



LORD Vibration, Shock and Motion Control Products

For Industrial Applications

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How to Use this Catalog

Vibration, shock, motion and noise control problems are a fact of life in the design and operation of many types of equipment today. LORD Corporation can help you solve such problems with a wide range of control products for applications that include: electric motors; fans and blowers; vibratory conveyors and other material handling equipment; pumps, compressors and refrigeration units; disk drives; measuring instruments; construction and agricultural equipment; electronic devices; and punch presses, lathes and other industrial equipment.

This catalog is intended to provide you with basic background on vibration control theory and specific product solutions to your unique vibration, shock, motion and noise control problems. This catalog features:

- An *Engineering Guide* covering terms and definitions, outlining the criteria that affect proper mount selection and providing step-by-step instruction through the information-gathering process.
- *Individual Product Sections* detailing the performance characteristics and dimensional data of the LORD products most commonly used to solve vibration and noise control problems in general industrial applications. For additional guidance in the selection process, LORD also offers technical assistance availability by calling the Customer Support Center (in United States and Canada) toll free at +1 877 ASK LORD (275 5673).

Custom-Engineered Solutions

LORD offers standardized products to meet most applications, but some control problems require specialized solutions such as a custom-designed mount or a combination of LORD products. LORD Corporation's vibration and noise control experts can analyze your individual requirements and provide the most effective and affordable product solutions.

About LORD Corporation

LORD is a diversified technology company with a long history of developing breakthrough adhesive, coating and motion management technologies that significantly improve the performance of our customers' products. We have provided innovative solutions to demanding aerospace, defense, automotive and industrial customer problems for more than 80 years. With technology centers and manufacturing locations around the world, our 2,400+ employees are ready to serve you.

Special Note

The parts listed in this catalog are standard products. The design and configuration are owned and controlled by LORD Corporation. Requirements conveyed by customer drawings or specifications will be matched as closely as possible to a standard product in order to assure comparable form, fit and function. An exact match, however, is not assured. If this is not acceptable, please contact LORD Engineering for assistance on a custom-design quotation.

Express Warranty and Disclaimer of Other Warranties

Seller agrees to correct any defect in workmanship or material in products sold which may develop under proper and normal use, by repair or replacement of the Seller's option F.O.B. our plant, of the defective part or parts, provided written notice of any such defect describing the same is given to the Seller within twelve (12) months from date of shipment. The responsibility of the Seller with respect to any such defect in products sold is limited to such correction or replacement.

THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATIONS OR LIABILITY ON THE PART OF THE SELLER, EXCEPT THAT IN NO CASE SHALL THE LIABILITY OF THE SELLER ARISING OUT OF THIS SALE EXCEED THE SALES PRICE OF THE PRODUCTS COVERED HEREUNDER.

Important Notice

The industrial mounts listed in this catalog are not designed for nor intended for use in aircraft. Aircraft engine and accessory mounts are available from LORD Corporation's Aerospace Group.

Commitment to Quality

LORD Industrial Products have long been recognized as the quality benchmark in the industry. This recognition has been earned through an unwavering commitment to quality, as expressed in our Quality Policy.

LORD Corporation is committed to providing products and services that consistently meet our customers' expectations of quality and value. We continually monitor and improve our processes as a means to ensure overall customer satisfaction, achieve our quality objectives, and share best practices.

This Quality Policy is implemented through a top-down/ bottom-up dedication to build an organizational culture in which all activities and transactions are accomplished completely, efficiently, the first time, and to the satisfaction of our customers, our management, and our co-workers.

To facilitate this, employees at all levels strive for the achievement of:

- Clear and current understanding of exactly what our customers expect.
- Well-defined processes for converting customer expectations into internal actions.
- Processes and tasks that are aligned against common goals and objectives.
- Key measures that help manage by fact.
- An environment that encourages and rewards long-term continuous improvement.

We approach our quality initiatives as we do all other major initiatives at LORD, using the hallmarks of teamwork, innovation and voice of the customer to guide our efforts.

These efforts have gained us recognition by the most demanding critics of all – our customers. The following are a sampling of customers who have approved the LORD Quality System:

- Bombardier Recreational Products
- Caterpillar
- Case Corporation
- John Deere
- Freightliner
- General Electric
- General Motors
- Ingersoll Rand
- Mack
- Mercury Marine
- Steelcase

Want more assurance? All LORD manufacturing sites, technical sites and administrative operations are certified to ISO 9001, ISO/TS 16949, and/or AS 9001 by QMI-SAI Global Registrars.

The bottom line? Peace of mind that your selection of LORD products and services will meet your expectations, first time and every time!

Introduction

Forces and motions are the elements utilized by mechanical equipment to perform work. Unfortunately, these same elements can produce undesirable effects, even in the most carefully designed equipment. The adverse effects of vibration, shock and noise disturbances range from simple annoyances to shortened equipment life through failure of its components. They will affect comfort, safety or performance.

Vibration, shock and noise control components, properly applied, will improve your products. They will operate more smoothly and quietly, and they will be less disturbing to surrounding equipment and personnel, less susceptible to damage and less expensive to make. Bonded rubber mounts provide cost-effective solutions to problems involving vibration, shock and structural noise control.

The theory and concepts for bonded rubber mounts are relatively straightforward. A great many of the applications are uncomplicated, and the nonspecialist can handle them directly. However, some vibration and shock control problems are quite complex, making component selection and design complicated.

These applications require the involvement of specialists in order to arrive at suitable recommendations, and LORD has a technical staff available to assist you. In any event, the information presented in this catalog will prove useful in your independent application solutions, as well as at those times when technical assistance is necessary. Refer to Engineering Guide, Application Selection Guide section.

This catalog has been prepared to assist the individual who does not frequently deal with vibration and shock problems and to remind others of the versatility of bonded rubber mounts. It presents the important information needed to select and use bonded rubber mounts: terms and definitions; theory; sample problems; and data on standard mounts.

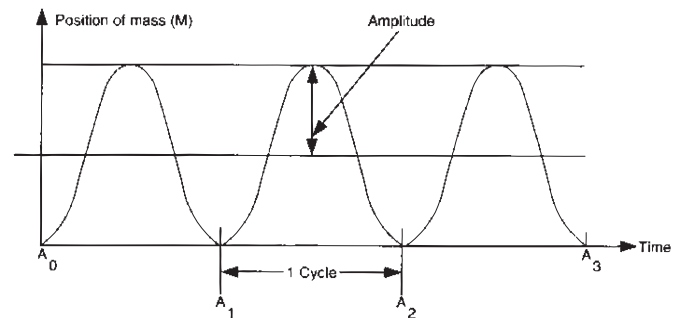
Terms and Definitions

There are a number of terms which should be understood before entering into a discussion of vibration and shock theory. Some of these are quite basic and may be familiar to the users of this catalog. However, a common understanding should exist for maximum effectiveness.

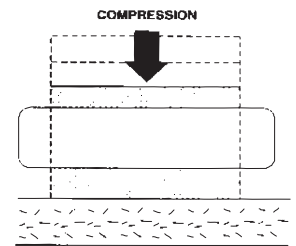
Acceleration – rate of change of velocity with time.

Usually along a specified axis, usually expressed in “G” or gravitational units. It may refer to angular motion.

Amplitude – the maximum displacement from its zero value position.



Compression – when specified as a direction for loading – a deformation caused by squeezing the layers of an object in a direction perpendicular to the layers.



Damping (c) – the mechanism in an isolation system which dissipates a significant amount of energy. This mechanism is important in controlling resonance in vibratory systems.

Disturbing Frequency (f_d) – the number of oscillations per unit time of an external force or displacement applied to a vibrating system. f_d = disturbing frequency.

Durometer (hardness) – an arbitrary numerical value, which measures the resistance to the penetration of the durometer meter indenter point; value may be taken immediately or after a very short specified time.

Fragility – is the highest vibration or shock level that can be withstood without equipment failure.

“G” Level – an expression of the vibration shock acceleration level being imposed on a piece of equipment as a dimensionless factor times the acceleration due to gravity.

Isolation – the protection of equipment from vibration and/or shock. The degree (or percentage) of isolation necessary is a function of the fragility of the equipment.

Load Deflection Curve – the measured and recorded displacement of a mounting plotted versus an applied load.

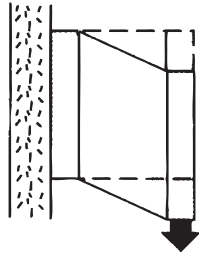
Natural Frequency (f_n) – the number of cycles (expressed as Hertz or cycles per second) at which a structure will oscillate if disturbed by some force and allowed to come to rest without any further outside influence.

Random Vibration – non-sinusoidal vibration characterized by the excitation of a broad band of frequencies at random levels simultaneously.

Resonance – vibratory system is said to be operating at resonance when the frequency of the disturbance (vibration or shock) coincides with the system natural frequency.

Set – is the amount of deformation never recovered after removal of a load. It may be in shear or compression.

Shear – when specified as a direction for loading – a deformation caused by sliding layers of an object past each other in a direction parallel to the layers.



Shock Pulse – a shock pulse is a transmission of kinetic energy to a system, which takes place in a relatively short length of time compared to the natural period of this system. It is followed by a natural decay of the oscillatory motion. Shock pulses are usually displayed as plots of acceleration vs. period of time.

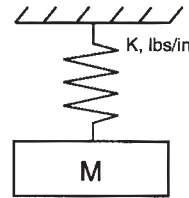
Spring Rate – is the force required to induce a unit deflection of spring. A steel spring has a very linear relationship between force and deflection. Elastomeric springs may or may not be linear depending on the amount of deflection due to the load.

Static Deflection (d_s) – the deflection of the isolator under the static or deadweight load of the mounted equipment.

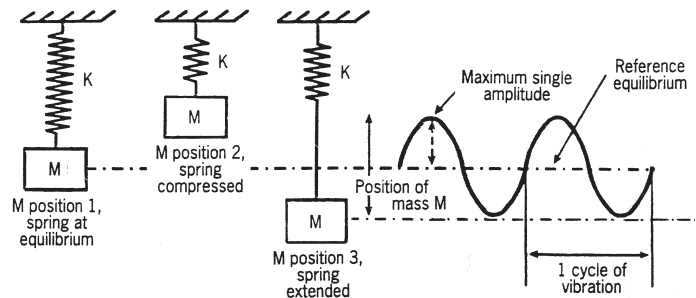
Transmissibility (T) – is a dimensionless unit expressing the ratio of the response vibration output to the input condition. It may be measured as motion, force, velocity or acceleration.

Theory

Vibration is an oscillatory motion. Any body with mass and elasticity can vibrate. The simplest type of vibrating system is called a single-degree-of-freedom spring-mass system. The spring is characterized by its spring rate, K , and a mass, M .



This system is called a single-degree-of-freedom system because motion can occur in only one direction. Spring rate defines the force required to induce a unit deflection of a spring. A steel spring has a linear relationship between force and deflection. Elastomeric springs may or may not be linear depending on the amount and direction of the load. Nonlinearity can be designed into elastomeric springs to achieve certain results. Elastomeric springs also differ from steel springs in that their stiffness is sensitive to the rate or speed of deflection. If a rubber spring is deflected quickly, it appears stiffer than if it is deflected slowly.



When a mass is attached to a spring, the mass moves to its position of equilibrium, position 1. The difference between the spring's undeflected or free length and its position of equilibrium is called the system's static deflection, d_s . If a force is applied to the system, position 2, and then removed, the spring-mass system will vibrate, position 3. When plotted against time, the position of the mass relative to its equilibrium position is a sinusoidal curve. The maximum single amplitude is the deflection of the mass from its equilibrium position to its maximum displacement in one direction. Double amplitude displacement is the total deflection in both directions. The period of vibration is the time it takes for the mass to move from its equilibrium position to its peak in one direction, to its peak in the other and back to its equilibrium position.

If a load is applied to our spring mass system and then released, the mass will vibrate at a constant rate. We call this condition resonance, and the vibration rate is called the natural or resonant frequency. The natural frequency of a system can be considered a function of mass (M) and spring rate (K).

$$\text{Natural frequency } f_n = \frac{1}{2\pi} \sqrt{\frac{K}{M}}$$

Natural frequency is usually measured in hertz. This equation can be written in many forms:

$$f_n = \frac{1}{2\pi} \sqrt{\frac{Kg}{W}} = 3.13 \sqrt{\frac{K}{W}}$$

where K=spring rate, lb/in; W=weight in pounds; M=mass in lb-sec²/in; and g=acceleration of gravity, 386.2 in/sec². From this formula, you can see that an increase in mounting system stiffness or a decrease in weight will increase the natural frequency. A decrease in mounting system stiffness or an increase in weight will decrease the natural frequency.

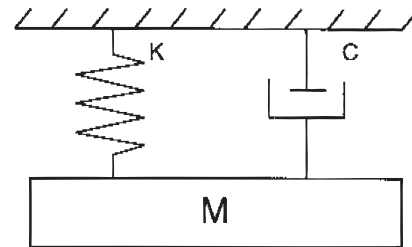
So far we have discussed free vibration, what happens when a force is applied and removed from our spring mass system. When a force is applied to the system as a sinusoidal vibration, the output through the system can be defined in terms of transmissibility. Transmissibility is the ratio of output to input and is dimensionless. Vibration output and input can be measured as motion, force, velocity or acceleration. The transmissibility of a mount is a function of the relationship of the input frequency to the natural frequency and the amount of damping.

$$\text{Transmissibility, } T = \frac{1}{\left(\frac{f_d}{f_n}\right)^2 - 1}$$

for undamped springs when $f_d/f_n \geq \sqrt{2}$ where f_d =input or disturbing frequency and f_n = natural frequency.

In Figure 1, we see transmissibility plotted against the frequency ratio, f_d/f_n . When the disturbing frequency is very low compared to the natural frequency, the transmissibility is close to one, position 1. If the disturbing frequency is close to the natural frequency, the transmissibility is very high. The output is much larger than the input. (See Region of Amplification, position 2.) Position 3 is the crossover point when the f_d/f_n ratio is equal to the $\sqrt{2}$. When the disturbing frequency is high compared to the natural frequency, transmissibility is low. (See Region of Isolation, position 4.) Isolation is the goal of an elastomeric spring. We wish to attenuate a known disturbing frequency. From the desired transmissibility, we can define the required frequency ratio and calculate the system natural frequency. Using the natural frequency calculations, we can calculate the required spring rates for the vibration mounts.

An elastomeric spring has another characteristic that a simple steel spring does not. It has hysteresis damping, C.



When an elastomeric mount is deflected, some energy is converted to heat. Without damping, a spring mass system will continue to oscillate at its resonant frequency for an extended time after the input has stopped. With damping, the oscillations decay more quickly. Damping also has an effect on transmissibility.

Figure 1

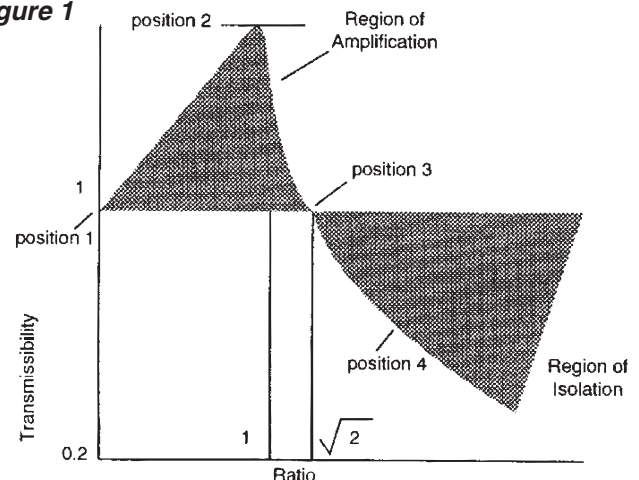
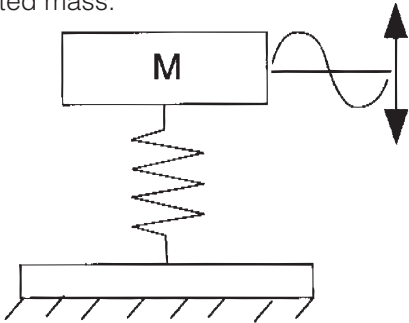


Figure 2 is a plot of transmissibility for two levels of damping, η . As you can see, the greater the amount of damping, the lower the transmissibility at resonance, position 1. Positions 2a and 2b have different transmissibility values for the same frequency ratio when using different values for damping. This illustrates the compromise an engineer must make when choosing the necessary amount of damping in an elastomeric mount. If the disturbing frequencies are known, we would design a lightly damped mounting system with a natural frequency well below the disturbing frequency. The low damping would provide optimum isolation. In cases where the disturbing frequencies are numerous, unknown or impossible to avoid, a highly damped system is preferred. The high damping reduces the peak response that can occur if the same disturbances are near the natural frequency of the mounts. A reduction in isolation efficiency will also occur. Vibration isolation employs resilient mountings and mounting systems to reduce the transmission of vibration from one point to another. All simple or single-degree-of-freedom problems can be classified into two groups:

1. Mass excited system: Protecting the supporting structure from vibratory disturbances originating in the supported mass.



2. Base Excited System: Protecting the supported mass from the vibratory disturbances of the supporting structure.

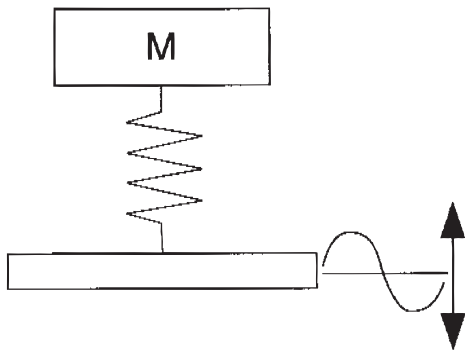
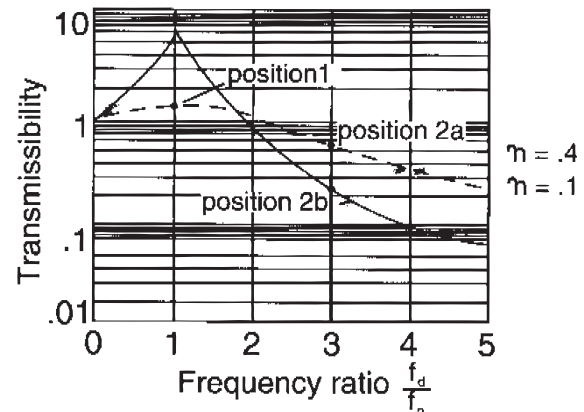


Figure 2



In the first case, mass excited, the mass moves because of the vibrating force. This causes a deflection across the spring which transmits a force to the structure. This force must be reduced. In the second case, base excited, the vibrating or moving structure causes a deflection across the spring which transmits a force to the supported mass. This causes the mass to move. This motion must be reduced.

When do you start thinking about vibration control? The earlier the better. The record proves that the best time to consider the need for vibration control is in the beginning stages of product design.

The reward for this kind of foresight is best performance at the lowest cost. Your best chance of gaining this benefit comes when you call in a specialist as soon as the vibration or shock problem is recognized. Recognizing such a problem is a design responsibility. Vibration analysis is a requisite of equal importance with stress analysis, cost analysis, material selection and reliability assurance. No design is complete without all of these.

These benefits are produced when the mounting system design coincides with product design:

- Accurate analysis of the dynamic environment.
- Precise determination of mounting system requirements.
- Most advantageous system configuration.
- Adequate space for mountings and sway space clearance for the mounted assembly.
- Predictable results through application of proven principles to meet exact requirements.

These are just a few of the reasons for considering vibration control early in design. It is apparent that the designer has everything to gain and nothing to lose by following this practice.

Shock Mechanics

Shock is a common phenomenon with many familiar sources: aircraft landings, impacting of railroad cars, power surges or impacts in marine drive systems, driving over bumps, dropping product containers, explosions, missile launching and staging. Thus, shock protection is a common requirement in good product design. Today's trend to higher speeds, heavier loads, larger power plants and lighter weights accentuate the problem.

Mechanical shock is a nonperiodic disturbance of a mechanical system characterized by suddenness and severity. Such extreme disturbances cause significant forces in the system which may be damaging. A shock input is non-repetitive in nature and of limited time duration. The response it produces normally decays to an arbitrarily small value before the next disturbance.

Shock inputs may be caused by:

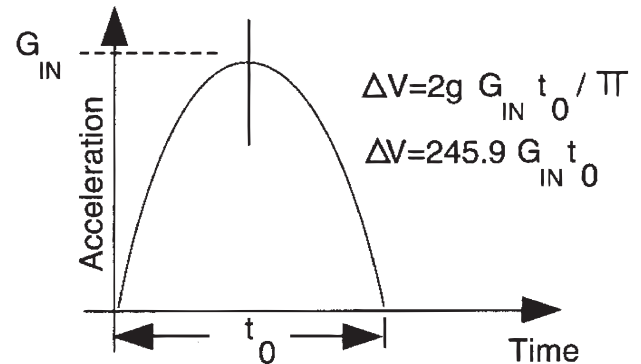
1. A sudden introduction of energy into the system or a change in the level of energy in the system.
2. A force excitation.
3. An abrupt motion, velocity or acceleration change.

Analysis of a shock problem usually starts with an examination of the shock input. Shock inputs are of short duration and non-periodic. Often these short duration transient loads have complex wave shapes. Analysis may be simplified by comparing the actual wave shape to several simple wave shapes for which the response is known. Important features of the shock pulse are: maximum amplitude, time duration and approximate shape. The majority of excitations typically encountered are:

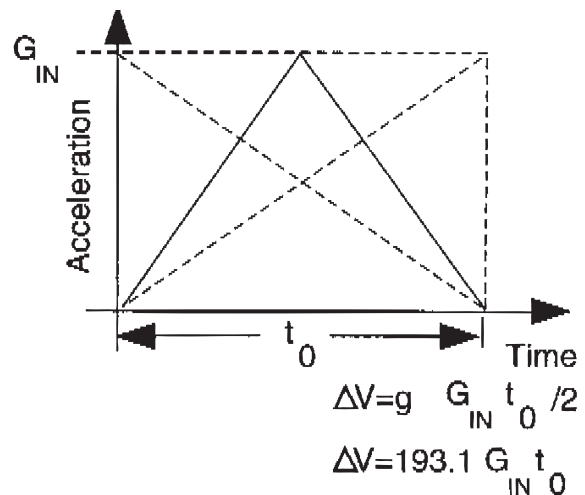
- Half-sine Shock Pulse
- Triangular Shock Pulse
- Drop Shock
- Velocity Shock

Each can be defined as:

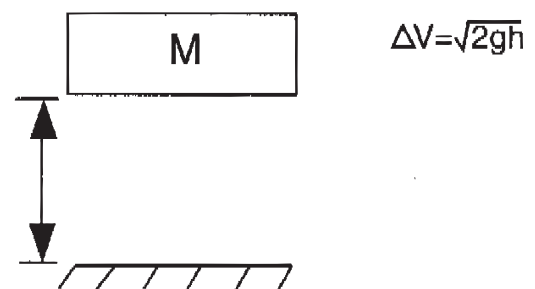
• Half-sine Shock Pulse



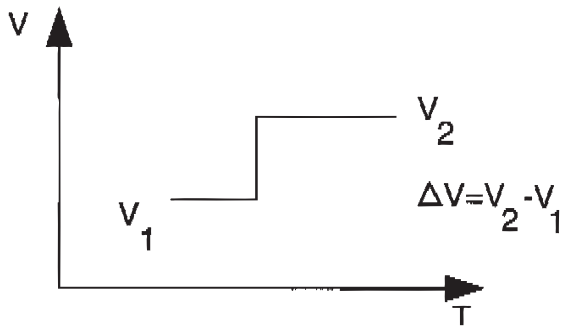
• Triangular Shock Pulse



• Drop Shock



• Velocity Shock

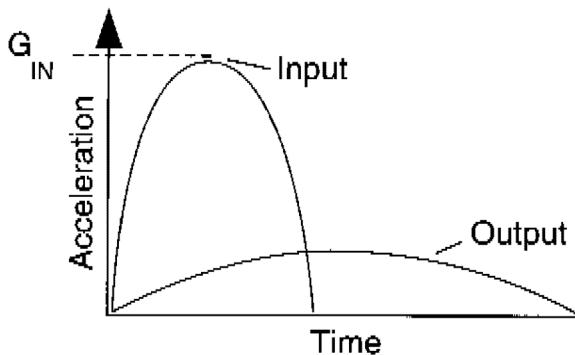


where: ΔV = change in velocity, in/sec
 g = acceleration due to gravity, 386 in/sec²
 G_{in} = shock pulse magnitude, G's
 Π = 3.1416
 t_o = shock pulse duration in seconds
 h = drop height in inches
 V_2 = velocity at point 2
 V_1 = velocity at point 1

Engineers should consider mechanical shock by comparing the fragility level of the most sensitive component to the actual shock acceleration input. Fragility is defined as the highest acceleration level beyond which equipment will fail to operate within specification. The shock mount shall not permit the output acceleration to exceed the fragility level. The G's output can be calculated by:

$$G_{out} = \frac{2\pi f_n \Delta V}{386.2 \text{ in/sec}^2} = \frac{f_n \Delta V}{61.4}$$

In other words, the input acceleration is absorbed by the resilient mount, and the shock energy is released over a broader time base. By dispersing the shock energy over a broader time base, the output accelerations are reduced.

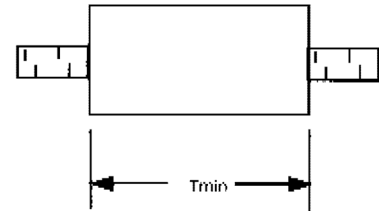


The elastomeric isolator must have the ability to accommodate the higher deflections that are characteristic of mechanical shock. The dynamic deflection, d_d , can be calculated by:

$$d_d = \frac{\Delta V}{2\pi f_n}$$

This dynamic deflection must not exceed the safe limits of the isolator's strain capability. We can use an equation to determine the minimum rubber wall thickness for a shear or sandwich mount:

$$T_{min} = \frac{d_d}{1.5}$$



where T_{min} =

The designer must also accommodate sway space within the product design. If not, even though the shock mount may be very efficient, lack of necessary sway space may cause secondary collisions resulting in the same damaging effect as if no shock attenuation devices were used.

If the concepts outlined above are kept firmly in mind, the designer will be well on his way to the most efficient attenuation of shock in a wide variety of applications.

Elastomers for Vibration Isolation

"Rubber" is a synthetic or natural material whose long-coiled, high molecular weight chains have been cross bridged by certain chemical ingredients to form a network. It is characterized by the ability to accept and recover from extreme deformation of 200% or more. The term "elastomer" includes natural rubber and the many synthetic materials that possess rubber-like properties.

Choice of an elastomer invariably hinges on the balance of properties offered. Some properties are interdependent, and the designer should understand the effect of one upon the other. To gain a desirable characteristic, for example, it may be necessary to accept reduction in some other property. Two or more optimum properties may be obtainable together.

Within the various families of LORD products, a number of elastomers may be selected. Some brief description may help guide in their selection for a particular problem.

Selection and Service Guide for Elastomers

Common or Trade Name	Natural Rubber	Synthetic Natural	Neoprene	Nitrile or Buna N	Silicone
Chemical Type	Natural polyisoprene	Isoprene	Chloroprene	Nitrile butadiene	Polysiloxane
ASTM D1418 Designation	NR	IR	CR	NBR	MQ, PMQ VMQ, PVMQ
ASTM D2000/SAE J200 type, class	AA	AA	BC, BE	BF, BG, BK, CH	FC, FE, GE
PHYSICAL					
¹ Density (gm/cm ³)	0.93	0.93	1.24	1.00	1.1-1.6
Hardness range (Shore A)	30-100	40-80	40-95	20-90	25-80
Permeability to gases	C	C	B	B-A	D
Electrical resistivity	A	A	C	D-C	A
Odor	B-A	B	C-B	B	B
Taste	C-B	C-B	C-B	C-B	B
Nonstaining	A	A	B-A	C-B	A
Bondability	A	A	A	B-A	B-A
MECHANICAL					
² Tensile strength (max psi)	4500	4000	4000	3500	600-1500
³ Abrasion resistance	A	A	B-A	A	C-B
⁴ Flex resistance	A	A	B	B	C-B
⁵ Tear resistance	A	B	B	B	C-B
⁶ Impact resistance	A	A	B	C	D-C
⁷ Deformation capacity	A	A	A	B	A
⁸ Elasticity	A	A	B	B	B-A
⁹ Resilience	A	A	A	B	D-A
¹⁰⁻¹¹ Creep, stress relaxation	A	B	B	B	C-A
THERMAL					
Recommended max temp (°C)	70	70	100	100-125	200-225
¹² Low-temp stiffening	B	B	C	C	A
Heat-aging resistance	B-C	B-C	B-A	B	A
Flame resistance	D	D	B-A	D	A
RESISTANCE TO:					
Weather	C-B	C-B	B	C-B	A
Oxygen	B	B	A	B	A
Ozone	C-D	C-D	B	C-D	A
Radiation	B	B	B	B	C-B
Water	A	A	B	A	A
Steam	B	B	B	C-B	C-B
Alkali dil/conc	A/C-B	C-B/C-B	A/A	B/B	A/A
Acid dil/conc	A/C-B	C-B/C-B	A/A	B/B	B/C
¹³ Oil, gasoline, kerosene	NR	NR	C	A	D-C
Benzene, toluol	NR	NR	D	B	NR
¹³ Animal, vegetable oils	D-B	D-B	B	B	A
Oxygenated solvents	B	B	C	D	B-C
Halogenated solvents	NR	NR	D	C-B	NR
Alcohol	B-A	B	A	C-B	C-B
Synthetic lubes (diester)	NR	NR	D	B-A	NR
Hydraulic fluids					
Silicates	B-A	B-A	B	B	D
Phosphates	D	B	C	D	B

A = Excellent B = Good C = Fair D = Poor NR = Not Recommended

- The higher the density, the more rubber is required to make a given part. For example, compare neoprene and natural rubber. Even at the same price per pound, neoprene would be more expensive to use.
- While tensile strength per se is not necessarily important, retention of strength at elevated temperatures suggests retention of other mechanical properties as well.
- Abrasion-resistance ratings apply to a wide range of temperatures as well as type of abrasion (such as rubbing and impingement).
- A high resistance to crack-growth indicates good general durability – necessary where physical abuse is expected.
- Tear resistance, along with crack-grown resistance, is desirable where physical abuse is expected.
- Rubbers that strain-crystallize at extreme deformations are much more durable in impact than those that do not. Low-temperature flexibility also helps improve impact performance.

- A high deformation capacity usually indicates a high fatigue resistance to flexing.
 - The lower the permanent set, the better the structural integrity and the better the retention of initial dimensions.
 - The higher the resistance, the less the degradative heat buildup in a flexing or dynamic situation.
 - The better the resistance to creep, the longer the life of the part, particularly where clearances are to be maintained.
 - Resistance to stress relaxation is essential in seals and other components under steady stress in service.
 - Good low-temperature flexibility is a must for most shock absorbers. The first jolt is critical, regardless of subsequent softness.
 - Resistance to oils and greases is essentially a surface effect: parts with poor resistance to these substances but that have appreciable bulk will not be degraded by such exposure.
- Data courtesy of LORD Corporation.

Sample Problems

Example Problem #1 – Vibration Isolation

Problem: An electric motor and pump assembly, rigidly mounted on a common base, transmits vibration to other components of a hydraulic system. The weight of the assembly and base is 140 lb. Four isolators are to be located at the corners of the rectangular base. The lowest vibratory forcing frequency is 1800 rpm and is the result of rotational unbalance.

Objective: To reduce the amount of vibration transmitted to the supporting structure. A vibration isolation efficiency of 70 to 90 percent is usually possible to obtain. Here a value of 80 percent is selected.

Solution:

1. First find transmissibility, T , which corresponds to the required vibration isolation of 80 percent, ($I = 0.8$)

$$T + I = 1 \text{ or}$$

$$1 - I = T$$

$$1 - 0.8 = 0.2 \quad T = 0.2$$

2. Determine the forcing frequency f_d in cycles per second (Hz). The lowest forcing frequency is used because this is the worst condition. If high isolation is attained at this frequency, isolation will be even better at higher frequencies.

$$\frac{1800}{60 \text{ sec/min}} = f_d = 30 \text{ Hz}$$

3. Determine the natural frequency f_n that the isolated system needs to provide a transmissibility $T = 0.2$. The following equation assumes zero damping.

$$T = \frac{1}{\left(\frac{f_d}{f_n}\right)^2 - 1} \quad \text{solve for } f_n$$

$$T = \frac{f_d}{\sqrt{\frac{1}{T} + 1}} = \frac{30 \text{ Hz}}{\sqrt{\frac{1}{.2} + 1}}$$

$$f_n = 12.2 \text{ Hz}$$

4. Calculate the load at each mounting point. If the center of gravity of the supported mass is centrally located in the horizontal plane, simply divide the total weight by the number of mounting points.

$$140 \text{ lb} \div 4 \text{ mounts} = 35 \text{ lb/mounting point}$$

5. Determine the required static deflection and spring rate. Static deflection (d_s) for this natural frequency is calculated with the formula:

$$f_n = \frac{1}{2\pi} \sqrt{\frac{K}{M}}$$

$$d_s = \frac{9.8}{(f_n)^2} \quad (9.8 \text{ is constant})$$

$$d_s = \frac{9.8}{(12.2 \text{ Hz})^2} = .066"$$

The required spring rate (K) can be calculated with the formula:

$$K = \frac{\text{load (lbs)}}{\text{static deflection } (d_s)}$$

$$K = \frac{35 \text{ lbs}}{.066"} = 530 \text{ lbs/in}$$

530 lb/in is the required spring rate for an isolator at a mounting point. This calculation can be completed using the total weight so the spring rate (K) calculated will be a total spring rate rather than a per mount spring rate. Dividing by the number of mounts will equal a per mount spring rate.

6. Select a mount that has a maximum load rating equal to or greater than the supported point load and a spring rate equal to or smaller than the calculated value. For our example the load/mount is 35 lb, and the spring rate is 530 lb/in. We can select 4 pieces of part number 200P-35 which are rated at 35 lb with a spring rate of 560 lb/in. (Refer to Platform Mounts, Table 1.)
7. Mounts are not always available with the right combination of load capacity and spring rate. Overloading mounts is not recommended. Underloaded mounts will produce less static deflection and not isolate as well. The Isolation Efficiency Curve (in the following section) will help you determine the isolation efficiency you can expect. First calculate the static deflection (d_s) for the actual mount, 200P-35.

$$d_s = \frac{\text{load (lbs)}}{\text{spring rate}}$$

$$d_s = \frac{35 \text{ lbs}}{560 \text{ lbs/in}} = .0625"$$

Check natural frequency:

$$d_s = \frac{9.8}{(f_n)^2} \quad \text{or} \quad f_n = \frac{9.8}{d_s}$$

$$f_n = \frac{9.8}{.0625"} = 12.5 \text{ Hz}$$

Check isolation frequency:

$$\frac{1}{\left(\frac{30 \text{ Hz}}{12.5 \text{ Hz}}\right)^2 - 1} = .21$$

Isolation Efficiency $I = 1 - T$

$$I = 1 - 0.21 = 0.79$$

The isolation efficiency of the 200P-35 is 79%.

Example Problem #2 - Shock Isolation

Problem: An electronic component is subjected to an 11 millisecond, 1/2 sine, 20g input and must be isolated. The item's fragility is 15 G's. The weight of the component is 7 pounds and is supported at 4 mounting points.

Objective: Reduce the amount of shock transmitted through the frame to the electronic component.

Solution:

1. First calculate the change in velocity, ΔV , for a 1/2 sine pulse.

$$\Delta V = \frac{2 g G t_o}{\pi}$$

$$= \frac{(386 \text{ in/sec}^2) (20 \text{ g's}) (.011 \text{ seconds})}{\pi}$$

$$\Delta V = 54 \text{ in/sec}$$

2. Calculate the desired natural frequency. Fragility is 15 G's, which is the desired G's output.

$$G_{\text{OUTPUT}} = \frac{\Delta V (f_n)}{\pi} \quad \text{or} \quad f_n = \frac{61.4 (G_{\text{OUT}})}{\Delta V}$$

$$f_n = \frac{61.4 (15 \text{ g's})}{54 \text{ in/sec}}$$

$$f_n = 17 \text{ Hz}$$

3. Calculate the dynamic deflection.

$$d_d = \frac{\Delta V}{2 \pi f_n}$$

$$= \frac{54 \text{ in/sec}}{2 (\pi) (17 \text{ Hz})}$$

$$= .51 \text{ inches single amplitude}$$

4. Determine the minimum thickness of a sandwich mount, T_{\min}

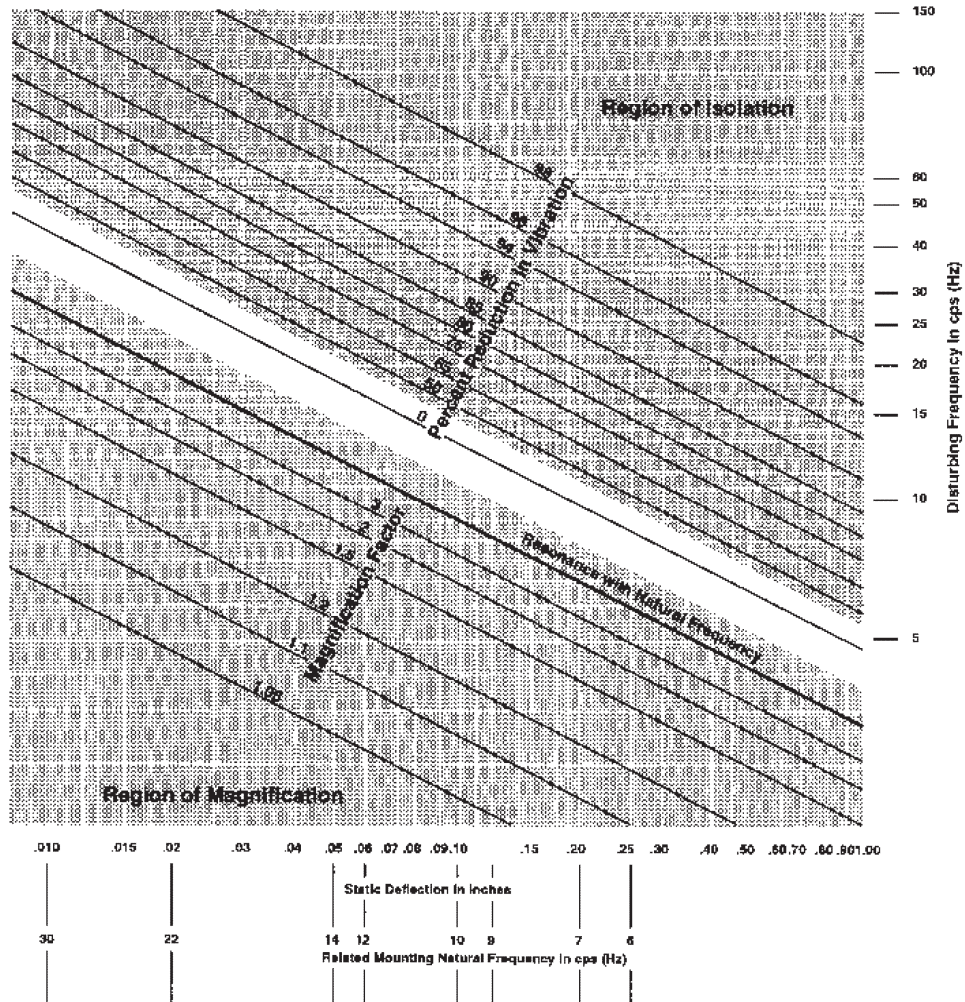
$$T_{\min} = \frac{d_d}{1.5}$$

$$= \frac{.51}{1.5}$$

$$T_{\min} = .34 \text{ inches}$$

5. Select a sandwich mount that has a minimum thickness of 0.34" and can support a shear static load of 1-3/4 pounds (7 pounds/4 mounts = 1.75 lb/mount). Select part number SMB003-0100-3 (refer to Flex-Bolt Sandwich Mounts, Table 1).

Isolation Efficiency Curve for Flexible Mounting Systems



For simple linear vibration, the Isolation Efficiency Curve illustrates the percentage of vibration isolation it's possible to obtain in a flexibly mounted assembly with any combination of static deflection and disturbing frequencies. The bottom area shows the region of magnification of vibration that occurs when the ratio of the disturbing frequency to the natural frequency of the mounted assembly is less than $\sqrt{2}$. A condition of resonance exists when the natural frequency of the assembly and the disturbing frequency are equal. The area illustrates the percentage of the vibratory forces prevented from reaching the supporting structure when proper flexible mountings are selected. Reduction in transfer of vibratory forces is obtained only when the ratio of the disturbing frequency to the natural frequency is greater than $\sqrt{2}$.

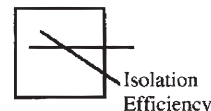
How to Use the Curve

The curve can also be used to arrive at the required static deflection by starting with the disturbing frequency. Find the point where the disturbing frequency and desired percent reduction in vibration line intersect. The vertical line passing through this point is the required static deflection to produce the desired vibration isolation efficiency of the disturbing frequency.

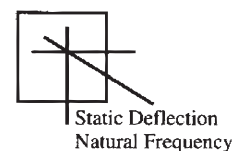
1. Determine f_d (disturbing frequency)



2. Decide on required Isolation Efficiency



3. Vertical line from point of intersection as required d_s (static deflection) and f_n (natural frequency)



$$K, (\text{Spring Rate}) = \frac{\text{supported load}}{\text{required static deflection}}$$

Application Selection Guide

	Actuators	Cabs	Computer & Acc.	Conveyors	Delicate Eqpt.	Drive Lines	Electronics	Engines	Engine Gen/Pump Sets	Fans/Blowers	Heating/Cooling Units	Instruments & Gauges	Machinery – Punch, Printing, Milling, Presses	Electric Motors	Pumps/Compressors	Shakers/Vibrators	Vehicle Accessories	Shipping Containers
Grommet Isolators Standard			•		•		•			•		•		•			•	
Platform Mounts Platform			•		•		•	•	•	•	•	•	•	•	•		•	
Heavy-Duty Platform		•		•				•	•	•	•		•	•	•		•	
Multiplane			•		•		•			•	•	•		•	•		•	
Center-Bonded Mounts CB-1100 Series		•						•	•	•	•		•	•	•	•	•	
CB-1180 Series		•						•	•	•	•		•	•	•	•	•	
CBA Series		•						•	•	•	•		•	•	•	•	•	
CBA-50 Series		•						•	•	•	•		•	•	•	•	•	
STA Series		•						•	•						•		•	
Safetied Tubeform Series		•						•	•	•			•		•	•	•	
Conical Mounts		•						•	•	•				•	•		•	
Surface-Effect Mounts		•						•							•		•	
Binocular/Split Mounts		•						•	•	•				•	•		•	
Two-Piece Mounts CBB/CBC Series		•						•	•	•	•		•	•	•	•	•	
SSB Series		•						•	•	•	•		•	•	•	•	•	
CB-2200 Series		•						•	•	•	•		•	•	•	•	•	
Bushings Center-bonded	•	•											•			•		
Square-Bonded													•			•		
Sandwich Mounts Small Industrial Engine Mounts								•	•	•	•			•	•		•	
Small – Metric Threads			•		•		•	•	•	•	•	•	•	•	•	•	•	•
Small – Standard UNC Threads			•		•		•	•	•	•	•	•	•	•	•	•	•	•
Medium				•		•		•	•	•	•		•	•	•	•		•
Large				•						•	•		•	•	•	•		•
Machinery Mounts Lattice				•	•				•	•	•		•	•	•	•		
Chan-L™ Mounts			•	•	•		•		•	•	•	•	•	•	•	•		
Industrial Shock										•	•		•	•				
Leveling				•						•	•		•					
Couplings Shear-Type			•			•	•				•		•	•	•		•	
Spool-Type						•	•	•	•	•	•		•	•	•		•	
Bushing-Type						•		•	•	•	•				•		•	
LCR Series						•		•	•	•	•		•	•	•		•	
LCD Series						•		•	•						•		•	

Data Required for Industrial Application Analysis

1. Specific name and description of unit: _____

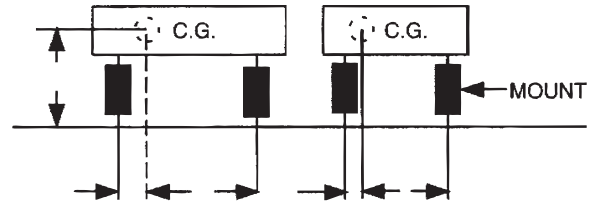
2. Total supported weight: _____ lb

3. Weight distribution or center of gravity location with respect to mounting point:

☐ Centered

☐ Offset (if so, fill in blanks)

Number of mounts: _____



4. Disturbing frequency range: _____ to _____ cpm (or Hz)

5. Primary direction of disturbance: horizontal ☐, vertical ☐, all directions ☐

6. Source of vibration: rotating eccentric weight ☐, rotating machinery ☐,
 other ☐ _____

7. Vibration isolation desired: _____ % min

8. Impact loads on unit: _____ G's, _____ direction.

9. Frequency of impact loads: _____

10. Sway space limitation: _____ in

11. External forces on mounting system:

Belt or chain pull _____ lb, _____ direction.

