2}$. The exposed bolt pattern is available for sizes larger than size 6. It has the same number of bolts, size of bolts, and bolt circle as industry standards up to size 7. Heat treated bolts are plated for corrosion resistance.

Modifications and variations of the standard Flanged Sleeve coupling exist to suit specific or unique applications. Sizes can go as large as size 30 which can accommodate up to 54" bores. Insulated couplings, Jordan types, extended slide, vertical, brakedrum, and continuously lubricated are some of the special designs that can be made.
**Vari-Crown Tooth Form**

**Straight**
With straight hub teeth, there is a high concentration of load under misaligned conditions. As misalignment increases, more of the load is carried by the ends of the teeth, resulting in premature breakdown and coupling failure.

**Conventional Crown**
Some manufacturers use a conventionally crowned hub tooth known by various trade names. Regardless of the nomenclature, however, the contour of the tooth is a segment of an arc. Under all operating conditions, equal or similar contact areas between the hub teeth and the sleeve teeth exist.

**Lovejoy/Sier-Bath Vari-Crown**
The Sier-Bath Vari-Crown tooth form has a crown at the center of the tooth which is similar to a conventionally crowned tooth coupling. However, as soon as misalignment occurs, the transmitted torque is carried on a flattened area of the hub tooth which is considerably broader and stronger than the conventionally crowned tooth form. Note the larger contact area and reduced stress area of the Vari-Crown tooth form.

**Patented Vari-Crown Tooth Form for Long Life**

**Facts**
- It can be shown\(^1\) that bodies with the smallest relative curvature have the largest area of contact under load, or specifically, a body with the largest radius of curvature has the largest area of contact with another body when under load. More importantly, under a given load the bodies with the greater radii of curvature have lower induced surface contact stresses.

- Gear tooth couplings have fewer teeth in contact as misalignment increases.

**Lower Stresses**
Lovejoy/Sier-Bath’s solution to these facts was the development of the patented Vari-Crown tooth form. The Vari-Crown tooth form is a curve with constantly changing radii of curvature. The tooth contact area under misaligned conditions has a much larger radius of curvature than conventional crowning. The contact area is larger, thus reducing the unit stress.

**Notes:**
1. Hertz’s study of contact stresses of curved surfaces.

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**Constant Velocity Power Transmission**
Lovejoy/Sier-Bath produces the Vari-Crown tooth form by a generating method maintaining the necessary characteristics for conjugate tooth action, which are:

1. Constant normal base pitch at any position on the crowned teeth.
2. Correct pressure angle matching of the normal to the curved surface and the sleeve surface at any position of misalignment.

**Less Backlash**
The tooth design requires less backlash for a given angle of misalignment than the conventional or circular arc crown. In many applications this is a desirable feature in a gear tooth coupling.
Gear Couplings

Gear Coupling Selection Process

Factors Affecting Selection
Following is a list of factors that may have to be considered. No priority can be put on these factors. Factors have to be weighed based on specifications and what is technically, environmentally, and economically feasible.

Only a few of these factors will come into play on any one application.
- Interchangeability with other brands.
- Bore size capacity.
- Torque capacity.
- Maximum speed capacity.
- Special balancing.
- Weight or low inertia.
- Previous purchase history.
- Availability.
- Alignment requirements.
- Rebore capability.

Finding the Right Type of Coupling
For any one application you will find that only a few of the factors listed will have a high priority. List those priorities. This will be very helpful in picking the right type of coupling.

Selection of Type
Refer to Gear Coupling Selection Charts shown on pages G-15 through G-17. These charts summarize all Lovejoy Gear Coupling products and show individual product capacities. List the factors that are most important to selection of the right type of coupling. By the process of elimination you will eliminate those types that do not apply to the application. Here are a few examples.
1. If an exact retrofit is required all other types of couplings are eliminated from contention.
2. A retrofit or a close proximity will narrow the choices.
3. High Speed requirements eliminate all non high speed couplings or those that cannot be balanced for the RPM required.
4. Spacer or floating shaft couplings eliminate all other types.
5. Torque or HP/100 RPM requirements sometimes eliminate certain coupling types. For instance, if the application has a required torque of 2,000,000 inch pounds, smaller capacity coupling types would not be considered.

Selection of Size
Once the best type has been chosen then the coupling size is determined.
Make a list of the physical attributes required, using the following list as a guideline:
- Bore and Keyway
- Bore tolerances if specified
- Nominal torque
- Peak torque a) at startup b) during operation.
- HP/100 RPM required
- Nominal RPM
- Balance tolerances if specified
- Shaft separation- BSE
- Driven equipment description, for use in applying a service factor.
- Shrouded or exposed bolts
- For modified or engineered couplings more information has to be recorded. Please consult Lovejoy Engineering.

Application Service Factors
No additional service factor should be applied if the driver side input HP or torque has already compensated for the load characteristics. By knowing the actual torque load we can compare this with the driver side torque available. If there is enough service factor applied to the driver side then match the coupling torque to the driver torque. This may be especially important if the coupling is being used between a speed reducer and the driven machine.

After the torque or horsepower is known, a service factor may have to be applied. Refer to page G-14 for the Gear Coupling Application Service Factors chart.

Application service factors are applied in order to give reasonably good life to the coupling to prevent premature wear of gear teeth and do not guarantee that the coupling will last indefinitely. Application service factors cannot compensate for poor alignment, improper selection or overlooked environmental conditions. No amount of application service factor can compensate for having selected the wrong size of coupling.

Step by Step Procedure
Having considered the preceding, the selection process steps are:
1. Choose the gear coupling series and type that meets the application requirement.
2. Determine the nominal torque in in-lbs of your application by using the following formula:
   \[ \text{Nominal Torque} = \frac{\text{in-lb} \times (\text{HP} \times 63025)}{\text{RPM}} \]
   \[ \text{Nm} = \frac{(\text{KW} \times 9550)}{\text{RPM}} \]
3. Find the application in the Application Service Factor chart. Multiply the nominal torque by the application service factor to determine the total required torque.
4. Compare the required torque to the maximum torque capacity found in the Gear Coupling Selection chart for the coupling type selected.
5. Check that the maximum bore size and the maximum RPM of the coupling type selected are capable of meeting the application requirements.
6. Specify any special requirements. This includes the BSE dimension for floating shaft and spacer types, shear pin torque, slide coupling detail, and mill motor tapered shaft data.

Lovejoy Engineering will assist with any application problem.
Gear Coupling Examples

Selection Example 1: Flanged Coupling
The application is a 400 HP electric motor driving a high pressure centrifugal water pump. RPM is 3600. The motor shaft is 2.375\( \frac{\text{in}}{\text{H}11542} \). Pump shaft is 2.875\( \frac{\text{in}}{\text{H}11542} \). A flange type coupling is requested.

Step 1: Since a flange type is specified, this eliminates the “C” series. Choose the “F” series.

Step 2: Refer to pages G-20 and G-21 for Flanged Series Double Engagement coupling information. Review of the bore size compatibility shows that Size F 2\( \frac{1}{2} \) is requested to accommodate a 2.875\( \frac{\text{in}}{\text{H}11542} \) shaft requirement.

Step 3: Using the Application Service chart on page G-14, notice that the application service factor for centrifugal pumps is 1.0.

Step 4: Check the power capacity. Find the HP/100 RPM required for 400 HP at 3600 RPM.

\[
\frac{\text{HP}}{100 \text{ RPM}} = \frac{400 \times 100}{3600} = 11.11
\]

The size F 2\( \frac{1}{2} \) is rated at 90 HP/100 RPM. The coupling may seem too large, but it is needed to accommodate the maximum shaft size of 2.875\( \frac{\text{in}}{\text{H}11542} \).

Step 5: Check the RPM. Size F 2\( \frac{1}{2} \) is rate for 4400 RPM Max.

Step 6: Specify any special requirements, such as shaft fit, coatings, etc.

Step 7: Referring to the Gear Coupling Selection chart, the code for this coupling is F (size). Specify F 2\( \frac{1}{2} \) and give the bore and keyway data. All couplings in this series are made with an interference fit in the bore unless otherwise specified.

Selection Example 3: Floating Shaft Coupling
The application requires a test stand dynamometer to be driven by a DC motor. The products tested are subject to occasional shock load of not more that 2x running torque and not more often than four times an hour. Design HP 1440 at 1000 RPM, with 3000 RPM maximum. The shafts are 20\( \frac{\text{in}}{\text{H}11542} \) apart (BSE) and shaft sizes are 4.000\( \frac{\text{in}}{\text{H}11542} \) and 3.500\( \frac{\text{in}}{\text{H}11542} \). The outside diameter cannot exceed 10\( \frac{\text{in}}{\text{H}11542} \), and must be greased packed.

Step 4: The size 2\( \frac{1}{2} \) is only rated for 90 HP/100 RPM. Therefore, size 3 with a rating or 150 HP/100 RPM is required. This has an OD of 9.44\( \frac{\text{in}}{\text{H}11542} \) (rigid); the OD is 8.38\( \frac{\text{in}}{\text{H}11542} \).

Determine the HP/100 RPM for the application.

\[
\frac{\text{HP}}{100 \text{ RPM}} = \frac{1440 \times 100}{1000} = 144
\]

No service factor is listed for dynamometer drives, but the shock load is not high and is infrequent and probably not a factor in the life of the coupling. Therefore, selection will be based on the 144 HP/100 RPM.