Distance from C.G.: _____ in, torque reaction _____ lb-in

12. Stationary ☐, or mobile ☐ equipment. If mobile, what type of vehicle?

On-highway ☐, Off-highway ☐.

13. Environmental requirements: Temperature – High _____ °F, Low _____ °F

Solvent exposure (severe) – Oil ☐, Hydraulic fluid ☐, Gasoline ☐,

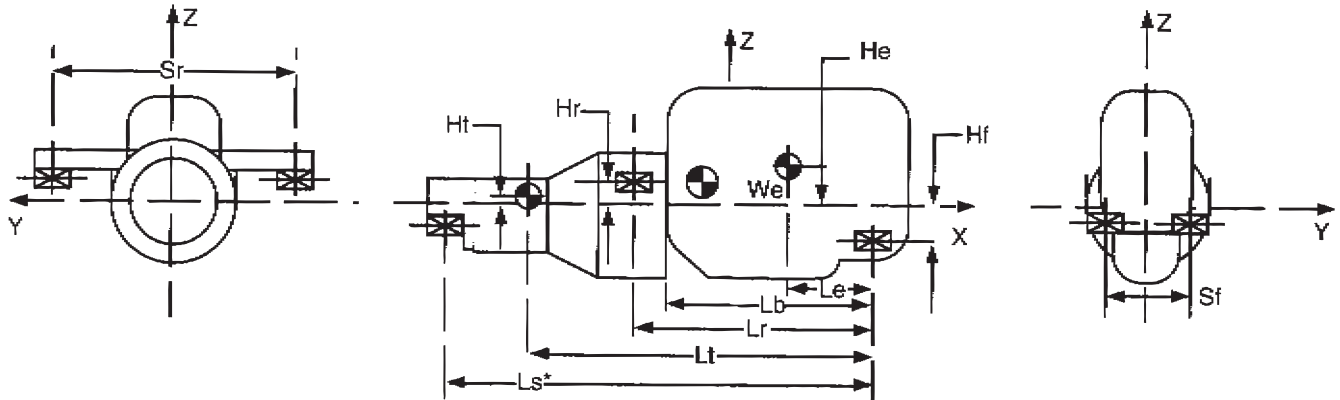
Ozone ☐, Other ☐ _____

Sketch, layout drawing, etc., is desirable.

General comments: _____

Photocopy, complete the questionnaire from catalog, and mail or fax to: LORD Corporation; Application Engineering;
 2000 West Grandview Blvd.; P. O. Box 10038; Erie, PA 16514-0038; Fax # 814.866.1773.

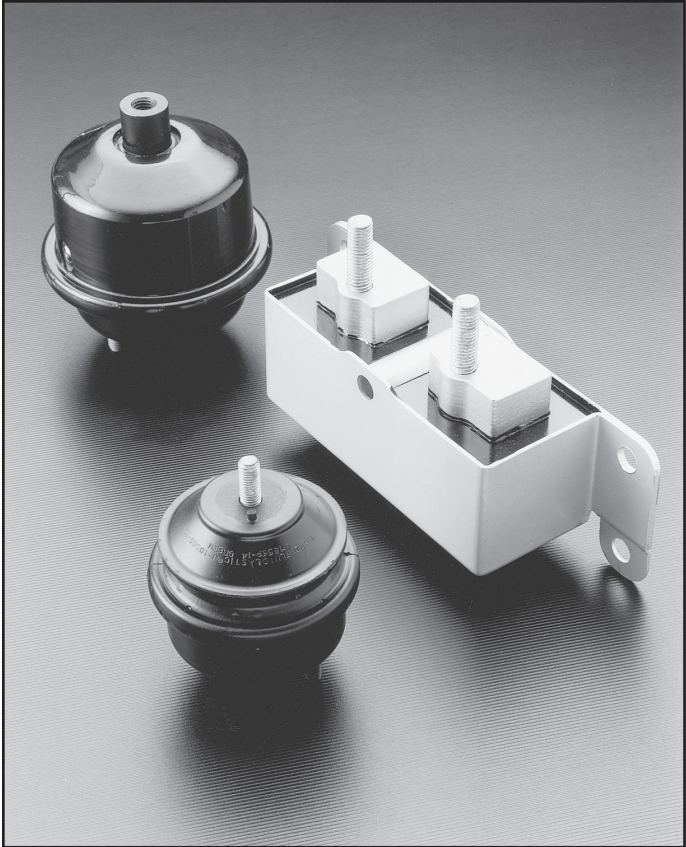
Data Required for Engine Analysis



1. Engine Model & Manufacturer _____
2. Transmission Model & Manufacturer _____
3. Engine Weight (Wet, Including Accessories) We = _____
4. Transmission Weight (Wet) Wt = _____
5. Engine C.G. Height Above CSCL He = _____
6. Transmission C.G. Height Above/Below CSCL Ht = _____
7. Front Mount Location Above/Below CSCL Hf = _____
8. Rear Mount Location Above/Below CSCL Hr = _____
9. Engine C.G. Location Behind Front Mount Le = _____
10. Rear Face of Block Behind Front Mount Lb = _____
11. Rear Mount Location Behind Front Mount Lr = _____
12. Transmission C.G. Location Behind Front Mount Lt = _____
13. Rear Mounting Spread Sr = _____
14. Front Mounting Spread (Zero for Single Front Mount) Sf = _____
15. Engine Speed NI = _____
 - Idle
 - Operating NO = _____
16. Number of Cylinders and Arrangement (I-6, 90° V-8, etc.) _____
17. Two or Four Stroke _____
18. Tail Support Location Behind Front Mount (if applicable) Ls = _____
- 19*. Moments of Inertia of Total System or for all Components
 (Engine, Transmission, etc.) Ixx = _____
 (If these are not available, a drawing of the Engine/Transmission System Iyy = _____
 is required, outline dimensions required.) Izz = _____
20. Output Torque (Including highest gear multiplication) TO = _____
21. Firing Sequence _____
22. Crankshaft Arrangement (# of Throws, Staggered Throw, etc.) _____
23. Application: ☐ on-highway; ☐ off-highway; ☐ severe duty (provide details of application) _____

* A tail support mount is necessary if static bending moment on rear face of block (RFOB) is greater than the manufacturing's rating.

Photocopy, complete the questionnaire from catalog, and mail or fax to: LORD Corporation; Application Engineering; 2000 West Grandview Blvd.; P. O. Box 10038; Erie, PA 16514-0038; Fax # 814.866.1773.



Fluidlastic™ Mounts

Introducing a new generation of mounts. Fluidlastic™ Mounts combine rubber and fluids to provide vibration isolation and noise reduction measurably better than conventional mounts. They also provide greater versatility because the mounts are tuned to precisely match application requirements. This new generation of mounts will help you solve tough vibration and noise problems.

Three-In-One Performance

The Fluidlastic Mount is three mounts in one depending upon the frequency and amplitude of the excitation. First, it's a spring providing basic load and motion capability to the system. Second, it's a damper providing restricted motion at or near resonant conditions. And thirdly, it's a tuned absorber providing superior isolation at a specific frequency.

Fluidlastic Mounts are rubber mounts which encapsulate a fluid that flows through a variety of ports and orifices depending upon the dynamic characteristics needed (see Figure 1). The result is a very versatile and effective vibration isolator.

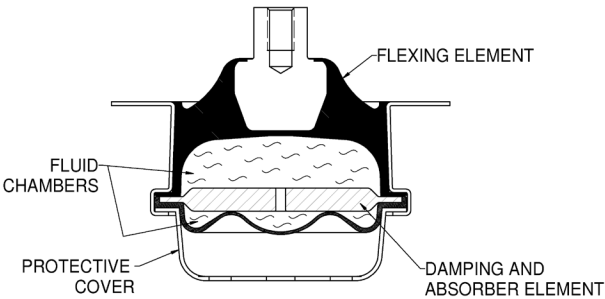
Why They Out-Perform Conventional Rubber Mounts

The Fluidlastic Mount concept allows the use of a softer mount for better isolation of vibration and uses internal fluid damping to reduce motions at resonant conditions or shock inputs. Fluidlastic mounts offer tuneable damping. The level of damping and the frequency where the peak damping occurs can be specified. A variety of fluids and orifice configurations create this damper effect. The fluid provides damping in the amplification region, as well as very low damping in the isolation region.

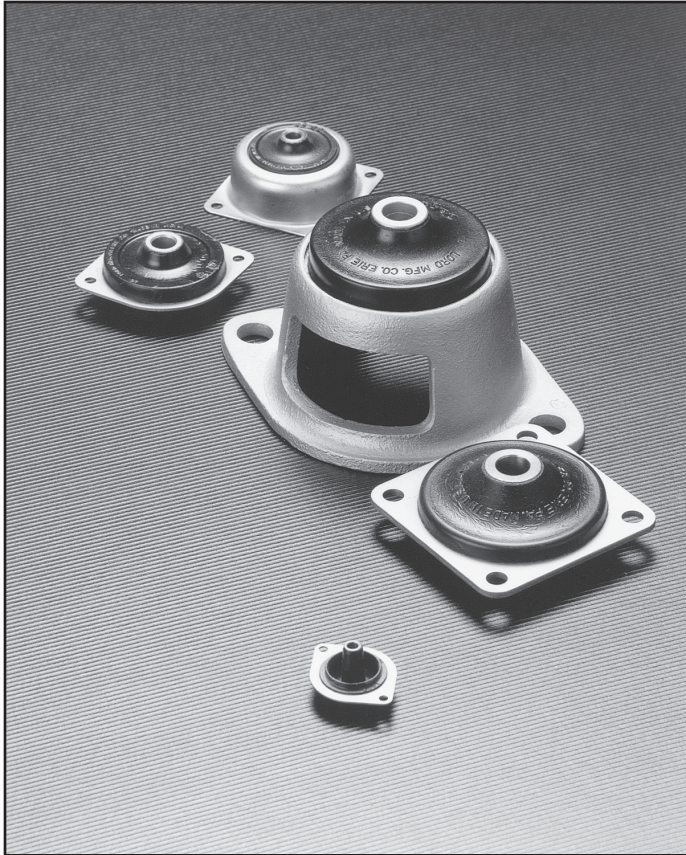
Another important feature of the Fluidlastic Mount is a conveniently packaged tuned absorber. Fluid movement within the mount as it is deflected becomes a tuned mass at a specific frequency or frequency band. This absorber effect is accomplished by the porting and geometry of the fluid path within the mount. The result is a dynamic stiffness that is considerably softer than the static stiffness for that frequency range. This feature is especially useful in improving isolation of noise or vibration at a predominant frequency.

LORD Corporation's design experience along with our test and analytical capability makes LORD the leader in the field of a new generation of mounts. Contact LORD Engineering to review your job application requirements.

Figure 1



Product Line	Rated Load Range (lb)	Typical Applications
J-18569	200-400	Cab Mounts
FL-1002	250-920	Gen Sets



Platform Mounts

Featuring: Platform Mounts
Heavy-Duty Platform Mounts
Multiplane Mounts

LORD Platform Mounts provide effective isolation against vibration. The contour of the flexing element was developed to provide uniform stress distribution. This, plus high strength bonding and the use of specially compounded elastomers, provides maximum service life.

These versatile mounts are available in three types, each type featuring square, diamond or holder configurations to suit a variety of design requirements. The three types, Platform Mounts, Heavy-Duty Platform Mounts and Multiplane Mounts, offer a range in load ratings from 0.5 to 600 pounds.

Snubbing washers provide an interlocking system of metal parts which act to prevent damage from overload or excessive shock impact.

LORD Platform Mounts are easy to install and provide space efficiency. Typical applications include electronic equipment, business machines, medical equipment and small pumps, engines and gen sets.

Features and Benefits

- Three types of mounts for different applications
- Square, diamond or holder configurations to suit a variety of design needs
- Load ratings from 0.5 to 500 pounds per mount
- Uniform stress distribution
- Easy to install

Platform Mount Series

Table 1 – Specifications and Dimensions

Series Number	Part Number			Max. Axial Rated Load @ 1/16 in (1.58 mm) Deflection		Axial Spring Rates		Dimensions Under No Load					
	Square	Diamond	Holder					G ①		I		O ①	
				lb	N	lb/in	N/mm	in	mm	in	mm	in	mm
100 Aluminum	–	100PDL-A	–	0.5	2	8	1.4	0.30	7.6	0.41	10.4	0.78	19.8
	100PL-2	100PDL-2	100PHL-2	2	9	32	5.6	0.30	7.6	0.41	10.4	0.78	19.8
	100PL-4	100PDL-4	100PHL-4	4	18	64	11.2	0.30	7.6	0.41	10.4	0.78	19.8
	100PL-6	100PDL-6	100PHL-6	6	27	96	16.8	0.30	7.6	0.41	10.4	0.78	19.8
	100PL-10	–	–	10	44	160	28.0	0.39	9.9	0.62	15.7	0.88	22.4
150 (Steel)	–	150PD-2	–	2	9	32	5.6	0.40	10.2	0.62	15.7	1.12	28.4
	150P-6	150PD-6	–	6	27	96	16.8	0.40	10.2	0.62	15.7	1.12	28.4
	150P-8	150PD-8	150PH-8	8	36	128	22.4	0.40	10.2	0.62	15.7	1.12	28.4
	150P-10	150PD-10	150PH-10	10	44	160	28.0	0.40	10.2	0.62	15.7	1.12	28.4
	150P-12	150PD-12	150PH-12	12	53	192	33.6	0.40	10.2	0.62	15.7	1.12	28.4
	150P-18	150PD-18	–	18	80	288	50.4	0.40	10.2	0.62	15.7	1.12	28.4
	150P-24	150PD-24	–	24	107	384	67.2	0.56	14.2	0.88	22.4	1.28	32.5
	150P-30	150PD-30	150PH-30	30	133	480	84.1	0.68	17.3	1.12	28.4	1.41	35.8
200 (Steel)	–	200PD-15	–	15	67	240	42.0	0.59	15.0	1.00	25.4	1.56	39.6
	200P-25	200PD-25	–	25	111	400	70.1	0.59	15.0	1.00	25.4	1.56	39.6
	200P-35	–	200PH-35	35	156	560	98.1	0.59	15.0	1.00	25.4	1.56	39.6
	200P-45	200PD-45	200PH-45	45	200	720	126.1	0.59	15.0	1.00	25.4	1.56	39.6
200X (Steel)	200XP-60	200XPD-60	–	60	267	960	163.1	1.40	35.6	1.81	46.0	2.38	60.5
	200XP-90	200XPD-90	200XPH-90	90	400	1440	252.2	1.40	35.6	1.81	46.0	2.38	60.5

Materials: Metal parts are cold rolled steel or alodized aluminum alloy. Flexing elements are specially compounded natural rubber. Steel holders for holder-type mountings are plated. Unplated steel parts are coated with specially prepared rust preventative for protection during shipment or storage.

① Reference dimensions.

Tolerances: 0.xx = ± 0.03 in (± 0.762 mm)
0.xxx = ± 0.015 in (± 0.381 mm)

Mounting bolt holes are + 0.003 in (0.076 mm) and - 0.002 in (0.050 mm)

Table 2 – Dimensions

Series Number	Dimensions Under No Load																											
	A ①		B		C		D + 0.008" - 0.002"		E		F		K		L		M		P		Q		R		S		U ①	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
100	1.00	25.4	1.25	31.8	1.000	25.4	0.166	4.2	0.141	3.6	0.032	0.8	1.69	42.9	1.375	34.9	0.141	3.6	0.025	0.6	1.414	35.9	0.62	15.7	1.66	42.2	0.15	3.8
150	1.50	38.1	1.75	44.5	1.375	34.9	0.257	6.5	0.166	4.2	0.050	1.3	2.38	60.5	1.938	49.2	0.196	5.0	0.032	0.8	1.945	49.4	0.88	22.4	2.32	58.9	0.18	4.6
200	2.00	50.8	2.25	57.2	1.750	44.5	0.391	9.9	0.196	5.0	0.062	1.6	3.00	76.2	2.500	63.5	0.257	6.5	0.032	0.8	2.475	62.9	1.12	28.4	2.98	75.2	0.22	5.6
200X	2.00	50.8	2.25	57.2	1.750	44.5	0.391	9.9	0.196	5.0	0.062	1.6	3.00	76.2	2.500	63.5	0.257	6.5	0.032	0.8	2.475	62.9	1.12	28.4	2.98	75.2	0.22	5.6

Customized designs and special elastomer compounds for specific problems are available. These may result in spring rates and dimensions other than shown.

Isolation Performance: Refer to Engineering Guide, Sample Problems section for a step by step method to calculate system natural frequencies and isolation efficiency.

① Reference dimensions.

For loads over 90 lb (400 N), use a Heavy-Duty Platform Mount. Radial spring rate is approximately two to three times the listed axial spring rate.

Figure 1 – Part Dimensions - Square

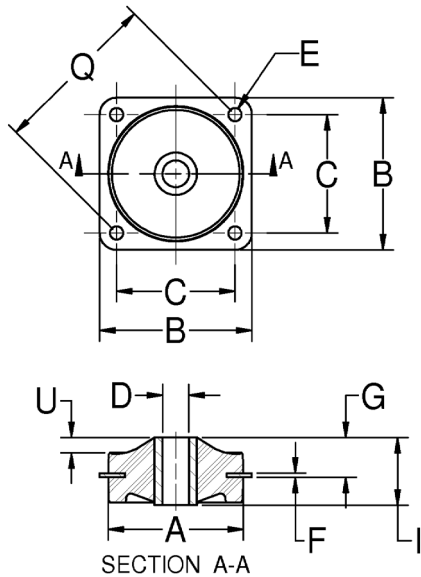


Figure 2 – Part Dimensions - Diamond

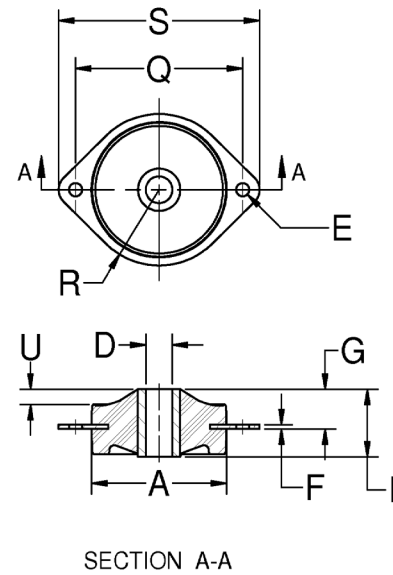


Figure 3 – Part Dimensions - Holder

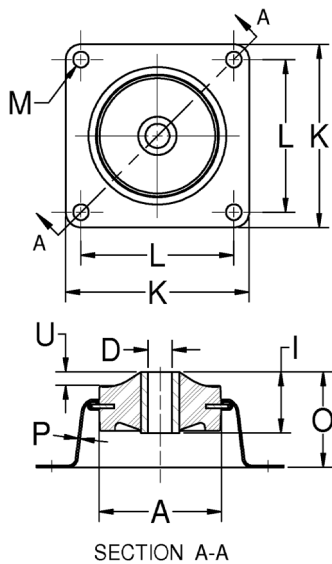


Figure 4 – Installation View

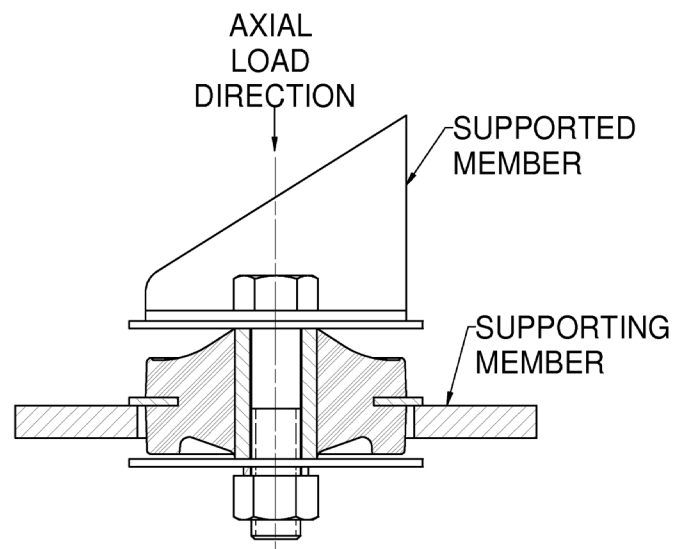


Table 3 – Snubbing Washer Part Numbers and Dimensions

Series Number	Part Number ②	Steel Washer					
		Dimensions					
		O.D.		I.D.		Thickness	
		in	mm	in	mm	in	mm
100	J-2049-1	0.88	22.4	0.17	4.3	0.03	0.8
150	J-2049-2	1.38	35.1	0.26	6.6	0.05	1.3
200	J-2049-3	1.88	35.1	0.39	9.9	0.06	1.5
200X	J-2049-3	1.88	35.1	0.39	9.9	0.06	1.5

② Steel washers are plated.

Heavy-Duty Platform Mount Series

Table 1 – Specifications and Dimensions

Series Number	Part Number		Max. Axial Rated Load		Axial Spring Rates		Dimensions Under No Load							
	Square	Holder					G ①		I		O ①		U ①	
			lb	N	lb/in	N/mm	in	mm	in	mm	in	mm	in	mm
283	283P-120	–	120	534	480	84.1	0.88	22.4	1.25	31.8	3.12	79.2	0.50	12.7
	283P-155	283PH-155	155	689	620	108.6	0.88	22.4	1.25	31.8	3.12	79.2	0.50	12.7
	283P-185	283PH-185	185	823	740	129.6	1.12	28.4	1.50	38.1	3.38	85.9	0.50	12.7
	283P-220	–	220	979	880	154.1	1.12	28.4	1.75	44.5	3.38	85.9	0.50	12.7
	283P-250	–	250	1112	1000	175.1	1.38	35.1	2.00	50.8	3.62	91.9	0.50	12.7
	283P-280	–	280	1245	1120	196.1	1.38	35.1	2.25	57.2	3.62	91.9	0.50	12.7
	283P-310	283PH-310	310	1379	1240	217.2	1.62	41.1	2.50	63.5	3.88	98.6	0.50	12.7
	283P-400	283PH-400	400	1779	1600	280.7	1.62	41.1	2.50	63.5	3.88	98.6	0.50	12.7
	283P-500	283PH-500	500	2224	2000	350.7	1.62	41.1	2.50	63.5	3.88	98.6	0.50	12.7

Materials: Metal parts are steel except holder which is ductile iron. Flexing elements are specially compounded natural rubber. Metal parts are coated with specially prepared rust preventative for protection during shipping or storage.

① Reference dimensions.

Tolerances: 0.xx = ± 0.03 in (± 0.762 mm)

0.xxx = ± 0.015 in (± 0.381 mm)

Bolt holes are + 0.005 in (0.127 mm) and - 0.002 in (0.050 mm)

Table 2 – Dimensions

Series Number	Dimensions Under No Load																									
	A ①		B		C		D + 0.016" - 0.005"		E		F		K		L ± 0.016"		M		P		Q		T ①		V _R ①	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
283	2.88	71.1	3.25	82.6	2.562	65.1	0.516	13.1	0.328	8.3	0.125	3.2	6.50	165.1	5.250	133.4	0.58/0.55	14.7/14	0.22	5.63	3.62	91.9	2.75	69.9	2.25	57.2

Customized designs and special elastomer compounds for specific problems are available. These may result in spring rates and dimensions other than shown.

Isolation Performance: Refer to Engineering Guide, Sample Problems section for a step by step method to calculate system natural frequencies and isolation efficiency.

① Reference dimensions.

For loads under 120 lb (534 N), use a Standard Platform Mount.

Figure 1 – Part Dimensions - Square

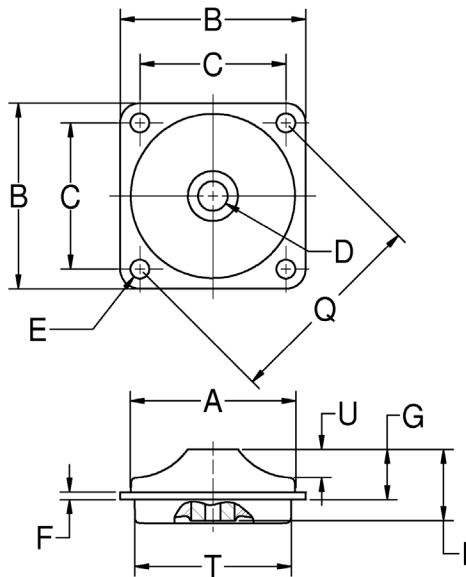


Figure 2 – Part Dimensions - Holder

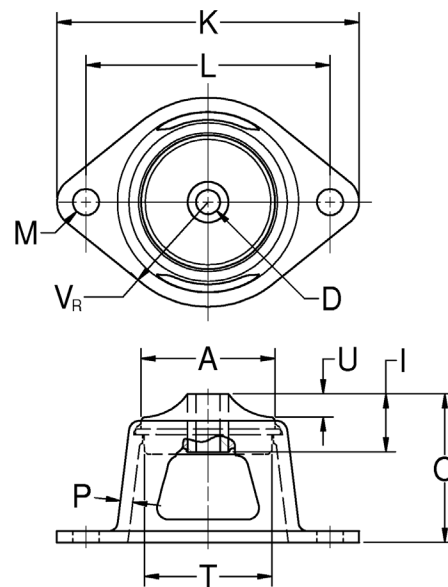


Figure 3 – Installation View

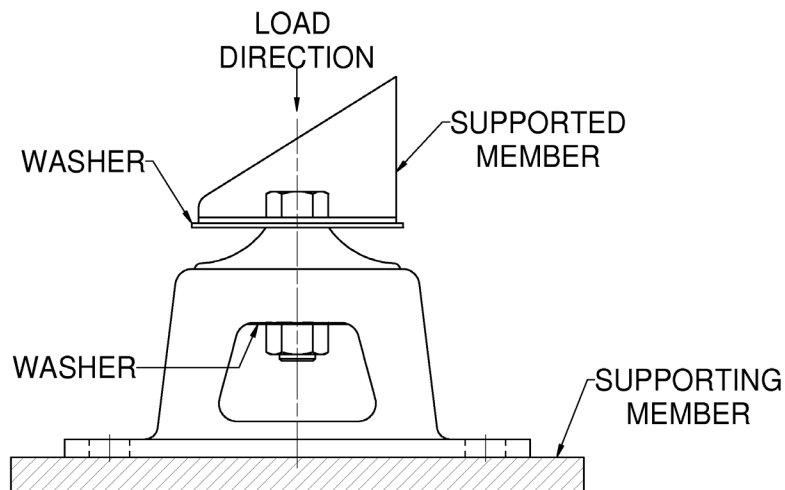


Table 3 – Snubbing Washer Part Numbers and Dimensions

Series Number	Part Number	Washer					
		Dimensions					
		O.D.		I.D.		Thickness	
		in	mm	in	mm	in	mm
283	J-2049-4	2.88	73.2	0.52	13.2	0.125	3.2

Multiplane Mount Series

Table 1 – Specifications and Dimensions

Series Number	Part Number			Max. Axial Rated Load @ 3/16 in (4.80 mm) Deflection		Axial Spring Rates		Dimensions Under No Load					
	Square	Diamond	Holder					A ①		B		C	
				lb	N	lb/in	N/mm	in	mm	in	mm	in	mm
106 Aluminum	–	106PDL-1	106PHL-1	1	4	5	.9	1.00	25.4	1.25	31.8	1.000	25.4
	–	106PDL-2	106PHL-2	2	9	11	1.9	1.00	25.4	1.25	31.8	1.000	25.4
	–	106PDL-3	106PHL-3	3	13	16	2.8	1.00	25.4	1.25	31.8	1.000	25.4
	–	106PDL-4	106PHL-4	4	18	21	3.7	1.00	25.4	1.25	31.8	1.000	25.4
	106PL-6	106PDL-6	106PHL-6	6	27	32	5.6	1.00	25.4	1.25	31.8	1.000	25.4
156 Steel	156P-6	156PD-6	–	6	27	32	5.6	1.50	38.1	1.75	44.5	1.375	34.9
	156P-9	156PD-9	156PH-9	9	40	48	8.4	1.50	38.1	1.75	44.5	1.375	34.9
	156P-13	156PD-13	–	13	58	69	12.1	1.50	38.1	1.75	44.5	1.375	34.9
	156P-16	156PD-16	156PH-16	16	71	85	14.9	1.50	38.1	1.75	44.5	1.375	34.9
206 Steel	206P-20	206PD-20	206PH-20	20	89	106	18.6	2.00	50.8	2.25	57.2	1.750	44.5
	206P-30	206PD-30	206PH-30	30	133	160	28.0	2.00	50.8	2.25	57.2	1.750	44.5
	206P-45	206PD-45	206PH-45	45	200	240	42.0	2.00	50.8	2.25	57.2	1.750	44.5

Materials: Metal parts are cold rolled steel or alodized aluminum alloy. Flexing elements are specially compounded natural rubber. Steel holder for holder-type mountings are plated. Unplated steel parts are coated with specially prepared rust preventative for protection during shipment or storage.

① Reference dimensions.

Tolerances: 0.xx = ± 0.03 in (± 0.762 mm)
0.xxx = ± 0.015 in (± 0.381 mm)

Mounting bolt holes are + 0.003 in (0.076 mm) and - 0.002 in (0.050 mm)

Table 2 – Dimensions

Series Number	Dimensions Under No Load																											
	D + 0.008" - 0.002"		E		F		G ①		I		K		L		M		O ①		P		Q		R		S		U ①	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
106	0.166	4.2	0.141	3.6	0.032	0.8	0.53	13.5	0.84	21.3	1.69	42.9	1.375	34.9	0.141	3.6	1.58	40.1	0.025	0.6	1.414	35.9	0.62	15.7	1.66	42.2	0.38	9.7
156	0.257	6.5	0.166	4.2	0.050	1.3	0.60	15.2	0.97	24.6	2.38	60.5	1.937	49.2	0.196	5.0	1.81	46.0	0.032	0.8	1.945	49.4	0.88	22.4	2.32	58.9	0.42	10.7
206	0.391	9.9	0.196	5.0	0.062	1.6	0.59	14.9	1.00	25.4	3.00	76.2	2.500	63.5	0.257	6.5	1.98	50.3	0.032	0.8	2.475	62.9	1.12	28.4	2.98	75.7	0.34	8.6

Customized designs and special elastomer compounds for specific problems are available. These may result in spring rates and dimensions other than shown.

Isolation Performance: Refer to Engineering Guide, Sample Problems section for a step by step method to calculate system natural frequencies and isolation efficiency.

① Reference dimensions.

Figure 1 – Part Dimensions - Square

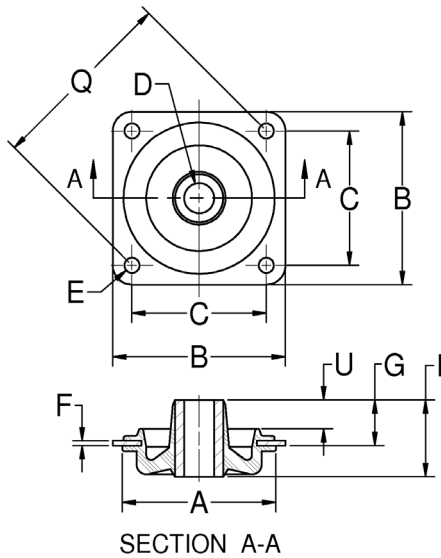


Figure 2 – Part Dimensions - Diamond

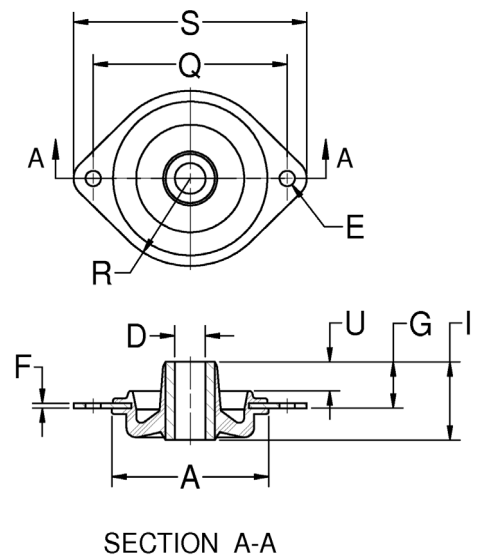


Figure 3 – Part Dimensions - Holder

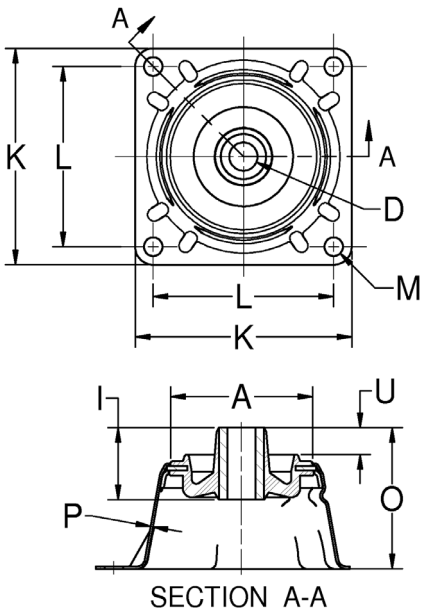


Figure 4 – Installation View

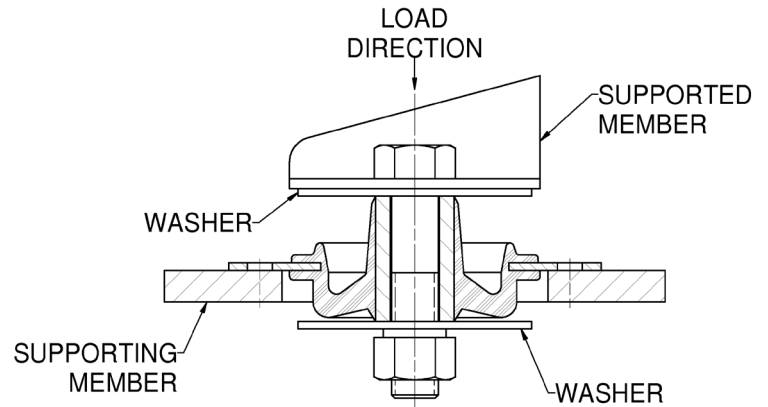
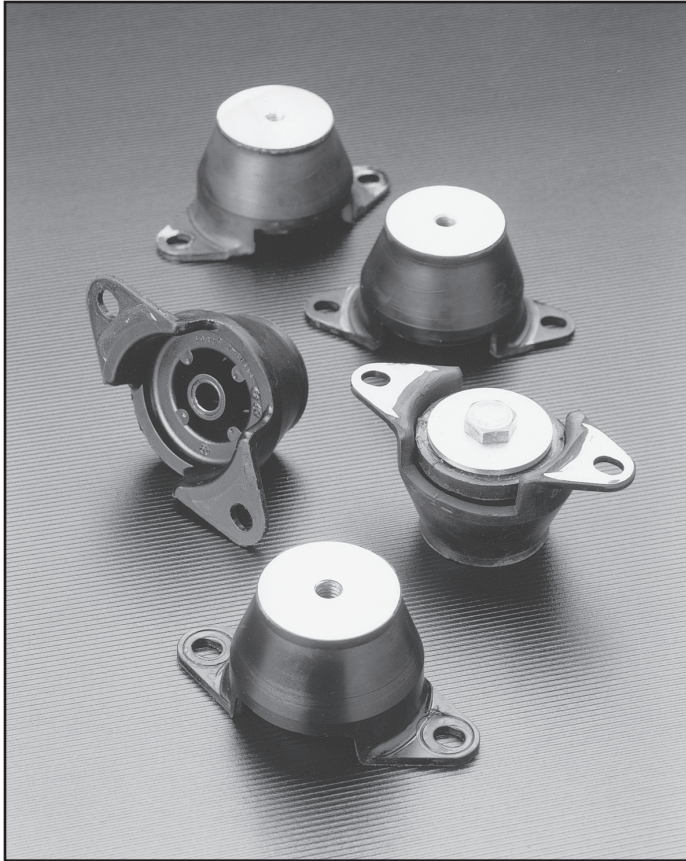


Table 3 – Snubbing Washer Part Numbers and Dimensions

Series Number	Part Number ②	Steel Washer					
		Dimensions					
		O.D. ± 0.016"		I.D. + 0.016" - 0.000"		Thickness ± 0.010"	
		in	mm	in	mm	in	mm
106	J-2049-1	0.88	22.4	0.17	4.3	0.032	0.8
156	J-2049-2	1.38	35.1	0.26	6.6	0.050	1.3
206	J-2049-3	1.88	47.8	0.39	9.9	0.060	1.5

② Steel washers are plated.



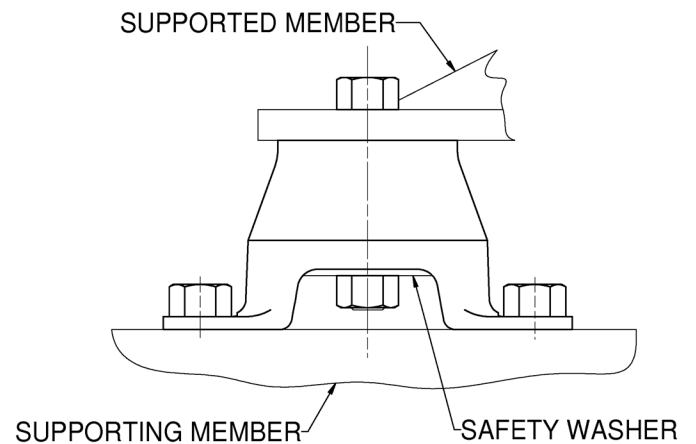
Small Industrial Engine Mounts

LORD Small Industrial Engine Mounts J-20922 Series are especially designed for mounting 2-, 3- and 4-cylinder gas or diesel engines in various types of vehicles and equipment.

Features and Benefits

- Moderately soft vertical stiffness
- Soft lateral and fore/aft stiffness
- Snubbed to limit travel in all directions
- Inter-locked metals (when assembled with washer) provide safety restraint
- Well-suited for low mounting locations
- 120-300 lb load ratings

Figure 1



J-20922 Series

Table 1 – Load Data

Part Number	Max. Axial Rated Load @ 0.1 in (2.5 mm) Deflection		Axial Spring Rates		Lateral Spring Rates	
	lb	N	lb/in	N/mm	lb/in	mm
J-20922-21	120	534	1200	210	200	35
J-20922-22	140	623	1400	245	250	44
J-20922-23	170	756	1700	300	300	53
J-20922-24	210	934	2100	370	360	63
J-20922-25	250	1112	2500	440	420	74
J-20922-26	300	1334	3000	550	500	90

Note: Washer part number is J-2049-3. Elastomer is natural rubber.

Figure 2 – Dimensions

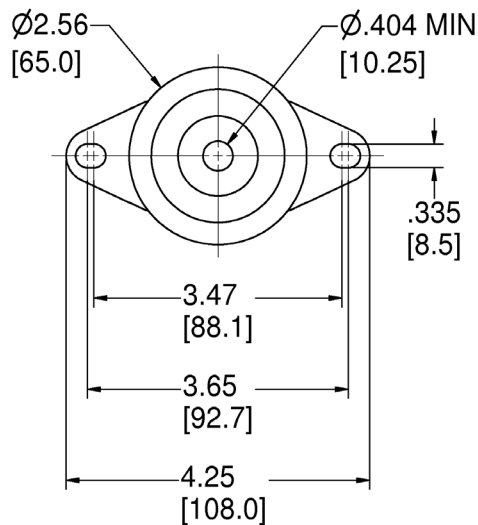


Figure 3 – Dimensions

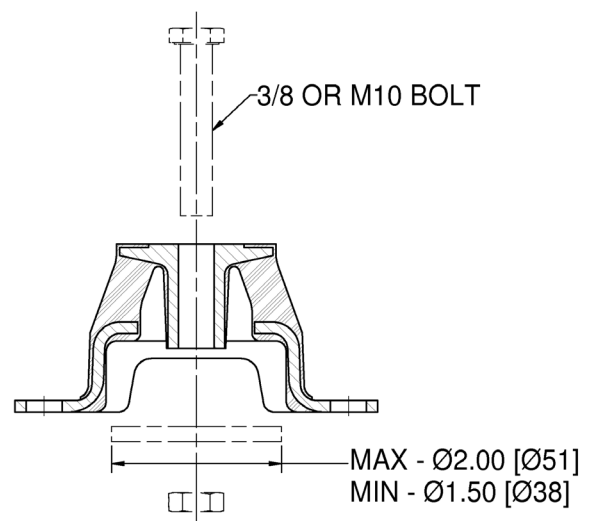
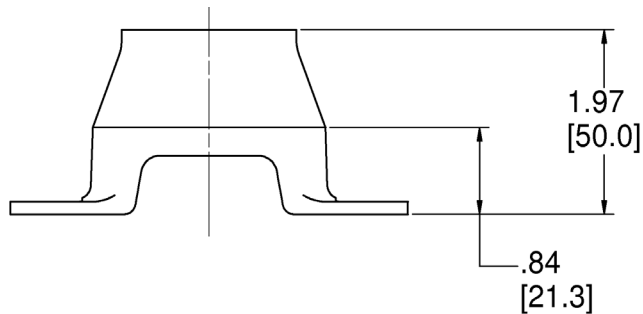
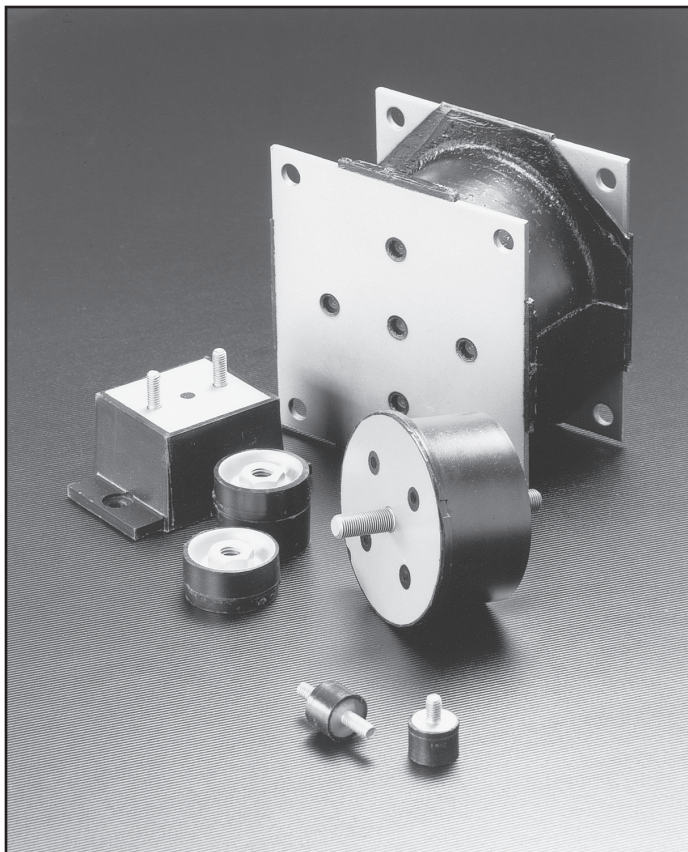


Figure 4 – Dimensions



Washer, nut and bolt not supplied with mount.



Flex-Bolt™ Sandwich Mounts

Featuring: Small Sandwich Mounts
(Standard UNC Threads)
Small Sandwich Mounts (Metric Threads)
Medium Sandwich Mounts
Large Sandwich Mounts

LORD Flex-Bolt™ Sandwich Mounts are designed to protect equipment and machinery against damaging vibration. This family of mounts has excellent capacity for energy control.

Constructed with high-strength bonds and specially compounded elastomers, these mounts provide high load-carrying capacity and assure long life.

The simple design and unitized construction provide low-cost mounting systems which are compact, lightweight, easy to install and maintenance-free.

These mounts are available in three size groups to suit a variety of applications. Small Flex-Bolt Sandwich Mounts are available in metric and standard (UNC) threads.

Typical applications for Flex-Bolt Sandwich Mounts include business machines; motorcycles; heating, ventilating and air conditioning equipment; light motors; appliances; shipping containers; feeders; compactors; and vibratory rollers.