Step 5: Since the RPM peaks at 3000, and the BSE is 20\( \frac{\text{in}}{\text{H}11542} \), the application must be submitted to engineering.

Step 6: State any special requirements.

Step 7: Referring to the Gear Coupling Selection chart, the code for this coupling is FFS (size). Specify FFS 3 and give the bore and keyway data. All couplings in this series are made with an interference fit in the bore unless otherwise specified.

Lovejoy engineering will assist in any application problem.
### Application Service Factors for Gear Couplings

Values contained in the table should be used as a general guide and are to be applied to smooth power sources such as electric motors and steam turbines. For drives involving internal combustion engines add 1.0 to the values listed.

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# Lovejoy/Sier-Bath “C” Continuous Sleeve Series

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<th>Size Range</th>
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<th>Max. RPM</th>
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<td>Specifications</td>
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**Notes:**
1. These are maximum values. For reasonable life expectancy and low reactionary loads, the misalignment should not exceed ¾° for small couplings and ½° for larger couplings.
2. The maximum RPM of a Floating Shaft coupling set may be determined by the critical speed of the floating shaft itself.
3. Maximum RPM may be determined by dimensions of spacer.
### Lovejoy/Sier-Bath “F” Flanged Sleeve Series

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<td>G-34</td>
<td>1-9</td>
<td>1.625-12.000</td>
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<td>Standard Heavy Duty</td>
<td>FHD</td>
<td>G-35</td>
<td>7-30</td>
<td>9.750-45.500</td>
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<td>FFR</td>
<td>G-36-37</td>
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<td>1.625-45.500</td>
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<td>1-3/8°</td>
<td>X X X</td>
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<tr>
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<td>FFS</td>
<td>G-36-37</td>
<td>1-30</td>
<td>1.625-45.500</td>
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<td>6,000-220-220</td>
<td>3°-3/8°</td>
<td>X X X</td>
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<td>FMM</td>
<td>G-38-39</td>
<td>1-6</td>
<td>1.625-8.000</td>
<td>7,600-750,000-87,746</td>
<td>6,000-2,100-2,100</td>
<td>3°-1-3/8°</td>
<td>X X</td>
</tr>
<tr>
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<td>FSL</td>
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<td>1.625-9.000</td>
<td>7,600-1,008,400-113,944</td>
<td>6,000-2,000-2,000</td>
<td>3°-1-3/8°</td>
<td>X X X</td>
</tr>
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<td>3°-1-3/8°</td>
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<td>0°</td>
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**Notes:**
1. These are maximum values. For reasonable life expectancy and low reactionary loads the misalignment should not exceed 3/4° for small couplings and 1° for larger couplings.
2. The maximum RPM of a Floating Shaft coupling set may be determined by the critical speed of the floating shaft itself.
3. Maximum RPM may be determined by dimensions of spacer.
4. Consult Lovejoy Engineering for Metric Bores over 500 mm.
After review of the selection process, the examples and the general selection information on pages G-12 through G-17, you can use the following charts to obtain specific information on torque capability, maximum bore, maximum misalignment, lubrication quantities and weights. For convenience, data is listed in English and metric units.

Continuous Sleeve Series (C) ......................................................... charts 1, 2, 3
Flanged Sleeve Series (F) .......................................................... charts 4, 5, 6, 7

**Continuous Sleeve Series**

**Chart 1**

<table>
<thead>
<tr>
<th>Size C</th>
<th>Capacity HP @ 100 RPM</th>
<th>Torque (in-lb x 10^3)</th>
<th>Shear Pin Torque RPM</th>
<th>Max. Speed Unbalanced</th>
<th>Parallel Misalignment</th>
<th>Grease Capacity</th>
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<td>.005</td>
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<td>5,000</td>
<td>.007</td>
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Notes: 1. Max Speed Balanced — Approximately 3 Times Speed Shown Unbalanced
2. Horsepower, Torque, and Parallel Misalignment Capacity for sizes 7/8 through 3 1/2 are based on 1/8° misalignment per gear mesh.
3. Horsepower, Torque, and Parallel Misalignment Capacity for sizes 4 through 12 are based on 1/4° misalignment per gear mesh.

**Chart 2**

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<th>Size C</th>
<th>Flex-Flex (mill motor)</th>
<th>Flex-Universal (mill motor)</th>
<th>Floating Shaft (cplg only – no shaft)</th>
<th>Spacer (cplg only – no spacer)</th>
<th>Cut-out Shifter</th>
<th>Shear Pin</th>
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Determined By W and OD Dimension

**Table of Contents**

Gear Couplings

VIRTUS

Power Transmission

G-11
Continuous Sleeve Series Con’t.

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<th>Size C</th>
<th>Rough Bore</th>
<th>Maximum Bore</th>
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<td>inch mm</td>
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Note: 1. Bores and Keyways are standard per AGMA 9002-A86 for inch sizes through 9.000; see page ED-17 in Engineering Data section, Metric Bores are per ISO R286 and Keyways are per DIN 6885; see page ED-15 in Engineering Data section.

2. These bores have a reduced keyway.

Flanged Sleeve Series Sizes 1 to 9

<table>
<thead>
<tr>
<th>Size F</th>
<th>Rough Bore</th>
<th>Capacity</th>
<th>Max. Speed</th>
<th>Parallel</th>
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<td>Unbal³ RPM</td>
<td>Misalignment</td>
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<td>in mm</td>
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</table>

Notes: 1. Horsespower Torque Capacity and Parallel Misalignment
   Capacity for sizes 1 through 5½, are based on 1½° misalignment per gear mesh and maximum bore. Consult Lovejoy for greater capacity.

2. Horsepower, Torque Capacity and Parallel Misalignment
   Capacity for sizes 6 through 9 are bases on ¾° misalignment per gear mesh and maximum bore. Consult Lovejoy for greater capacity.

3. For couplings operating at higher speeds, consult Lovejoy engineering.
Flanged Sleeve Series Sizes 1 to 9 con’t.

<table>
<thead>
<tr>
<th>Size</th>
<th>Lube Capacity flex-flex</th>
<th>Lube Capacity flex-rigid</th>
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<tr>
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<td>Weight US</td>
<td>Volume US</td>
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<tr>
<td>1</td>
<td>2 oz</td>
<td>57g</td>
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<tr>
<td>1½</td>
<td>4 oz</td>
<td>113 g</td>
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<tr>
<td>2</td>
<td>6 oz</td>
<td>163 g</td>
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</table>

2½% 11 oz | 297 g | 12 oz-liq | 355 mL | 5 oz     | 149 g | 6 oz-liq | 178 mL |
3    1.0 lb | 454 g | 18 oz-liq | 533 mL | 0.5 lb    | 227 g | 9 oz-liq | 266 mL |
3½   1.3 lbs | 568 g | 24 oz-liq | 710 mL | 0.6 lb    | 284 g | 12 oz-liq | 355 mL |
4    2.0 lbs | 908 g | 1.1 qts | 1.1 L  | 1.0 lb    | 454 g | 18 oz-liq | 532 mL |
4½   3.5 lbs | 159 kg | 2.0 qts | 1.9 L  | 1.8 lbs   | 795 g | 10 qt    | 946 mL |
5    4.5 lbs | 204 kg | 2.5 qts | 2.4 L  | 2.3 lbs   | 1000 kg | 1.3 qts | 1.2 L  |
5½   6.5 lbs | 295 kg | 3.5 qts | 3.3 L  | 3.3 lbs   | 1500 kg | 1.8 qts | 1.7 L  |
6    7.3 lbs | 329 kg | 1.0 gal | 3.8 L  | 3.6 lbs   | 1800 kg | 0.5 gal  | 1.9 L  |
7    9.3 lbs | 420 kg | 1.3 gals | 4.7 L | 4.6 lbs   | 2100 kg | 0.6 gal  | 2.4 L  |
8    18 lbs | 795 kg | 2.3 gals | 8.5 L | 8.8 lbs   | 4000 kg | 1.1 gals | 4.3 L  |
9    20 lbs | 908 kg | 2.8 gals | 10.4 L | 10.0 lbs  | 5000 kg | 1.4 gals | 5.2 L  |
The One-Piece Sleeve Gear Coupling

One-piece steel sleeve Internal teeth run full working length

Steel hubs

Keyway

Gear teeth precision-cut, evenly spaced

Lubrication holes (2)

Draw-off holes (Optional)

Reinforced rubber lubrication seals held in by snap rings

Oil-hardened spring steel snap rings positioned by grooves in sleeve

The One-Piece Sleeve Gear Coupling
Lovejoy/Sier-Bath Continuous Sleeve Series “C” and “CFR”

*Flex-Flex*

The basis for all types of Lovejoy/Sier–Bath Continuous Sleeve Flexible Gear Couplings. Suitable for most applications. Great simplicity allows inexpensive adaptation to a wide variety of special types.

*Flex-Rigid*

The Flex-Rigid Gear Coupling consists of a flexible hub and rigid hub with a single sleeve. The flexible hub is a standard reborable hub. The rigid hub uses a splined reborable type hub. Flex-Rigid type gear couplings are most commonly used in floating shaft applications, or on line shafting to accommodate axial expansion. The Flex-Rigid coupling accommodates angular misalignment only.

Use These Specifications for Both Standard & Vertical Shaft Type.