Features and Benefits

- Economical
- Compact and lightweight
- Easy to install
- Maintenance-free
- Three size groups: small, medium and large
- Unitized construction

Small Sandwich Mounts (Standard UNC Threads)

Table 1 – Specifications and Dimensions

Part Number	Type	Elastomer ①	Shear				Compression				Part Dimensions			
			Maximum Static Load		Spring Rate K _S		Maximum Static Load		Spring Rate K _C		A		B	
			lb	N	lb/in	N/mm	lb	N	lb/in	N/mm	in	mm	in	mm
SMB003-0100-1	1	NR	1	4	18	3	7	31	100	18	0.38	9.7	0.38	9.7
SMB003-0100-2	1	NR	1.5	7	26	5	10	44	138	24	0.38	9.7	0.38	9.7
SMB003-0100-7	1	OR	1.5	7	26	5	10	44	180	32	0.38	9.7	0.38	9.7
SMB003-0100-3	1	NR	2	9	40	7	13	58	200	35	0.38	9.7	0.38	9.7
SMB003-0100-43	1	OR	2.5	11	30	5	11	49	143	25	0.38	9.7	0.38	9.7
SMB003-0100-42	1	OR	2.5	11	30	5	11	49	143	25	0.38	9.7	0.38	9.7
SMB003-0100-9	1	OR	3	13	50	9	17	76	285	50	0.38	9.7	0.38	9.7
SMB003-0200-6	2	OR	1	4	50	9	6	27	260	46	0.38	9.7	0.19	4.8
SMB003-0200-9	2	OR	3	13	120	21	11	49	360	63	0.38	9.7	0.19	4.8
SMB003-0100-12	1	OR	4	18	375	66	25	111	2000	350	0.38	9.7	0.38	9.7
SMB006-0100-2	1	NR	5	22	55	10	35	156	325	57	0.62	15.7	0.50	12.7
SMB006-0100-7	1	OR	5	22	55	10	35	156	325	57	0.62	15.7	0.50	12.7
SMB006-0100-9	1	OR	9	40	105	18	60	267	700	123	0.62	15.7	0.50	12.7
SMB006-0200-6	2	OR	4	18	90	16	17	76	510	89	0.62	15.7	0.25	6.4
SMB006-0200-9	2	OR	7	31	180	32	35	156	1020	179	0.62	15.7	0.25	6.4
J-4624-109	1	OR	3	13	28	5	28	125	195	34	1.0	25.4	0.38	9.7
J-4624-43	2	NR	4	18	130	23	18	80	565	99	1.0	25.4	0.25	6.4
J-4624-19	1	NR	6	27	55	10	36	160	320	56	1.0	25.4	0.38	9.7
J-4624-57	1	NR	6	27	55	10	36	160	320	56	1.0	25.4	0.62	15.7
J-4624-479	2	OR	8	36	230	40	44	196	1000	175	1.0	25.4	0.25	6.4
J-4624-165	2	NR	9	40	185	32	35	156	765	134	1.0	25.4	0.25	6.4
J-4624-1	1	OR	12	53	105	18	64	285	620	109	1.0	25.4	0.38	9.7
J-4624-14	1	OR	12	53	105	18	64	285	620	109	1.0	25.4	0.50	12.7
J-4624-27	1	OR	12	53	105	18	64	285	620	109	1.0	25.4	0.75	19.1
J-4624-119	1	OR	12	53	105	18	64	285	620	109	1.0	25.4	0.88	22.4
J-4624-23	1	OR	17	76	180	18	110	489	940	165	1.0	25.4	0.62	15.7
J-4624-63	1	OR	22	98	200	35	135	601	1200	210	1.0	25.4	0.75	19.1
J-4624-13	1	OR	22	98	200	35	135	601	1200	210	1.0	25.4	0.50	12.7
J-4624-3	1	OR	22	98	300	53	135	601	1470	257	1.0	25.4	0.88	22.4
J-4624-45	1	OR	22	98	200	35	135	601	1200	210	1.0	25.4	0.75	19.1
J-4624-545	2	OR	22	98	500	53	135	601	2100	368	1.0	25.4	0.25	6.4
J-4624-32	1	OR	29	129	260	46	200	890	1800	315	1.0	25.4	0.50	12.7
J-4624-351	1	OR	29	129	260	46	200	890	1800	315	1.0	25.4	0.50	12.7
J-4624-10	2	NR	40	178	750	131	168	747	4200	735	1.0	25.4	0.25	6.4
J-4624-7	3	NR	—	—	—	—	30	133	400	70	1.0	25.4	—	—
J-4624-2	3	OR	—	—	—	—	90	400	750	131	1.0	25.4	—	—
J-4624-851	1	NR	12	53	105	18	64	285	620	109	1.0	25.4	0.50	12.3
J-4624-827	3	PB	—	—	—	—	53	236	580	102	1.0	25.4	—	—
J-4624-873	1	OR	29	129	260	46	200	890	1800	315	1.0	25.4	0.75	19.1
J-4624-556	1	NR	35	156	200	35	135	601	1200	210	1.0	25.4	0.75	19.1
J-11729-123	1	NR	20	89	150	26	180	801	950	166	1.5	38.1	0.75	19.1
J-11729-126	1	OR	25	111	185	32	190	845	1000	175	1.5	38.1	0.75	19.1
J-11729-169	1	NR	30	133	125	22	225	1001	900	158	1.5	38.1	0.75	19.1
J-11729-124	1	NR	35	156	320	56	300	1334	1715	300	1.5	38.1	0.75	19.1
J-11729-127	1	OR	35	156	320	56	300	1334	1600	280	1.5	38.1	0.75	19.1
J-11729-125	1	NR	50	222	380	67	420	1868	2000	350	1.5	38.1	0.75	19.1
J-11729-177	2	OR	20	89	225	39	60	267	900	158	1.5	38.1	0.33	8.4
J-11729-187	2	OR	22	98	320	56	100	445	2050	359	1.5	38.1	0.33	8.4
J-11729-190	2	NR	25	111	110	19	120	534	500	88	1.5	38.1	0.33	8.4
J-11729-195	3	OR	—	—	—	—	250	1112	1820	319	1.5	38.1	—	—
J-11729-666	1	NR	11	49	550	96	90	400	3750	657	1.5	38.1	0.75	19.1

① NR = Natural Rubber

OR = Oil-Resistant Elastomer - Neoprene

PB = Oil-Resistant Elastomer

A part's listing in this catalog does not guarantee its availability.

To download/print the most current catalog, go to www.LORD.com.

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions				Bolt Information*	
	C		D		Thread Size	Grade per SAE J429
	in	mm	in	mm		
SMB003-0100-1	0.50	12.7	0.38	9.7	8 - 32	1
SMB003-0100-2	0.50	12.7	0.38	9.7	8 - 32	1
SMB003-0100-7	0.50	12.7	0.38	9.7	8 - 32	1
SMB003-0100-3	0.50	12.7	0.38	9.7	8 - 32	1
SMB003-0100-43	0.50	12.7	0.38	9.7	6 - 32	1
SMB003-0100-42	0.50	12.7	0.38	9.7	10 - 32	1
SMB003-0100-9	0.50	12.7	0.38	9.7	8 - 32	1
SMB003-0200-6	0.50	12.7	0.38	9.7	8 - 32	1
SMB003-0200-9	0.50	12.7	0.38	9.7	8 - 32	1
SMB003-0100-12	0.25	6.4	0.38	9.7	8 - 32	1
SMB006-0100-2	0.62	15.7	0.50	12.7	1/4 - 20	1
SMB006-0100-7	0.62	15.7	0.50	12.7	1/4 - 20	1
SMB006-0100-9	0.62	15.7	0.50	12.7	1/4 - 20	1
SMB006-0200-6	0.62	15.7	0.50	12.7	1/4 - 20	1
SMB006-0200-9	0.62	15.7	0.50	12.7	1/4 - 20	1
J-4624-109	0.75	19.1	0.38	9.7	1/4 - 20	1
J-4624-43	0.75	19.1	0.38	9.7	1/4 - 20	1
J-4624-19	0.75	19.1	0.38	9.7	1/4 - 20	1
J-4624-57	0.75	19.1	0.62	15.7	5/16 - 18	1
J-4624-479	0.75	19.1	0.50	12.7	1/4 - 20	1
J-4624-165	0.75	19.1	0.62	15.7	1/4 - 20	1
J-4624-1	0.75	19.1	0.38	9.7	1/4 - 20	1
J-4624-14	0.75	19.1	0.50	12.7	1/4 - 20	1
J-4624-27	0.75	19.1	0.75	19.1	1/4 - 20	1
J-4624-119	0.75	19.1	0.50	12.7	5/16 - 18	1
J-4624-23	0.75	19.1	0.62	15.7	1/4 - 20	1
J-4624-63	0.75	19.1	0.50	12.7	1/4 - 20	1
J-4624-13	0.75	19.1	0.50	12.7	5/16 - 18	1
J-4624-3	0.75	19.1	0.50	12.7	5/16 - 18	1
J-4624-45	0.75	19.1	0.75	19.1	5/16 - 18	1
J 4624-545	0.75	19.1	0.50	12.7	5/16 - 18	1
J-4624-32	0.75	19.1	0.50	12.7	1/4 - 20	1
J-4624-351	0.75	19.1	0.50	12.7	5/16 - 18	1
J 4624-10	0.75	19.1	0.38	9.7	1/4 - 20	1
J-4624-7	0.69	17.5	0.38	9.7	1/4 - 20	1
J-4624-2	0.69	17.5	0.38	9.7	1/4 - 20	1
J-4624-851	0.75	19.1	0.50	12.7	1/4 - 20	1
J-4624-827	0.69	17.5	0.62	15.7	1/4 - 20	1
J-4624-873	0.75	19.1	0.75	19.1	5/16 - 18	1
J-4624-556	0.75	19.1	0.50	12.7	1/4 - 20	1
J-11729-123	1.0	25.4	0.75	19.1	3/8 - 16	1
J-11729-126	1.0	25.4	0.75	19.1	3/8 - 16	1
J-11729-169	1.5	38.1	0.75	19.1	3/8 - 16	1
J 11729-124	1.0	25.4	0.75	19.1	3/8 - 16	1
J-11729-127	1.0	25.4	0.75	19.1	3/8 - 16	1
J-11729-125	1.0	25.4	0.75	19.1	3/8 - 16	1
J-11729-177	1.0	25.4	0.75	19.1	3/8 - 16	1
J-11729-187	1.0	25.4	0.75	19.1	3/8 - 16	1
J-11729-190	1.5	38.1	0.75	19.1	3/8 - 16	1
J-11729-195	1.0	25.4	0.75	19.1	3/8 - 16	1
J-11729-666	1.0	25.4	0.75	19.1	3/8 - 16	1

* For tightening torque information, refer to Tightening Torque Charts section.

Figure 1 – Part Dimensions - Type 1

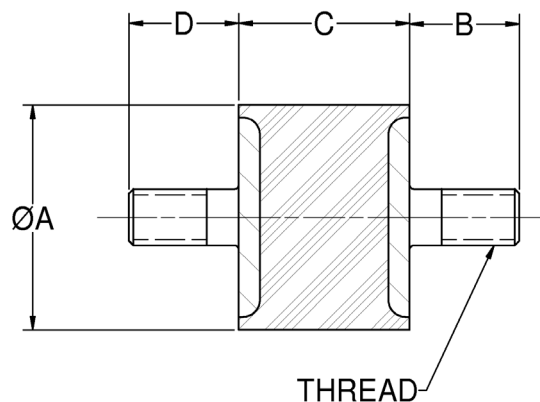


Figure 2 – Part Dimensions - Type 2

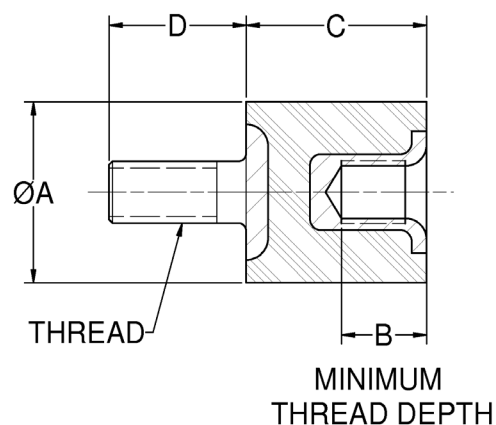
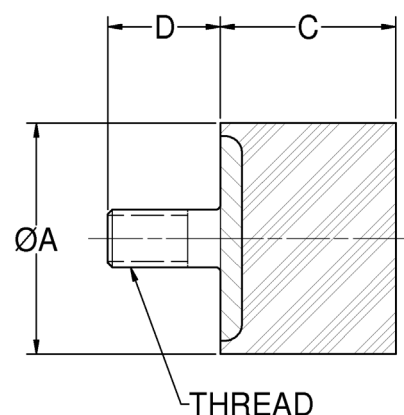


Figure 3 – Part Dimensions - Type 3



Small Sandwich Mounts (Metric Threads)

Table 1 – Specifications and Dimensions

Part Number	Type	Elastomer ①	Shear				Compression				Part Dimensions			
			Maximum Static Load		Spring Rate K _S		Maximum Static Load		Spring Rate K _C		A		B	
			lb	N	lb/in	N/mm	lb	N	lb/in	N/mm	in	mm	in	mm
SMB003-0400-8	1	OR	2	9	40	7	13	58	200	35	0.38	9.7	0.38	9.7
SMB003-0500-6	2	OR	1	4	55	10	7	31	295	52	0.38	9.7	0.19	4.8
SMB003-0500-9	2	OR	2	9	120	21	11	49	460	81	0.38	9.7	0.19	4.8
SMB006-0400-7	1	OR	5	22	55	10	35	156	320	56	0.62	15.7	0.50	12.7
SMB006-0400-9	1	OR	9	40	140	25	60	267	700	123	0.62	15.7	0.50	12.7
SMB006-0500-6	2	OR	4	18	110	19	17	76	550	96	0.62	15.7	0.25	6.3
SMB006-0500-9	2	OR	7	31	220	39	35	156	800	151	0.62	15.7	0.25	6.3
J-4624-616	1	OR	14	62	125	22	95	423	700	123	1.0	25.4	0.75	19.0
J-4624-618	1	OR	22	98	220	39	145	645	1200	210	1.0	25.4	0.75	19.0
J-4624-640	2	NR	6	27	155	27	45	200	750	131	1.0	25.4	0.25	6.3
J-11729-685	1	NR	43	191	171	30	145	644	1200	210	1.5	38.1	0.87	22.1

Materials: Metal parts are steel per SAE J429, Grade 1.

① NR = Natural Rubber

OR = Oil-Resistant Elastomer - Neoprene

† Non-Stock Item, please contact LORD Corporation for availability.

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions				Bolt Information*	
	C		D		Thread Size	Class per SAE J1199
	in	mm	in	mm		
SMB003-0400-8	.50	12.7	.38	9.7	M4 x 0.7	4.6
SMB003-0500-6	.50	12.7	.38	9.7	M4 x 0.7	4.6
SMB003-0500-9	.50	12.7	.38	9.7	M4 x 0.7	4.6
SMB006-0400-7	.62	15.7	.50	12.7	M6 x 1.0	4.6
SMB006-0400-9	.62	15.7	.50	12.7	M6 x 1.0	4.6
SMB006-0500-6	.62	15.7	.50	12.7	M6 x 1.0	4.6
SMB006-0500-9	.62	15.7	.50	12.7	M6 x 1.0	4.6
J-4624-616	.75	19.0	.75	19.0	M6 x 1.0	4.6
J-4624-618	.75	19.0	.75	19.0	M6 x 1.0	4.6
J-4624-640	.75	19.0	.75	19.0	M6 x 1.0	4.6
J-11729-685	1.20	30.5	0.84	22.1	M8 x 1.25	6

Materials: Metal parts are steel per SAE J429, Grade 1.

* For tightening torque information, refer to Tightening Torque Charts section.

Figure 1 – Part Dimensions - Type 1

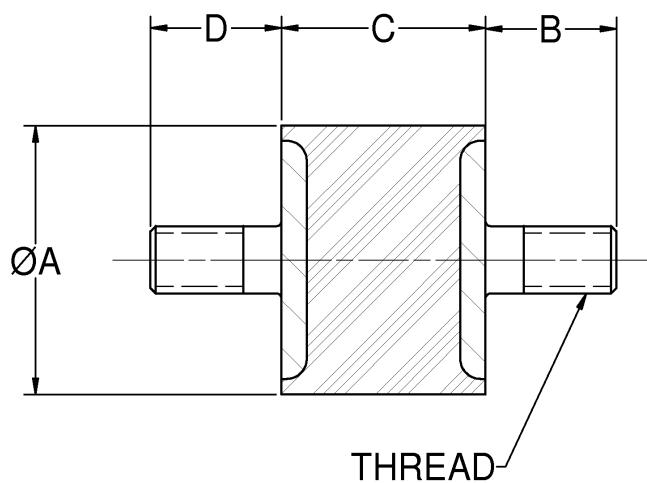
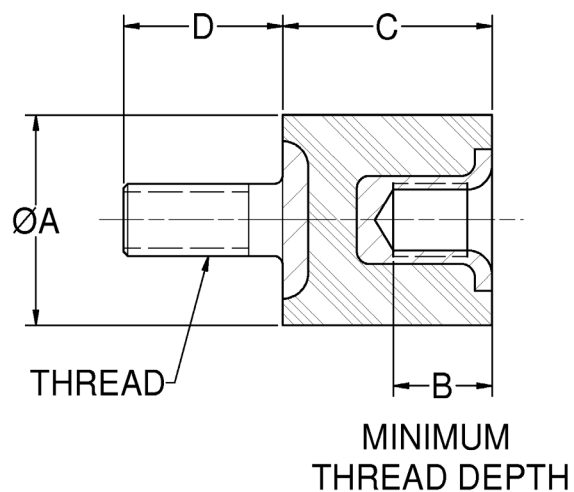


Figure 2 – Part Dimensions - Type 2



Medium Sandwich Mounts

Table 1 – Specifications and Dimensions

Part Number	Type	Elastomer ①	Shear				Compression				Part Dimensions			
			Maximum Static Load		Spring Rate K _S		Maximum Static Load		Spring Rate K _C		A		B	
			lb	N	lb/in	N/mm	lb	N	lb/in	N/mm	in	mm	in	mm
J-3424-143	4	NR	23	102	115	20	130	578	650	114	2.0	50.8	.40	10.2
J-3424-49	4	NR	30	133	75	13	184	818	455	80	2.0	50.8	.40	10.2
J-3424-8	4	NR	36	160	110	19	208	925	635	111	2.0	50.8	.40	10.2
J-3424-5	4	OR	38	169	165	29	205	912	900	158	2.0	50.8	.40	10.2
J-3424-30	4	NR	49	218	320	56	259	1152	1685	295	2.0	50.8	.40	10.2
J-3424-6	4	NR	57	253	250	44	274	1219	1200	210	2.0	50.8	.40	10.2
J-3424-2	4	OR	66	293	290	51	278	1237	1220	214	2.0	50.8	.40	10.2
J-3424-80	4	NR	91	405	400	70	382	1699	1675	293	2.0	50.8	.40	10.2
J-3424-3	4	OR	81	360	355	62	417	1855	1830	320	2.0	50.8	.40	10.2
J-3424-21	4	OR	120	534	525	92	549	2442	2410	422	2.0	50.8	.40	10.2
J-3424-147	5	NR	—	—	—	—	551	2451	5400	946	2.0	50.8	.40	10.2
J-5294-2	6	OR	190	845	665	116	1500	6672	3675	643	2.81	71.4	4.78	121.4
J-5425-15	1	NR	92	409	220	39	600	2669	1250	219	3.12	79.2	1.25	31.8
J-5425-275	4	NR	110	489	260	46	720	3203	1400	245	3.12	79.2	.53	13.5
J-5425-1	1	NR	157	698	455	80	1020	4537	2165	379	3.12	79.2	1.25	31.8
J-5425-123	4	NR	165	732	750	133	1670	7428	4125	722	3.12	79.2	.53	13.5
J-5425-276	1	NR	221	933	850	149	1670	7428	3525	617	3.12	79.2	1.25	31.58
J-5425-27	2	NR	236	1050	650	114	1540	6850	2750	482	3.12	79.2	.53	13.5
J-5425-6	1	NR	175	777	800	142	2040	9074	4000	700	3.12	79.2	1.25	31.8
J-5425-169	3	NR	—	—	—	—	1100	4893	2680	469	3.12	79.2	—	—
J-5425-219	1	NR	325	1446	325	57	—	—	1800	315	3.12	79.2	0.87	3.9

① NR = Natural Rubber

OR = Oil-Resistant Elastomer - Neoprene

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions												Bolt Information*	
	C		D		E		F		G		H		Thread Size	Grade per SAE J429
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm		
J-3424-143	2.12	53.8	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-49	3.00	76.2	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-8	2.62	66.5	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-5	2.12	53.8	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-30	1.75	44.5	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-6	2.12	53.8	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-2	2.12	53.8	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-80	2.12	53.8	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-3	2.12	53.8	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-21	2.12	53.8	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-3424-147	1.00	25.4	0.40	10.2	—	—	—	—	—	—	—	—	1/2 - 13	2
J-5294-2	2.56	65.0	3.0	76.2	1.75	44.5	2.25	57.2	3.88	98.6	0.81	20.6	5/16 - 18	2
J-5425-15	3.00	76.2	1.25	31.8	—	—	—	—	—	—	—	—	1/2 - 13	2
J-5425-275	3.00	76.2	0.53	13.5	—	—	—	—	—	—	—	—	1/2 - 13	2
J-5425-1	3.00	76.2	1.25	31.8	—	—	—	—	—	—	—	—	1/2 - 13	2
J-5425-123	2.25	57.2	0.53	13.5	—	—	—	—	—	—	—	—	1/2 - 20	2
J-5425-276	2.25	57.2	1.25	31.8	—	—	—	—	—	—	—	—	1/2 - 13	2
J-5425-27	3.00	76.2	1.25	38.1	—	—	—	—	—	—	—	—	1/2 - 20	2
J-5425-6	3.00	76.2	1.25	38.1	—	—	—	—	—	—	—	—	1/2 - 13	2
J-5425-169	2.50	63.5	0.75	19.1	—	—	—	—	—	—	—	—	1/2 - 13	2
J-5425-219	3.0	76.2	0.87	3.9	—	—	—	—	—	—	—	—	1/2 - 13	2

* For tightening torque information, refer to Tightening Torque Charts section.

A part's listing in this catalog does not guarantee its availability.
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Figure 1 – Part Dimensions - Type 1

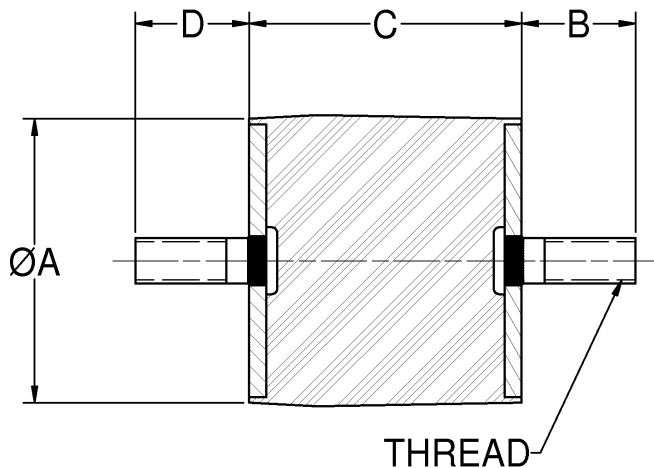


Figure 2 – Part Dimensions - Type 2

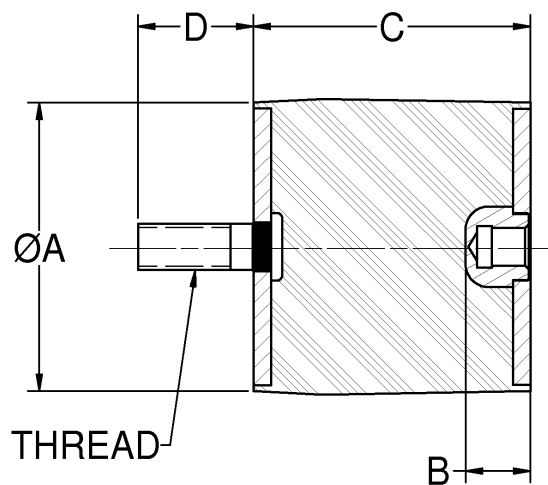


Figure 3 – Part Dimensions - Type 3

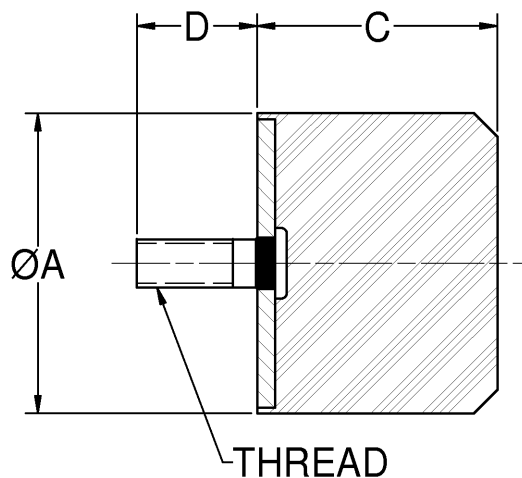


Figure 4 – Part Dimensions - Type 4

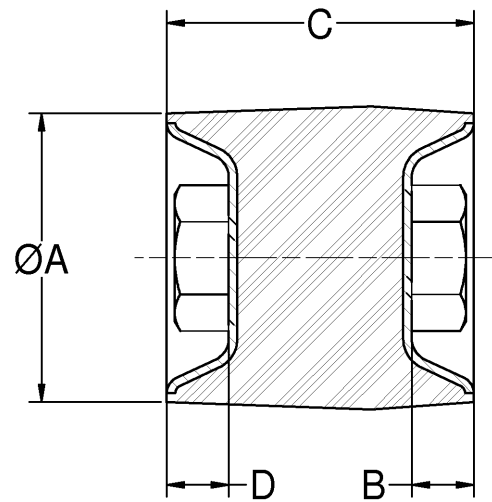


Figure 5 – Part Dimensions - Type 5

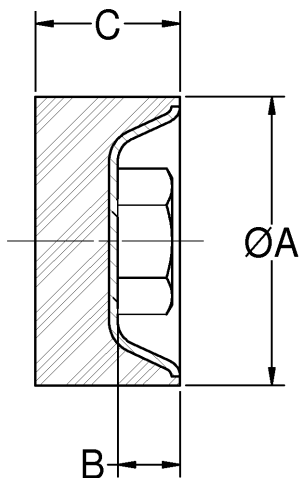
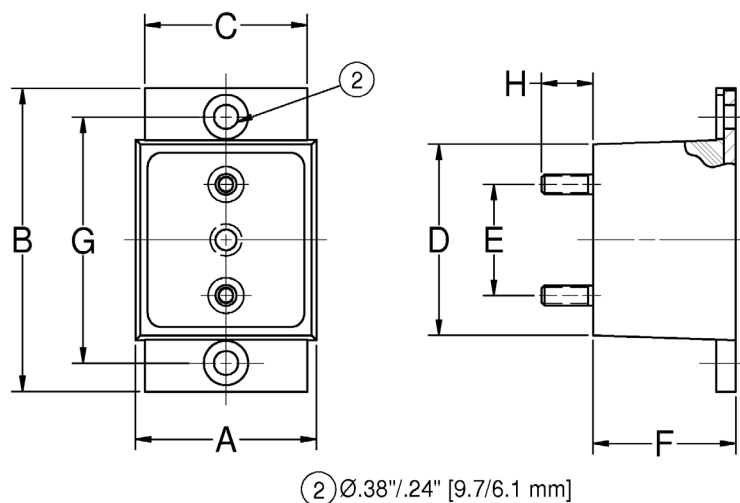


Figure 6 – Part Dimensions - Type 6



Large Sandwich Mounts

Table 1 – Specifications and Dimensions

Part Number	Type	Elastomer ①	Shear				Compression				Part Dimensions			
			Maximum Static Load		Spring Rate K _S		Maximum Static Load		Spring Rate K _C		A		B	
			lb	N	lb/in	N/mm	lb	N	lb/in	N/mm	in	mm	in	mm
J-5735-2	3	NR	245	1090	440	77	1575	7006	2000	350	4.83	122.7	4.83	122.7
J-5682-22	1	NR	160	712	550	98	1650	7340	4285	750	4.00	101.6	1.25	31.8
J-5682-1	1	OR	225	1000	900	160	2700	12,010	6900	1208	4.00	101.6	1.25	31.8
J-5682-32	2	NR	—	—	—	—	2260	10,050	11,800	2065	3.96	100.6	—	—
J-5130-55	4	NR	450	2002	1800	315	3400	15,124	15,000	2627	4.75	120.7	4.75	120.7
J-5130-1	4	OR	550	2447	2000	350	4130	18,371	17,300	3030	4.75	120.7	4.75	120.7
SMA070-0600-3	5	NR	600	2669	1450	254	4900	21,746	9400	1646	7.12	180.8	7.12	180.8
J-14056-4	5	NR	770	3425	850	149	3670	16,325	5100	893	7.12	180.8	7.12	180.8
SMA090-0900-1	5	NR	900	4003	1675	293	7600	33,806	10,500	1839	9.00	228.6	9.00	228.6
SMA095-1200-3	5	NR	1200	5338	970	170	5800	25,800	5800	1016	9.44	239.8	9.44	239.8
J-6332-121	6	SP	1360	6050	4800	846	12,240	54,446	42,800	7494	7.14	181.4	9.00	228.6
J-6332-2	6	OR	1680	7473	4200	735	13,440	59,784	40,500	7092	7.14	181.4	9.00	228.6
J-6332-183	7	OR	1680	7473	4200	735	13,440	59,606	42,100	7372	7.14	181.4	9.00	228.6

① NR = Natural Rubber
OR = Oil-Resistant Elastomer - Neoprene
SP = SPE-1 Low Temperature Elastomer

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions																Flange Thickness		Bolt Information*	
	C		D		E		F		G		H		I		J		in	mm	Thread Size	Grade per SAE J429
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm				
J-5735-2	3.75	95.3	4.03	102.4	4.38	111.3	0.38	9.7	1.0	25.4	—	—	—	—	—	—	0.24	6.1	1/2 - 13	2
J-5682-22	2.25	57.2	1.25	31.8	4.48	113.8	—	—	—	—	—	—	—	—	—	—	—	—	1/2 - 20	2
J-5682-1	2.25	57.2	1.25	31.8	4.48	113.8	—	—	—	—	—	—	—	—	—	—	—	—	1/2 - 20	2
J-5682-32	1.50	38.1	1.25	31.8	4.48	113.8	—	—	—	—	—	—	—	—	—	—	—	—	1/2 - 13	2
J-5130-55	2.62	66.5	2.12	53.8	5.12	130.0	0.53	13.5	—	—	—	—	—	—	—	—	—	—	1/2 - 20	2
J-5130-1	2.62	66.5	2.12	53.8	5.12	130.0	0.53	13.5	—	—	—	—	—	—	—	—	—	—	1/2 - 20	2
SMA070-0600-3	5.75	146.1	5.75	146.1	0.51	12.9	3.00	76.2	5.30	134.6	—	—	—	—	—	—	0.19	4.8	—	2
J-14056-4	5.75	146.1	5.75	146.1	0.51	12.9	4.00	101.6	5.50	139.7	—	—	—	—	—	—	0.19	4.8	—	2
SMA090-0900-1	7.50	190.5	7.50	190.5	0.51	12.9	4.00	101.6	6.50	165.1	—	—	—	—	—	—	0.19	4.8	—	2
SMA095-1200-3	7.50	190.5	7.50	190.5	0.76	19.3	5.50	139.7	7.40	188.88	—	—	—	—	—	—	0.25	6.4	—	2
J-6332-121	7.12	180.8	4.00	101.6	5.50	139.7	3.88	98.6	2.25	57.2	2.50	63.5	1.00	25.4	0.53	13.5	—	—	1/2 - 20	2
J-6332-2	7.12	180.8	4.00	101.6	5.50	139.7	3.88	98.6	2.25	57.2	2.50	63.5	1.00	25.4	0.53	13.5	—	—	1/2 - 20	2
J-6332-183	7.12	180.8	4.00	101.6	5.50	139.7	3.88	98.6	2.25	57.2	2.50	63.5	0.53	13.5	—	—	—	—	1/2 - 20	2

* For tightening torque information, refer to Tightening Torque Charts section.

Figure 1 – Part Dimensions - Type 1

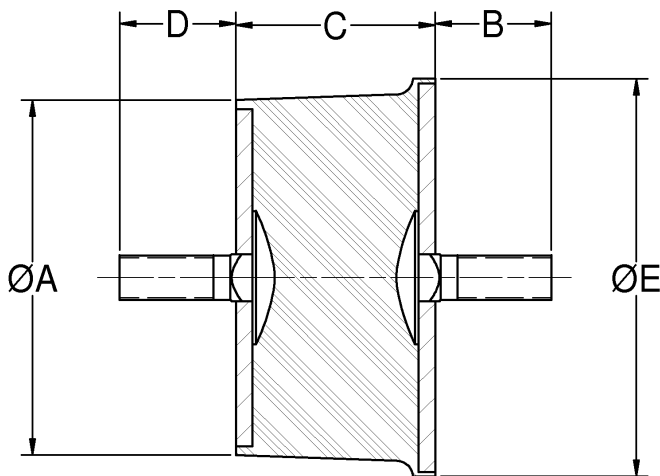


Figure 2 – Part Dimensions - Type 2

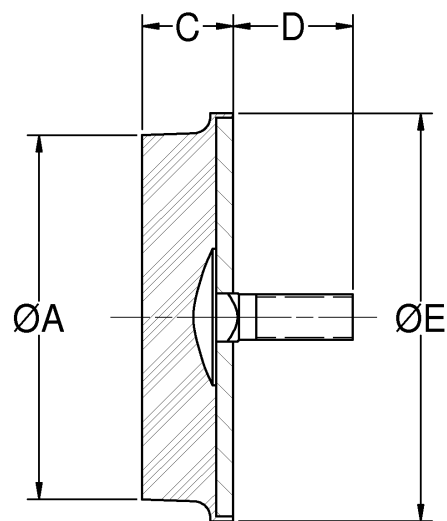


Figure 3 – Part Dimensions - Type 3

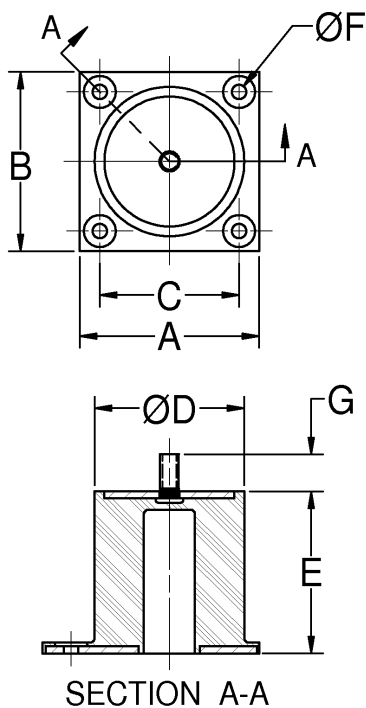


Figure 4 – Part Dimensions - Type 4

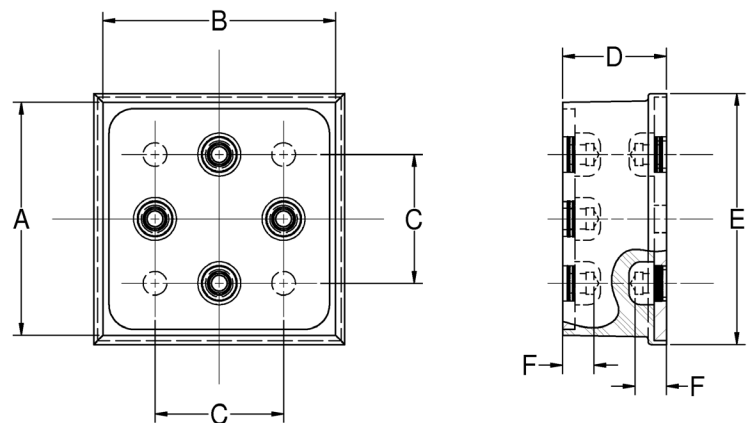


Figure 5 – Part Dimensions - Type 5

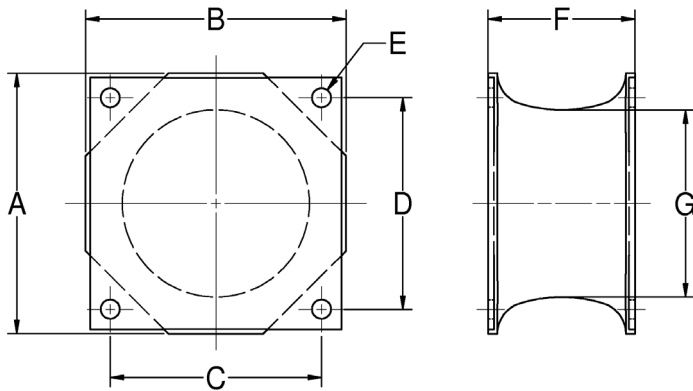


Figure 6 – Part Dimensions - Type 6

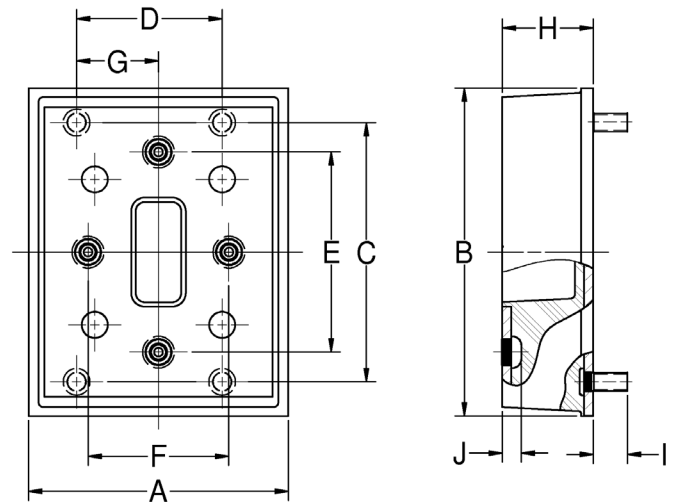
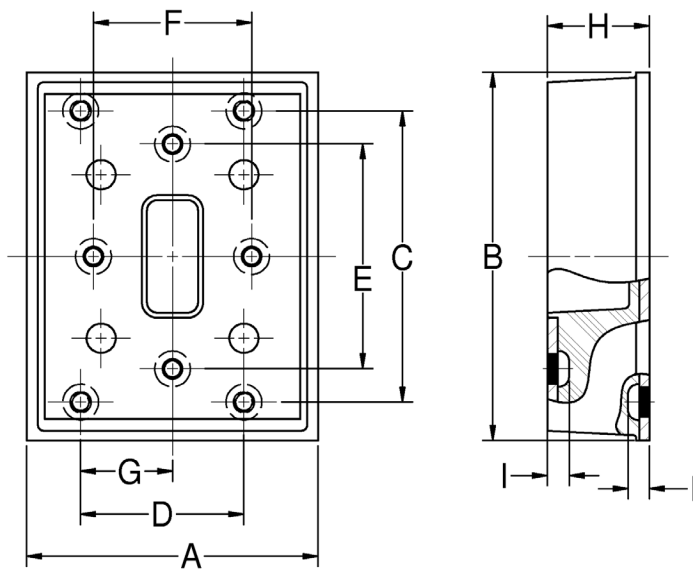
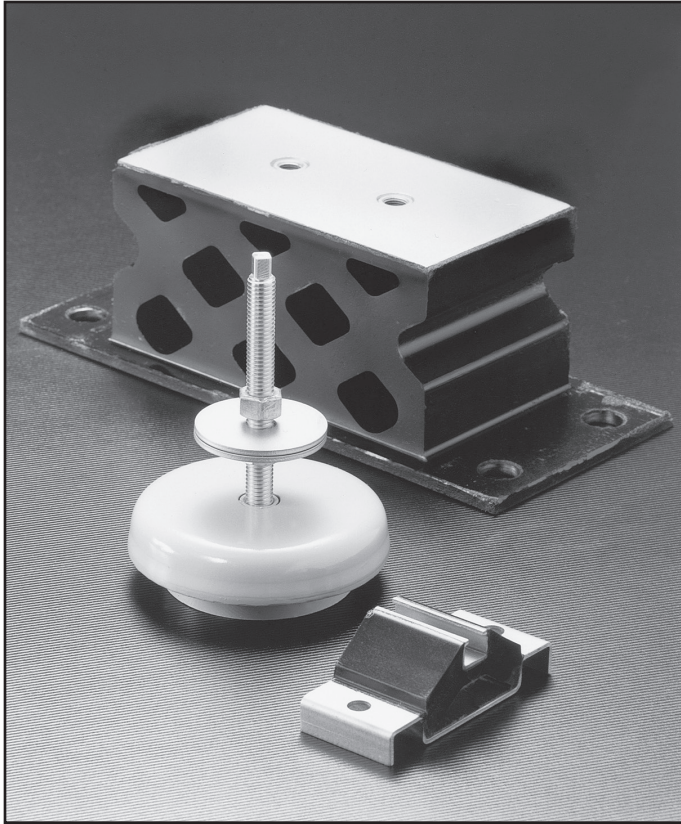


Figure 7 – Part Dimensions - Type 7





Machinery Mounts

Featuring: Lattice Mounts
Chan-L™ Mounts
Industrial Shock Mounts
Leveling Mounts

LORD Machinery Mounts are designed to support heavy equipment and isolate intermittent or continuous vibration. The result is greater machine accuracy, longer service life, smoother operation and reduced maintenance. These mounts are available in four types to suit different needs.

Lattice Mounts are recommended for applications where disturbing frequencies are as low as 6 Hz. Their lattice design provides a soft vertical spring rate combined with lateral stability. Typical applications include shaker-screens, sifters, rubber mills, air compressors and large engines/generators.

Chan-L™ Mounts are recommended for machines where vertical disturbing frequencies are 600 cpm or higher. Their elastomer-supported channel design features a soft vertical spring rate. The design incorporates built-in protection against metal-to-metal bottoming. Typical applications include separating and grading screens and shakeouts.

Industrial Shock Mounts efficiently control shock and structural noise transmission from heavy industrial machinery. Adjacent controls, sensitive instruments and precision machines are protected from impact disturbances which could hamper their performance. Worker comfort is increased, and building structures need less maintenance.

Features and Benefits

- High-efficiency, multi-directional isolation of low frequency vibration
- Extremely rugged and require no maintenance
- Easy to install
- Long service life

Lattice Mounts

Table 1 – Specifications and Dimensions

Part Number	Type	Maximum Static Load		Deflection		Part Dimensions							
						A		B		C		D	
		lb	N	in	mm	in	mm	in	mm	in	mm	in	mm
J-5984-11	I	425	1890	0.62	15.7	9.75	247.7	8.12	206.2	5.50	139.7	①	①
J-5984-20	I	640	2847	0.62	15.7	9.75	247.7	8.12	206.2	5.50	139.7	①	①
J-4976-8	I	650	2891	0.62	15.7	12.50	317.5	10.88	276.4	8.25	209.6	2.75	69.9
J-4976-9	I	850	3781	0.62	15.7	12.50	317.5	10.88	276.4	8.25	209.6	2.75	69.9
J-4557-13	I	1000	4448	0.50	12.7	12.00	304.8	10.38	263.7	8.50	215.9	2.75	69.9
J-5665-35	I	1300	5783	1.00	25.4	14.23	361.4	12.44	316.0	9.06	230.1	②	②
J-5665-32	I	2000	8896	1.00	25.4	18.60	472.4	16.88	428.8	13.50	342.9	4.50	114.3
J-5665-33	I	3000	13,345	1.00	25.4	18.60	472.4	16.88	428.8	13.50	342.9	4.50	114.3
J-5665-34	I	4000	17,793	1.00	25.4	18.60	472.4	16.88	428.8	13.50	342.9	4.50	114.3

① One hole centered in top plate.

② Two holes midway in top plate.