<table>
<thead>
<tr>
<th>Standard Flex-Flex</th>
<th>Flex-Rigid</th>
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<tr>
<td>Double Engagement</td>
<td>Single Engagement</td>
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<tr>
<td>(C)</td>
<td>(CFR)</td>
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</table>

### Dimensions
- ** cuando requerido:** Required inside diameter of both hubs, with tolerances.
- **tamaño de claves:** Sizes of keyways, if desired.
- **velocidad y potencia de unidad de impulsión:** Speed and horsepower of driving unit.

#### Notes:
1. **Cuando hacer un corte:** Draw–off holes are optional at additional charge in sizes 7/8 through 31/2. They are standard on sizes 4 and up.
2. **Tamaños mayores disponibles:** Larger sizes are available – consult Lovejoy Engineering.
3. **La distancia entre los ejes:** The distance between shafts may be any dimension between G and G1.
4. **Para información sobre rendimiento:** For Performance Data see pages G-18 and G-19.

#### Table of Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque Rating</th>
<th>Max Speed</th>
<th>Maximum Bore</th>
<th>Minimum Bore</th>
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<th>OD</th>
<th>HD</th>
<th>HL</th>
<th>LS</th>
<th>SL</th>
<th>Distance Between Shafts</th>
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<th>CBD</th>
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<td>inch</td>
<td>inch</td>
<td>inch</td>
<td>inch</td>
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</table>

**When ordering, please specify:**
1. Required inside diameter of both hubs, with tolerances.
2. Sizes of keyways, if desired.
3. Speed and horsepower of driving unit.
Gear Couplings

Lovejoy/Sier-Bath Continuous Sleeve Series
Floating Shaft Type – “CFS”

The Floating Shaft Type coupling is designed for remote drive and excessive misalignment problems. The coupling hubs on the driver and driven ends are rigid while the two center hubs connected by the center shaft are flexible. These hubs can be reversed if necessary without sacrificing ease of installation or disassembly.

Notes:
1. Larger sizes are available – consult Lovejoy Engineering.
2. Draw-off holes are optional at additional charge in sizes 7/8 through 3½. They are standard on sizes 4 and up.
3. May be any dimension between G and G1.
4. Minimum length of floating shaft.
5. For Performance Data see pages G-18 and G-19.

When ordering, please specify:
1. Required inside diameter of all hubs, with tolerances. Indicate which bores are for flexible and which for rigid hubs.
2. Sizes of keyways, if desired.
3. Speed and horsepower of driving unit.
4. A Floating Shaft coupling consists of two flexible hubs, two rigid hubs, two sleeves, four accessory kits, one shaft, and two keys, and should be ordered as “One Set Floating Shaft coupling.”
5. Distance between ends of shafts to be connected.
**Lovejoy/Sier-Bath Continuous Sleeve Series**  
**Shear Pin Type – “CSHP”**

The Shear Pin coupling is designed to prevent damage to connected equipment resulting from excessive torque or sudden shock. The shear pins in the Lovejoy coupling are manufactured to shear at predetermined loads which are specified by the customer. New pins may be quickly inserted.

### Notes:
1. Larger sizes are available – consult Lovejoy Engineering.
2. Draw-off holes are available at an additional charge on sizes 1\(\frac{1}{4}\) through 3\(\frac{1}{2}\). They are standard on sizes 4 and up.
3. For Performance Data see pages G-18 and G-19.

### Maximum Bore

<table>
<thead>
<tr>
<th>Size CSHP</th>
<th>Torque Rating Unbalanced in-lbs.</th>
<th>Max Speed RPM</th>
<th>std. or rigid hub metric key sq. key inch mm</th>
<th>Shear hub metric key sq. key inch mm</th>
<th>Minimum Bore inch</th>
<th>OAL inch</th>
<th>OD inch</th>
<th>LS inch</th>
<th>HD inch</th>
<th>LTB inch</th>
<th>HL inch</th>
<th>F inch</th>
<th>G inch</th>
<th>R inch</th>
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</thead>
<tbody>
<tr>
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</table>

### When ordering, please specify:
1. Required inside diameter of both hubs, with tolerances.
2. Sizes of keyways, if desired.
3. Speed and horsepower of driving unit.
4. Complete operational data of application.
5. Which is shear hub, and torque at which pins are to shear.
Lovejoy/Sier-Bath Flanged Sleeve Series

- Draw-off Holes (Optional)
- Vari-Crown Hub Teeth
- Both Hub Diameters are Identical
- "O" Ring Seals
- Major Diameter Fit
- Heat-Treated Bolts for High Strength Coated for Corrosion Resistance
- Two Lubrication Plugs in Each Half Sleeve

Gasket

Med. Carbon Steel Hubs & Sleeves

Larger Bore Capacity

Interference Fit

Smooth One Piece Sleeve

Flanges Available in Both Shrouded and Exposed Bolt Design
VIRTUS
Power Transmission

Gear Couplings

Lovejoy/Sier-Bath Flanged Sleeve Series — “F”

Double Engagement (Flex – Flex)
The standard “F” is the basis for the other models in the Flanged Sleeve Series. It provides standard double engagement for parallel misalignment, angular misalignment, and end float.