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions											
	E		F		G		H		J		M	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
J-5984-11	4.50	114.3	2.06	52.3	3.38	85.9	4.19	106.4	0.76	19.3	—	—
J-5984-20	4.50	114.3	2.06	52.3	3.38	85.9	4.91	124.7	0.76	19.3	—	—
J-4976-8	5.50	139.7	3.25	82.6	4.56	115.8	4.19	106.4	0.76	19.3	—	—
J-4976-9	5.50	139.7	3.25	82.6	4.56	115.8	4.19	106.4	0.76	19.3	—	—
J-4557-13	5.00	127.0	3.25	82.6	4.08	103.6	3.50	88.9	0.76	19.3	—	—
J-5665-35	9.14	232.2	5.00	127.0	7.62	193.5	6.08	154.4	0.76	19.3	5.00	127.0
J-5665-32	9.14	232.2	5.00	127.0	7.62	193.5	6.08	154.4	0.76	19.3	—	—
J-5665-33	9.14	232.2	5.00	127.0	7.62	193.5	6.08	154.4	0.76	19.3	—	—
J-5665-34	9.14	232.2	5.00	127.0	7.62	193.5	6.08	154.4	0.76	19.3	—	—

Figure 1 – Part Dimensions - Type I

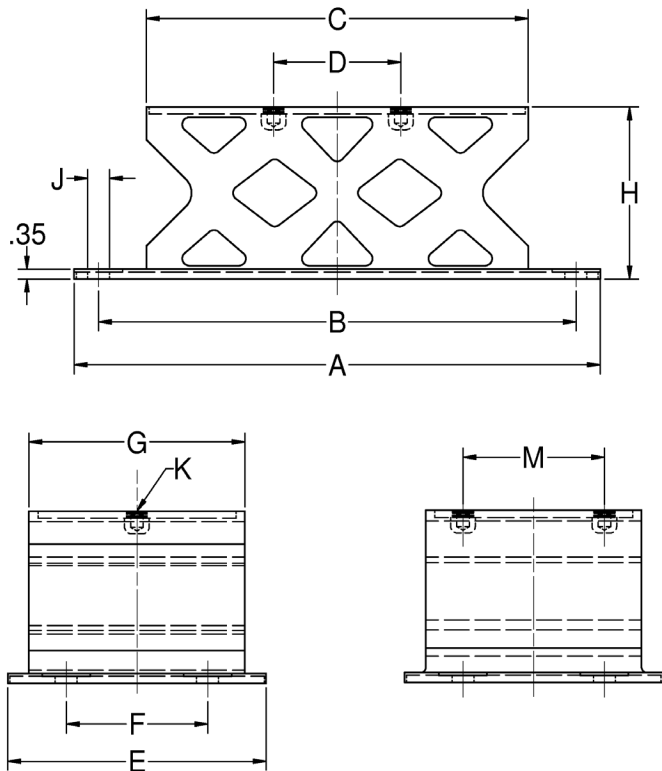


Figure 2 – Installation View

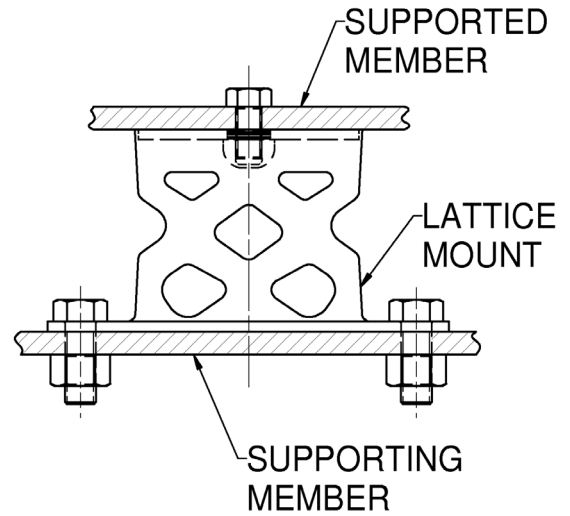


Table 3 – Specifications and Dimensions

Part Number	Part Dimension	Weight Each	
	K ③	lb	kg
J-5984-11	.500-20UNF-2B	5.8	2.6
J-5984-20	.625-18UNF-2B	5.8	2.6
J-4976-8	.500-20UNF-2B	10.6	4.8
J-4976-9	.500-20UNF-2B	10.6	4.8
J-4557-13	.500-20UNF-2B	9.2	4.2
J-5665-35	.500-20UNF-2B	17.3	7.8
J-5665-32	.500-20UNF-2B	26.5	12.0
J-5665-33	.500-20UNF-2B	26.5	12.0
J-5665-34	.500-20UNF-2B	26.5	12.0

③ Maximum permissible depth of thread engagement is 0.53".

Chan-L™ Mounts

Table 1 – Specifications and Dimensions

Part Number	Type	Maximum Static Load Rating				Part Dimensions Under No Load							
		Load		Deflection		A		B		C		D	
		lb	N	in	mm	in	mm	in	mm	in	mm	in	mm
J-2170-1	II	50	222	0.25	6.4	1.00	25.4	①	①	3.69	93.7	4.50	114.3
J-2171-1	II	100	448	0.25	6.4	2.00	50.8	①	①	3.69	93.7	4.50	114.3
J-2172-1	I	200	889	0.25	6.4	4.00	101.6	2.50	63.5	3.69	93.7	4.50	114.3
J-2173-1	I	400	1779	0.25	6.4	8.00	203.2	6.00	152.4	3.69	93.7	4.50	114.3

① One hole centered in each side of mount top plate.

Materials: Steel and Natural Rubber

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions Under No Load								Weight Each	
	E		F		G Ⓢ		H Ø			
	in	mm	in	mm	in	mm	in	mm	lb	kg
J-2170-1	2.75	69.9	1.56	39.6	0.59	15.0	0.41	10.4	0.25	0.1
J-2171-1	2.75	69.9	1.56	39.6	0.59	15.0	0.41	10.4	0.50	0.2
J-2172-1	2.75	69.9	1.56	39.6	0.59	15.0	0.41	10.4	1.06	0.5
J-2173-1	2.75	69.9	1.53	38.9	0.59	15.0	0.41	10.4	2.16	1.0

② Provides opening for 3/8" (9.5 mm) hex or square head bolt.

Materials: Steel and Natural Rubber

Vibration Problems: LORD Machinery Mounts are specifically engineered to isolate vertical shocks and reduce transmission of structural noise through floors. If your application involves intermittent or continuous vibration frequencies above 600 cycles per minute, use LORD Chan-L Mounts. If frequencies below 600 cycles per minute are involved, use LORD Lattice Mounts.

Figure 1 – Part Dimensions - Type I

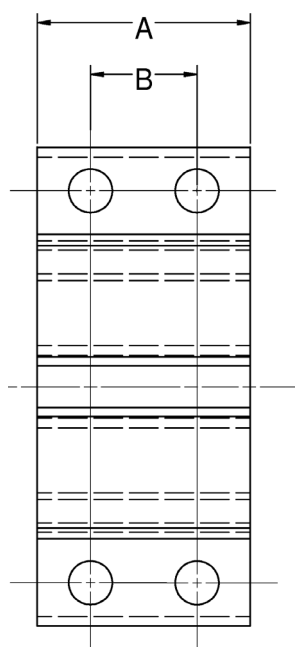


Figure 2 – Part Dimensions - Type II

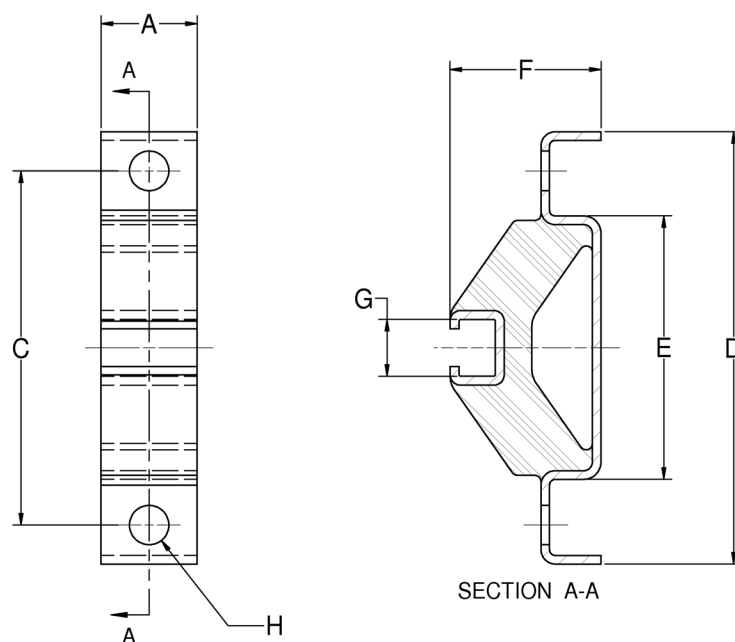
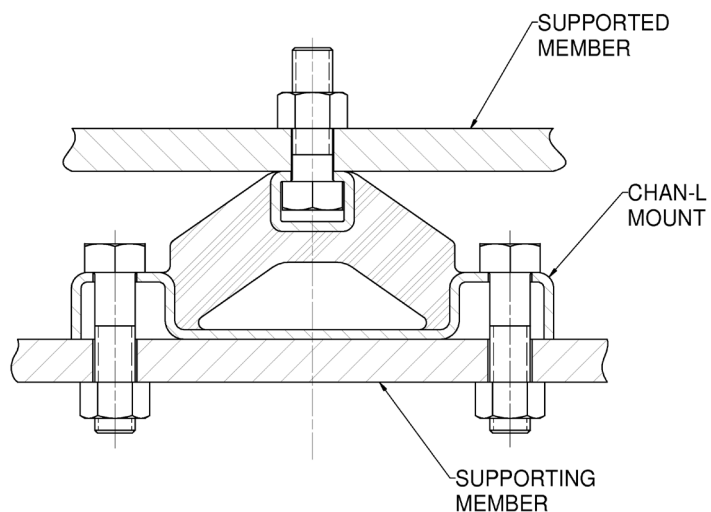


Figure 3 – Installation View



Industrial Shock Mounts

Table 1 – Specifications and Dimensions

Part Number	Figure	Maximum Axial Load		Deflection @ Maximum Axial Load		Part Dimensions							
						A		B		C - Diameter		D	
		lb	N	in	mm	in	mm	in	mm	in	mm	in	mm
J-2919-1	1	750-1500	3336-6672	0.03	0.762	2.5	63.5	—	—	0.656	16.7	1.19	30.2
J-2867-1	1	1500-3000	6672-13,345	0.03	0.762	4	101.6	—	—	0.656	16.7	1.19	30.2
J-2866-1	2	3000-7500	13,345-33,362	0.03	0.762	8	203.2	4	101.6	0.656	16.7	1.19	30.2

Material: Parts made of Neoprene Elastomer.

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions				
	E	F		G	
		in	mm	in	mm
J-2919-1	5/8-11UNC-2B	5.5	139.7	7	177.8
J-2867-1	5/8-11UNC-2B	5.5	139.7	7	177.8
J-2866-1	5/8-11UNC-2B	5.5	139.7	7	177.8

Material: Parts made of Neoprene Elastomer.

Installation: Each LORD Industrial Shock Mount is only 1-3/16" (30.16 mm) high. It requires minimal lifting of machinery, and does not shift the machine's center of gravity. The top plate of each Shock Mount is tapped to receive a standard 5/8-11 UNC-2B bolt for attaching to the machine. Through holes are provided on each side of the bottom plate extension for bolting the Shock Mount to the floor.

Vibration Problems: LORD Machinery Mounts are specifically engineered to isolate vertical shocks and reduce transmission of structural noise through floors. If your application involves intermittent or continuous vibration frequencies above 600 cycles per minute, use LORD Chan-L Mounts. If frequencies below 600 cycles per minute are involved, use LORD Lattice Mounts.

Figure 1 – Part Dimensions

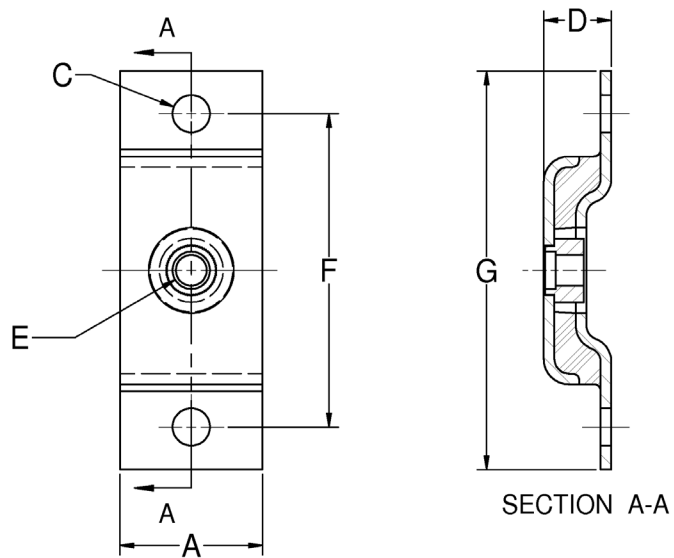


Figure 2 – Part Dimensions

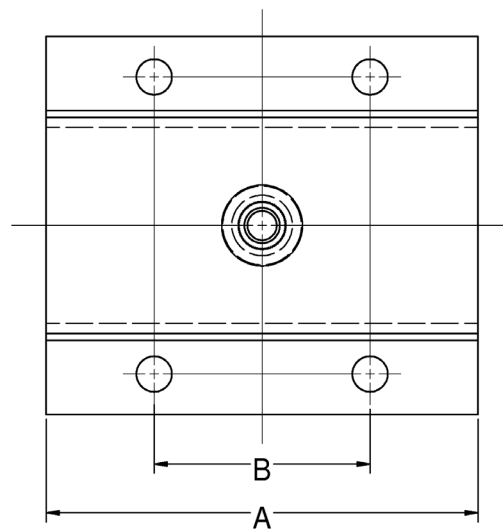
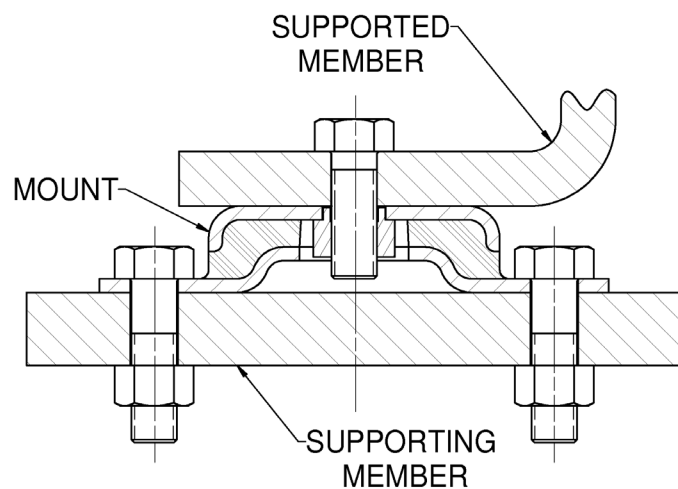


Figure 3 – Installation View



Leveling Mounts

Table 1 – Specifications and Dimensions

Part Number	Maximum Axial Load		Adjusting Bolt		Part Dimensions				Weight Each	
					D		H - Height (Free)			
	lb	N	in	mm	in	mm	in	mm	lb	kg
J-16462-4	4500	20017	3/4 - 10UNC x 5"	127	6-1/4	158.8	1-5/8	41.3	5.0	2.3

Maximum adjustment is 1/2" (12.7 mm). Do not exceed this amount.

Metal housing made of high strength steel - high visibility yellow paint (OSHA approved).

Elastomer: neoprene compounded to resist oil, ozone and caustic material.

Adjustment bolt and lock nut included.

Vertical natural frequency under maximum load: 12 Hz.

Figure 1 – Part Dimensions

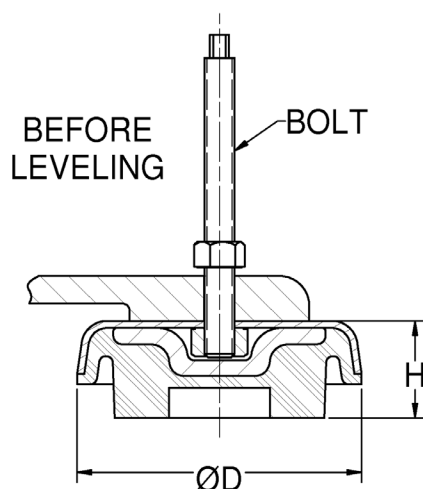
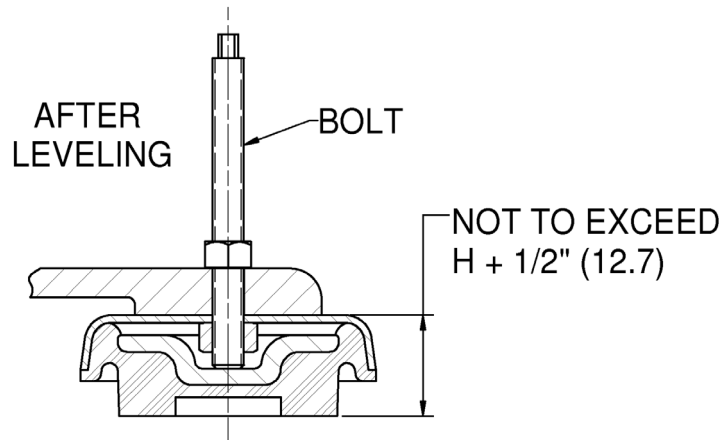


Figure 2 – Part Dimensions



Installation: Before installing, be sure the mounts are the right ones for your machine.

1. Remove adjusting bolt and lock nut from mount.
2. Raise machine and slide mount under foot.
3. Insert adjusting bolt through clearance hole in foot and engage threads in mount.
4. Lower machine onto mounts
5. Turn bolt until it bottoms.

To Level:

6. Level machine by turning the adjusting bolt.
7. Tighten lock nut against machine base.



Surface-Effect Mounts

Surface-Effect Mounts combine surface-effect damping principles with traditional rubber-bonded-to-metal technology. The result is a soft mount capable of providing effective damping over large deflections and a wide range of frequencies. As cab and engine mounts in on- and off-highway vehicles, Surface-Effect Mounts meet the most demanding requirements for vibration isolation and noise attenuation while controlling motion.

The systems feature a damper pack containing an elastomer that comes in contact with a sliding surface, producing both hysteretic and friction damping. When conventional mounts are unable to satisfy vehicle requirements, Surface-Effect Mounts can successfully control noise and vibration for improved ride comfort and enhanced product performance and maintainability.

Features and Benefits

- A smoothly damped response at low and medium frequencies with isolation at high frequencies. Natural frequency is 6 Hz at rated load.
- Amplitude sensitive, responding to larger motions with greater damping forces
- Speed mount optimization and vehicle development by allowing easy in-the-field adjustment of damping and small displacement decoupling
- Accommodate a wide range of rated loads
- Withstand R.O.P.S. loads with the addition of support rings. Further non-standard support rings for special applications are available.
- Offer optimal tuning through the modular spring/damper assembly for ride comfort and motion control
- Exhibit long, highly reliable service life

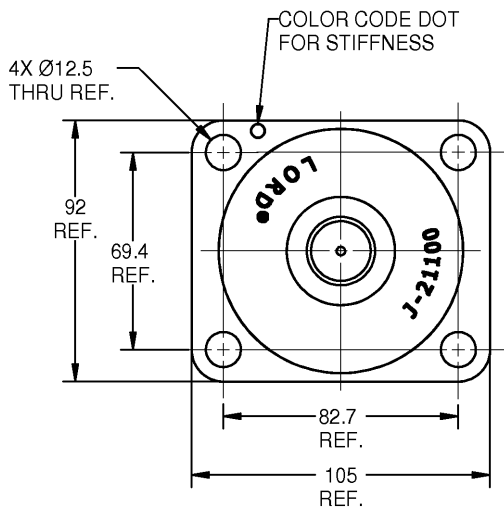
The on-site adjustable damping and decoupling capabilities of the mounts offer unique advantages in terms of reducing development/testing time and minimizing the cost of systems optimization. Adding or removing damping disks within a mount's surface-effect pack changes the contact area and amount of damping for adjustment of prototype mounts.

Surface-Effect Mounts are simple in construction, and the absence of pressure seals and fluids eliminates the possibility of leaks common with hydraulic mounts. In accelerated durability tests, these mounts have successfully passed more than 11 million cycles (the equivalent of 3 million kilometers or 2 million miles of Class 8 truck cab service) without significant wear.

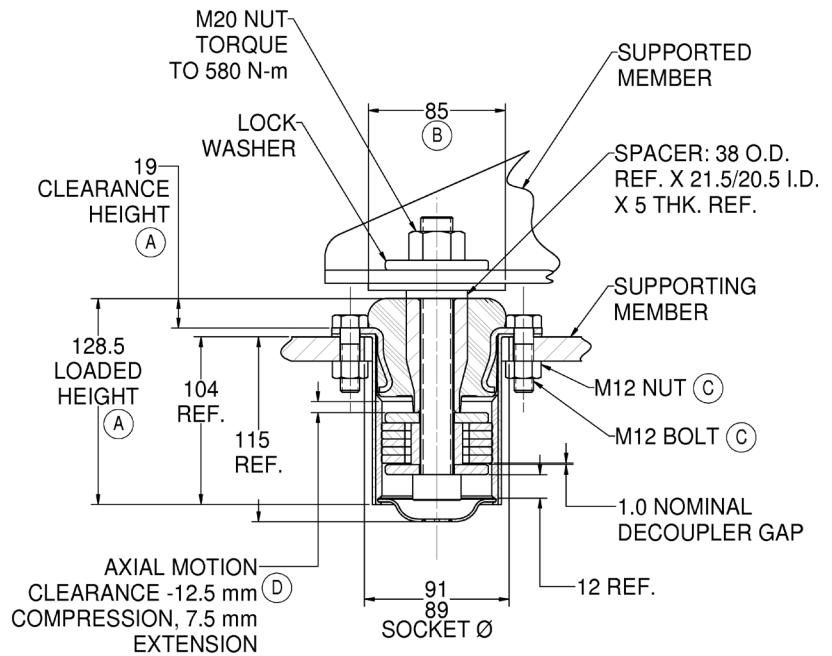
Specifications and Dimensions

Part Number	Rated Axial Static Load		Rated Axial Static Deflection		Axial Static Stiffness		Radial Static Stiffness		Recommended Bolt Information			
									Size		Grade or Class	
	lb	N	in	mm	lb/in	N/mm	lb/in	N/mm	English	Metric	SAE J429	SAE J1199
SE-1100-1	700	3115	0.30	7.5	1770	310	6850	1200	3/4	M20	8	10.9
SE-1100-4	1140	5073	0.30	7.5	2860	500	11420	2000	3/4	M20	8	10.9
SE-1100-7	1570	6984	0.30	7.5	3950	690	16000	2800	3/4	M20	8	10.9

Typical Installation



Shown under Static Load (E)



- (A) Rated Static Load Ref.
- (B) Diameter Recommended Flat Area for Mount Snubbing Ref.
- (C) 4 Required; Customer Furnished
- (D) At Static Load Position Ref.
- (E) Recommended Static Deflection when used with Snubbing Washers and 5 mm Thk. Ref. Spacer as shown is 7.5 mm (0.30 in) Nominal at Rated Load.



Binocular/Split Mounts

LORD Binocular/Split Mounts are designed for applications involving severe dynamic forces in the static load direction, as well as the rebound direction. Travel is limited in both directions by rubber in compression which provides snubbing.

These mounts are designed as front engine mounts, and accommodate frame racking and twisting while isolating vibration and absorbing shock.

Typical applications for Binocular/Split Mounts include on-highway, off-highway and construction vehicles.

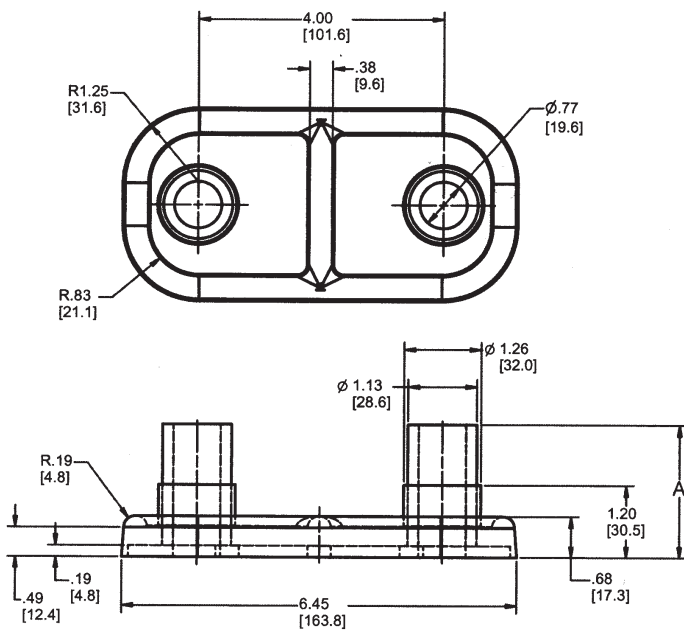
Features and Benefits

- Dynamically effective in all directions
- Prevent mechanical transmission of noise
- Accommodate misalignment and distortion
- High rebound capacity
- Easy to install with common tools
- Standard bolt torque assures proper assembly
- Fail-safe assembly
- Sized for English and Metric bolts
- Long dependable service life
- Economical

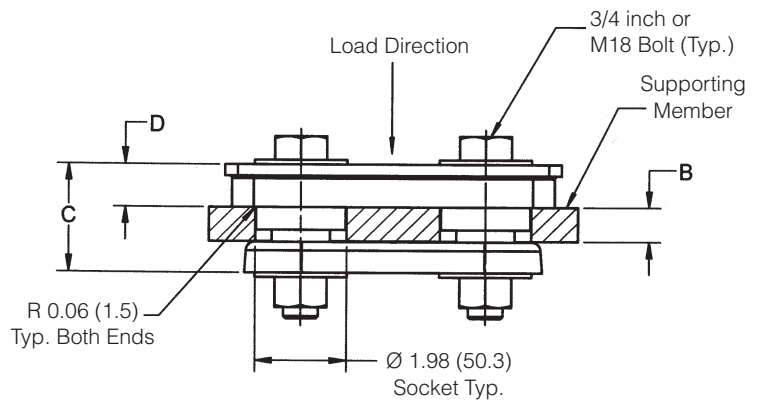
Specifications and Dimensions

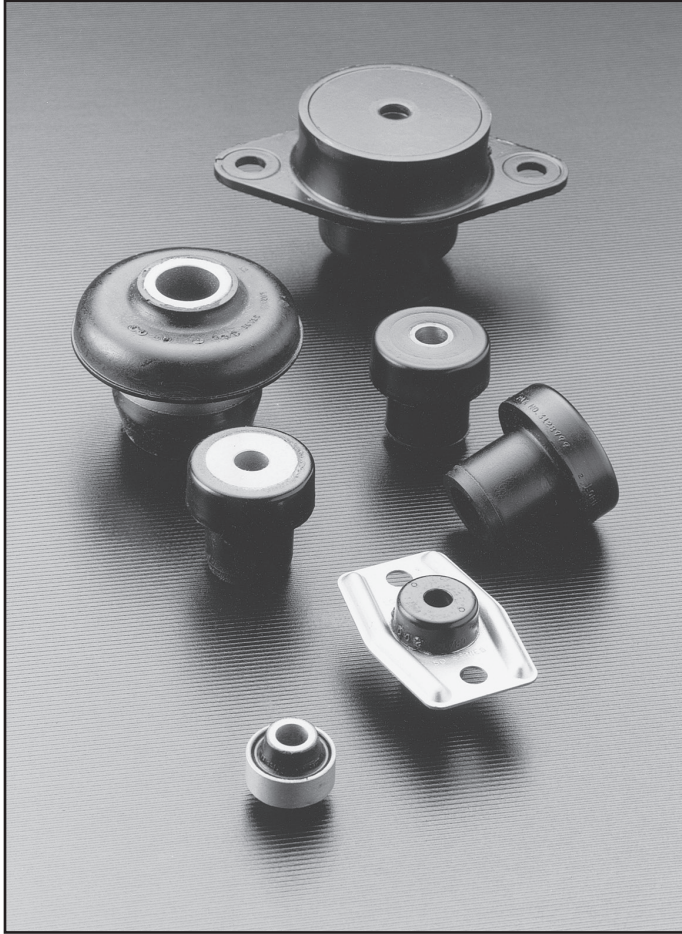
Kit Part Number	Sleeve Length (A)		Socket Thickness (B)		Overall Height (C)		Upper Part Thickness (D)		Rated Vertical Load		Deflection @ Rated Load		Vertical Stiffness		Lateral Stiffness	
	in	mm	in	mm	in	mm	in	mm	lb	N	in	mm	lb/in	N/mm	lb/in	N/mm
J-21246-6	2.48	62.9	0.63	16	2.39	60.7	1.34	34	1300	5783	0.101	2.57	13,625	2386	1950	341
J-21246-12	2.48	62.9	0.63	16	2.66	67.6	1.34	34	1000	4448	0.054	1.37	17,647	3090	1400	245
J-21246-13	2.2	55.9	0.75	19	2.39	60.7	0.945	24	1500	6672	0.62	1.58	24,000	4203	3300	578

Figure 1 – Part Dimensions



**Figure 2 – Typical Installation
(Shown Under No Load)**





Center-Bonded Mounts

Featuring: CB-1100 Series
CB-1180 Series
CBA Series
CBA-50 Series
STA Series
Safetied Tubeform Series

LORD Center-Bonded Mounts isolate vibration, control shock and reduce noise due to structure borne vibrations. Available in a full range of rated load capacities and able to withstand shock loads of 10 g's, these mounts effectively protect equipment and improve operator comfort. They are ideal for automotive, marine, railroad and industrial markets.

Center-Bonded Mounts provide flexible suspension systems for mobile, transport-mounted or portable equipment. Typical applications include engines, cabs, fuel tanks, pumps, air conditioning units, compressors and industrial machinery.

Features and Benefits

- Vibration isolation in all directions
- Noise attenuation
- Easy installation because of one-piece design
- Low-cost installation
- Long service life
- Consistent performance because of permanently bonded design
- Shock protection in all directions provided by cushioned snubbing, no metal-to-metal bottoming
- Standard sizes available from stock
- Space-saving size
- Captive installation after overload failure when recommended bolt, washer and nut are used
- Accommodate English and Metric bolts

Application Engineering Assistance

Frequently, vibration isolation problems require a system engineering analysis. LORD has the computer capability, as well as specialized programs, for analyzing engine/transmission combinations. The output from this analysis is a mounting proposal which optimizes performance over the complete range of operating speeds. This service is available to you upon request.

CB-1100 Series

Table 1 – Specifications and Dimensions

Part Number	Maximum Axial Static Load Rating ①				Part Dimensions											
	Load		Deflection		A ±0.03		B ±0.01		C ±0.015		D		E ±0.015		F ±0.02	
	lb	N	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
CB-1120-1	75	330	0.025	0.64	1.09	27.7	0.40	10.2	0.81	20.6	1.02	25.9	0.62	15.7	0.22	5.6
CB-1120-3	125	560	0.025	0.64	1.09	27.7	0.40	10.2	0.81	20.6	1.02	25.9	0.62	15.7	0.22	5.6
CB-1121-2	250	1110	0.04	1.02	1.75	44.5	0.515	13.1	1.24	31.5	1.25	31.8	1.00	25.4	0.41	10.4
CB-1121-4	450	2000	0.04	1.02	1.75	44.5	0.515	13.1	1.24	31.5	1.25	31.8	1.00	25.4	0.41	10.4
CB-1122-2	350	1560	0.06	1.52	2.00	50.8	0.532	13.5	1.35	34.3	1.62	41.1	1.31	33.3	0.53	13.5
CB-1122-4	600	2670	0.06	1.52	2.00	50.8	0.532	13.5	1.35	34.3	1.62	41.1	1.31	33.3	0.53	13.5
CB-1123-2	500	2230	0.07	1.78	2.50	63.5	0.648	16.5	1.62	41.2	2.00	50.8	1.69	42.9	0.62	15.7
CB-1123-5	1000	4450	0.06	1.52	2.50	63.5	0.648	16.5	1.62	41.2	2.00	50.8	1.69	42.9	0.62	15.7
CB-1124-2	750	3340	0.085	2.16	2.98	75.7	0.648	16.5	1.98	50.3	2.22	56.4	2.00	50.8	0.81	20.6
CB-1124-5	1400	6230	0.07	1.78	2.98	75.7	0.648	16.5	1.98	50.3	2.22	56.4	2.00	50.8	0.81	20.6
CB-1125-2	1400	6230	0.13	3.30	3.74	95.0	0.803	20.4	2.23	56.6	2.48	63.0	2.00	50.8	1.00	25.4
CB-1125-4	2100	9350	0.12	3.05	3.74	95.0	0.803	20.4	2.23	56.6	2.48	63.0	2.00	50.8	1.00	25.4

Mounts and washers only supplied by LORD. For installation instructions, refer to Center-Bonded Mounts, Installation Guide section.

① These ratings are for general industrial applications. For on-highway, use 80% of loads shown. For off-highway, use 70% of loads shown.

In applications where the mounts will be immersed in oil, parts made in oil-resistant elastomer are available. Contact LORD for additional information.

Table 2 – Specifications and Dimensions

Part Number	Required Mating Directions												Recommended Bolt Information*				Nominal Dynamic/ Static Spring Rate Ratio ②
	H ±0.03		I _D Min. Dia.		K _D Min. Dia.		S _D ±0.03		T ±0.03		R ±0.015		Size		Grade or Class		
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	English	Metric	SAE J429	SAE J1199	
CB-1120-1	0.21	5.3	1.25	31.8	1.12	28.5	.75	19.1	0.31	7.9	0.06	1.5	3/8	M10	2	5.8	1.08
CB-1120-3	0.21	5.3	1.25	31.8	1.12	28.5	.75	19.1	0.31	7.9	0.06	1.5	3/8	M10	2	5.8	1.19
CB-1121-2	0.38	9.7	2.00	50.8	1.50	38.1	1.12	28.4	0.38	9.7	0.06	1.5	1/2	M12	2	5.8	1.15
CB-1121-4	0.38	9.7	2.00	50.8	1.50	38.1	1.12	28.4	0.38	9.7	0.06	1.5	1/2	M12	2	5.8	1.22
CB-1122-2	0.45	11.4	2.25	57.2	2.00	50.8	1.25	31.8	0.62	15.8	0.06	1.5	1/2	M12	2	5.8	1.15
CB-1122-4	0.45	11.4	2.25	57.2	2.00	50.8	1.25	31.8	0.62	15.8	0.06	1.5	1/2	M12	2	5.8	1.22
CB-1123-2	0.56	14.2	2.88	73.2	2.25	57.2	1.50	38.1	0.75	19.1	0.06	1.5	5/8	M16	8	10.9	1.15
CB-1123-5	0.56	14.2	2.88	73.2	2.25	57.2	1.50	38.1	0.75	19.1	0.06	1.5	5/8	M16	8	10.9	1.23
CB-1124-2	0.71	18.0	3.50	88.9	2.50	63.5	1.81	46.0	0.93	23.6	0.06	1.5	5/8	M16	8	10.9	1.15
CB-1124-5	0.71	18.0	3.50	88.9	2.50	63.5	1.81	46.0	0.93	23.6	0.06	1.5	5/8	M16	8	10.9	1.23
CB-1125-2	0.94	23.9	4.25	108.0	3.00	76.2	2.00	50.8	0.75	19.1	0.12	3.0	3/4	M18	8	10.9	1.15
CB-1125-4	0.94	23.9	4.25	108.0	3.00	76.2	2.00	50.8	0.75	19.1	0.12	3.0	3/4	M18	8	10.9	1.22

For installation instructions, refer to Center-Bonded Mounts, Installation Guide section.
* For tightening torque information, refer to Tightening Torque Charts section.

② This column of figures can be used to calculate dynamic spring rate for natural frequency based on static values.

$$(K_{DYN} = K_{ST} \times \frac{DYN}{STATIC} \text{ Ratio})$$

Figure 1 – Part Dimensions

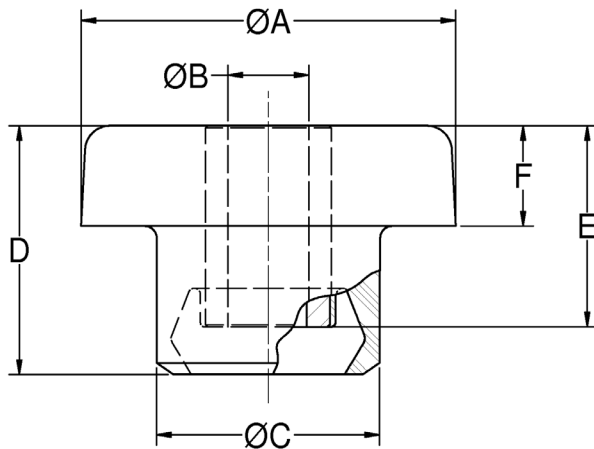


Figure 2 – Installation View

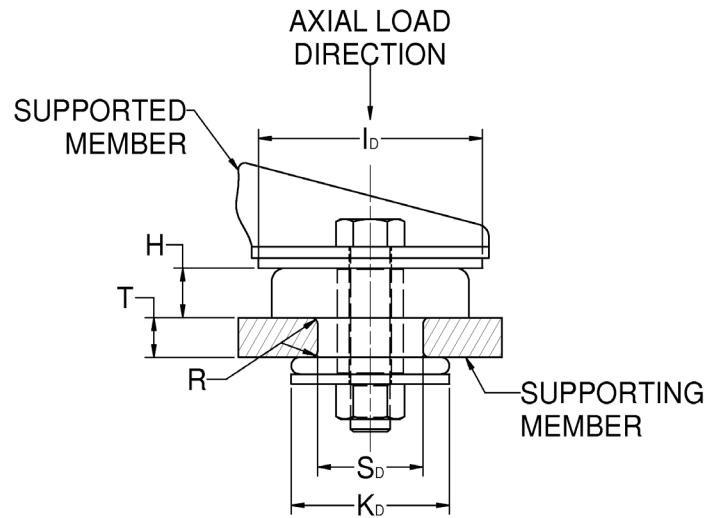


Table 3 – Washer Part Numbers and Dimensions

CB-1100 Series	Head Washer	O.D.		I.D.		Thickness		Tail Washer	O.D.		I.D.		Thickness	
		in	mm	in	mm	in	mm		in	mm	in	mm	in	mm
CB-1120	J-2049-62	1.25	31.8	0.40	10.2	0.125	3.2	J-2049-61	1.12	28.4	0.40	10.2	0.125	3.2
CB-1121	J-2049-64	2.00	50.8	0.52	13.2	0.125	3.2	J-2049-63	1.50	38.1	0.52	13.2	0.125	3.2
CB-1122	J-2049-65	2.25	57.2	0.52	13.2	0.125	3.2	J-2049-64	2.00	50.8	0.52	13.2	0.125	3.2
CB-1123	J-2049-68	2.88	73.2	0.66	16.8	0.125	3.2	J-2049-66	2.25	57.2	0.64	16.3	0.125	3.2
CB-1124	J-2049-70	3.50	88.9	0.64	16.3	0.190	4.8	J-2049-67	2.50	63.5	0.64	16.3	0.125	3.2
CB-1125	J-2049-71	4.25	108.0	0.80	20.3	0.190	4.8	J-2049-69	3.00	76.2	0.80	20.4	0.190	4.8

CB-1180 Series

Table 1 – Specifications and Dimensions

Part Number	Maximum Axial Static Load Rating ①				Part Dimensions											
	Load		Deflection		A		B		C		D		E		F	
	lb	N	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
CB-1180-1	400	1780	0.135	3.4	2.50	63.1	0.64	16.3	1.87	47.8	3.20	81.3	2.12	53.8	1.01	25.7
CB-1180-2	700	3115	0.156	3.9	2.50	63.1	0.64	16.3	1.87	47.8	3.20	81.3	2.12	53.8	1.01	25.7

① These ratings are for general industrial applications. For on-highway, use 80% of loads shown. For off-highway, use 70% of loads shown.

For installation instructions, refer to Center-Bonded Mounts, Installation Guide section.

Table 2 – Specifications and Dimensions

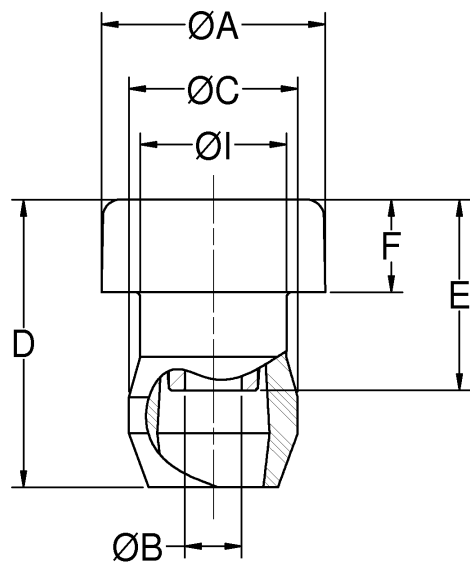
Part Number	Part Dimensions										Recommended Bolt Information*			
	H		I		S _D ±0.03		R		T		Size		Grade or Class	
	in	mm	in	mm	in	mm	in	mm	in	mm	English	Metric	SAE J429	SAE J1199
CB-1180-1	0.87	22.1	1.625	41.3	1.50	38.1	0.075	1.9	0.75	19.1	5/8	M16	8	10.9
CB-1180-2	0.87	22.1	1.625	41.3	1.50	38.1	0.075	1.9	0.75	19.1	5/8	M16	8	10.9

* For tightening torque information, refer to Tightening Torque Charts section.

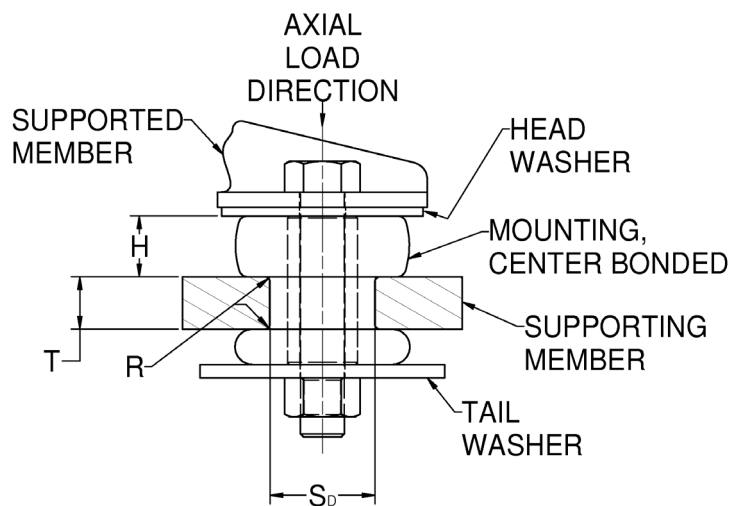
Table 3 – Washer Part Numbers and Dimensions

Part Number	Head Washer	O.D.		I.D.		Thickness		Tail Washer	O.D.		I.D.		Thickness	
		in	mm	in	mm	in	mm		in	mm	in	mm	in	mm
CB-1180-1	J-2049-68	2.88	73.2	0.66	16.8	0.125	3.2	J-2049-70	3.50	88.9	0.64	16.3	0.19	4.8
CB-1180-2	J-2049-68	2.88	73.2	0.66	16.8	0.125	3.2	J-2049-70	3.50	88.9	0.64	16.3	0.19	4.8

Figure 1 – Part Dimensions



**Figure 2 – Installation View
(Shown Under No Load)**



CBA Series

Table 1 – Specifications and Dimensions

Part Number	See Fig.	Maximum Axial Static Load Rating at Deflection ①		Part Dimensions											
		lb at in	N at mm	A ±0.015		B		C ±0.015		D ±0.02		E ±0.015		F ±0.02	
				in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
CBA12-100	1	100 at 0.09	445 at 2.3	1.25	31.8	0.410	10.4	0.95	24.1	1.44	36.6	1.07	27.2	0.55	14.0
CBA12-200	1	200 at 0.09	890 at 2.3	1.25	31.8	0.410	10.4	0.95	24.1	1.44	36.6	1.07	27.2	0.55	14.0
CBA20-300	1	300 at 0.09	1334 at 2.3	2.00	50.8	0.540	13.5	1.38	35.1	2.00	50.8	1.45	36.8	0.75	19.1
CBA20-300-1	2	300 at 0.09	1334 at 2.3	2.00	50.8	0.545	13.5	1.38	35.1	2.00	50.8	1.45	36.8	0.75	19.1
CBA20-400	1	400 at 0.10	1779 at 2.5	2.00	50.8	0.540	13.5	1.38	35.1	2.00	50.8	1.45	36.8	0.75	19.1
CBA20-400-1	2	400 at 0.10	1779 at 2.5	2.00	50.8	0.545	13.5	1.38	35.1	2.00	50.8	1.45	36.8	0.75	19.1
CBA24-500	1	500 at 0.09	2224 at 2.3	2.35	59.7	0.657	16.5	1.50	38.1	2.11	53.6	1.50	38.1	0.69	17.5
CBA24-500-1	2	500 at 0.09	2224 at 2.3	2.35	59.7	0.655	16.3	1.50	38.1	2.11	53.6	1.50	38.1	0.69	17.5
CBA24-650	1	650 at 0.10	2891 at 2.5	2.35	59.7	0.657	16.5	1.50	38.1	2.11	53.6	1.50	38.1	0.69	17.5
CBA24-650-1	2	650 at 0.10	2891 at 2.5	2.35	59.7	0.655	16.3	1.50	38.1	2.11	53.6	1.50	38.1	0.69	17.5
CBA28-800	1	800 at 0.10	3559 at 2.5	2.80	71.1	0.810	20.3	1.62	41.1	2.38	60.5	1.63	41.4	0.69	17.5
CBA28-800-1	2	800 at 0.10	3559 at 2.5	2.80	71.1	0.785	19.6	1.62	41.1	2.38	60.5	1.63	41.4	0.69	17.5
CBA28-1050	1	1050 at 0.10	4671 at 2.5	2.80	71.1	0.810	20.3	1.62	41.1	2.38	60.5	1.63	41.4	0.69	17.5
CBA28-1050-1	2	1050 at 0.10	4671 at 2.5	2.80	71.1	0.785	19.6	1.62	41.1	2.38	60.5	1.63	41.4	0.69	17.5
CBA33-1200	1	1200 at 0.11	5338 at 2.8	3.30	83.8	0.810	20.3	1.62	41.1	2.50	63.5	1.94	49.3	0.88	22.4
CBA33-1200-1	2	1200 at 0.11	5338 at 2.8	3.30	83.8	0.785	19.6	1.62	41.1	2.50	63.5	1.94	49.3	0.88	22.4
CBA33-1600	1	1600 at 0.12	7117 at 3.0	3.30	83.8	0.810	20.3	1.62	41.1	2.50	63.5	1.94	49.3	0.88	22.4
CBA33-1600-1	2	1600 at 0.12	7117 at 3.0	3.30	83.8	0.785	19.6	1.62	41.1	2.50	63.5	1.94	49.3	0.88	22.4

Mounts and washers only supplied by LORD.

① These ratings are for general industrial applications. For on-highway, use 80% of loads shown. For off-highway, use 70% of loads shown.

Table 2 – Specifications and Dimensions

Part Number	Installation Dimensions														Metal Parts ②
	H		I		K		L		S _D ±0.03		R ±0.015		T ±0.03		
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	
CBA12-100	0.51	13.0	1.50	38.1	1.50	38.1	—	—	0.895	22.7	0.06	1.5	0.38	9.70	LCS
CBA12-200	0.51	13.0	1.50	38.1	1.50	38.1	—	—	0.895	22.7	0.06	1.5	0.38	9.70	LCS
CBA20-300	0.69	17.5	2.38	60.5	2.25	57.2	—	—	1.25	31.8	0.06	1.5	0.50	12.7	LCS
CBA20-300-1	0.69	17.5	2.38	60.5	2.25	57.2	1.38	35.1	1.25	31.8	0.06	1.5	0.50	12.7	HSS
CBA20-400	0.69	17.5	2.38	60.5	2.25	57.2	—	—	1.25	31.8	0.06	1.5	0.50	12.7	LCS
CBA20-400-1	0.69	17.5	2.38	60.5	2.25	57.2	1.38	35.1	1.25	31.8	0.06	1.5	0.50	12.7	HSS
CBA24-500	0.62	15.7	2.75	69.9	2.50	63.5	—	—	1.38	35.1	0.06	1.5	0.62	15.7	LCS
CBA24-500-1	0.62	15.7	2.75	69.9	2.50	63.5	1.62	41.1	1.38	35.1	0.06	1.5	0.62	15.7	HSS
CBA24-650	0.62	15.7	2.75	69.9	2.50	63.5	—	—	1.38	35.1	0.06	1.5	0.62	15.7	LCS
CBA24-650-1	0.62	15.7	2.75	69.9	2.50	63.5	1.62	41.1	1.38	35.1	0.06	1.5	0.62	15.7	HSS
CBA28-800	0.63	16.0	3.25	82.6	3.00	76.2	—	—	1.50	38.1	0.06	1.5	0.75	19.1	LCS
CBA28-800-1	0.63	16.0	3.25	82.6	3.00	76.2	1.62	41.1	1.50	38.1	0.06	1.5	0.75	19.1	HSS
CBA28-1050	0.63	16.0	3.25	82.6	3.00	76.2	—	—	1.50	38.1	0.06	1.5	0.75	19.1	LCS
CBA28-1050-1	0.63	16.0	3.25	82.6	3.00	76.2	1.62	41.1	1.50	38.1	0.06	1.5	0.75	19.1	HSS
CBA33-1200	0.81	20.6	3.88	98.6	3.00	76.2	—	—	1.50	38.1	0.06	1.5	0.88	22.4	LCS
CBA33-1200-1	0.81	20.6	3.88	98.6	3.00	76.2	1.62	41.1	1.50	38.1	0.06	1.5	0.88	22.4	HSS
CBA33-1600	0.81	20.6	3.88	98.6	3.00	76.2	—	—	1.50	38.1	0.06	1.5	0.88	22.4	LCS
CBA33-1600-1	0.81	20.6	3.88	98.6	3.00	76.2	1.62	41.1	1.50	38.1	0.06	1.5	0.88	22.4	HSS

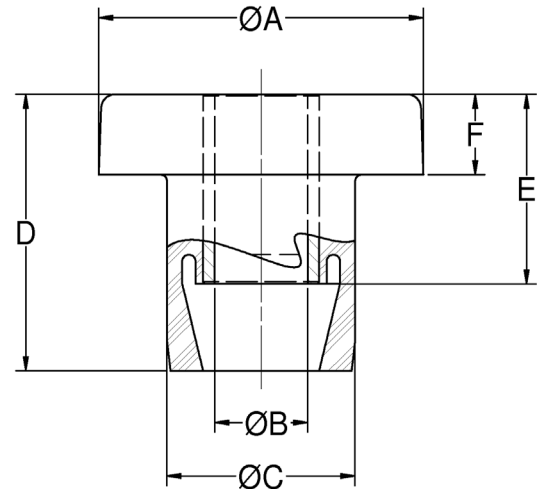
② LCS = Low Carbon Steel
HSS = High Strength Steel

For installation instructions, refer to Center-Bonded Mounts, Installation Guide section.

Table 3 – Specifications and Dimensions

Part Number	Recommended Bolt Information*				Nominal Dynamic/ Static Spring Rate Ratio ③
	Size		Grade or Class		
	English	Metric	SAE J429	SAE J1199	
CBA12-100	3/8	M10	2	5.8	1.08
CBA12-200	3/8	M10	2	5.8	1.22
CBA20-300	1/2	M12	2	5.8	1.15
CBA20-300-1	1/2	M12	8	10.9	1.15
CBA20-400	1/2	M12	2	5.8	1.19
CBA20-400-1	1/2	M12	8	10.9	1.19
CBA24-500	5/8	M16	2	5.8	1.15
CBA24-500-1	5/8	M16	8	10.9	1.15
CBA24-650	5/8	M16	2	5.8	1.19
CBA24-650-1	5/8	M16	8	10.9	1.19
CBA28-800	3/4	M18	2	5.8	1.15
CBA28-800-1	3/4	M18	8	10.9	1.15
CBA28-1050	3/4	M18	2	5.8	1.19
CBA28-1050-1	3/4	M18	8	10.9	1.19
CBA33-1200	3/4	M18	2	5.8	1.15
CBA33-1200-1	3/4	M18	8	10.9	1.15
CBA33-1600	3/4	M18	2	5.8	1.19
CBA33-1600-1	3/4	M18	8	10.9	1.19

Figure 1 – Standard Series (Uninstalled)



* For tightening torque information, refer to Tightening Torque Charts section.

③ This column of figures can be used to calculate dynamic spring rate for natural frequency based on static values.
 $(K_{DYN} = K_{ST} \times \frac{DYN}{STATIC} \text{ Ratio})$

Figure 2 – High Bolt Torque Series (-1 Parts, Uninstalled, Flanged Inner Member)

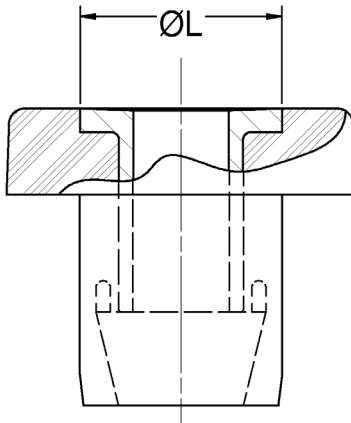


Figure 3 – Installation View (Shown Under No Load)

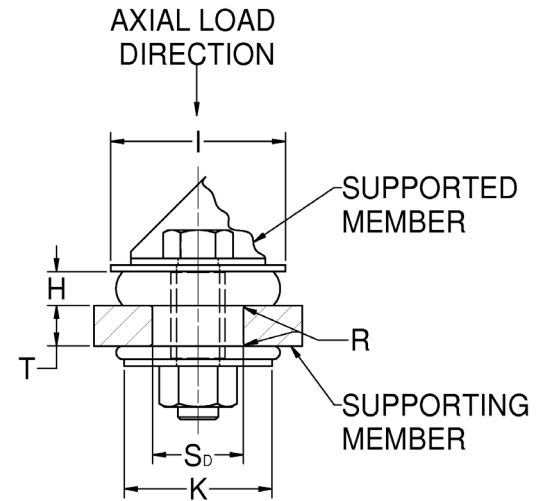


Table 4 – Washer Part Numbers and Dimensions

CBA Series	Head Washer	O.D.		I.D.		Thickness		Tail Washer	O.D.		I.D.		Thickness	
		in	mm	in	mm	in	mm		in	mm	in	mm	in	mm
CBA12	J-2049-58	1.50	38.1	0.42	10.7	0.120	3.0	J-2049-58	1.50	38.1	0.42	10.7	0.120	3.0
CBA20	J-2049-52	2.38	60.5	0.53	13.5	0.125	3.2	J-2049-65	2.25	57.2	0.52	13.2	0.125	3.2
CBA24	J-2049-53	2.75	69.9	0.64	16.3	0.125	3.2	J-2049-67	2.50	63.5	0.64	16.3	0.125	3.2
CBA28	J-2049-54	3.25	82.6	0.80	20.3	0.188	4.8	J-2049-69	3.00	76.2	0.80	20.3	0.188	4.8
CBA33	J-2049-55	3.88	98.6	0.80	20.3	0.188	4.8	J-2049-69	3.00	76.2	0.80	20.3	0.188	4.8

Washers must be ordered separately.

CBA-50 Series

Table 1 – Specifications and Dimensions

Part Number ①	Maximum Axial Static Load Rating at Deflection ②		Typical Spring Rates				Metal Bracket Part Number ③	Part Dimensions									
			Axial		Radial			A		B		C				D	
	Dia. Min.											Dia. Max.					
	lb at in	N at mm	lb/in	N/mm	lb/in	N/mm		in	mm	in	mm	in	mm	in	mm	in	mm
CBA12-100-50	100 at 0.09	445 at 2.3	1110	194	1300	228	Y-30266-5-1	2.38	60.5	0.44	11.2	0.404	10.3	0.412	10.5	1.75	44.5
CBA12-200-50	200 at 0.09	890 at 2.3	2220	389	3000	525	Y-30266-5-1	2.38	60.5	0.44	11.2	0.404	10.3	0.412	10.5	1.75	44.5
CBA20-300-50	300 at 0.12	1334 at 3.0	2500	438	3500	613	Y-30266-4-1	3.75	95.2	0.50	12.7	0.404	10.3	0.412	10.5	2.25	57.2
CBA20-400-50	400 at 0.12	1780 at 3.0	3300	578	4300	753	Y-30266-4-1	3.75	95.2	0.50	12.7	0.404	10.3	0.412	10.5	2.25	57.2
CBA24-500-50	500 at 0.12	2224 at 3.0	4200	736	5300	927	Y-30266-3-1	4.25	108.0	0.50	12.7	0.404	10.3	0.412	10.5	2.50	63.5
CBA24-650-50	650 at 0.12	2891 at 3.0	5400	945	7500	1313	Y-30266-3-1	4.25	108.0	0.50	12.7	0.404	10.3	0.412	10.5	2.50	63.5

All metal parts are made of low carbon steel.

① Mounts and washers only supplied by LORD.

② **These ratings are for general industrial applications. For on-highway, use 80% of loads shown. For off-highway, use 70% of loads shown.**

③ If you require a high bolt torque series or any other special part, use metal bracket part number and the CBA part number found in the Center-Bonded Mounts, CBA Series Specifications and Dimensions tables or contact LORD Corporation for assistance.

Table 2 – Specifications and Dimensions

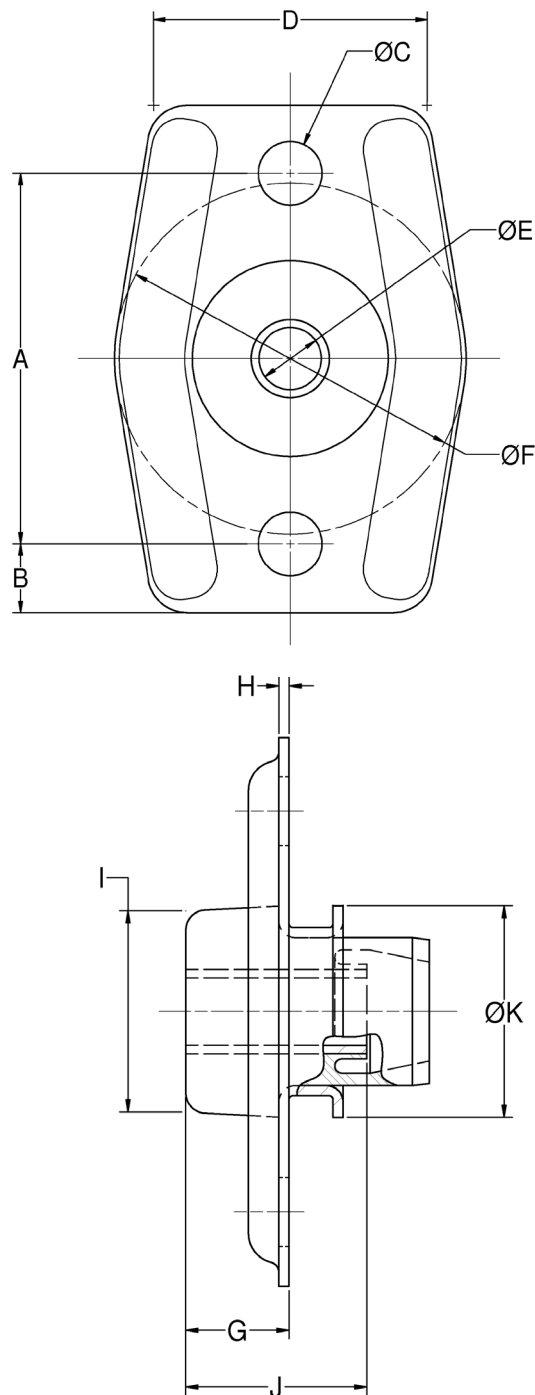
Part Number ①	Part Dimensions																											
	E						F		G		H		I		J		K		M Min. ④		N		S _D ±0.03		T			
	I.D. Min.		I.D. Max.		O.D.																				Min. ⑤		Max. ⑥	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
CBA12-100-50	0.397	10.1	0.410	10.4	0.50	12.7	2.25	57.2	0.61	15.5	0.06	1.5	1.25	31.8	1.07	27.2	1.25	31.8	1.50	38.1	0.57	14.5	1.38	35.1	0.19	4.8	0.25	6.40
CBA12-200-50	0.397	10.1	0.410	10.4	0.50	12.7	2.25	57.2	0.61	15.5	0.06	1.5	1.25	31.8	1.07	27.2	1.25	31.8	1.50	38.1	0.57	14.5	1.38	35.1	0.19	4.8	0.25	6.40
CBA20-300-50	0.525	13.3	0.540	13.7	0.75	19.0	3.00	76.2	0.85	21.6	0.10	2.5	2.00	50.8	1.45	36.8	1.92	48.8	2.38	60.5	0.79	20.1	2.00	50.8	0.25	6.4	0.38	9.70
CBA20-400-50	0.525	13.3	0.540	13.7	0.75	19.0	3.00	76.2	0.85	21.6	0.10	2.5	2.00	50.8	1.45	36.8	1.92	48.8	2.38	60.5	0.79	20.1	2.00	50.8	0.25	6.4	0.38	9.70
CBA24-500-50	0.639	16.2	0.657	16.7	0.88	22.3	3.50	88.9	0.82	20.8	0.13	3.3	2.35	59.7	1.50	38.1	2.19	55.6	2.75	69.9	0.76	19.3	2.25	57.2	0.38	9.7	0.50	12.7
CBA24-650-50	0.639	16.2	0.657	16.7	0.88	22.3	3.50	88.9	0.82	20.8	0.13	3.3	2.35	59.7	1.50	38.1	2.19	55.6	2.75	69.9	0.76	19.3	2.25	57.2	0.38	9.7	0.50	12.7

④ Bracket must provide support in excess of M Dia. Min., otherwise a washer is required. Washer must be ordered separately.

⑤ Minimum supporting member thickness for high rebound load capacities.

⑥ Maximum supporting member thickness for all applications.

Figure 1 – Part Dimensions



**Figure 2 – Installation View
(Shown Under No Load)**

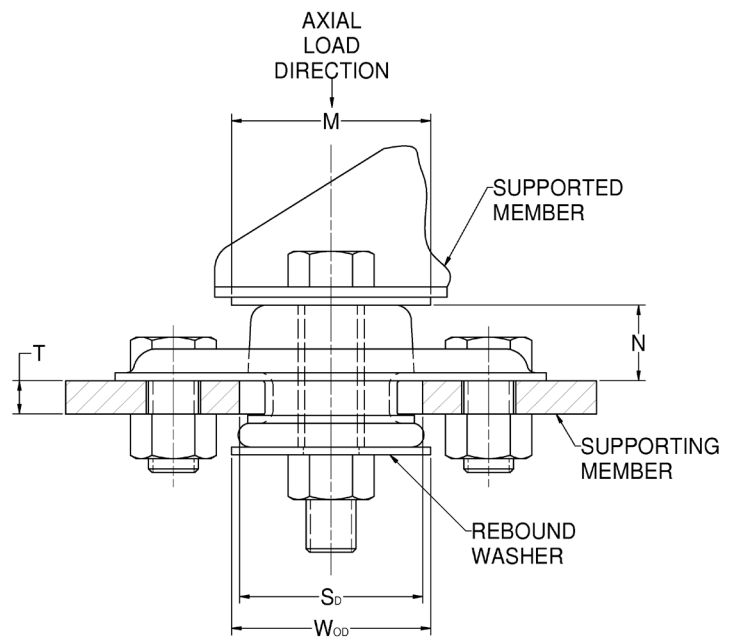


Table 3 – Washer Part Numbers and Dimensions

CBA-50 Series	Washer Part Number	WOD		I.D.		Thickness	
		in	mm	in	mm	in	mm
CBA12	J-2049-58	1.50	38.1	0.42	10.7	0.120	3.0
CBA20	J-2049-52	2.38	60.5	0.53	13.5	0.125	3.2
CBA24	J-2049-53	2.75	69.9	0.64	16.3	0.125	3.2

STA Series

Table 1 – Specifications and Dimensions

Part Number ①	Max. Axial Static Load Rating ②		Axial Static Spring Rate		Radial Static Spring Rate		Part Dimensions									
							A		B		C		D		E	
	lb	N	lb/in	N/mm	lb/in	N/mm	in	mm	in	mm	in	mm	in	mm	in	mm
STA30-200-1	200	890	2800	490	3,000	525	3.12	79.4	3.00	76.2	0.77	19.6	1.25	31.8	0.81	20.6
STA30-300-1	300	1330	3700	645	4,500	788	3.12	79.4	3.00	76.2	0.77	19.6	1.25	31.8	0.81	20.6
STA30-400-1	400	1780	5000	870	8,000	1,401	3.12	79.4	3.00	76.2	0.77	19.6	1.25	31.8	0.81	20.6
STA36-500-1	500	2220	4300	750	12,500	2,189	3.75	95.3	3.62	92.0	1.02	25.9	1.50	38.1	1.05	26.7
STA36-600-1	600	2670	6100	1060	15,000	2,627	3.75	95.3	3.62	92.0	1.02	25.9	1.50	38.1	1.05	26.7
STA36-700-1	700	3110	7000	1220	20,000	3,503	3.75	95.3	3.62	92.0	1.02	25.9	1.50	38.1	1.05	26.7

① Mount assembly only supplied by LORD.

Mounting: Natural Rubber, non oil-resistant, low carbon steel, corrosion-resistant coated.

② Ratings are the same for on-highway, off-highway and general industrial applications.

Tolerances: 0.xx = ± 0.03 in (± 0.762 mm)
0.xxx = ± 0.015 in (± 0.381 mm)

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions																	
	F		G		H		J		K		L		S _D ±0.03		R		T	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
STA30-200-1	0.63	16.0	1.56	39.6	2.25	57.2	2.34	59.4	2.345	59.4	0.69	17.3	2.38	60.5	3.25	82.6	0.62	15.7
STA30-300-1	0.63	16.0	1.56	39.6	2.25	57.2	2.34	59.4	2.345	59.4	0.69	17.3	2.38	60.5	3.25	82.6	0.62	15.7
STA30-400-1	0.63	16.0	1.56	39.6	2.25	57.2	2.34	59.4	2.345	59.4	0.69	17.3	2.38	60.5	3.25	82.6	0.62	15.7
STA36-500-1	0.72	18.3	2.03	51.6	2.80	71.1	2.47	62.7	2.470	62.7	0.96	24.4	2.50	63.5	4.00	101.6	0.75	19.1
STA36-600-1	0.72	18.3	2.03	51.6	2.80	71.1	2.47	62.7	2.470	62.7	0.96	24.4	2.50	63.5	4.00	101.6	0.75	19.1
STA36-700-1	0.72	18.3	2.03	51.6	2.80	71.1	2.47	62.7	2.470	62.7	0.96	24.4	2.50	63.5	4.00	101.6	0.75	19.1

Table 3 – Dimensions and Washer Part Numbers

Part Number	Recommended Bolt Information*				Rebound Washer Part Number
	Size		Grade or Class		
	English	Metric	SAE J429	SAE J1199	
STA30-200-1	3/4	M18	8	10.9	J-2049-54
STA30-300-1	3/4	M18	8	10.9	J-2049-54
STA30-400-1	3/4	M18	8	10.9	J-2049-54
STA36-500-1	1	M24	8	10.9	J-2049-76
STA36-600-1	1	M24	8	10.9	J-2049-76
STA36-700-1	1	M24	8	10.9	J-2049-76

* For tightening torque information, refer to Tightening Torque Charts section.

③ **Rebound Washer:** Steel, zinc plated.

Mounts are designed to be loaded in the axial direction only. If bracket provides support equal to top rebound washer, Diameter A top rebound washer is not required.

④ Bottom rebound washer is required for all installations; see tabulation for part number.

STA30-200-1 to STA30-400-1

Figure 1 – Part Dimensions

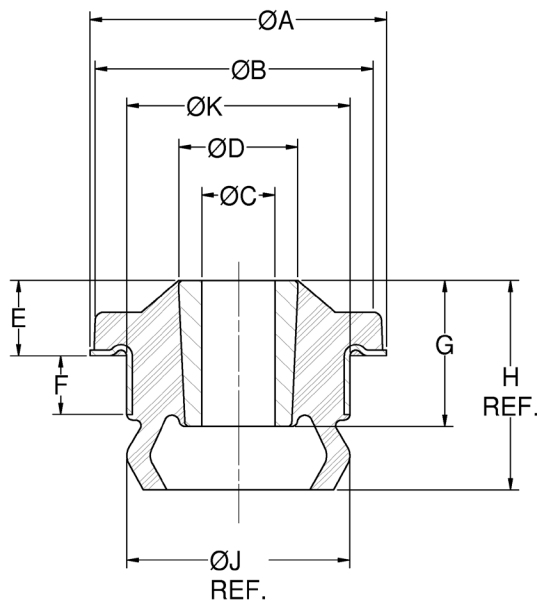
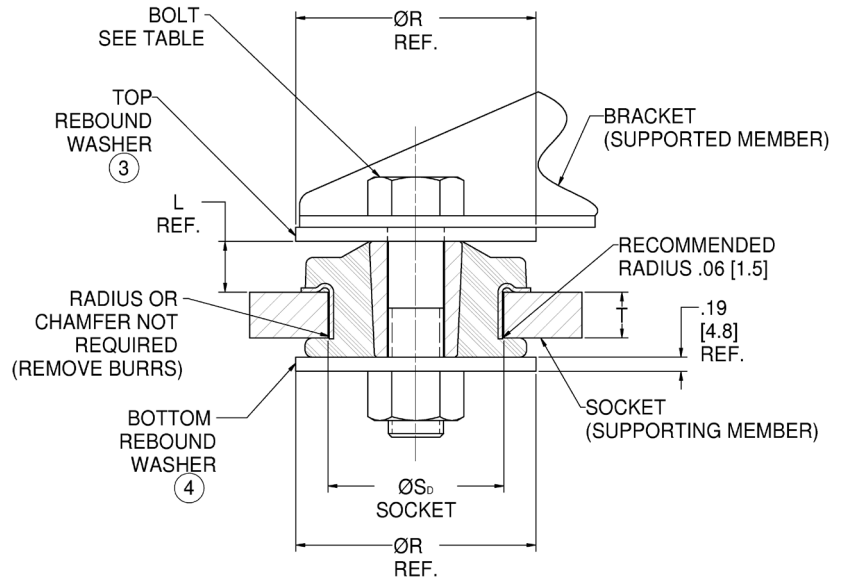


Figure 2 – Installation View (Shown Under No Load)



STA36-500-1 to STA36-700-1

Figure 3 – Part Dimensions

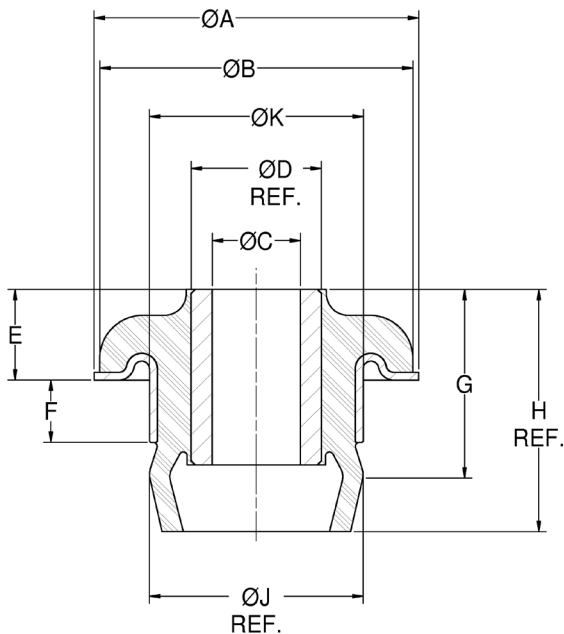
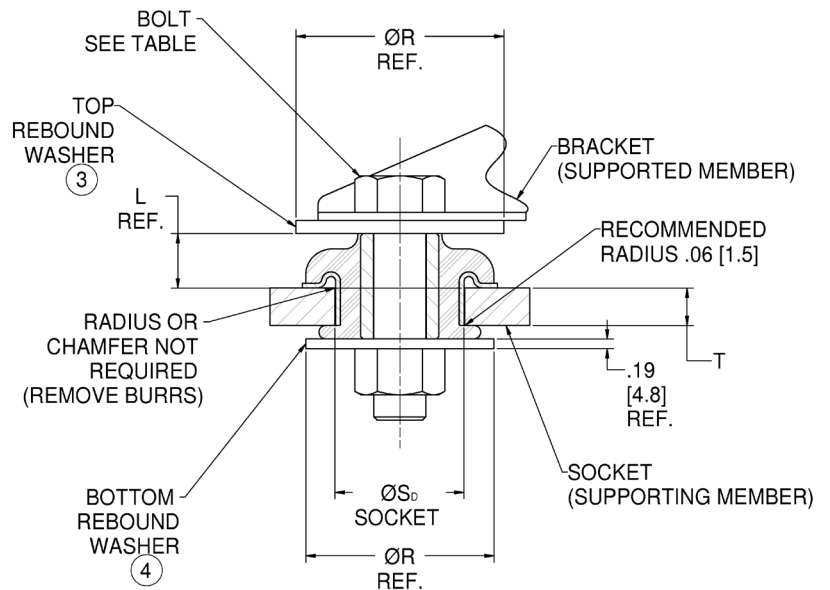


Figure 4 – Installation View (Shown Under No Load)



Safetied Tubeform Series

Table 1 – Specifications and Dimensions

Part Number	Elastomer ①	Axial Static Load				Radial Static Load				Axial Static Deflection at Nominal Load		Part Dimensions			
		Nominal		Maximum		Nominal		Maximum				A		B	
		lb	N	lb	N	lb	N	lb	N	in	mm	in	mm	in	mm
J-20595-1	NR	320	1423	480	2135	160	712	320	1423	0.10	2.5	5.25	133.4	4.25	108.0
J-20595-5	NR	680	3025	1020	4537	340	1512	680	3025						
J-20595-12	OR	380	1690	570	2535	190	845	380	1690	0.10	2.5	5.25	133.4	4.25	108.0
J-20595-13	OR	460	2046	690	3069	230	1023	460	2046						
J-18748-23	NR	680	3025	1020	4537	340	1512	680	3025	0.10	2.5	6.25	158.8	5.00	127.0
J-18748-27	OR	560	2490	840	3736	280	1245	560	2490	0.10	2.5	6.25	158.8	5.00	127.0
J-18748-28	OR	680	3025	1020	4537	340	1512	680	3025						
J-18748-29	OR	830	3692	1245	5538	415	1846	830	3692						
J-18748-30	OR	1000	4448	1500	6672	500	2224	1000	4448						
J-18787-13	NR	1210	5382	1815	8073	605	2691	1210	5382	0.10	2.5	7.50	190.5	6.00	152.4
J-18787-15	NR	1780	7918	2700	12,010	890	3959	1780	7918						
J-18787-16	OR	830	3692	1245	5538	415	1846	830	3692	0.10	2.5	7.50	190.5	6.00	152.4
J-18787-19	OR	1470	6539	2205	9808	735	3269	1470	6539						
J-18787-20	OR	1780	7918	2700	12,010	890	3959	1780	7918						

Mounts and washers only supplied by LORD.

① NR = Natural Rubber
OR = Oil-Resistant Elastomer - Neoprene

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions																		Recommended Bolt Information*			
	C		D		E		F		G		H		I		S _D		T		Size		Grade or Class	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	English	Metric	SAE J429	SAE J1199
J-20595-1 J-20595-5	0.687	17.4	0.406	10.3	2.75	69.9	2.25	57.2	1.18	30.0	0.125	3.2	2.25	57.2	2.62	66.5	0.69	17.5	5/8	M16	8	10.9
J-20595-12 J-20595-13	0.687	17.4	0.406	10.3	2.75	69.9	2.25	57.2	1.18	30.0	0.125	3.2	2.25	57.2	2.62	66.5	0.69	17.5	5/8	M16	8	10.9
J-18748-23	0.778	19.8	0.531	13.5	3.38	85.9	3.00	76.2	1.38	35.1	0.190	4.8	2.50	63.6	2.88	73.2	1.25	31.8	3/4	M18	8	10.9
J-18748-27 J-18748-28 J-18748-29 J-18748-30	0.778	19.8	0.531	13.5	3.38	85.9	3.00	76.2	1.38	35.1	0.190	4.8	2.50	63.6	2.88	73.2	1.25	31.8	3/4	M18	8	10.9
J-18787-13 J-18787-15	1.065	27.1	0.656	16.7	4.38	111.3	4.00	101.6	1.50	38.1	0.250	6.4	3.30	83.8	3.75	95.3	2.00	50.8	1	M24	8	10.9
J-18787-16 J-18787-19 J-18787-20	1.065	27.1	0.656	16.7	4.38	111.3	4.00	101.6	1.50	38.1	0.250	6.4	3.30	83.8	3.75	95.3	2.00	50.8	1	M24	8	10.9

* For tightening torque information, refer to Tightening Torque Charts section.

Figure 1 – Part Dimensions

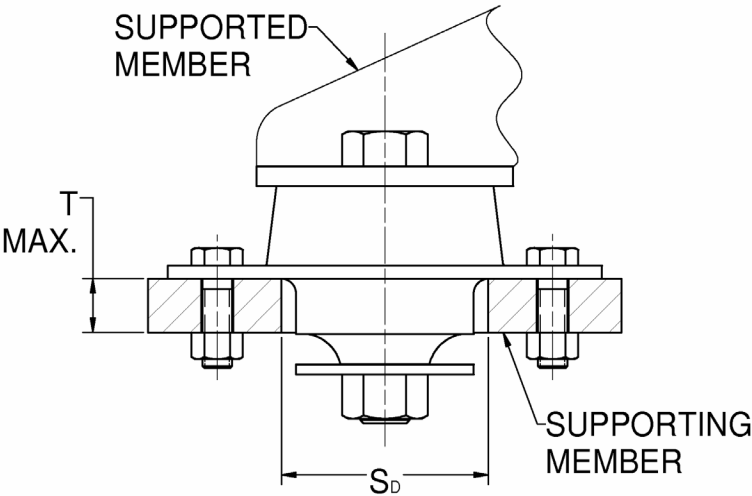


Figure 2 – Installation View
(Shown Under No Load)

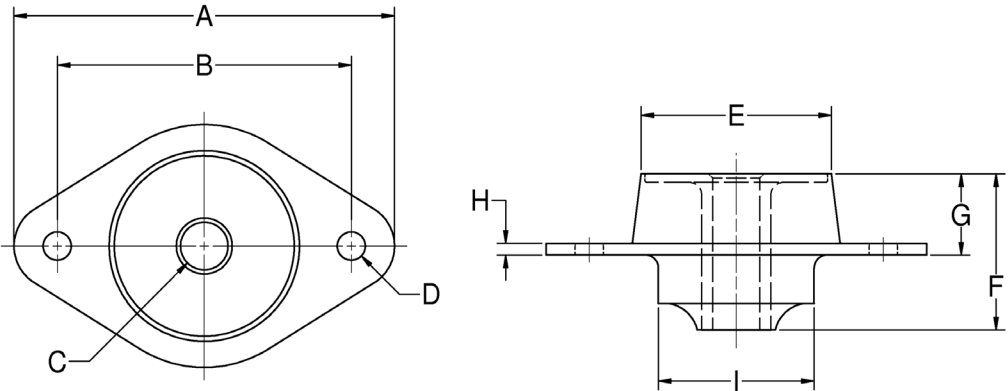


Table 3 – Washer Part Numbers and Dimensions

Series Number	Part Dimensions					
	O.D.		I.D.		Thickness	
	in	mm	in	mm	in	mm
J-20595	2.25	57.2	0.64	16.3	0.125	3.2
J-18748	2.50	63.5	0.76	19.3	0.188	4.8
J-18787	3.25	82.6	1.01	25.7	0.250	6.4

Mounts and washers only supplied by LORD.

Installation Guide

Specifications

Materials: The elastomers are high quality natural rubber which meet LORD specifications (available upon request).

The elastomer-to-metal bonds are stronger than the elastomer.

Environmental: For applications in severe oil environments, contact LORD. Based on extensive experience, center-bonded mounts have been designed to operate in normal fluid, temperature and other environmental conditions such as found in the engine compartment of on- and off-highway applications.

Testing/Quality Control: Drawings of each part specify the load deflection tests which are performed to assure consistency of spring rate characteristics.

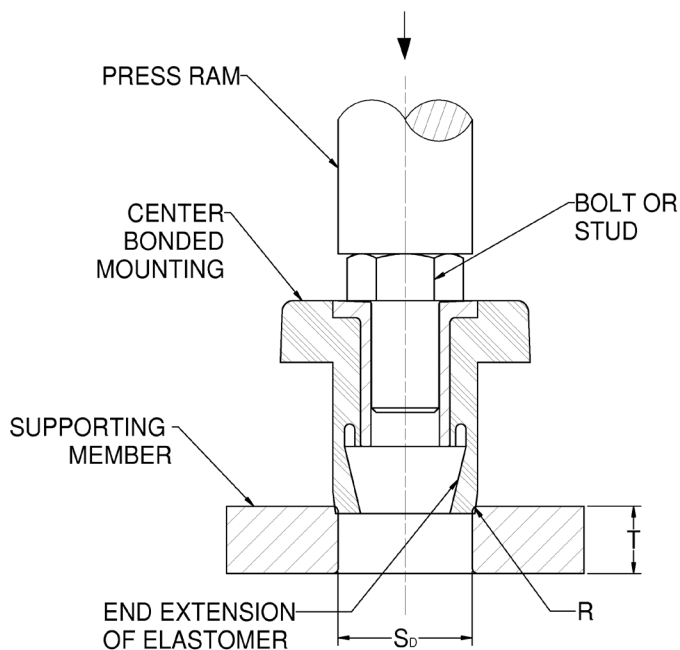
Testing/Performance: Extensive laboratory fatigue testing has been performed under simulated service conditions.

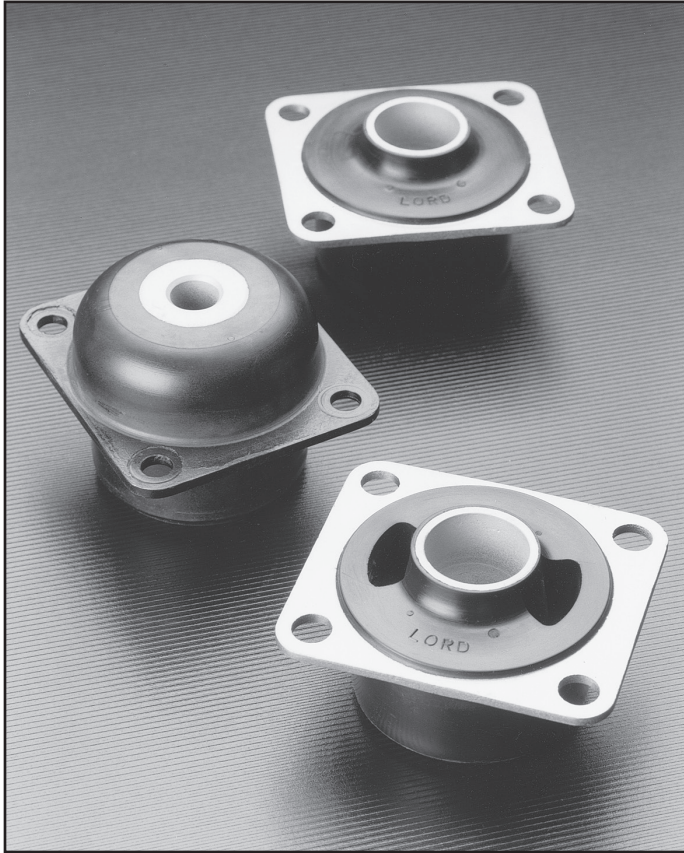
Installation

Installation is simple, consisting of four steps:

1. Both mount and socket should be lightly lubricated with rubber lubricant or water. A special rubber lubricant, P-80 Emulsion, is available from International Products Corporation; P.O. Box 70; Burlington, NJ 08016-0070; Phone: (609) 386-8770; Fax: (609) 386-8438.
2. Insert part in socket and rotate part by hand while applying axial force until partially positioned. Insert assembly driver in the metal inner member of the mount. Care should be taken that the driving device does not overhang the outside diameter of the inner member in order to prevent damage to the elastomer.
3. Apply pressure to the driving device to seat the mount in its socket.
4. Assemble the other elements of the support, insert the mount bolt and tighten to the required torque. When the nut is tightened against the snubbing washer, the rebound shoulder is formed automatically. The resulting pre-compression assures optimum performance.

Figure 1





Conical Mounts

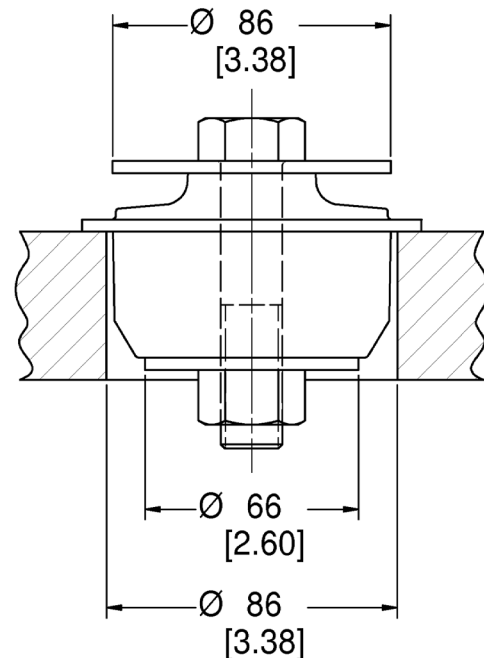
LORD Conical mounts provide effective vibration isolation and noise attenuation with a simple, robust mount design. Consistent performance, high load bearing capabilities and a choice of radial stiffness characteristics are key features of these mounts. For more demanding vibration and noise reduction requirements, LORD integrates Conical Mounts with surface-effect technology to form an advanced control solution known as Surface-Effect Systems.

Conical Mounts are appropriate for both on-road and off-road vehicles. Applications include cab mounts and engine and transmission mounts for trucks and buses, and construction and agricultural vehicles.

Features and Benefits

- Provide strong, dependable performance
- Have a typical static deflection of 5 mm
- Offer a choice of radial stiffnesses
- Can be snubbed
- Can be safetied with the use of snubbing washers
- Withstand R.O.P.S. loads with the addition of support rings
- Are easily installed
- Exhibit long, highly reliable service life

Figure 1



Specifications and Dimensions

Part Number	Durometer Shore A	Rated Axial Static Load kN (lb)	Rated Axial Static Deflection kN (lb)	Axial Static Stiffness N/mm (lb/in)	Axial Dynamic Stiffness ① N/mm (lb/in)	Radial R1 Static Stiffness N/mm (lb/in)	Radial R2 Static Stiffness N/mm (lb/in)	Recommended Bolt Information*			
								Size		Grade or Class	
								English	Metric	SAE J429	SAE J1199
J-21100-9	35	1.67 (375)	5.0 (0.20)	210 (1200)	215 (1230)	800 (4570)	800 (4570)	3/4	M20	**	**
J-21100-1	40	2.4 (540)	5.0 (0.20)	310 (1770)	340 (1945)	1200 (6855)	1200 (6855)	3/4	M20	**	**
J-21100-4	45	2.7 (607)	5.0 (0.20)	400 (2285)	470 (2690)	1600 (9140)	1600 (9140)	3/4	M20	**	**
J-21100-5	50	3.9 (880)	5.0 (0.20)	500 (2860)	600 (3430)	2000 (11420)	2000 (11420)	3/4	M20	**	**
J-21100-10	55	4.6 (1040)	5.0 (0.20)	590 (3370)	725 (4140)	2400 (13700)	2400 (13700)	3/4	M20	**	**
J-21100-11	60	5.3 (1200)	5.0 (0.20)	690 (3950)	850 (4855)	2800 (16000)	2800 (16000)	3/4	M20	**	**
J-21102-1	40	1.3 (300)	5.0 (0.20)	190 (1085)	210 (1200)	960 (5485)	960 (5485)	3/4	M20	**	**
J-21103-1	40	1.1 (250)	5.0 (0.20)	150 (860)	160 (915)	850 (4855)	400 (2285)	3/4	M20	**	**
J-21104-1	40	0.82 (185)	5.0 (0.20)	110 (630)	120 (685)	600 (3430)	300 (1720)	3/4	M20	**	**
J-21159-3	46	5.3 (1200)	7.6 (0.30)	668 (3812)	823 (4700) ②	2270 (12970)	2270 (12970)	7/8	M20	8	10.9
J-21159-4	58	8.9 (2000)	7.6 (0.30)	983 (5613)	2030 (11600) ②	3877 (22140)	3877 (22140)	7/8	M20	8	10.9
J-21159-6	45	5.16 (1160)	7.6 (0.30)	645 (3680)	780 (4470)	2150 (12300)	2150 (12300)	7/8	M20	8	10.9
J-21159-7	50	6.23 (1400)	7.6 (0.30)	740 (4230)	990 (5655)	2645 (15100)	2645 (15100)	7/8	M20	8	10.9
J-21159-8	55	7.43 (1670)	7.6 (0.30)	845 (4822)	1345 (7685)	3170 (18110)	3170 (18110)	7/8	M20	8	10.9
J-21159-9	66	11.39 (2560)	7.6 (0.30)	1195 (6820)	3545 (20250)	4955 (28300)	4955 (28300)	7/8	M20	8	10.9
J-21212-1 ③	61	1.05 (240)	3.6 (0.14)	207 (1180)	254 (1450)	462 (2640)	462 (2640)	3/8	M10	2	5.8
J-21212-3	58	0.80 (180)	3.6 (0.14)	182 (1040)	222 (1270)	387 (2210)	387 (2210)	3/8	M10	2	5.8

* For tightening torque information, refer to Tightening Torque Charts section.

** Tightening torque 3/4 bolt = 320 lb-ft; M20 bolt = 430 N-m dry.

① Data at Axial Rated Static Load, with input +0.3 mm (0.01 in) at 5.0 Hz.

② Data at Axial Load and Dynamic Axial Motion of ±0.5 mm.

③ Other parts available in this series, contact LORD.