<table>
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<th>Size F</th>
<th>Torque Rating in-lbs.</th>
<th>Max Speed Unbalanced RPM</th>
<th>Maximum Bore sq. key metric key</th>
<th>Minimum Bore inch</th>
<th>OAL inch</th>
<th>FD inch</th>
<th>D inch</th>
<th>HD inch</th>
<th>LTB inch</th>
<th>BSE inch</th>
<th>CAC inch</th>
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</table>

Notes:
1. Shrouded bolts are standard on sizes 1 through 5 1/2. Exposed bolts are standard on sizes 6 through 9.
2. Draw off holes are available at an additional charge on sizes F1 through 3 1/2. They are standard on sizes 4 and up.
3. For Performance Data see pages G-19 and G-20.

When ordering, please specify:
1. Required bore diameter of both hubs, with tolerance.
2. Sizes of keyways, if desired. Set screws not supplied unless specified.
3. Speed and Horsepower of driving unit.
Lovejoy/Sier-Bath Flanged Sleeve Series
Flex – Rigid and Floating Shaft Type — “FFR” and “FFS”

**Single Engagement (Flex-Rigid)**

Single Engagement type couplings consist of a flexible and a rigid half. These couplings only accommodate angular misalignment. Single Engagement type gear couplings are most commonly used in floating shaft applications. The floating shaft configuration allows removal of the center assembly for ease of maintenance without repositioning machinery. Also, rigid hubs can accommodate larger shaft diameters than the flex hub when additional bore capacity is required.

**Single Engagement (Flex-Rigid)**

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<th>Maximum Bore</th>
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<td>Rigid Hub</td>
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<td></td>
<td></td>
<td></td>
<td>mm</td>
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<td>D</td>
<td>HD</td>
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<td></td>
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**Notes:**
1. Shrouded bolts are standard on sizes 1 through 5 1/2. Exposed bolts are standard on sizes 6 through 9.
2. FFR is used for Single Engagement Flex-Rigid.
3. FFS is used for Floating Shaft.
4. For Performance Data see pages G-19 and G-20.

**When ordering, please specify:**
1. Required bore diameter of both hubs, with tolerances.
2. Indicate which bore is for Flex Hub and which is for Rigid Hub.
4. Speed and horsepower of driving unit.
5. If two Single Engagement couplings are to be used as a Floating Shaft set, submit drawing if available.
6. Shaft separation—exact distance between connected shaft ends required if floating shaft is to be supplied by Lovejoy.
7. Floating Shaft type supplied less shaft unless otherwise specified.
Lovejoy/Sier-Bath Flanged Sleeve Series
Mill Motor Type – “FMM”

Designed specifically for mill type motors with tapered shafts. The sleeves and one hub are standard, the other hub is taper bored to customer specifications and cut off for the nut on end of the motor shaft.

When ordering, please specify:
1. Required bore diameter of both hubs, with tolerance. Include dimensions of large end and small end of bore.
2. Taper per foot and length of tapered portion of shaft.
3. Sizes of keyways, if desired. Specify if they are parallel to the center line of the shaft or parallel to the bore. Set screws not supplied unless specified.
4. Speed and horsepower of driving unit.
5. Specify counter bore dimensions if desired.
6. Submit drawing if available.
7. Mill motor frame size if applicable.

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### Gear Couplings

#### Lovejoy/Sier-Bath Flanged Sleeve Series

**Mill Motor Type – “FMM”**

Designed specifically for mill type motors with tapered shafts. The sleeves and one hub are standard, the other hub is taper bored to customer specifications and cut off for the nut on end of the motor shaft.

<table>
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<th>Size</th>
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<th>Minimum Bore</th>
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<td>inch</td>
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Notes:
1. LTB1 Dimensions shown are maximum lengths of Universal Hubs kept in stock and altered to customer’s specifications. Longer length hubs are made to order.
2. Dimension G1 shown on page G-36.
3. For Performance Data see pages G-19 and G-20.
Lovejoy/Sier-Bath Flanged Sleeve Series
Spacer Type – “FSPCR”

Spacer Gear couplings allow additional spacing between shafting where ease of maintenance is required. The spacer allows a number of service functions to be performed while providing room for the removal of the standard coupling half from the shaft without moving the driver or driven units.

This coupling consists of standard full-flex hubs and sleeve assemblies bolted to a flanged spacer. Thus, a wide variety of shaft spacings can be accommodated. Consult Lovejoy for price and delivery for shaft spacings. This coupling has angular and parallel misalignment capabilities in addition to end float.

Notes:
1. Shrouded bolts are standard on sizes 1 1/2 through 5 1/2.
   Exposed bolts are standard on sizes 6 and 7.
2. For Performance Data see pages G-19 to G-20.

When ordering, please specify:
1. Required bore diameter of both hubs, with tolerances.
2. Sizes of keyways, if desired. Set screws not supplied unless specified.
3. Speed, horsepower and application details.
4. Length of spacer or distance between ends of shafts to be connected.
5. Submit drawing if available.
Gear Couplings

Lovejoy/Sier-Bath Flanged Sleeve Series (only)

Flange Details—Inch

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Notes: OAL & G—Standard. OAL1 & G1—1 Hub reversed. OAL2 & G2—2 Hubs reversed.

G-23
Lovejoy/Sier-Bath Flanged Sleeve Series

Special Couplings

**Limited End Float Spacer**
The addition of plates restricts axial travel of the drive or driven shaft. The spacer makes it possible to remove the hubs from either shaft without disturbing the connected units.

**Vertical Floating Shaft**
The lower coupling has a hardened crowned button inserted in the plate of the lower hub. The entire floating assembly rests on this button. Optional construction of upper coupling would be a flexible hub on the floating shaft with a rigid hub on top.

**Vertical**
This coupling has the same horsepower, RPM and misalignment capacities as standard couplings of corresponding sizes. A plate with a hardened crowned button rests on the lower shaft which supports the weight of the sleeve.

**Jordan**
Used on Jordan machines and refiners, this design is similar to the slide type, except the long hub is split and secured to the shaft with a bolt clamp. This permits quick axial adjustment of the Jordan shafts in this hub.

**Insulated**
Use of a special non-metallic material between flanges and around bolts prevents passage of stray currents from one shaft to the other.
**Gear Couplings**

**VIRTUS Flanged Sleeve Series — “JIS”**

**Double Engagement (Flex – Flex or SS Type)**
The standard “JIS-SS Type” is the basis for the models in the Flanged Sleeve Series. It provides standard double engagement for parallel misalignment, angular misalignment, and end float.

**Single Engagement (Flex-Rigid or SE Type)**
Single Engagement type couplings consist of a flexible and a rigid half. These couplings only accommodate angular misalignment. Single Engagement type gear couplings are most commonly used in floating shaft applications. The floating shaft configuration allows removal of the center assembly for ease of maintenance without repositioning machinery. Also, rigid hubs can accommodate larger shaft diameters than the flex hub when additional bore capacity is required.

---

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<th>Rated Torque (Nm.)</th>
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**Notes:**
1. Splined, hex, round, set screw or keyway bore available at additional charge.
2. For Floating Shaft connection see page G-20.
3. Required Distance Between Shaft Ends (DBSE).
4. For Lubrication Data see pages G-27.

**When ordering, please specify:**
1. Required bore diameter of both hubs, with tolerance.
2. Sizes of keyways, if desired. Set screws not supplied unless specified.
3. Speed and Horsepower of driving unit.
**Coupling Grease**

High quality coupling grease for low to high-speed applications. The grease is designed to address the problems that are unique to gear coupling applications such as high pressure, high centrifugal force, prolonged work periods, and corrosive environments. Please see pages G-11 and G-13 for specific quantities per product line.

**Lubrication**

Centrifugal separation of the oil and thickener during operation is a basic problem in gear coupling applications, especially high speed applications. The higher the operating speed, the greater the amount of separation can be expected. This causes the soap properties in the grease to accumulate in the areas where lubrication is required. The soap does not provide adequate lubrication which results in accelerating the coupling wear.

**Hub Puller Hole Data—F Hubs**

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**Contents**

The grease contains ingredients that have been proven to in gear coupling applications. The grease contains:

- Lithium Soap
- Highly Refined Paraffinic Mineral Oil
- Rust Inhibitors
- Anti-oxidants
- EP/Anti-wear additive

**Standard & Universal Hub Dimensions**

**F Hubs—Inch**

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<td>0.67</td>
<td>4.25</td>
</tr>
<tr>
<td>4</td>
<td>5.52</td>
<td>3.27</td>
<td>0.25</td>
<td>0.86</td>
<td>4.38</td>
</tr>
<tr>
<td>4/3</td>
<td>6.64</td>
<td>3.89</td>
<td>0.25</td>
<td>0.86</td>
<td>5.00</td>
</tr>
<tr>
<td>5</td>
<td>6.39</td>
<td>4.52</td>
<td>0.25</td>
<td>1.23</td>
<td>6.00</td>
</tr>
<tr>
<td>6</td>
<td>7.64</td>
<td>4.52</td>
<td>0.25</td>
<td>1.61</td>
<td>6.38</td>
</tr>
</tbody>
</table>
Coupling Grease

Coupling Grease should be designed to resist centrifugal separation, thereby keeping the oil portion of the grease in the working areas of the coupling. When using the Coupling Grease, lubrication intervals may be extended. A coupling exposed to extreme temperatures, excessive moisture, frequent reversals or grease leakage may require more frequent lubrication.