Figure 1 – J-21100 Series

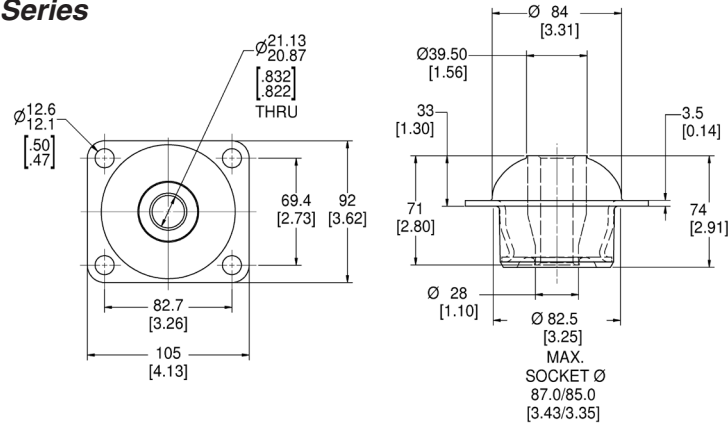


Figure 2 – J-21102-1

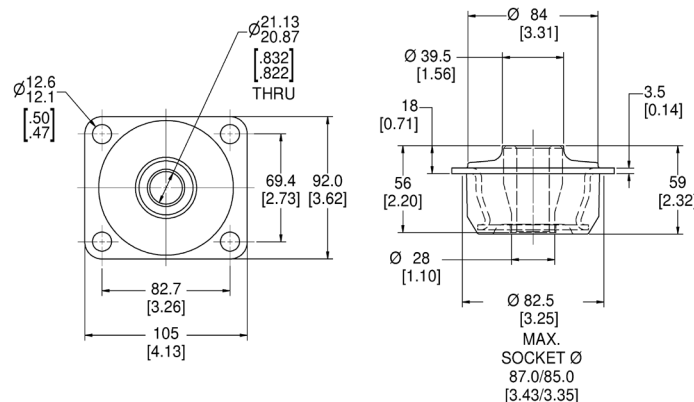


Figure 3 – J-21103-1

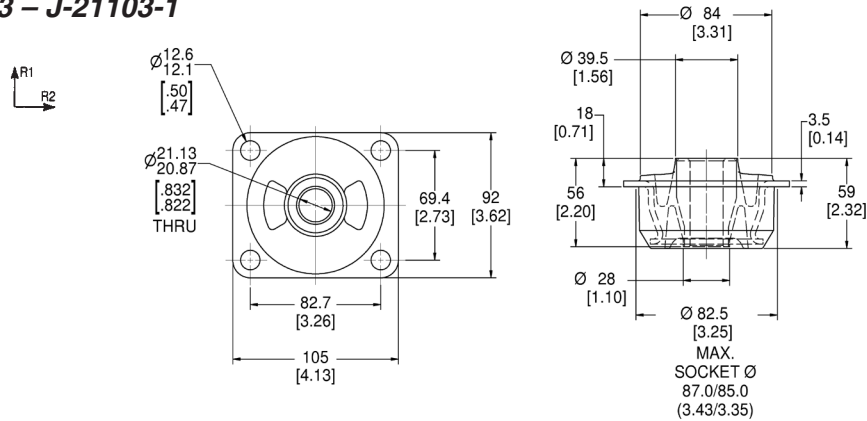


Figure 4 – J-21104-1

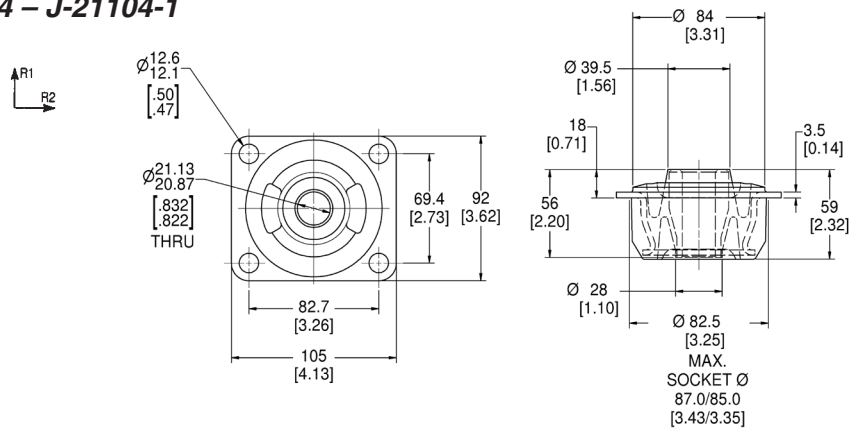


Figure 5 – J-21159 Series

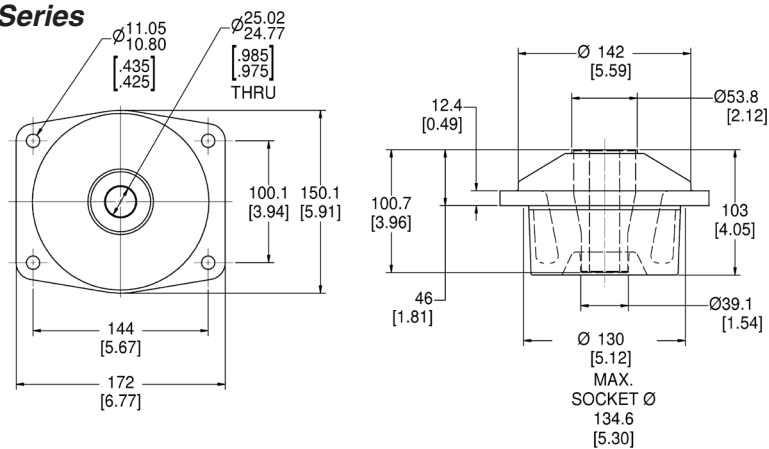
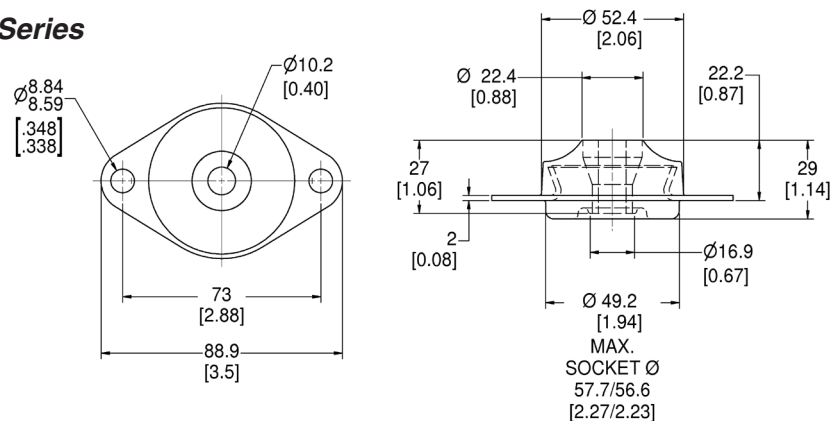
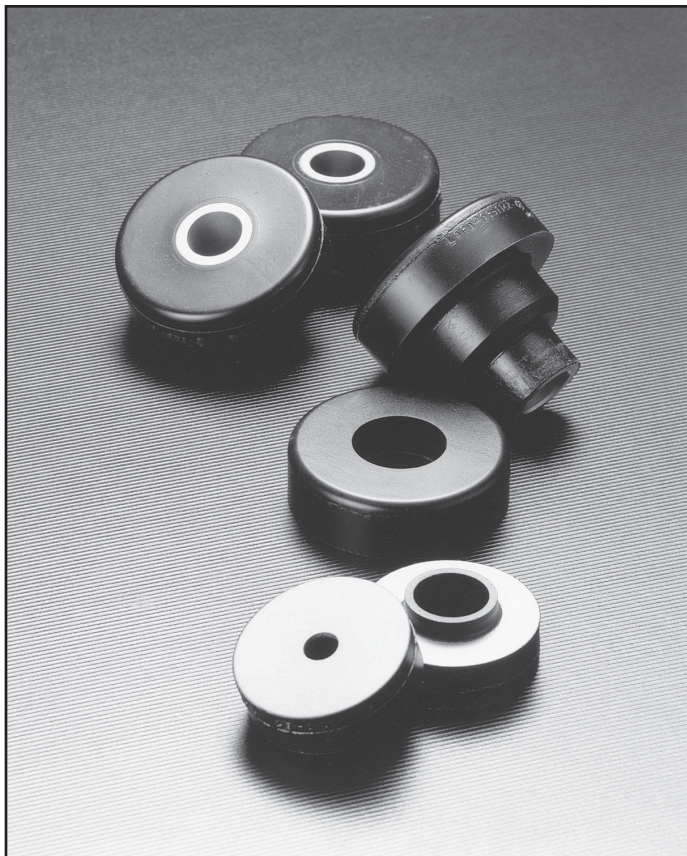


Figure 6 – J-21212 Series





Two-Piece Mounts

Featuring: CBB and CBC Series
SSB Series
CB-2200 Series

LORD Two-Piece Mounts are designed for applications involving severe dynamic forces in the static load direction, as well as the rebound direction. Travel is limited in both directions by rubber in compression which provides snubbing.

These mounts are designed to support engines, cabs and accessory units, and accommodate frame racking and twisting while isolating vibration and absorbing shock.

Typical applications for Two-Piece Mounts include on-highway, off-highway vehicles, construction and industrial machines.

Features and Benefits

- Dynamically effective in all directions
- Prevent mechanical transmission of noise
- Accommodate misalignment and distortion
- High rebound capacity
- Easy to install with common tools
- Standard bolt torque assures proper assembly
- Top and bottom parts alike, cannot be misassembled
- Fail-safe assembly
- Sized for English and Metric bolts
- Long dependable service life
- Economical

CBB and CBC Series

Table 1 – Specifications and Dimensions

Part Number	See Figure	Maximum Axial Static Load Rating at Deflection ①		Part Dimensions											
				A		B		C		D Ref.		E		F	
		lb at in	N at mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
CBB35-2-7	1 & 2	440 at 0.05	1960 at 1.27	3.50	88.9	0.938	23.8	2.24	56.9	1.48	37.6	1.44	36.6	1.04	26.4
CBB35-2-9	1 & 2	940 at 0.05	4180 at 1.27	3.50	88.9	0.938	23.8	2.25	57.2	1.48	37.6	1.44	36.6	1.04	26.4
CBC35-2-7	3 & 4	500 at 0.05	2225 at 1.27	3.50	88.9	0.938	23.8	2.23	56.6	1.60	40.6	1.44	36.6	1.04	26.4
CBC35-2-9	3 & 4	875 at 0.05	3890 at 1.27	3.50	88.9	0.938	23.3	2.23	56.6	1.60	40.6	1.44	36.6	1.04	26.4
CBB45-2-7	1 & 2	1000 at 0.06	4448 at 1.59	4.50	114.3	1.06	27.1	2.48	63.0	1.76	44.7	1.69	42.9	1.32	33.5
CBB45-2-9	1 & 2	1565 at 0.06	6960 at 1.59	4.50	114.3	1.06	27.1	2.48	63.0	1.76	44.7	1.69	42.9	1.32	33.5
CBC45-2-7	3 & 4	1030 at 0.06	4585 at 1.59	4.50	114.3	1.06	27.1	2.48	63.0	1.94	49.3	1.69	42.9	1.32	33.5
CBC45-2-9	3 & 4	1565 at 0.06	6950 at 1.59	4.50	114.3	1.06	27.1	2.48	63.0	1.94	49.3	1.69	42.9	1.32	33.5
J-8006-10	3 & 4	440 at 0.04	1960 at 0.95	2.50	63.5	0.64	16.3	1.63	41.3	0.81	20.6	0.56	14.2	0.62	15.7
J-8006-66	3 & 4	565 at 0.04	2515 at 0.95	2.50	63.5	0.64	16.3	1.50	38.1	1.19	30.2	0.94	23.9	0.62	15.7

All metal parts are made of low carbon steel.
Mounts and washers only supplied by LORD.

① These loads are for on-highway and general industrial applications. For off-highway, use 90% of the load shown.

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions ②										Recommended Bolt Information*			
	G		H		S _D ±0.015		R		T		Size		Grade or Class	
	in	mm	in	mm	in	mm	in	mm	in	mm	English	Metric	SAE J429	SAE J1199
CBB35-2-7	0.94	23.9	2.88	73.2	2.26	57.5	—	—	1.00	25.4	7/8	M20	8	10.9
CBB35-2-9	0.94	23.9	2.88	73.2	2.26	57.5	—	—	1.00	25.4	7/8	M20	8	10.9
CBC35-2-7	0.94	23.9	2.88	73.2	2.26	57.5	0.12	3.1	1.00	25.4	7/8	M20	8	10.9
CBC35-2-9	0.94	23.9	2.88	73.2	2.26	57.5	0.12	3.1	1.00	25.4	7/8	M20	8	10.9
CBB45-2-7	1.19	30.2	3.38	85.8	2.53	64.3	—	—	1.00	25.4	1	M24	8	10.9
CBB45-2-9	1.19	30.2	3.38	85.8	2.53	64.3	—	—	1.00	25.4	1	M24	8	10.9
CBC45-2-7	1.19	30.2	3.38	85.8	2.53	64.3	0.12	3.1	1.00	25.4	1	M24	8	10.9
CBC45-2-9	1.19	30.2	3.38	85.8	2.53	64.3	0.12	3.1	1.00	25.4	1	M24	8	10.9
J-8006-10	0.47	11.9	1.12	28.5	1.65	41.9	0.03	0.76	0.18	4.6	5/8	M16	2	9.8
J-8006-66	0.50	12.7	1.88	47.8	1.53	38.9	0.06	1.5	0.88	22.4	5/8	M16	8	10.9

② Installed dimensions are under no load.

* For tightening torque information, refer to Tightening Torque Charts section.

Figure 1 – Part Dimensions - CBB Series

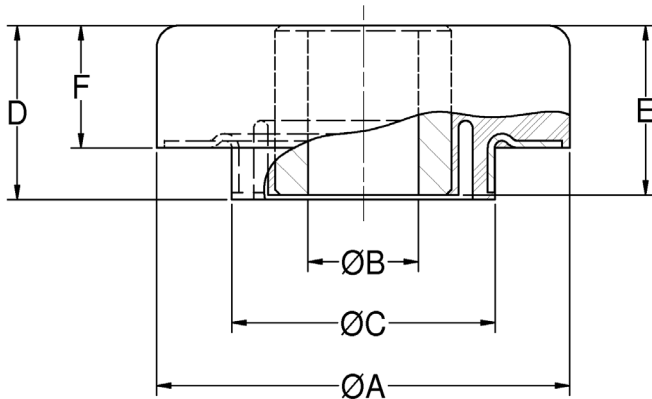


Figure 2 – Installation View - CBB Series (Shown Under No Load)

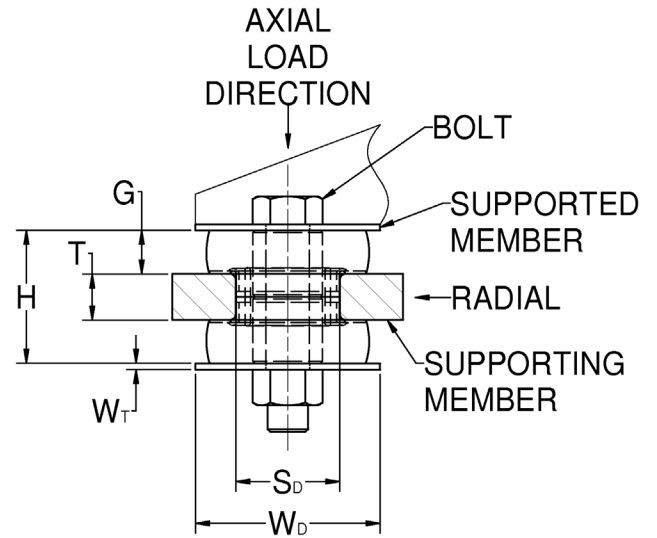


Figure 3 – Part Dimensions - CBC and J-8006 Series

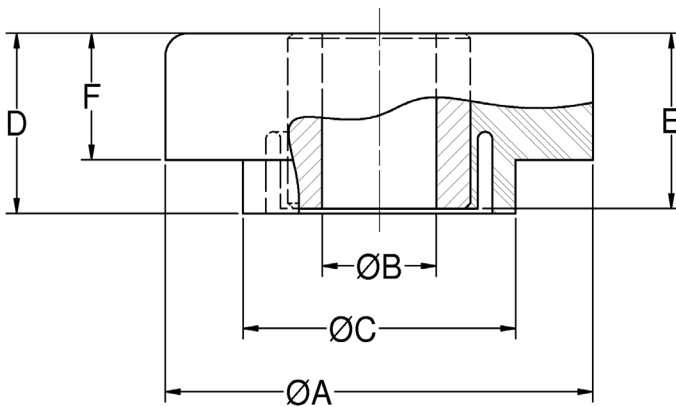


Figure 4 – Installation View - CBC and J-8006 Series (Shown Under No Load)

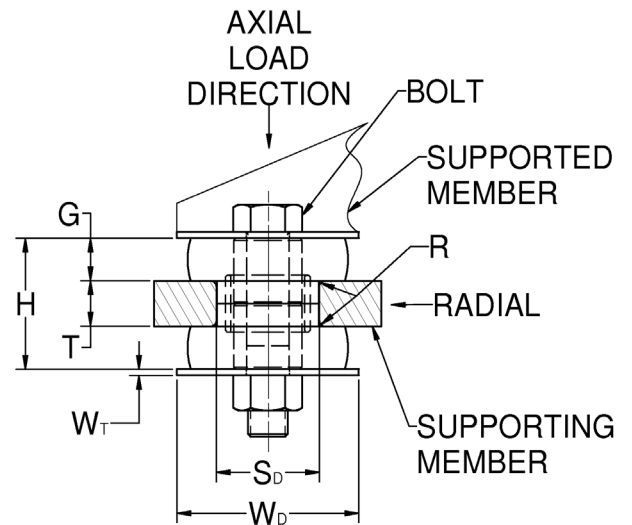


Table 3 – Washer Part Numbers and Dimensions

Part Number	Washer Part Number	W _D		W _T		I.D.	
		in	mm	in	mm	in	mm
CBB35-2-7	J-2049-72	4.00	101.6	0.134	3.4	0.95	24.1
CBB35-2-9	J-2049-72	4.00	101.6	0.134	3.4	0.95	24.1
CBC35-2-7	J-2049-72	4.00	101.6	0.134	3.4	0.95	24.1
CBC35-2-9	J-2049-72	4.00	101.6	0.134	3.4	0.95	24.1
CBB45-2-7	J-2049-73	5.00	127.0	0.134	3.4	1.07	27.2
CBB45-2-9	J-2049-73	5.00	127.0	0.134	3.4	1.07	27.2
CBC45-2-7	J-2049-73	5.00	127.0	0.134	3.4	1.07	27.2
CBC45-2-9	J-2049-73	5.00	127.0	0.134	3.4	1.07	27.2
J-8006-10	J-2049-68	2.88	73.2	0.125	3.2	0.66	16.8
J-8006-66	J-2049-68	2.88	73.2	0.125	3.2	0.66	16.8

SSB Series

Table 1 – Specifications and Dimensions

Part Number			Maximum Axial Static Load Rating at Deflection ①		Axial Spring Rate		Radial Spring Rate	
Kit	Mounting P/N	Spacer P/N	lb at in	N at mm	lb/in	N/mm	lb/in	N/mm
SSB20-1000-2	J-7401-27	Y-30100-7-1	185 at 0.035	825 at 0.90	4970	890	560	97
SSB20-1000-4	J-7401-29	Y-30100-7-1	300 at 0.040	1335 at 1.02	8120	1430	910	160
SSB26-1000-1	J-3049-67	Y-30100-7-1	400 at 0.035	1780 at 0.90	11,000	1930	1370	240
SSB26-1000-5	J-3049-70	Y-30100-7-1	685 at 0.040	3050 at 1.02	17,900	3215	2230	392
SSB33-1000-2	SSB33-1001-2	Y-32190-1-1	625 at 0.045	2780 at 1.15	15,200	2650	2220	385
SSB33-1000-4	SSB33-1001-4	Y-32190-1-1	1125 at 0.03	5005 at 0.76	37,500	6566	3890	675

① These loads are for on-highway and general industrial applications. For off-highway, use 80% of the load shown.

Table 2 – Specifications and Dimensions

Part Number			Part Dimensions															
			A		B		C		D		E		F		H		I	
Kit	Mounting P/N	Spacer P/N	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
SSB20-1000-2	J-7401-27	Y-30100-7-1	2.22	56.4	2.00	50.8	0.81	20.6	0.125	3.2	1.81	46.0	1.38	3.50	0.31	7.9	0.510	12.9
SSB20-1000-4	J-7401-29	Y-30100-7-1	2.22	56.4	2.00	50.8	0.81	20.6	0.125	3.2	1.81	46.0	1.38	3.50	0.31	7.9	0.510	12.9
SSB26-1000-1	J-3049-67	Y-30100-7-1	2.62	66.5	—	—	0.81	20.6	0.125	3.2	1.81	46.0	1.38	35.0	0.31	7.9	0.510	12.9
SSB26-1000-5	J-3049-70	Y30100-7-1	2.62	66.5	—	—	0.81	20.6	0.125	3.2	1.81	46.0	1.38	35.0	0.31	7.9	0.510	12.9
SSB33-1000-2	SSB33-1001-2	Y-32190-1-1	3.24	82.3	3.21	81.5	0.81	20.6	0.125	3.2	1.81	46.0	1.84	46.7	0.29	7.4	0.765	19.4
SSB33-1000-4	SSB33-1001-4	Y-32190-1-1	3.24	82.3	3.21	81.5	0.81	20.6	0.125	3.2	1.81	46.0	1.84	46.7	0.29	7.4	0.765	19.4

Table 3 – Specifications and Dimensions

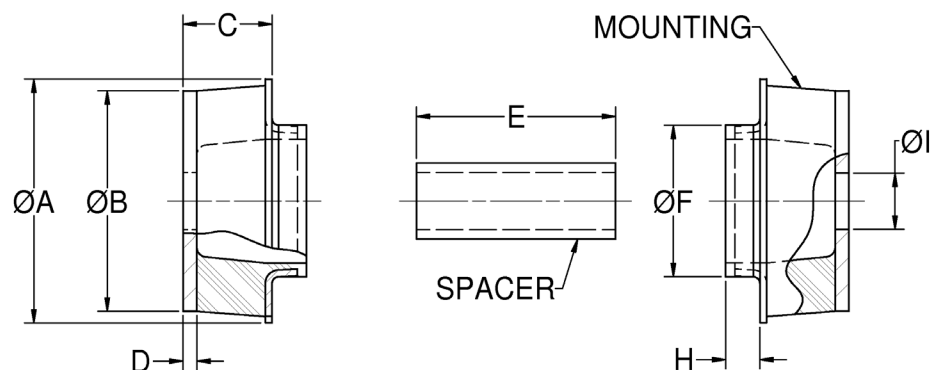
Part Number			Installation Dimensions							
			K		S _D ±0.015		R		T	
Kit	Mounting P/N	Spacer P/N	in	mm	in	mm	in by degree	mm by degree	in	mm
SSB20-1000-2	J-7401-27	Y-30100-7-1	2.06	52.3	1.40	35.6	0.07 by 45	1.8 by 45	0.625	15.9
SSB20-1000-4	J-7401-29	Y-30100-7-1	2.06	52.3	1.40	35.6	0.07 by 45	1.8 by 45	0.625	15.9
SSB26-1000-1	J-3049-67	Y-30100-7-1	2.06	52.3	1.40	35.6	0.07 by 45	1.8 by 45	0.625	15.9
SSB26-1000-5	J-3049-70	Y-30100-7-1	2.06	52.3	1.40	35.6	0.07 by 45	1.8 by 45	0.625	15.9
SSB33-1000-2	SSB33-1001-2	Y-32190-1-1	2.06	52.3	1.87	47.6	—	—	0.625	15.9
SSB33-1000-4	SSB33-1001-4	Y-32190-1-1	2.06	52.3	1.87	47.6	—	—	0.625	15.9

All metal parts are made of low carbon steel.

For applications in severe oil environments, contact LORD. Based on extensive experience, Two-Piece Mounts have been designed to operate in normal fluid, temperature and other environmental conditions such as found in the engine compartment of on- and off-highway applications.

Tolerances: 0.xx = ± 0.03 in (± 0.762 mm)
0.xxx = ± 0.01 in (± 0.254 mm)
Angles ± 2°

Figure 1 – Part Dimensions



**Figure 2 – Installation View
(Shown Under No Load)**

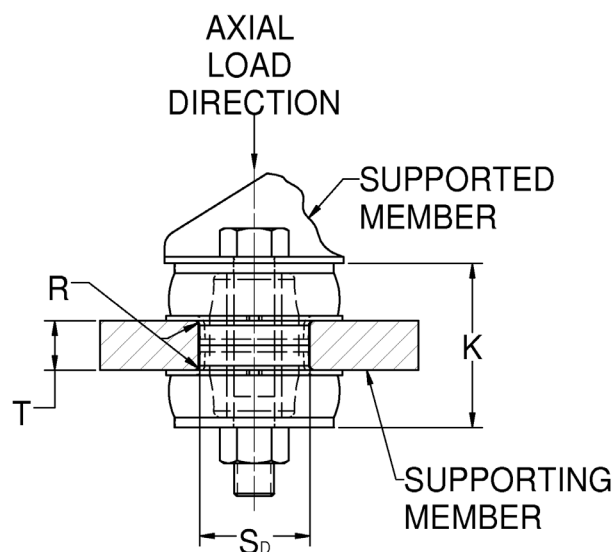


Table 4 – Specifications and Dimensions

Part Number			Recommended Bolt Information*			
			Size		Grade or Class	
Kit	Mounting P/N	Spacer P/N	English	Metric	SAE J429	SAE J1199
SSB20-1000-2	J-7401-27	Y-30100-7-1	1/2	M12	2	5.8
SSB20-1000-4	J-7401-29	Y-30100-7-1	1/2	M12	2	5.8
SSB26-1000-1	J-3049-67	Y-30100-7-1	1/2	M12	2	5.8
SSB26-1000-5	J-3049-70	Y-30100-7-1	1/2	M12	2	5.8
SSB33-1000-2	SSB33-1001-2	Y-32190-1-1	3/4	M18	8	10.9
SSB33-1000-4	SSB33-1001-4	Y-32190-1-1	3/4	M18	8	10.9

* For tightening torque information, refer to Tightening Torque Charts section.

CB-2200 Series

Table 1 – Specifications and Dimensions

Part Number ①	Elastomer ②	Part Number ①	Elastomer ②	Maximum Axial Load at Deflection Based on Plate Thickness							
				T - Thick Support Plate (Recommended)				T - Thin Support Plate (Optional)			
				Thickness - T		Load/Deflection ③		Thickness - T		Load/Deflection ③	
				in	mm	lb at in	N at mm	in	mm	lb at in	N at mm
CB-2201-1	NR	CB-2201-11	OR	0.375	9.5	40 at 0.05	178 at 1.3	0.375	9.5	40 at 0.05	178 at 1.3
CB-2201-2	NR	CB-2201-12	OR	0.375	9.5	90 at 0.05	400 at 1.3	0.375	9.5	90 at 0.05	400 at 1.3
CB-2201-3	NR	CB-2201-13	OR	0.375	9.5	140 at 0.05	623 at 1.3	0.375	9.5	140 at 0.05	623 at 1.3
CB-2201-4	NR	CB-2201-14	OR	0.375	9.5	250 at 0.05	1112 at 1.3	0.375	9.5	250 at 0.05	1112 at 1.3
—	—	CB-2201-15	OR	0.375	9.5	300 at 0.05	1334 at 1.3	0.375	9.5	300 at 0.05	1334 at 1.3
CB-2202-1	NR	CB-2202-11	OR	0.563	14.3	130 at 0.07	578 at 1.8	0.500	12.7	60 at 0.05	267 at 1.3
CB-2202-2	NR	CB-2202-12	OR	0.563	14.3	175 at 0.07	778 at 1.8	0.500	12.7	120 at 0.05	534 at 1.3
CB-2202-3	NR	CB-2202-13	OR	0.563	14.3	240 at 0.07	1068 at 1.8	0.500	12.7	160 at 0.05	712 at 1.3
CB-2202-4	NR	CB-2202-14	OR	0.563	14.3	380 at 0.07	1690 at 1.8	0.500	12.7	260 at 0.05	1157 at 1.3
CB-2202-5	NR	CB-2202-15	OR	0.563	14.3	630 at 0.07	2802 at 1.8	0.500	12.7	380 at 0.05	1690 at 1.3
CB-2203-1	NR	—	—	0.875	22.2	175 at 0.085	780 at 2.2	0.750	19.1	100 at 0.05	440 at 1.3
—	—	CB-2203-12	OR	0.875	22.2	300 at 0.085	1330 at 2.2	0.750	19.1	150 at 0.05	670 at 1.3
CB-2203-3	NR	CB-2203-13	OR	0.875	22.2	400 at 0.085	1780 at 2.2	0.750	19.1	225 at 0.05	1000 at 1.3
CB-2203-4	NR	CB-2203-14	OR	0.875	22.2	500 at 0.085	2220 at 2.2	0.750	19.1	325 at 0.05	1450 at 1.3
CB-2203-5	NR	CB-2203-15	OR	0.875	22.2	725 at 0.085	3220 at 2.2	0.750	19.1	450 at 0.05	2000 at 1.3
CB-2204-1	NR	CB-2204-11	OR	1.125	28.6	400 at 0.09	1780 at 2.3	1.000	25.4	200 at 0.05	890 at 1.3
CB-2204-2	NR	CB-2204-12	OR	1.125	28.6	550 at 0.09	2450 at 2.3	1.000	25.4	300 at 0.05	1330 at 1.3
CB-2204-3	NR	CB-2204-13	OR	1.125	28.6	700 at 0.09	3110 at 2.3	1.000	25.4	400 at 0.05	1780 at 1.3
CB-2204-4	NR	CB-2204-14	OR	1.125	28.6	850 at 0.09	3780 at 2.3	1.000	25.4	500 at 0.05	2220 at 1.3
CB-2204-5	NR	CB-2204-15	OR	1.125	28.6	1000 at 0.09	4450 at 2.3	1.000	25.4	600 at 0.05	2670 at 1.3
CB-2205-1	NR	CB-2205-11	OR	1.250	31.8	900 at 0.09	4000 at 2.3	1.000	25.4	300 at 0.05	1334 at 1.3
CB-2205-2	NR	CB-2205-12	OR	1.250	31.8	1200 at 0.09	5340 at 2.3	1.000	25.4	500 at 0.05	2224 at 1.3
CB-2205-3	NR	—	—	1.250	31.8	1500 at 0.09	6670 at 2.3	1.000	25.4	700 at 0.05	3114 at 1.3
CB-2205-4	NR	CB-2205-14	OR	1.250	31.8	1800 at 0.09	8010 at 2.3	1.000	25.4	900 at 0.05	4003 at 1.3
CB-2205-5	NR	CB-2205-15	OR	1.250	31.8	2100 at 0.09	9340 at 2.3	1.000	25.4	1100 at 0.05	5338 at 1.3
CB-2205-7	NR	—	OR	1.250	31.8	1600 at 0.09	7117 at 2.3	1.000	25.4	775 at 0.05	3447 at 1.3
—	—	CB-2205-18	OR	1.250	31.8	2200 at 0.09	9786 at 2.3	1.000	25.4	1000 at 0.05	4448 at 1.3
CB-2205-9	NR	CB-2205-19	OR	1.250	31.8	2825 at 0.09	12566 at 2.3	1.000	25.4	1425 at 0.05	6339 at 1.3
CB-2205-10	NR	CB-2205-20	OR	1.250	31.8	3450 at 0.09	15346 at 2.3	1.000	25.4	1800 at 0.05	8007 at 1.3

Mounts only supplied by LORD.

① One P/N contains one top and one bottom mount only.

② NR = Natural Rubber

OR = Oil-Resistant Elastomer - Neoprene

③ These loads are for on-highway and general industrial applications. For off-highway, use 90% of the load shown.

Caution: When using the maximum bolt torque listed a hardened (Rg95) rebound washer and support member should be used. A hardened washer may be placed under the supported member when the supported member is not hardened.

Table 2 – Specifications

Series Number	Recommended Bolt Information*			
	Size		Grade or Class	
	English	Metric	SAE J429	SAE J1199
CB-2201	3/8	M10	5	5.8
CB-2202	1/2	M12	8	10.9
CB-2203	5/8	M16	8	10.9
CB-2204	7/8	M20	8	10.9
CB-2205	1.0	M24	8	10.9

* For tightening torque information, refer to Tightening Torque Charts section.

Table 3 – Washer Specifications

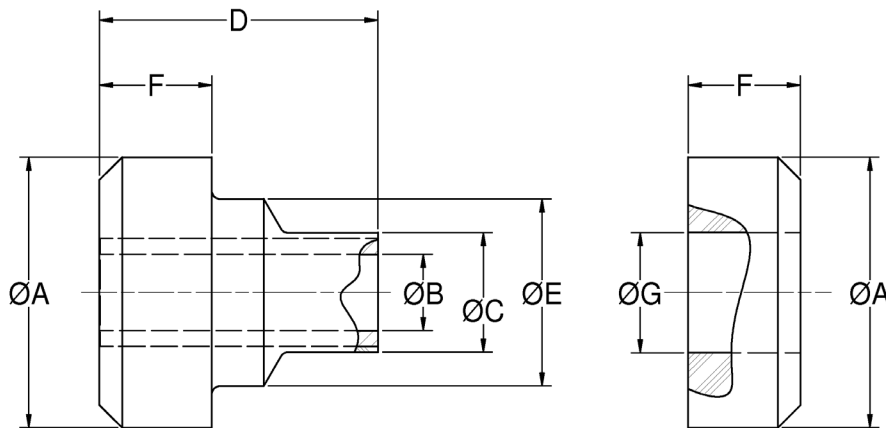
Series Number	Washer Part Number	O.D.		I.D.		Thickness	
		in	mm	in	mm	in	mm
CB-2201	J-2049-89	1.56	39.6	0.391	9.9	0.09	2.3
CB-2202	J-2049-90	2.13	54.1	0.530	13.5	0.134	3.4
CB-2203	J-2049-91	2.81	71.4	0.657	16.7	0.188	4.8
CB-2204	J-2049-92	3.88	98.6	0.938	23.8	0.250	6.4
CB-2205	J-2049-93	5.25	133.4	1.063	27.0	0.375	9.5

Material is SAE 1008-1015 steel zinc plated and chromate treated.

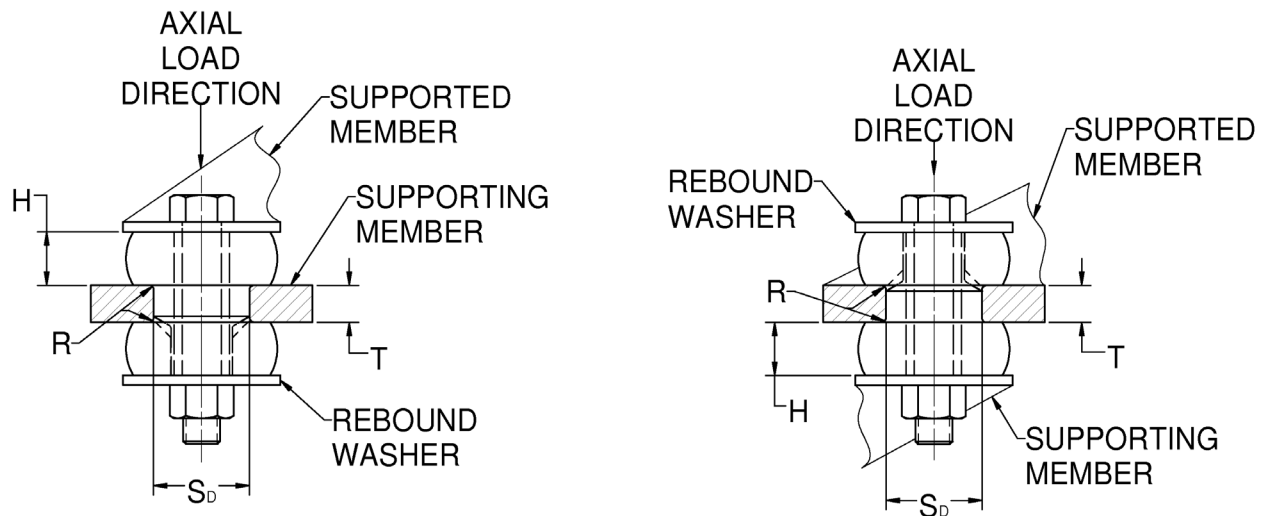
Table 4 – Specifications and Dimensions

Series Number	Part Dimensions														H Reference				Installation Dimensions			
	A		B		C Ref.		D		E		F		G		Thick Support Plate		Thin Support Plate		S _D		R Ref.	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
CB-2201	1.34/ 1.28	33.3	0.407/ 0.396	10.2	0.58	14.7	1.28/ 1.22	31.8	0.82/ 0.76	20.1	0.515/ 0.455	12.3	0.62/ 0.58	15.2	0.44	11.2	0.44	11.2	0.77/ 0.73	19.1	0.04	1.0
CB-2202	1.91/ 1.85	47.8	0.547/ 0.517	13.5	0.83	21.1	1.97/ 1.91	49.3	1.33/ 1.27	33.0	0.81/ 0.75	19.8	0.845/ 0.825	21.2	0.69	17.5	0.72	18.3	1.27/ 1.23	31.8	0.06	1.5
CB-2203	2.58/ 2.52	64.8	0.672/ 0.642	16.7	0.97	24.6	2.46/ 2.40	61.7	1.61/ 1.55	40.1	0.93/ 0.87	22.9	0.99/ 0.95	24.8	0.78	19.8	0.84	21.3	1.52/ 1.48	38.1	0.09	2.3
CB-2204	3.49/ 3.43	87.9	0.958/ 0.938	24.1	1.45	36.8	2.91/ 2.85	73.0	2.33/ 2.27	58.4	1.03/ 0.97	25.4	1.50/ 1.46	37.6	0.88	22.4	0.94	23.9	2.27/ 2.23	57.2	0.12	3.0
CB-2205	4.94/ 4.82	124.0	1.078/ 1.048	27.0	1.50	38.1	3.41/ 3.35	85.9	2.58/ 2.52	64.8	1.28/ 1.22	31.8	1.52/ 1.46	37.8	1.06	26.9	1.19	30.2	2.52/ 2.48	63.5	0.12	3.0

Figure 1 – Part Dimensions



**Figure 2 – Installation View
(Shown Under No Load)**





Bushings

Featuring: Center-Bonded Bushings
Square-Bonded Bushings

LORD Center-Bonded Bushings and Square-Bonded Bushings are used in applications where the absorption shock, attenuation of noise, reduction of wear and elimination of lubrication is required.

Center-Bonded Bushings are designed to be loaded radially and utilize a soft torsional spring rate to provide freedom in rotation. High radial restraint maintains the alignment between joined parts. They are not intended for use where extreme rotational motion will occur. Typical applications include heavy duty highway equipment, drilling equipment, harvesters, combines and industrial machinery.

Square-Bonded Bushings accommodate angular movement and isolate vibratory disturbances in heavy equipment. These bushings combine a torsional spring with an elastomeric pivot and isolator. They provide positive torsional positioning and pivot action under the most demanding operating conditions. Typical applications include wheel suspensions, vibratory feeders, mobile power equipment and vibratory cable layers.

Easy to install, the uncomplicated designs of the Center-Bonded and Square-Bonded Bushings provide initial economy, while the rugged elastomers and high strength bonding assure extended service life.

Features and Benefits

- Easy to install
- Uncomplicated design provides initial economy
- High-strength bonding assures extended service life
- Minimal maintenance due to specially compounded elastomer

Center-Bonded Bushings With Outer Member

Table 1 – Specifications and Dimensions

Part Number	Maximum Radial Static Load Rating		Spring Rate Radial (K rad)		Torsional		Recommended Socket Dimensions			
	lb	N	lb/in	N/mm	lb-in/deg	N-mm/deg	Diameter		Length	
							in ±0.001	mm	in	mm
J-3830-13	300	1334	14,000	2451	3.6	410	1.245	31.6	0.88	22.35
J-5385-31	1000	4448	36,600	6408	18.7	2128	1.743	44.3	2.00	50.80
J-6729-2	6000	26,689	150,000	26,265	119	13542	1.996	50.7	4.00	101.60
J-6740-3	9300	41,368	256,000	44,825	475	54055	3.231	82.1	4.00	101.60

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions							
	A		B		C		D	
	in	mm	in	mm	in	mm	in	mm
J-3830-13	0.516	13.1	1.253	31.8	1.00	25.4	0.75	19.1
J-5385-31	0.504	12.8	1.750	44.5	2.62	66.5	1.00	25.4
J-6729-2	1.129	28.7	2.000	50.8	4.25	108.0	1.31	33.3
J-6740-3	1.500	38.1	3.234	82.1	7.50	190.5	2.12	53.8

Figure 1 – Part Dimensions (With Outer member)

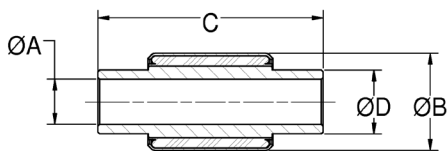


Figure 2 – Part Dimensions (Without Outer Member)

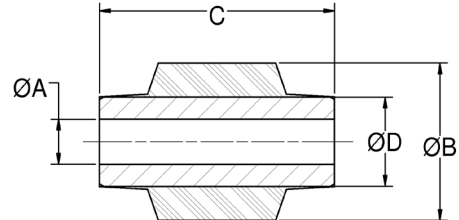
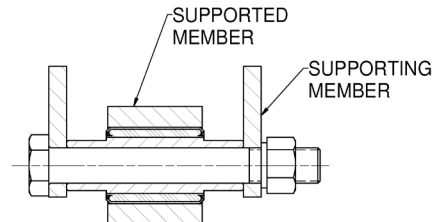


Figure 3 – Installation View



First determine the amount of static loading at the installation point. Then determine the conditions under which the joint will operate. The following should be used as a guide to part selection for Type “A” and Type “B” service.

TYPE A: Extreme conditions (reversing dynamic load or distortion at high frequency – over 600 cpm), use 1/3 the Radial Static Load Rating.

TYPE B: Average conditions (constant radial load, intermittent shock), use the Radial Static Load Rating.

Center-Bonded Bushings Without Outer Member

Table 3 – Specifications and Dimensions

Part Number	Maximum Radial Static Load Rating		Spring Rate Radial (K rad)		Torsional		Recommended Socket Dimensions			
							Diameter ①		Length	
	lb	N	lb/in	N/mm	lb-in/deg	N-mm/deg	in ±0.001	mm	in	mm
J-3830-6	200	890	13,700	2398	4.8	546	1.06	27.05	0.88	22.35
J-2005-2	250	1112	14,800	2591	3.0	339	0.70	17.78	1.00	25.40
J-4705-2	625	2780	25,200	4412	16	1906	1.28	32.63	1.44	36.58
J-6424-1	780	3470	39,200	6863	23	2597	1.37	34.92	1.47	37.34
J-6310-1	925	4115	27,500	4815	25	2823	1.72	44.68	1.56	39.62
J-5385-32	1000	4448	26,200	4587	24	2710	1.58	40.25	2.12	53.85
J-5950	1125	5004	40,000	7004	94	10613	2.22	56.38	1.88	47.75
J-5506	1800	8007	24,600	4307	58	6548	2.75	69.85	2.25	57.15
J-7121-2	1950	8674	105,000	18,385	100	11290	1.75	44.45	2.75	69.85
J-7231-1	2075	9230	168,000	29,416	81	9145	2.44	61.97	1.81	45.97
J-5807-1	2700	12,010	96,000	16,809	105	11055	2.31	58.67	3.00	76.20
J-5971	3200	14,234	102,000	17,860	260	29356	3.70	93.98	2.25	57.15
J-6729	5250	23,353	164,000	28,716	123	13887	1.75	44.45	4.00	101.60
J-6145	8200	36,475	312,000	54,631	796	89868	4.00	101.60	4.00	101.60

For installation instructions, refer to Bushings, Installation Guide section.

① Tolerance is ± 0.015 in (± 0.381 mm) for joints without outer member.

Table 4 – Specifications and Dimensions

Part Number	Part Dimensions							
	A		B		C		D	
	in	mm	in	mm	in	mm	in	mm
J-3830-6	0.517	13.1	1.12	28.4	1.00	25.4	0.75	19.1
J-2005-2	0.315	8.0	0.75	19.1	1.06	26.9	0.44	11.2
J-4705-2	0.641	16.3	1.37	34.8	1.63	41.4	0.88	22.4
J-6424-1	0.627	15.9	1.45	36.8	1.53	38.9	1.00	25.4
J-6310-1	1.004	25.5	1.84	46.7	1.69	42.9	1.25	31.8
J-5385-32	0.504	12.8	1.75	44.5	2.62	66.5	1.00	25.4
J-5950	1.316	33.4	2.39	60.7	2.24	56.9	1.50	38.1
J-5506	1.360	34.5	2.97	75.4	2.75	69.9	2.00	50.8
J-7121-2	1.003	25.5	1.94	49.3	2.99	75.9	1.19	30.2
J-7231-1	1.457	36.9	2.63	66.8	1.94	49.3	2.00	50.8
J-5807-1	1.251	31.8	2.47	62.7	3.37	85.6	1.62	41.1
J-5971	1.503	38.2	3.93	99.8	2.50	63.5	3.00	76.2
J-6729	1.129	28.7	1.86	47.2	4.25	108.0	1.31	33.3
J-6145	2.008	51.0	4.19	106.4	6.00	152.4	3.25	82.6

Square-Bonded Bushings

Table 1 – Specifications and Dimensions

Part Number	Maximum Radial Static Load Rating		Radial Spring Rate (K rad)		Static Torque @ 15 degrees ①		Key Location	Part Dimensions					
								A		B		C	
	lb	N	lb/in	N/mm	lb-in	N-mm		in	mm	in	mm	in	mm
J-6450-19	700	3114	25,000	4378	400	45,212	Y	1.75	44.5	2.62	66.5	0.626	15.9
J-8203-19	1700	7562	60,000	10,506	1500	169,545	Y	2.38	60.5	3.25	82.6	1.379	35.0
J-8203-35	1700	7562	100,000	17,510	2400	271,272	Y	2.40	61.0	3.25	82.6	1.379	35.0
J-9832-11	5000	22,241	160,000	28,016	5200	587,756	X	3.42	86.9	4.00	101.6	2.009	51.0

For installation instructions, refer to Bushings, Installation Guide section.

① Rated static angular deflection is 15° for all parts. Maximum recommended deflection, static plus dynamic is 45° for all parts. Heavy wall tubing is recommended for proper operation.