The benefits of using Coupling Grease include:
- Highest pressure and wear protection available.
- Built-in rust and corrosion inhibitors.
- Increased coupling life.
- Reduced maintenance costs.
- Reduced downtime.
- Superior lubrication.

In general, grease should be supplied every month and replaced every 3 months after operation.

Specifications

The specifications indicated below are average values, variations which do not affect product performance may occur.

**Temperature Operating Range:**
-40°F (-40°C) to 250°F (121°C)

**Minimum Base Oil Viscosity:**
2625 SUS (567 cSt) @ 100°F (38°C)

**Centrifuge Separation Characteristics:**
ASTM D-4425-K36 = 0/24

**NLGI Grade:**
1

**Minimum Dropping Point:**
225°F (108°C)

**Minimum Timken Load:**
40 lbs

If an alternative grease is used it should meet the minimum specifications listed below. Table 4 is a list of grease products that meet the general specifications but should not be considered exclusive recommendations.

Common Industrial Lubricants (NLGI Grade #2)

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Ambient Temperature Range:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°F to 150°F (-18°C to 66°C)</td>
</tr>
<tr>
<td>Amoco Oil Co.</td>
<td>Lithol Grease #2</td>
</tr>
<tr>
<td>Atlantic Richfield Co.</td>
<td>Litholene HEP 2</td>
</tr>
<tr>
<td>Conoco Inc.</td>
<td>Citgo HEP-2</td>
</tr>
<tr>
<td>Exxon Company, USA</td>
<td>EP Conolith #2</td>
</tr>
<tr>
<td>Gulf Oil Corp.</td>
<td>Ronex MP</td>
</tr>
<tr>
<td>E.F. Houghton &amp; Co.</td>
<td>Gulf crown Grease #2</td>
</tr>
<tr>
<td>Imperial Oil Ltd.</td>
<td>Cosmolube #2</td>
</tr>
<tr>
<td>Kendall Refining Co.</td>
<td>Esso MP Grease H</td>
</tr>
<tr>
<td>Mobil Oil Corp.</td>
<td>#81 Light</td>
</tr>
<tr>
<td>Phillips Petroleum Co.</td>
<td>Mobilux EP 111</td>
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<tr>
<td>Shell Oil Co.</td>
<td>Alvania Grease #2</td>
</tr>
<tr>
<td>Standard Oil Company (OH)</td>
<td>Factran #2</td>
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<tr>
<td>Sun Oil Company</td>
<td>Prestige 42</td>
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<tr>
<td>Texaco Lubricants</td>
<td>Starplex HD2</td>
</tr>
<tr>
<td>Texaco Canada Inc.</td>
<td>Marfak HD 2</td>
</tr>
<tr>
<td>Union Oil Co. (CA)</td>
<td>Union Unoba #2</td>
</tr>
</tbody>
</table>

Note: Check with lube manufacturer for approved lubricants to use in the food processing industry.

**Temperature Operating Range:**
0°F (-18°C) to 150°F (66°C)

**Centrifuge Separation Characteristics:**
Low oil separation rate and high resistance to separation from centrifuging.

**NLGI Grade:**
2

**Minimum Dropping Point:** 190°F (74°C)

Summary of Lubrications for Various Conditions.

<table>
<thead>
<tr>
<th>Applications</th>
<th>Speed</th>
<th>Conditions</th>
<th>Load</th>
<th>Misalignment</th>
<th>Grease lubrication</th>
<th>Oil lubrication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-speed</td>
<td>RPM ≤ 200 x d (1/2), d = pitch diameter of the gear tooth (inch)</td>
<td>Centrifugal force</td>
<td>≤ 10g</td>
<td>&lt; 3/4”</td>
<td>No. 0</td>
<td>-</td>
</tr>
<tr>
<td>Normal-speed</td>
<td>≤ 3,600 RPM</td>
<td>≤ 200</td>
<td>The peak torque &lt; 2.5 times the continuous torque.</td>
<td>≤ 3/4”</td>
<td>No. 2</td>
<td>-</td>
</tr>
<tr>
<td>High-speed</td>
<td>&gt; 3,600 RPM</td>
<td>&gt; 200</td>
<td>Uniform</td>
<td>&lt; 1/2”</td>
<td>No. 3</td>
<td>-</td>
</tr>
<tr>
<td>High-torque</td>
<td>&lt; 3,600 RPM</td>
<td>&lt; 200</td>
<td>The peak torque &gt; 2.5 times the continuous torque.</td>
<td>&gt; 3/4”</td>
<td>No. 2</td>
<td>-</td>
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<tr>
<td>High-misalignment</td>
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