Table 2 – Specifications and Dimensions

Part Number	Part Dimensions													
	D		E		F		G		H		I		J	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
J-6450-19	1.00	25.4	1.17	29.7	1.62	41.1	1.75	44.5	0.191	4.9	0.719	18.3	0.09	2.3
J-8203-19	1.62	41.1	2.15	54.6	2.25	57.2	3.00	76.2	0.191	4.9	1.444	36.7	0.09	2.3
J-8203-35	1.62	41.1	2.15	54.6	2.25	57.2	3.00	76.2	0.191	4.9	1.442	36.7	0.09	2.3
J-9832-11	2.53	64.3	2.50	63.5	3.25	82.6	3.75	95.3	0.253	6.4	2.128	54.1	0.09	2.3

To select a Square-Bonded Bushing for your requirements, compute the static torsional load it must support. Select from Tables 1-2, a bushing with static torque at 15° which is equal to or greater than the computed load.

Compute the static plus the dynamic torsional load. If this total load exceeds three times the static torque at 15°, select a larger size static torque rating part. Static radial load should also be computed and compared to the maximum static radial load listed above. Dynamic plus static radial load can also be three times loads listed above.

Figure 1 – Part Dimensions

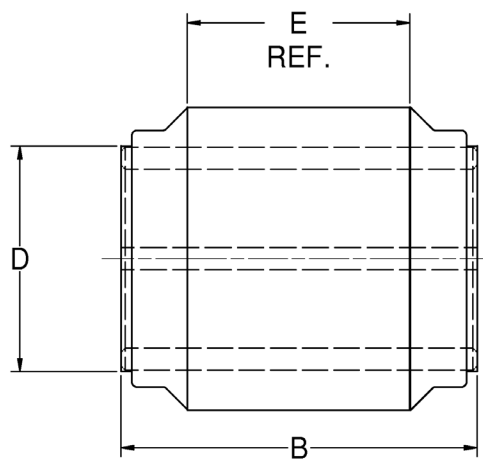
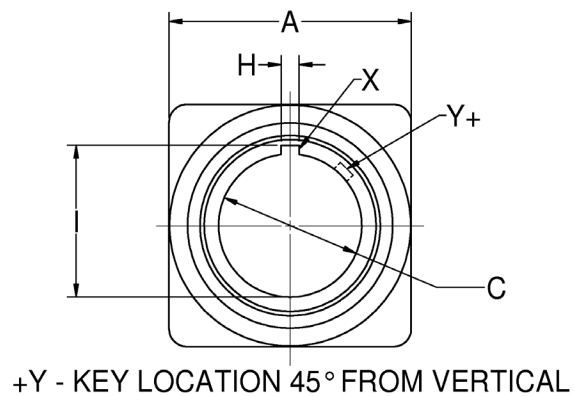
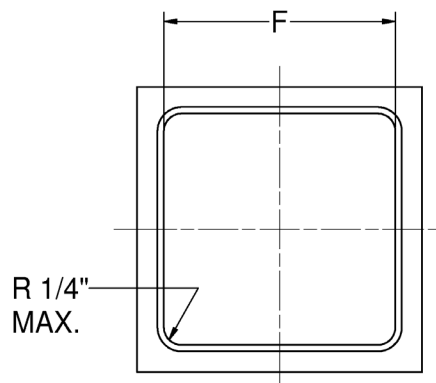
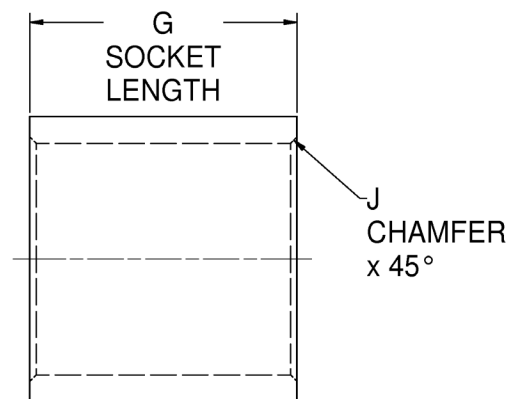


Figure 2 – Installation View



Installation Guide

Center-Bonded Bushing With Outer Member

Clamp or press-fit the outer member into a socket which has been machined to the dimensions shown on Center-Bonded Bushings with Outer Member – Table 1. The force required to install the joint in the socket with a press-fit can be approximated from the formula:

$$\text{Force (lb)} = 2500 \times \text{diameter} \times \text{length}$$

The inner member is normally attached by clamping or bolting its extended ends to a mounting bracket. An alternate method would be to press-fit a shaft through the inner tube.

Center-Bonded Bushing Without Outer Member

Since the outer part of this type joint is the flexing element, it must be compressed and inserted directly into a socket which has been machined to the dimensions shown on Center-Bonded Bushings without Outer Member – Table 3. This is done with the aid of a funnel-shaped fixture and a suitable lubricant: P-80 Rubber Emulsion Lubricant made by International Products Corporation; P. O. Box 70; Burlington, NJ 08016-0070; Phone: (609) 386-8770; Fax: (609) 386-8438.

The inner member attachment is accomplished in the same manner as described above for the joint with outer member.

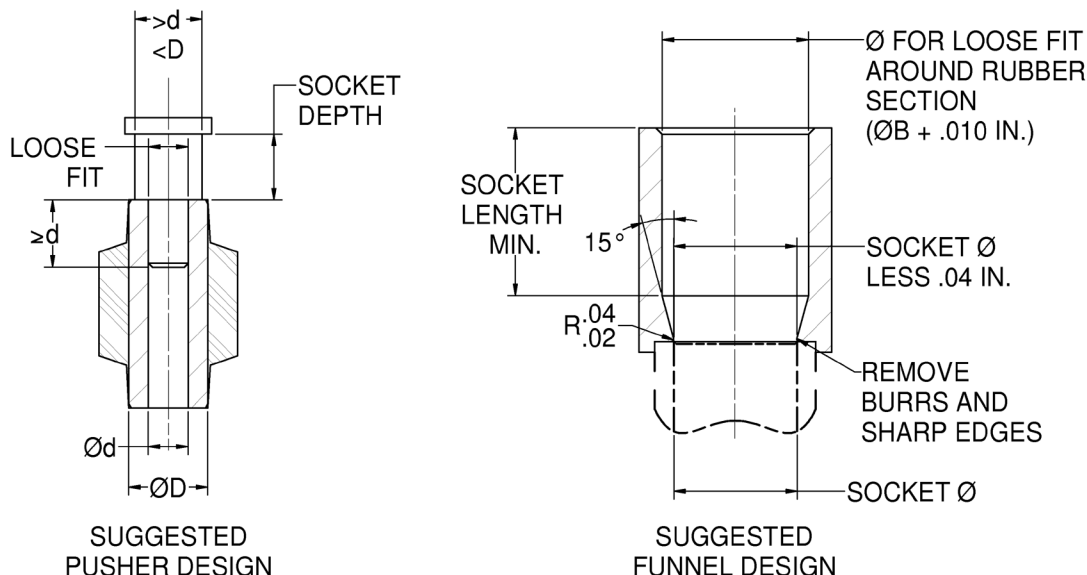
Square-Bonded Bushings

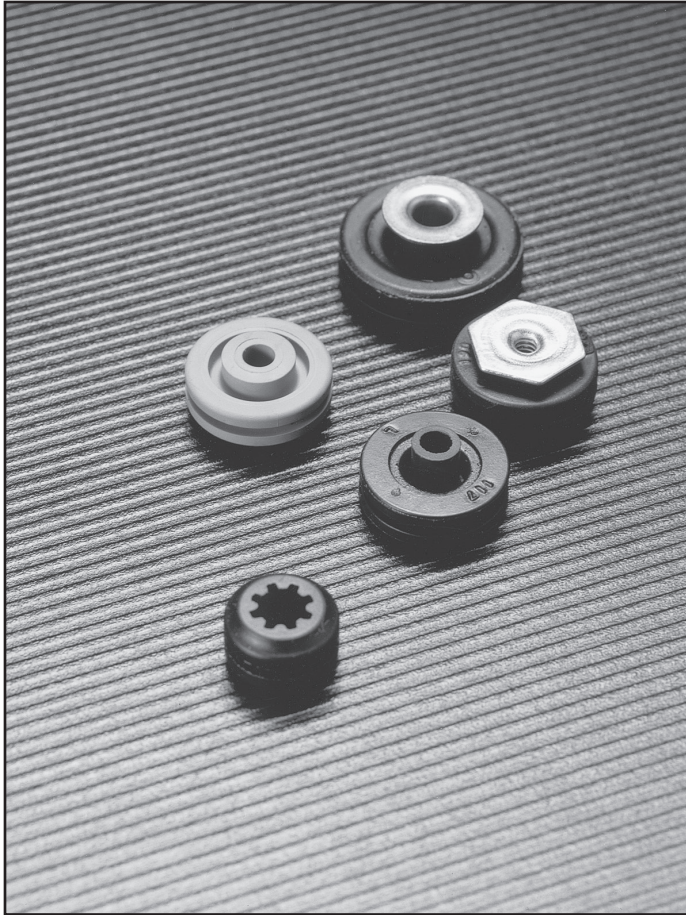
Joints may be installed in preformed sockets machined, cast or fabricated to dimensions as shown in Square-Bonded Bushings – Table 1.

Installation is a simple, four-step procedure:

1. Lubricate the mount and socket lightly with P-80 Rubber Emulsion Lubricant or water. Lubricant available from International Products Corporation; P. O. Box 70; Burlington, NJ 08016-0070; Phone: (609) 386-8770; Fax: (609) 386-8438.
2. Insert assembly fixture or driving bolt through center member. Take care that driving members do not overhang center member outside diameter or damage may result to the elastomer.
3. Apply sufficient pressure to seat the joint in the center of the supporting socket.
4. Attach the supported member snug against the center member.

Figure 1 – Suggested Funnel Design





Grommet Isolators

LORD Grommet Isolators provide effective, economical vibration isolation for light loads. They are suitable for commercial and military applications including computers, disk drives, business machines, precision instrumentation and general industrial equipment.

Grommet Isolators are designed and produced with the same kind of precision and care as our high performance bonded elastomeric mounts. This provides close control of stiffness and dimensions. You get the performance and quality you need at low cost.

Grommet Isolators are made of neoprene and natural rubber. They provide good vibration isolation for disturbing frequencies above 30 Hz.

Features and Benefits

- Economical
- Offer improved reliability in environments where harsh vibration and shock occur
- Space saving
- Oil resistant
- Effective vibration isolation and shock protection for light load applications

Table 1 – Specifications and Dimensions

Part Number	Figure	Elastomer ②	Maximum Axial Load		Axial Spring Rate		Radial Spring Rate		Thread Size	Ferrule Part Number
			lb	N	lb/in	N/mm	in/in	N/mm		
J-3112-5-1	1	NR	1	4	22	3.9	44	7.7	—	—
J-3112-12-1	3	NR	1	4	22	3.9	44	7.7	# 8 Screw	Y-10879- B
J-3112-2-2	2	OR	2	9	33	5.8	66	11.6	—	—
J-3112-1-3	1	OR	3	13	50	8.8	100	17.5	—	—
J-3112-8-3	3	OR	3	13	50	8.8	100	17.5	# 8 Screw	Y-10879-B
J-3112-8-11	3	OR	5.7	25	190	33.3	380	66.5	# 8 Screw	Y-10879-B
J-3112-8-6	3	OR	6	27	100	17.5	200	35.5	# 8 Screw	Y-10879-B
J-17736-1 ①	4	OR	1	4	17	3.0	17	3.0	—	—
J-17736-7 ①	5	OR	1	4	17	3.0	17	3.0	# 6 Screw	Y-31124-7-1
J-17736-8 ①	5	OR	2	9	33	5.8	33	5.8	# 6 Screw	Y-31124-7-1
J-17736-4 ①	6	OR	2	9	33	5.8	33	5.8	# 6-32UNC-2B	Y-31124-4-1
J-2927-4-1 ①	8	OR	1	4	16	2.8	16	2.8	# 10 Screw	Y-4045-B
J-2927-4-2 ①	8	OR	2	9	32	5.6	32	5.6	# 10 Screw	Y-4045-B
J-2924-4 ①	7	OR	4	18	65	11.4	65	11.4	—	—
J-2927-1-4 ①	8	OR	4	18	65	11.4	65	11.4	# 10 Screw	Y-4045-B

① Not recommended for Radial Static Load.

② NR = Natural Rubber
OR = Oil-Resistant Elastomer - Neoprene**Table 2 – Specifications and Dimensions**

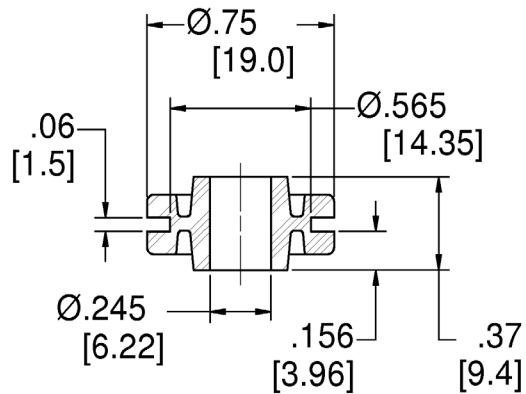
Part Number	Spacer ③				Support Member Plate ④			
	Length		O.D.		Thickness		Diameter	
	in	mm	in	mm	in	mm	in	mm
J-3112-5-1	0.365	9.3	0.255	6.5	0.062	1.6	0.555	14.1
J-3112-12-1	—	—	—	—	0.062	1.6	0.555	14.1
J-3112-2-2	0.365	9.3	0.175	4.4	0.062	1.6	0.555	14.1
J-3112-1-3	0.365	9.3	0.255	6.5	0.062	1.6	0.555	14.1
J-3112-8-3	—	—	—	—	0.062	1.6	0.555	14.1
J-3112-8-11	—	—	—	—	0.062	1.6	0.555	14.1
J-3112-8-6	—	—	—	—	0.062	1.6	0.555	14.1
J-17736-1 ①	0.365	9.3	0.175	4.4	0.062	1.6	0.555	14.1
J-17736-7 ①	—	—	—	—	0.062	1.6	0.555	14.1
J-17736-8 ①	—	—	—	—	0.062	1.6	0.555	14.1
J-17736-4 ①	—	—	—	—	0.062	1.6	0.555	14.1
J-2927-4-1 ①	—	—	—	—	0.062	1.6	0.735	18.7
J-2927-4-2 ①	—	—	—	—	0.062	1.6	0.735	18.7
J-2924-4 ①	0.455	11.6	0.195	5.0	0.062	1.6	0.735	18.7
J-2927-1-4 ①	—	—	—	—	0.062	1.6	0.735	18.7

① Not recommended for Radial Static Load.

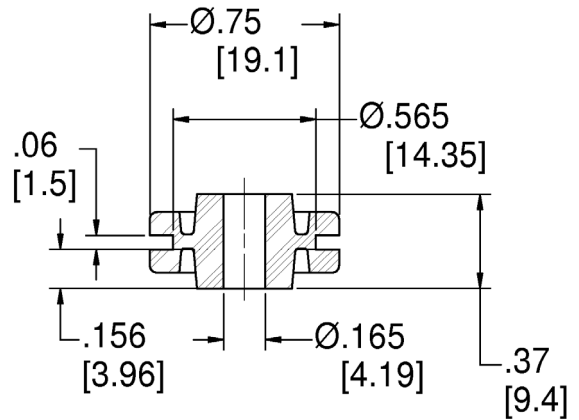
④ Tolerance is ± 0.005 in (± 0.127 mm).

③ Spacer recommended for positive tightening if ferrule is not used. Not supplied by LORD.

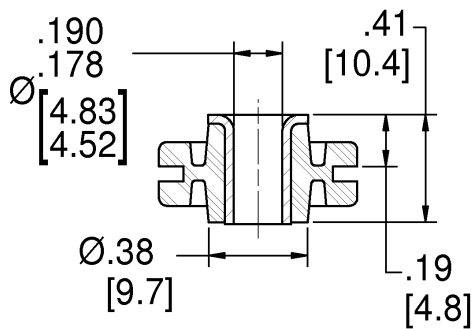
**Figure 1 – Part Dimensions - J-3112 Series
(Without Ferrule)**



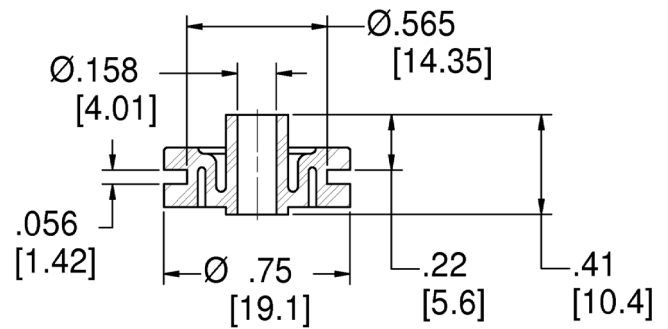
**Figure 2 – Part Dimensions - J-3112 Series
(Without Ferrule)**



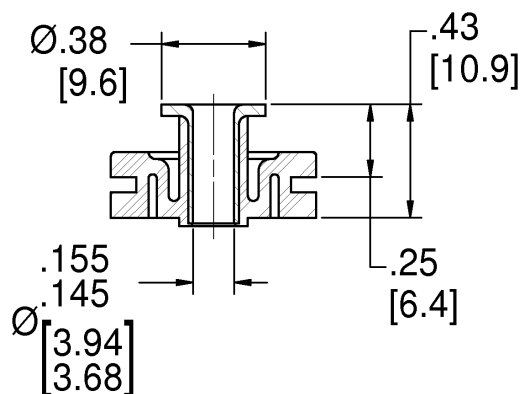
**Figure 3 – Part Dimensions - J-3112 Series
(#8 Screw, With Plain Ferrule)**



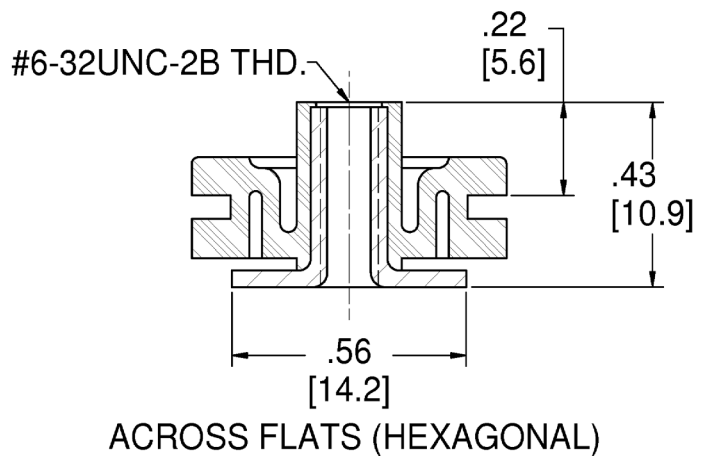
**Figure 4 – Part Dimensions - J-17736 Series
(Without Ferrule)**



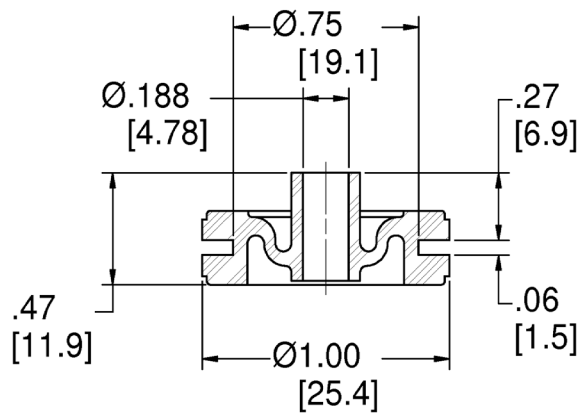
**Figure 5 – Part Dimensions - J-17736 Series
(#6 Screw, With Ferrule)**



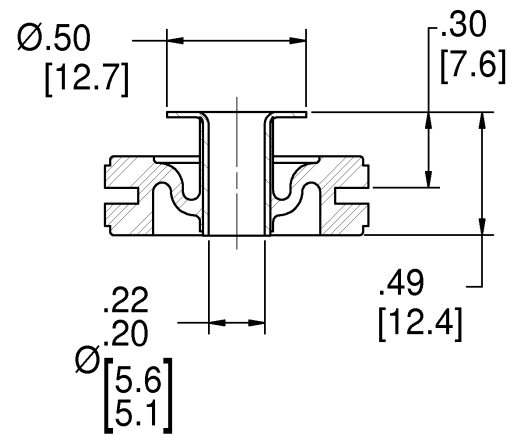
**Figure 6 – Part Dimensions - J-17736 Series
(With Threaded Ferrule)**

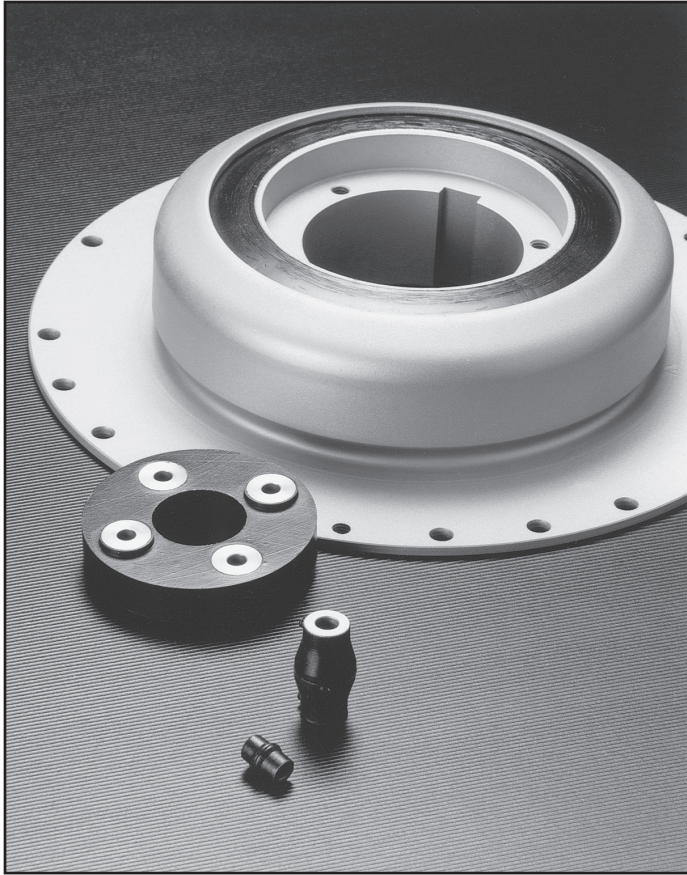


**Figure 7 – Part Dimensions - J-2924/2927 Series
(Without Ferrule)**



**Figure 8 – Part Dimensions - J-2924/2927 Series
(#10 Screw, With Plain Ferrule)**





Dynaflex® Elastomeric Flexible Couplings

Featuring: Dynaflex® Shear-Type Couplings
Dynaflex® Spool-Type Couplings
Dynaflex® Bushing-Type Couplings
Dynaflex® LCR Series Couplings
Dynaflex® LCD Series Couplings

Efficient power transmission and driveline component durability are among powertrain designers' most important concerns. Increased durability and up-time are two characteristics demanded by purchasers of today's complex and expensive machinery. These demands can only be met with reliable, trouble-free, smooth-running powertrains free from damaging loads which compromise component life.

Powertrain component life is determined by the load spectrum each component will experience during the machine's service life. Reciprocating engines, such as spark-ignited gasoline and compression-ignited diesels, produce alternating torque loads which, when superimposed on the steady driving torque, create alternating stresses in driveline system components which shorten component life and reliability. High transient start-up torques and misalignment caused by skewed rotational axes between driver and driven in electric motor, hydraulic and pneumatic drives also cause high imposed forces on driven components. These unwanted forces loosen bolted joints and cause spline fretting, clutch disk wear, bearing failure, gear tooth fatigue and shaft fatigue, among an array of other problems.

Elastomeric flexible couplings solve these problems. They prolong driveline component life because they reduce the magnitude of imposed loads, attenuate vibration in multiple planes, accommodate misalignments in multiple planes, and act as barriers impeding noise created by meshing gears, engaging clutches, etc.

Elastomeric flexible couplings are also maintenance-free. They require no lubrication or other maintenance throughout their service life. Among the large variety of coupling types available, LORD Corporation's elastomeric couplings offer the most comprehensive package of benefits available to the powertrain designer. LORD Corporation's product lines include five different elastomeric coupling styles which cover a wide range of application requirements.

Application

Application requirements suggest the coupling style needed to optimize powertrain performance and component longevity. Misalignment accommodation, torsional vibration isolation, transient shock dissipation and required service life are important parameters to consider when selecting a coupling to fill specific application requirements.

LORD engineers can assist you with selecting an appropriate coupling type and configuration. With extensive analytical capability and years of experience in designing products for powertrain vibration, shock and motion control, LORD engineers offer everything from simple application assistance to complex system analysis and specialized product design.

Torsional vibration, transient shock and misalignment load analyses require specialized computer programs and engineering experience. LORD engineers can analyze your system and recommend the right solution, whether it's a selection from the standard product line or a custom design.

LORD Corporation's standard product lines of elastomeric flexible powertrain couplings are presented in the following sections. Many variations of standard products are available, but not listed as 'standard.' Main drive, fan drive, PTO and accessory drive couplings are available in a host of custom designs and variations of standard products. LORD engineers are ready to help you meet your specific application requirements with custom designs where necessary.

Product Lines

LORD offers five major lines of elastomeric flexible couplings. Standard lines are presented on the following pages. In addition to the standards listed, many variations are available in each product line.

Dynaflex® Shear-Type Couplings

LORD Dynaflex Shear-Type Coupling features a durable elastomeric flexing element bonded between two hubs. These couplings are designed for fractional horsepower applications requiring smooth starting transition, torsional vibration isolation and misalignment accommodation. Typical applications are small electric motor drives, low-torque mechanisms, power take-offs and auxiliary equipment drives.

Dynaflex® Spool-Type Couplings

LORD Dynaflex Spool-Type Couplings can be arranged in a variety of configurations to create a wide range of torque-transmitting capability. Elastomeric spool elements can be purchased in lot sizes for customer-assembled coupling designs, or LORD can provide a complete coupling assembly to meet specific application requirements. Typical applications are large drives requiring high torque capacity and low torsional stiffness.

Dynaflex® Bushing-Type Couplings

LORD Dynaflex Bushing-Type Couplings are bonded elastomeric elements designed for use in multiple element coupling configurations where high torque capacity is required. Bushings are available in a variety of stiffnesses. They can be purchased in lots for customer-assembled designs, or LORD can provide complete coupling assemblies designed to meet your specific application requirements. Applications requiring high torque/high torsional stiffness, but angular, axial and parallel misalignment accommodation can be designed using these bushings in a variety of configurations including parallel and series arrangements.

Dynaflex® LCR Series Couplings

LORD Dynaflex LCR Series Couplings features an elastomeric ring with bonded, bush-type inserts allowing various attachment configurations. These couplings offer a soft torsional spring rate which permits smooth transmission of driving torque while attenuating shock torques and providing excellent misalignment accommodation. These couplings are used in PTO drives where torsion and cocking flexibility are required. They can be mated with a variety of hub configurations. Special high-torque designs are available, as well as custom designs to meet special application requirements.

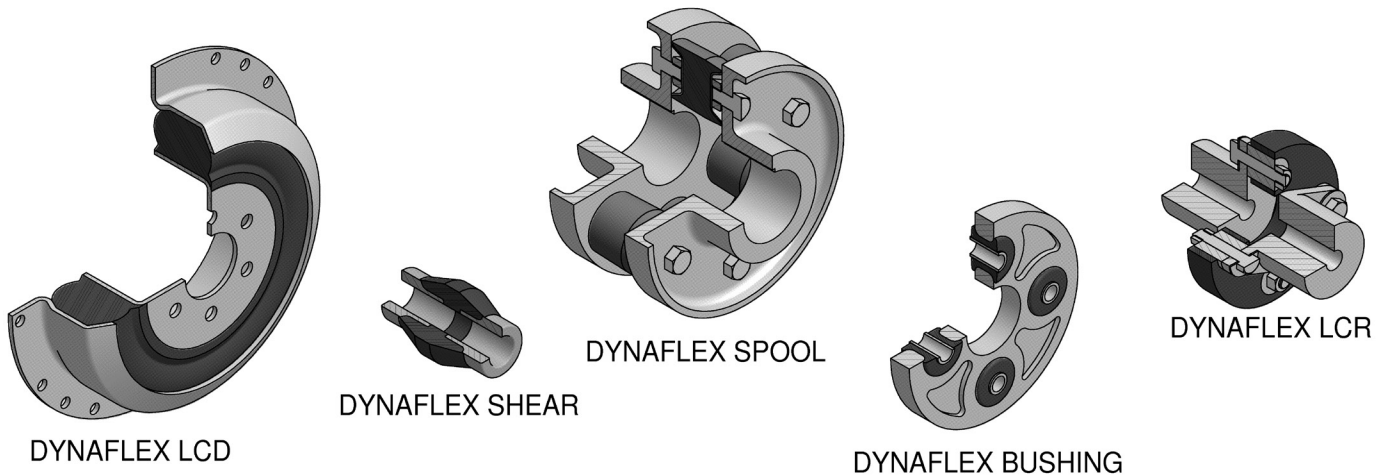
Dynaflex® LCD Series Couplings

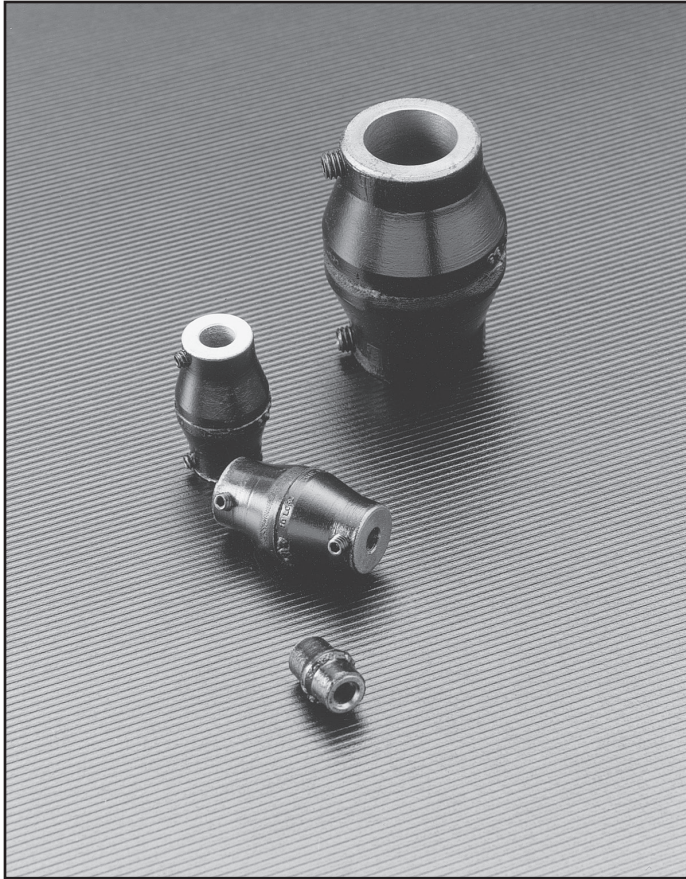
LORD Dynaflex LCD Series Couplings are the ultimate coupling for reciprocating engine drives. This coupling features a bonded elastomeric flexing element which is radially precompressed into a flanged outer housing. This design produces a low torsional stiffness for maximum isolation of engine firing-pulse-induced torsional disturbances, torque overload slip protection, misalignment accommodation, superior shock pulse attenuation and fatigue life, and is adaptable to a variety of drive attachment designs. Custom designs are available to fit nearly every SAE flywheel configuration available from most engine manufacturers.

Coupling Application Guide

	Dynaflex Shear-Type	Dynaflex Spool-Type	Dynaflex Bushing-Type	Dynaflex LCR Series	Dynaflex LCD Series
Horsepower	Rated: 1/50 to 1	Rated: 50 to 1000	Rated: 10 to 600	Rated: 4 to 135	Rated: 75 to 2000
Best Application Area	Low-frequency vibration, multidirectional misalignment	Low-frequency vibration, high-power drive systems	Multidirectional misalignment, high capacity	Large misalignment, safetied drive requirements	Diesel engines, low-frequency vibration, multidirectional misalignment
Outstanding Capabilities	Effectively accommodates combinations of misalignment, high torsional resilience	Versatility in design for exact application requirements (stiffness and capacity)	High torque capacity versus size	Angular misalignment capability	Fits many standard flywheels, high torsional
Versatility Factor	Widest application potential of all elastomeric couplings	Capacity and resilience can be varied by changing number and type of spool	Numerous combinations possible simply by changing flexing elements	Torsional spring rate varied by changing modulus or wall thickness	Large horsepower, high horsepower capacity
Fail-Safe Characteristics	Easily incorporated	Easily incorporated	Inherent	Inherent	Slip-torque feature

Dynaflex Elastomeric Flexible Couplings





Dynaflex® Shear-Type Couplings

Rated: 1/50 to 1 hp at 1750 rpm

LORD Dynaflex® Shear-Type Couplings are compact, one-piece flexible couplings economically constructed to isolate low-frequency vibration and accommodate multi-directional misalignment.

These couplings reduce the adverse effects of transient shock torques, torsional vibration, noise and misalignment associated with small equipment drivelines. This results in longer service life, smoother, quieter operation, less maintenance, and lower cost for your end product.

Shear-Type flexible couplings are useful in many small equipment driveline applications. Multi-directional misalignment capabilities make them ideally suited for fractional horsepower drivelines demanding noise reduction, vibration isolation and maintenance-free operation.

Typical applications include:

- Information Systems – Motor drive, printer rollers, indexing devices, linear actuator, drives and card sorters
- Hospital Bed – Actuator drive
- Dynamometer – Driveline
- Tachometer – Driveline
- Pumps, Blowers, Compressors – Driveline

Features and Benefits

- High torsional deflection
- Easy installation
- Versatile application potential - fractional horsepower couplings are available in a range of sizes to permit matching a specific coupling to your application.
- One-piece construction – convenient for small equipment with fractional horsepower requirements. Specified torque rating allows 15° angular deflection for excellent vibration isolation.
- Multi-directional misalignment accommodation – elastomeric flexibility accommodates misalignments up to 1/32 inch parallel, 2° angular.
- Vibration isolation – low torsional stiffness is achieved with the shear-type flexible coupling because the rubber is loaded in shear. This allows for low system natural frequencies and excellent driveline disturbances.
- Shock protection – torsional shock loads are attenuated by torsional deflection of the elastomer. Torsional flexibility smooths out rotational disturbances and protects system components from early fatigue failure.
- Noise reduction – no metal-to-metal contact; elastomeric barrier reduces gear noise, transmission and motor hum between shifts.
- Maintenance-free – elastomer flexibility accommodates all motion without metal-to-metal wear, eliminates the need for lubrication.
- Long service life – Dynaflex Shear-Type Couplings have proven themselves under demanding service conditions. Elastomers resist effects of abrasive materials, oil and grease.
- Attachment – shear-type flexible couplings are available in an assortment of bore sizes. Refer to Table 1.
- Constant velocity – inherent design properties produce a rotational constant velocity.

Dynaflex Shear-Type Couplings

Table 1 – Specifications and Dimensions

Coupling Part Number	Standard Bore Diameters		C (in)	D Ref. (in)	E Ref. (in)	F (in)	HP at 1750 rpm Ref.	Torque Rating (lb-in)	Static Torsional Stiffness (lb-in/deg) ±20%	Set Screw Size
	A (in)	B (in)								
SK-1947-6	0.125	0.125	0.44	0.56	0.36	0.81	1/50	0.8	0.053	5/40
SK-1947	0.187	0.187								
SK-1947-19	0.187	0.250								
SK-1947-29	0.250	0.250								
J-1211-1-2	0.187	0.187	0.63	0.81	0.56	1.38	1/16	2.50	0.17	10/24
J-1211-1-1	0.250	0.250								
J-1211-2-2	0.250	0.250	0.75	1.00	0.72	1.75	1/8	5	0.33	10/24
J-1211-2-11	0.250	0.312								
J-1211-2-6	0.250	0.375								
J-1211-2-3	0.312	0.312								
J-1211-2-12	0.312	0.375								
J-1211-2-1	0.375	0.375								
J-1211-3-4	0.312	0.312	0.88	1.25	0.88	2.13	1/4	10	0.66	1/4-20
J-1211-3-14	0.312	0.375								
J-1211-3-12	0.312	0.500								
J-1211-3-2	0.375	0.375								
J-1211-3-8	0.375	0.500								
J-1211-3-1	0.500	0.500								
J-1211-4-2	0.375	0.375	1.00	1.38	0.91	2.25	1/3	13	0.87	1/4-20
J-1211-4-35	0.375	0.500								
J-1211-4-11	0.375	0.625								
J-1211-4-14	0.500	0.500								
J-1211-4-4	0.500	0.625								
J-1211-4-1	0.625	0.625								
J-1211-5-3	0.500	0.500	1.13	1.63	1.00	2.50	1/2	20	1.33	1/4-20
J-1211-5-4	0.500	0.750								
J-1211-5-2	0.625	0.625								
J-1211-5-1	0.750	0.750								
J-1211-6-12	0.500	0.500	1.38	1.81	1.05	2.69	3/4	30	2.00	5/16-18
J-1211-6-18	0.625	0.625								
J-1211-6-14	0.625	0.750								
J-1211-7-16	0.500	0.750	1.50	2.00	1.11	2.88	1	40	2.66	5/16-18
J-1211-7-9	0.625	0.625								
J-1211-7-3	1.00	1.00								

Notes: Maximum recommended misalignment - 1/32 inch parallel, 2° angular.
Intrusion should not exceed "E" bore length dimensions.

Standard Construction: Hubs - steel; Bores - as listed; Set Screws - one per hub furnished but not installed; Flexing Element - neoprene.

Figure 1 – Part Dimensions

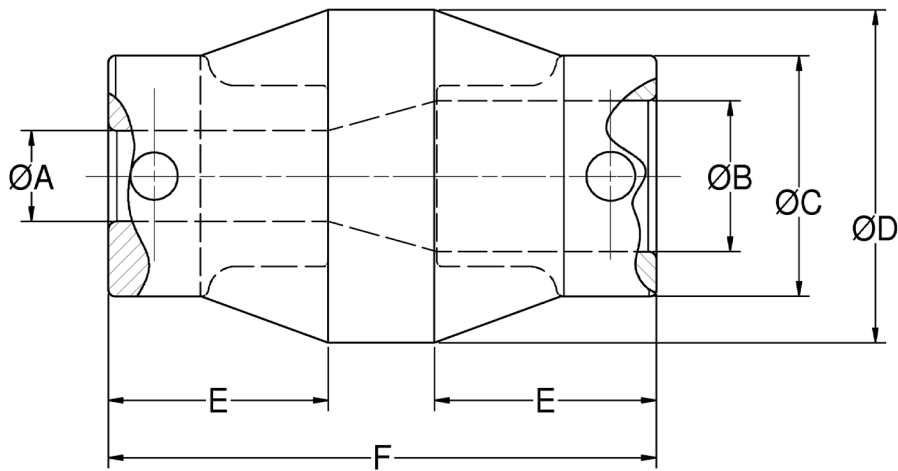
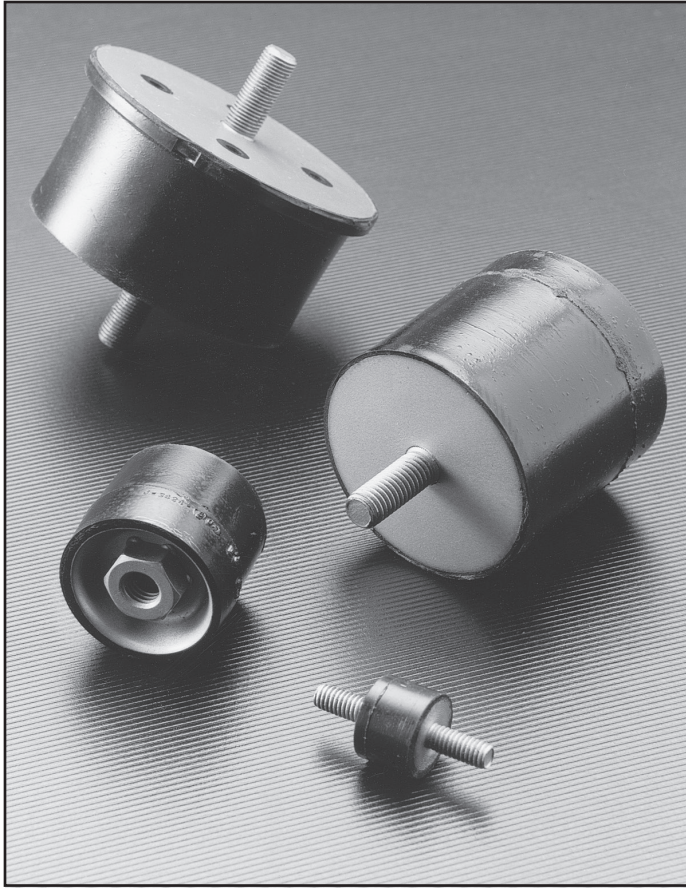


Table 2 – Standard Bore Tolerances

Bore Sizes	Tolerance
from 0.000 to 0.499	+ 0.001 - 0.000
from 0.500 to 0.749	+ 0.0015 - 0.0000
from 0.750 to 1.499	+ 0.002 - 0.000



Dynaflex® Spool-Type Couplings

Rated: 5 to 1000 hp at 2000 rpm

LORD Dynaflex® Spool-Type Couplings provide excellent protection against destructive torsional vibration in high-torque drive systems.

These couplings are customer-assembled, using bonded flexing spools from LORD, and bolted between customer-supplied metal hubs. Spools should be placed around recommended bolt circle on hub. Bonded spools can be installed or replaced with minimum effort. Coupling assembly has torsional deflection of 2° under rated torque.

Dynaflex Spool-Type Couplings

Table 1 – Specifications and Dimensions

Spool Part Number	A Diameter	B Thickness	C	Thread Attachment	Minimum Bolt Circle Diameter for Number of Mounts (in)									
					3	4	5	6	7	8	9	10	11	12
J-4624-1	1.00	0.75	0.38	1/4-20-2A	1.20	1.42	1.70	2.00	2.30	2.62	2.92	3.24	3.56	3.86
J-3424-2	2.00	2.12	0.40	1/2-13-2B	2.30	2.82	3.40	4.00	4.60	5.22	5.84	6.46	7.50	7.72
J-5425-1	3.19	3.00	1.25	1/2-13-2A	3.62	4.41	5.30	6.25	7.18	8.18	9.12	10.20	11.00	12.10
J-5682-1	4.48	2.25	1.25	1/2-20-2A	5.10	6.20	7.45	8.75	10.10	11.50	12.80	14.30	15.70	17.00

Notes: Maximum recommended misalignment - 1/32 inch parallel, 1° angular.

Coupling permits wide latitude in shaft lengths. However, sufficient spacing between shaft ends should be provided to allow for shaft end play.

It is suggested that all designs for Spool-Type Flexible Couplings be reviewed with LORD Corporation.

Construction: Rubber elements - LORD does not supply hubs, elements only;
Metal parts - steel; Flexing element - environmental-resistant elastomer.

Table 2 – Coupling Configuration Capacity Chart

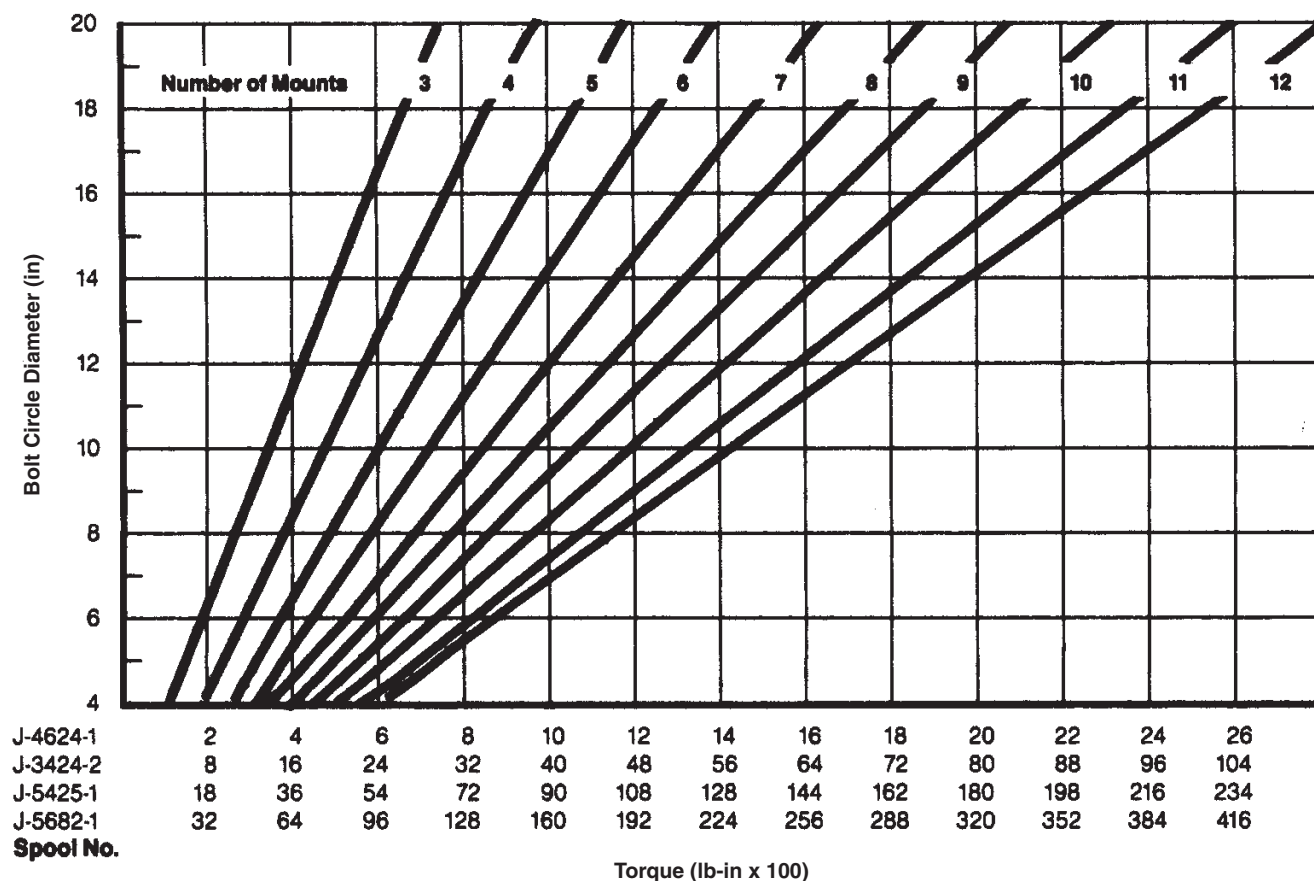


Figure 1 – Part Dimensions - J-4624-1

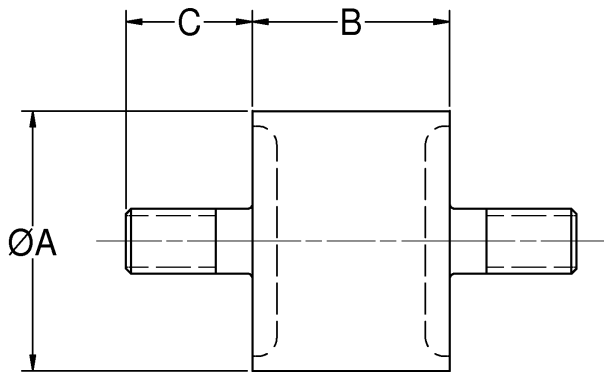


Figure 2 – Part Dimensions - J-3424-2

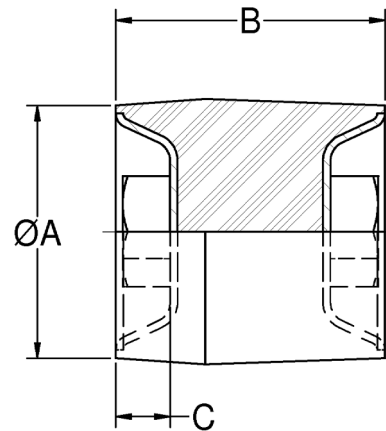


Figure 3 – Part Dimensions - J-5425-1

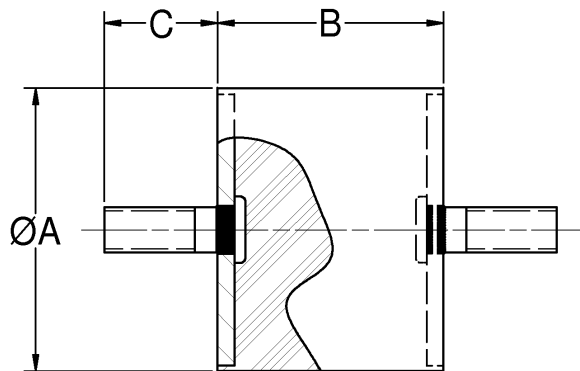


Figure 4 – Part Dimensions - J-5682-1

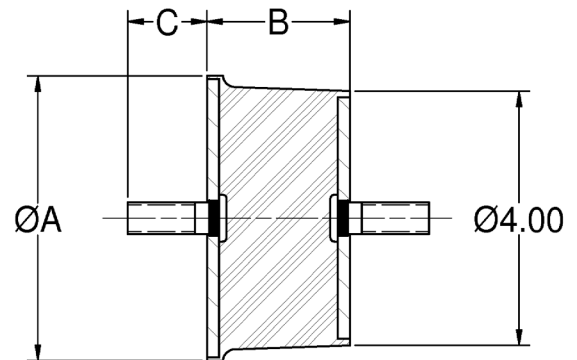
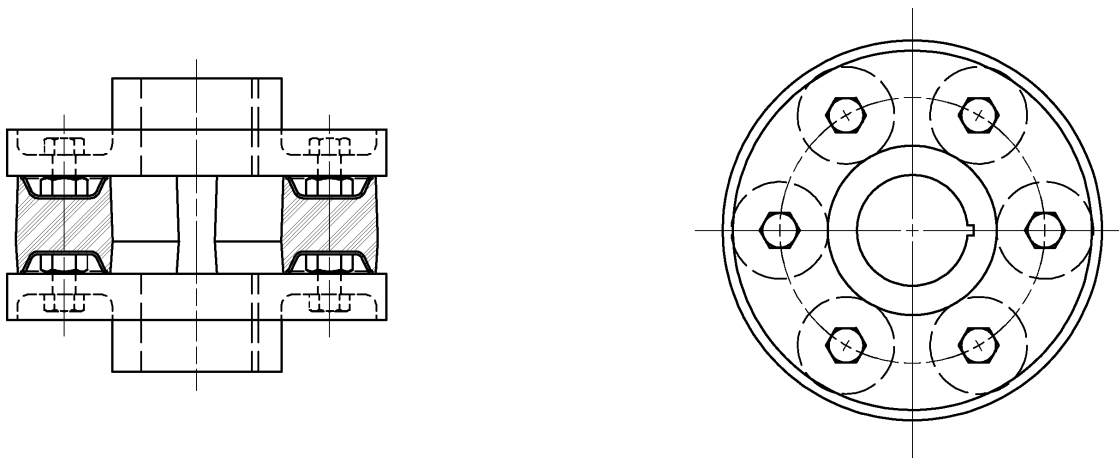
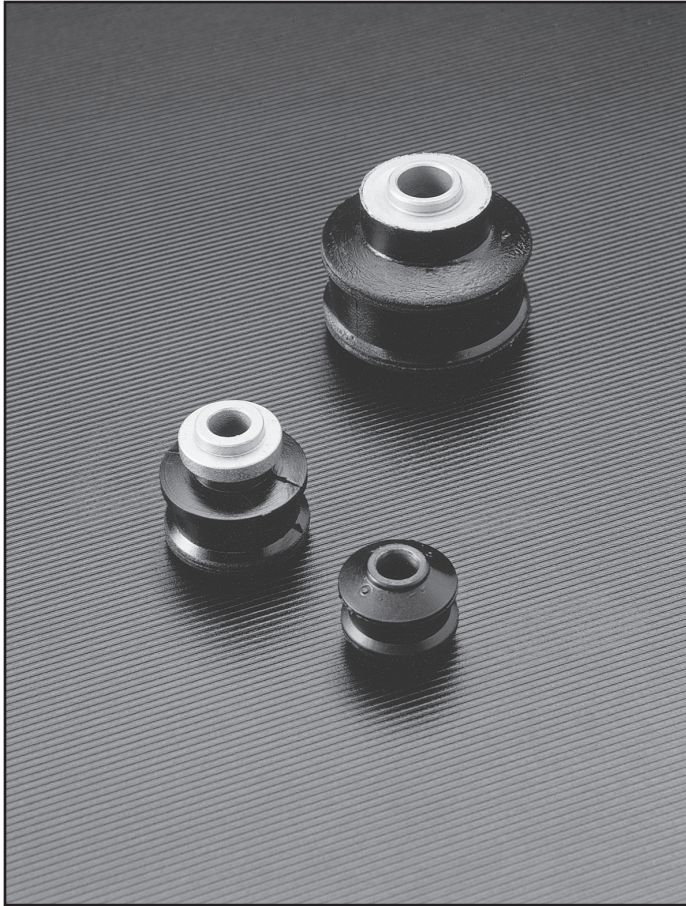


Figure 5 – Typical Assembly with Bonded Flexing Spools





Dynaflex® Bushing-Type Couplings

Rated: 10 to 600 hp at 2000 rpm

LORD Dynaflex® Bushing-Type Couplings accommodate misalignment, cushion torsional shock, and do not generate or transmit noise. Since relative motion is taken in the elastomer rather than sliding metal surfaces, no lubricant is involved or ever required. Dirt and grit cannot effect the coupling bushings. The elastomer has been compounded to provide long service life.

Typical applications include driveline installations where multi-directional misalignment must be accommodated and torque loads are medium to high.

Specification, selection and dimension information provided on the following pages facilitate design of the coupling assembly. The bushings are standard parts, and the flanges can be supplied by the end user or by LORD as a special design.

Selection Guide

Compression bushing-type couplings are assembled by pressing the elastomeric bushings into sockets of a coupling flange. Once assembled, the coupling can be used two ways:

• Parallel Arrangement

The driving shaft can be connected to all of the bushings, and the driven shaft connected to the coupling flange. This arrangement loads all bushings in parallel and produces maximum torque capacity and a less resilient coupling.

• Series Arrangement

This arrangement requires an even number of bushings per flange. Mating flanges of the driving and driven shafts are attached to alternate bushings. This arrangement transmits the torque through the bushings in an N x N series arrangement, thereby making the torque capacity one-half of the parallel arrangement. The coupling is also more flexible.

When high torque and small space are the controlling factors, the parallel arrangement is recommended. When misalignment is the controlling factor, the bushings should be applied in series arrangement.

Table 1 provides selection criteria for parallel arrangement, Table 2 provides data for the series arrangement. Bushing selection is dependent upon torque requirements, angular, parallel and axial misalignments, as well as bolt circle diameter, number of bushings and bushing size. The torque values shown on the charts are nominal. The bushings are capable of withstanding higher torques due to the shock loads or other short duration surges.

Torsional Flexibility

Bushing-type couplings are relatively stiff torsionally compared to other elastomeric couplings. The torsional spring rate of a coupling assembly can be calculated by using the equation and data provided on the curves.

Example

Required torque capacity – 3400 lb-in

Misalignment – Angular – 1.75°

Axial – 1/8 in

Parallel – 1/32 in

Proposed Coupling – 7 x 7 Series, J-5737-1, (N = 7)
8 in bolt circle

Torsional Spring Rate, $K_{\theta} = \frac{N}{2} R^2 K_R$

$$K_{\theta} = \frac{7}{2} (4)^2 4000 = 224,000 \text{ lb-in/rad.}$$

Caution: Shaft length must be considered for potential whirl problems.

Recommended Misalignment Limits

	Misalignment	Bushing Arrangement	
		Parallel	Series
Single Coupling	Angular	1°	1.75°
	Parallel	1/64 in	1/32 in
	Axial	±1/16 in	±1/8 in
Double Coupling	Angular	2°	3.5°
	Parallel	3/16 to 1/2 in*	3/8 to 1 in*
	Axial	±1/8 in	±1/4 in

* Dependent on shaft length (10 to 30 in).

Figure 1 – Parallel Arrangement

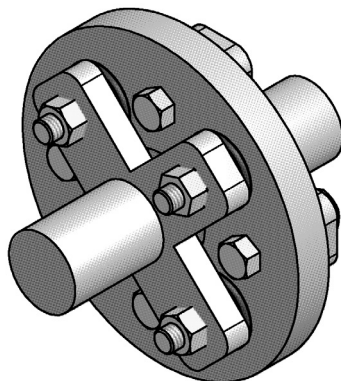
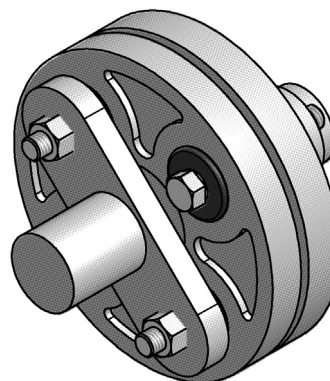


Figure 2 – Series Arrangement



Dynaflex Bushing-Type Couplings

Table 1 – Parallel Arrangement Selection

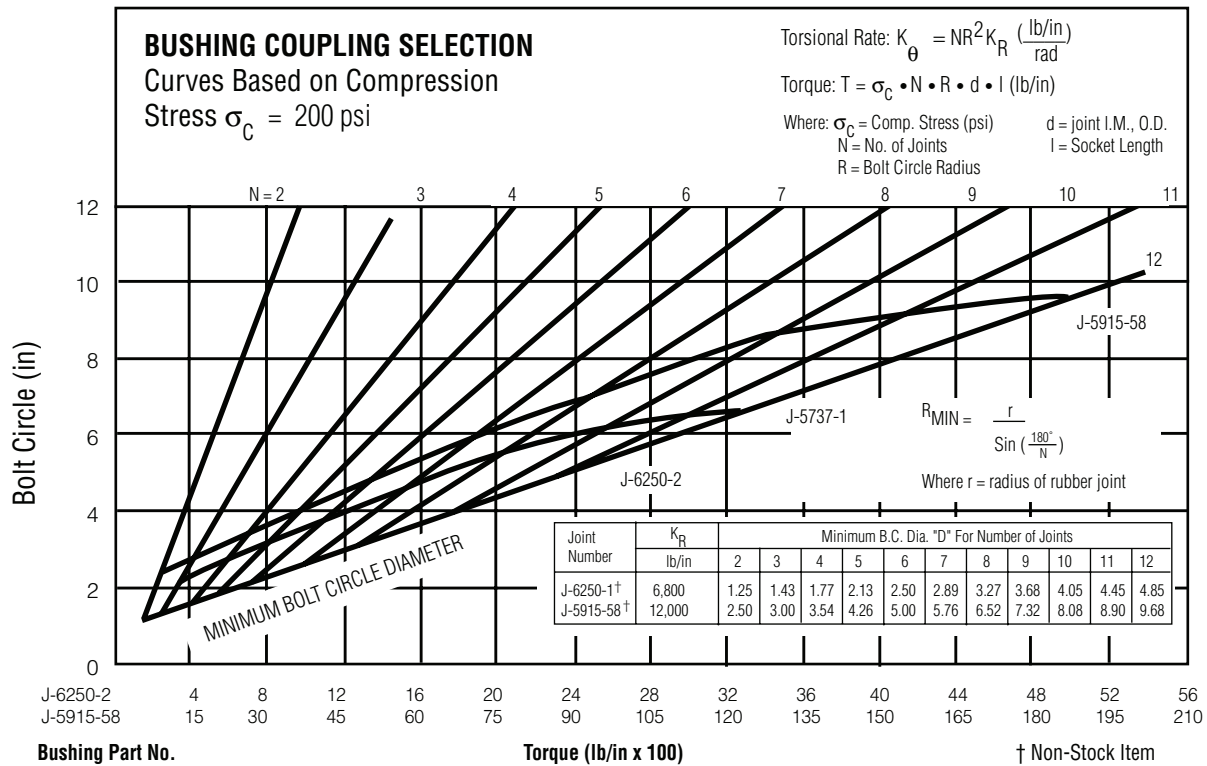


Table 2 – Series Arrangement Selection

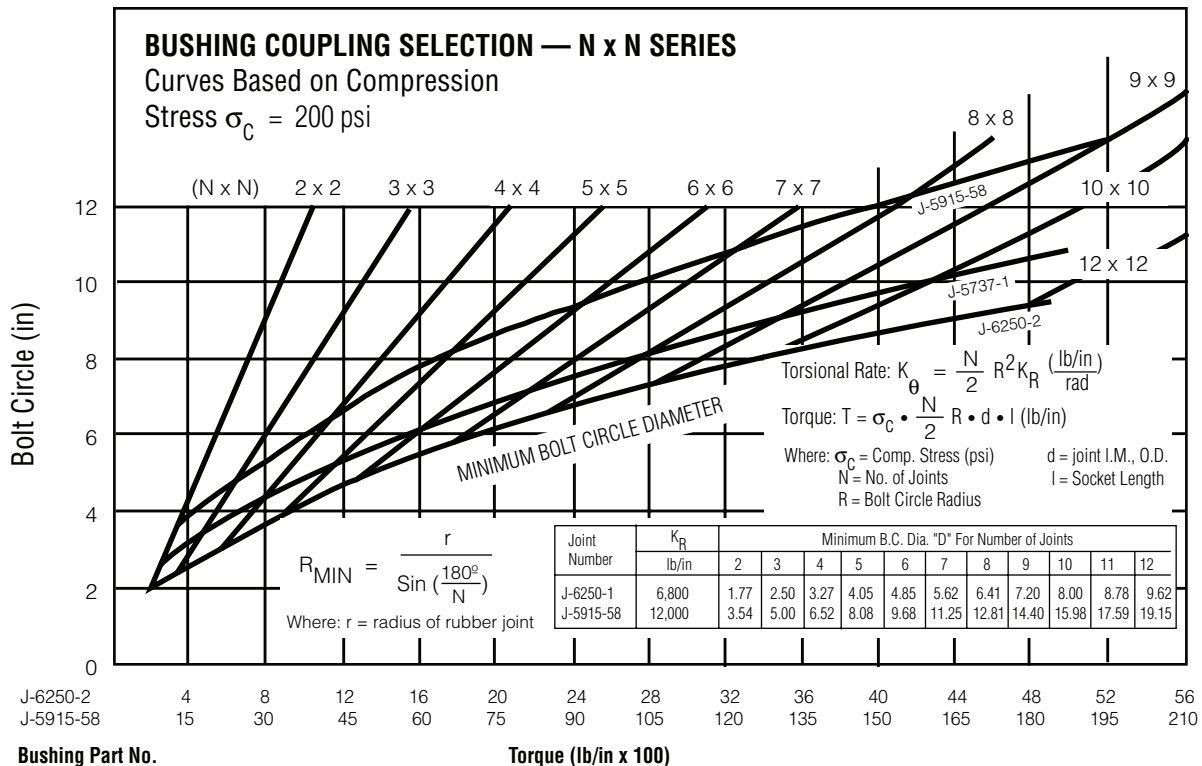
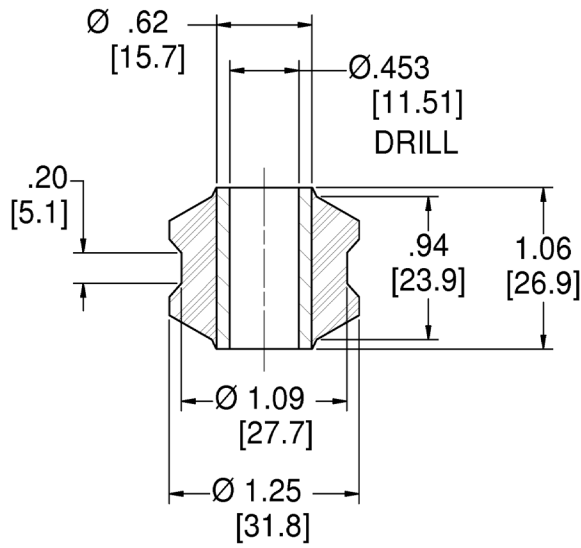
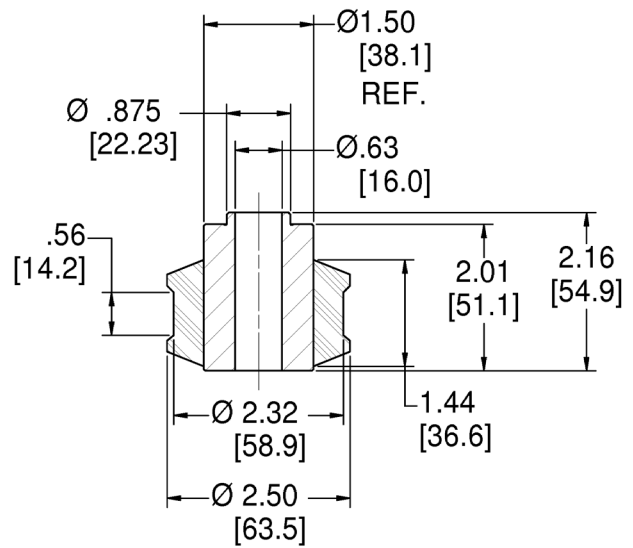
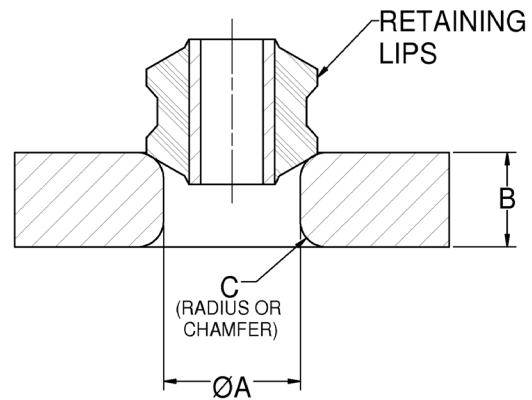


Figure 3 – Joint Dimensions - J-6250-2

Figure 4 – Joint Dimensions - J-5915-58

Table 3 – Typical Socket Dimensions

Part Number	A Socket Dia.		B		C			
					Radius		Chamfer x 45°	
	in	mm	in	mm	in	mm	in	mm
J-6250-2	1.00	25.4	0.69	17.5	0.19	4.8	0.13	3.3
J-5915-58	2.19	55.6	1.06	26.9	0.25	6.4	0.19	4.8

LORD does not supply hubs. Rubber elements only.

Figure 5 – Socket Dimensions


Installation Instructions: Use P-80 lube or equivalent mixed to manufacturer's specifications. Immerse rubber bushing in P-80 solution, making sure entire bushing is wet. Insert bushing into socket by pressing with adequate force to seat the bushing properly between the retaining lips. Appearance of top and bottom should be uniform after assembly.



Dynaflex® LCR Series Couplings

Rated: 4 to 135 hp at 2000 rpm

LORD Dynaflex® LCR Series Couplings are ring-type couplings developed to overcome numerous torsional problems associated with vehicular and industrial driveline systems. These easily installed couplings reduce noise transmission and increase bearing and driveline life through greater misalignment accommodation, isolation of low frequency disturbances, and isolation of torsional shock.

These highly flexible elastomeric couplings for accessory drives are also designed to eliminate lubrication and maintenance.

Features and Benefits

- Misalignment accommodation – elastomeric flexibility allows for large angular misalignment. For permissible misalignments, including axial and radial, Refer to Table 1.
- Vibration isolation – low torsional spring rate is achieved with the elastomeric ring-type coupling using rubber in compression. This allows for low system natural frequencies and isolation of first mode driveline disturbances in most driveline systems.
- Shock protection – isolates torsional shock, prevents backlash and protects system components, including bearings, from fatigue failure.
- Long service life – Dynaflex LCR Series Couplings have proven themselves under demanding service conditions.
- Maintenance-free – elastomer flexibility accommodates all motion without wear, eliminates the need for lubrication.
- Noise reduction – no metal-to-metal contact; elastomer attenuates structure-borne noise and isolates vibration from components that would act as noise generators.
- Systems Engineering – LORD has in-house computer capabilities for multi-torsional analysis to assist in proper coupling selection.

Typical Applications

Dynaflex LCR Series Couplings are useful for a wide range of rotary drive applications, from lawn and garden tractors to large construction equipment, including U-joint replacement. Typical applications include:

Typical End Product	Application
Farm Tractor	Trouble-Free Hydraulic Pump Devices
Lawn & Garden Tractors	Maintenance-Free Main Drive Couplings
Dynamometer	Protects Driveline from Failure
Snowmobile	Reliable Main Drive Coupling
Vibratory Rollers	Absorbs High Torsional Shock Loads in Eccentric Drive Units
On- & Off-Highway	Isolates and Protects Vehicles Auxiliary Driveline Systems
Industrial Machinery	Provides Inexpensive Coupling for Maximum Angular Misalignment and Vibration Control
Agriculture Equipment	Replaces Conventional Universal Joints and Provides Torsional Flexibility

Dynaflex LCR Series Couplings were designed and developed by LORD and have been in service since the early 1960s. The basic concept was intended for specific applications requiring low-cost, flexible couplings to accommodate all forms of misalignment and provide torsional resilience.

The coupling design incorporates metal inserts bonded in an elastomeric ring, which loads the flexing element in compression to transmit torque. Misalignment motion is accommodated by deflecting the elastomer in shear, which allows extreme misalignment without high reaction forces.

They are ideally suited for light-duty elastomeric universal joints, particularly where noise reduction or shock attenuation is required.

Absence of metal-to-metal contact through the coupling eliminates the need for lubrication and maintenance, while also reducing noise transmissions. Installation is accomplished by insertion between simple parallel flanges. This lightweight coupling element can be arranged in a single or double series configuration to match specific torsional stiffness and misalignment requirements.

Static Load Deflection Characteristics of LCR-300-600-046A Reference Curve

Ring-type couplings isolate torsional vibration and reduce the harmful effects of torsion shock. Torsional resilience is one important characteristic. Figure 1 shows the torsional spring rate.

Accommodating axial misalignment along the axis of shafts without high reaction forces is a unique feature of ring couplings. Figure 2 shows this load deflection relationship.

Ring-type couplings accommodate parallel misalignment with relatively low radial reaction forces imposed on driving and driven equipment. Figure 3 shows typical radial load deflection curves. Load deflection characteristics for other LCR couplings are available upon request.

Figure 1 – Typical Load/Deflection Curves

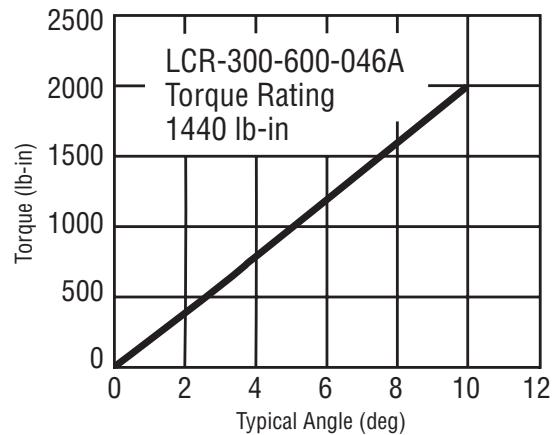


Figure 2 – Axial Load Deflection Curves

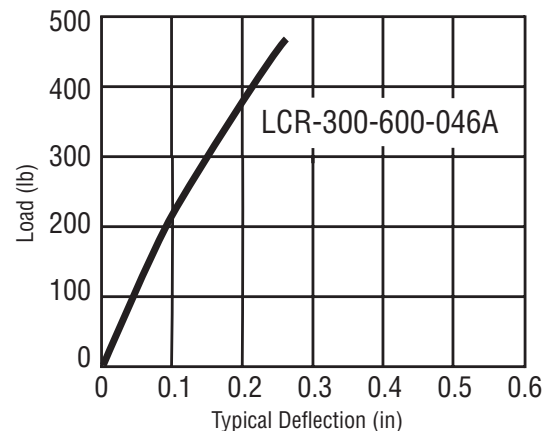
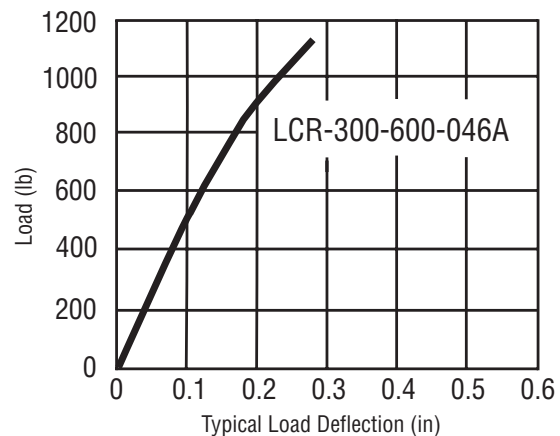


Figure 3 – Typical Radial Load Deflection Curves



Specifications

Materials: The elastomer used in Dynaflex LCR Series Couplings is high-quality natural rubber, which meets LORD specifications (available upon request) and exceeds SAE standards. Natural rubber is used because of its excellent physical properties such as tensile strength, tear and abrasion resistance, fatigue resistance and low temperature characteristics. Other elastomers are available to meet special applications needs. The elastomer-to-metal bonds are even stronger than the elastomers.

Dynaflex LCR Series Couplings listed on the following pages have aluminum alloy inserts. Many other insert configurations are possible to meet attachment requirements.

Environmental: Ring-type couplings will perform satisfactorily when exposed to the normal fluid, temperature and other environmental conditions found in drive-line systems. Special oil-resistant elastomers can be provided where total or partial oil immersion is necessary. For operation in ambient temperatures exceeding 170°F (77°C), consult LORD Engineering.

Misalignment: Misalignment capability applies for speeds up to 3500 rpm. Operation up to 7000 rpm is permitted with reduced misalignment (consult LORD Engineering).

Note: For speeds above 4000 rpm, shielding is required and/or balancing of assembly may be required.

Installation: Normal installation involves simple through bolt attachment to flanges. For flywheel attachment applications, metal inserts can be tapped/counter-bored to permit easy installation.

Remote Driven Units: Multiple U-joint shafts (especially longer shafts) and the speed at which the shaft rotates (especially higher rpm's) can create complex stability problems. To assure satisfactory coupling performance, all design layouts for remote mounted driven units should be reviewed by LORD Engineering. LORD analytical capability is only one part of the engineering service available on all coupling applications.

LCR ring-type couplings can be selected based on horsepower or maximum torque requirements. The data listed on the next page provides the necessary information to select a coupling and design it into your system.

New equipment designs and retrofits involving reciprocating engine drives and unusual driveline arrangements should be analyzed to avoid potential vibration and misalignment problems. Contact LORD Engineering for assistance.

Dynaflex LCR Series Couplings

Table 1 – Specifications and Dimensions

Part Number	Rated Performance Characteristics																				
	Torque Rating ①		Per 100 rpm		Capacity						Static Torsional Rate - K_{θ}		Axial Rate - K_A		Radial Rate - K_R		Permissible Misalignments				
	lb-in	N-m	hp	kW	1750 rpm		2000 rpm		3600 rpm		lb-in/ rad	N-m/ rad	lb/in	N/mm	lb/in	N/mm	Angular	Axial		Parallel	
					hp	kW	hp	kW	hp	kW								in	mm	in	mm
LCR-275-400-004A	125	14	0.20	0.15	3.5	2.6	4.0	3.0	7.1	5.3	420	47	150	26	375	66	±5°	±1/8	3.18	±1/16	1.59
LCR-275-400-009A	290	33	0.46	0.34	8.1	6.0	9.2	6.9	16.6	12.4	530	60	350	60	850	149	±4°	±3/32	2.38	±1/16	1.59
LCR-275-400-017A	550	62	0.87	0.65	15.3	11.4	17.5	13.0	31.4	23.4	1600	181	950	166	1300	228	±3°	±3/64	1.19	±1/32	0.79
LCR-300-600-046A	1440	163	2.28	1.70	40.0	29.8	45.7	34.1	82.3	61.3	18000	2034	2300	404	4500	790	±2°	±1/16	1.59	±1/32	0.79
LCR-400-800-060A	1900	215	3.01	2.24	52.8	39.3	60.3	45.0	108.5	80.9	24000	2712	1450	254	3000	525	±2°	±1/16	1.59	±1/64	0.40
LCR-400-800-115A	3600	407	5.71	4.26	100.0	74.5	114.2	85.2	205.6	153.3	46000	5197	3600	630	6400	1121	±2°	±1/16	1.59	±1/64	0.40
LCR-400-800-135A	4200	475	6.66	4.97	116.6	87.0	133.3	99.4	239.9	178.9	63000	7118	4200	736	9000	1576	±1-1/2°	±1/16	1.59	±1/64	0.40
LCR-450-600-011A	350	40	0.56	0.42	9.6	7.1	11.1	8.3	20.0	14.9	3100	350	1000	175	420	74	±5°	±1/8	3.18	±1/16	1.59

① Torque ratings as listed are maximum steady torques per application requirements. For general applications, dynamic torques of ±35 percent of the coupling rate torques can be applied to the listed torque ratings. Shock torques (e.g., start-up torque, etc.) of up to 200 percent rated torque are generally acceptable.

Torque Requirements:

$$\text{Torque (lb-in)} = \frac{63025 \times \text{hp}}{\text{rpm}}$$

Table 2 – Specifications and Dimensions

Part Number	Physical Characteristics (Nominal)*																				
	Weight		Inertia ②		No. of Inserts	A B.C. Dia.		B Hole Dia.		C Coupling I.D.		D Coupling I.D.		E Length		F Insert Dia.		G Length		H Length	
	lb-Mass	kg	lb-in-sec²	kg-mm²		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
LCR-275-400-004A	0.52	0.236	0.0020	226.0	4	2.75	69.85	0.32	8.13	4.00	101.60	1.62	41.15	1.00	25.40	0.91	23.11	0.12	3.18	0.75	19.05
LCR-275-400-009A	0.52	0.236	0.0020	226.0	4	2.75	69.85	0.32	8.13	4.00	101.60	1.62	41.15	1.00	25.40	0.91	23.11	0.12	3.18	0.75	19.05
LCR-275-400-017A	1.00	0.454	0.0038	430.0	4	2.75	69.85	0.32	8.13	4.00	101.60	1.62	41.15	1.75	44.45	0.91	23.11	0.12	3.18	1.50	38.10
LCR-300-600-046A	0.91	0.413	0.0041	463.0	6	3.00	76.20	0.39	9.91	4.06	103.12	1.88	47.75	1.53	38.86	1.00	25.40	0.12	3.18	1.28	32.50
LCR-400-800-060A	1.25	0.567	0.0072	814.0	8	4.00	101.60	0.51	12.95	5.21	132.33	2.74	69.60	1.50	38.10	1.00	25.40	0.12	3.18	1.25	31.75
LCR-400-800-115A	1.25	0.567	0.0072	814.0	8	4.00	101.60	0.51	12.95	5.21	132.33	2.74	69.60	1.50	38.10	1.00	25.40	0.12	3.18	1.25	31.75
LCR-400-800-135A	1.40	0.635	0.0099	111.9	8	4.00	101.60	0.51	12.95	5.21	132.33	2.74	69.60	2.00	50.80	1.00	25.40	0.12	3.18	1.75	44.45
LCR-450-600-011A	0.78	0.354	0.0032	362.0	6	4.50	114.30	0.41	10.30	5.56	141.22	3.40	86.36	0.68	17.27	1.00	25.40	0.12	3.18	0.43	10.92

* See detail drawings by part number for tolerances.

LORD does not supply hubs. LORD supplies ring elements only.

② Does not include bolts or flanges.

Figure 4 – Part Dimensions

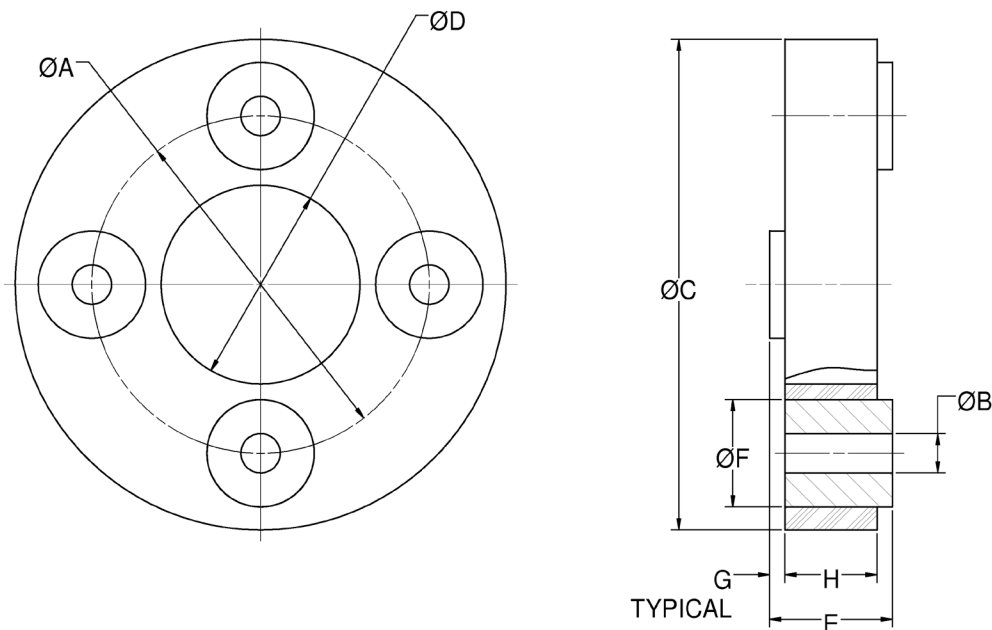
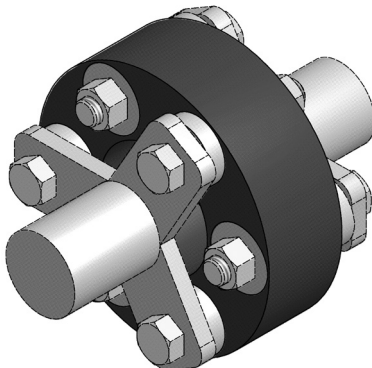
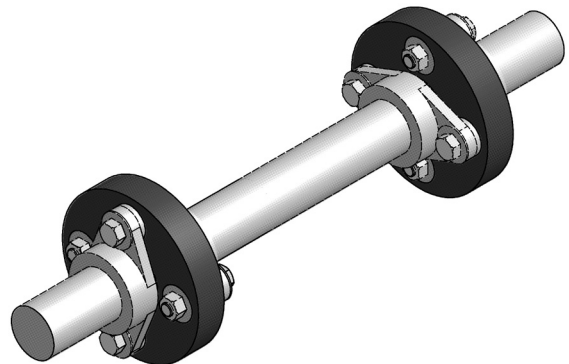


Figure 5 – Single Coupling Arrangement

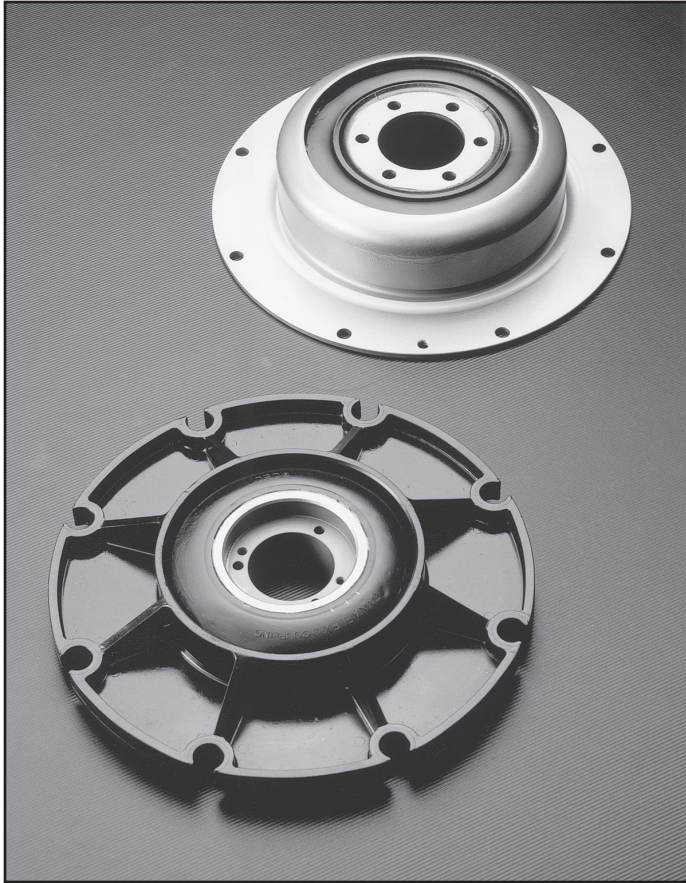


Single coupling arrangement consists of two shafts jointed by a single coupling for maximum economy.

Figure 6 – Double Coupling Arrangement



Double coupling/series arrangement uses two couplings separated by a floating shaft. This provides same torque capacity as single hub arrangement, with twice the permissible angular misalignment and half the torsional stiffness. Superior to single coupling for control of torsional vibration.



Dynaflex® LCD Series Couplings

Rated: 75 to 2000 hp at 2000 rpm

LORD Dynaflex® LCD Series Couplings have been developed to overcome numerous torsional problems associated with vehicular and industrial driveline systems. These couplings increase equipment life by protecting against torsional vibration, shock and misalignment.

Typical application attachments include:

- Flywheel to shaft
- Flywheel to hub (splined)
- Shaft to shaft
- Floating shaft

Features and Benefits

- Protection from torsional shock loads
- Design flexibility
- Safe for occasional severe overloads
- Vibration isolation – extremely low torsional spring rate is achieved with the Dynaflex LCD Series Coupling, using elastomer in shear. This allows for low system natural frequencies and isolation of first mode driveline disturbances.
- Damping at resonance – the elastomer used in Dynaflex LCD Series Couplings effectively reduces vibration at resonance.
- Shock protection – torsional shock loads are attenuated by large shear deflection of the elastomer. In the case of severe overloads, equipment damage is prevented by slippage between the elastomer and the outer housing.
- Misalignment accommodation – elastomer flexibility allows for angular, parallel and axial misalignment.
- Long service life – Dynaflex LCD Series Couplings have proven themselves under demanding and rugged service conditions.
- Maintenance-free – elastomer flexibility accommodates all motion without wear, eliminates the need for lubrication.
- Noise reduction – no metal-to-metal contact; elastomer attenuates structure-borne noise and isolates vibration from components that would act as noise generators.
- Attachment – fits many standard SAE flywheels.
- Design flexibility – standard rubber molds are used to produce each different size coupling shown in this catalog. Often it is necessary to change metal components for custom applications. This is common.
- Systems Engineering – LORD has in-house computer capabilities for multi-mass torsional analysis to assist in proper coupling selection.

Standardization of Proven Concept

Using the experience gained in designing and producing special Dynaflex couplings, LORD has developed a new standard product line of heavy-duty Dynaflex couplings. These couplings have a specially designed elastomeric element bonded to a metal inner member which is then preloaded and friction-fit into an outer member.

This unique concept provides low torsional spring rates which effectively isolate critical vibratory disturbances in driveline and accessory systems, thus prolonging equipment life. Misalignment and torsional shock loads are absorbed by shear deflection in the elastomeric element.

The ability of the coupling to slip at the outer member with short duration shock overloads protects the driveline and accessory components from premature failure. The Dynaflex LCD Series Coupling has been particularly successful for diesel driven applications.

Dynaflex LCD Series Couplings are available in 75 to 2000 hp ratings at a nominal 2000 rpm. Each size is also available in two stiffness values. These are referred to as the A and C stiffness values. The C stiffness parts are normally stocked.

Load Deflection Data

Figures 1 through 3 illustrate the torque or load versus deflection characteristics for the -A and -C stiffnesses of the LCD-0400 size couplings. The general characteristics of these curves are typical for all Dynaflex LCD Series Couplings.

Figure 1 shows the linearity of the coupling spring rate at (and well above) the rated capacity of 12,500 lb-in torque. The curves also demonstrate the unique overload slip characteristic at about 60,000 lb-in torque. It should be noted, however, that the overload protection results from slipping of the coupling. This slipping generates heat, and therefore continuous running at overload could be injurious to the coupling.

Figures 2 and 3 illustrate the flexibility of Dynaflex LCD Series Couplings to accommodate axial and radial misalignment. The -A variation is made in a softer elastomer to produce a lower torsional spring rate and therefore had the lower axial and radial spring rates. All spring rates are ideally linear over the normal operating range of deflection.

Figure 1 – Torsional Load/Deflection Curves

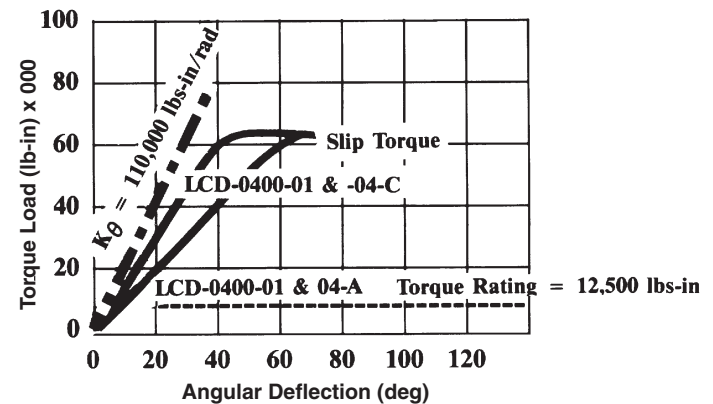


Figure 2 – Axial Load Deflection Curves

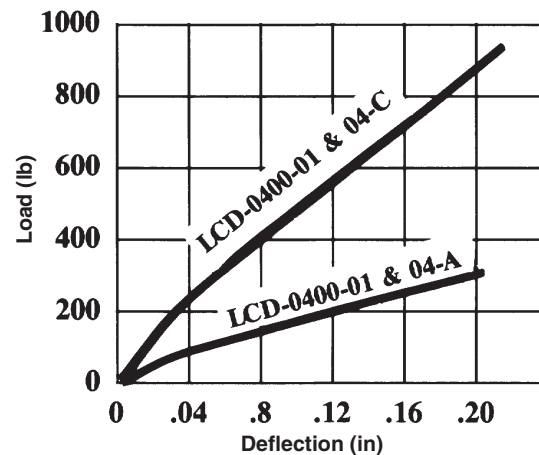
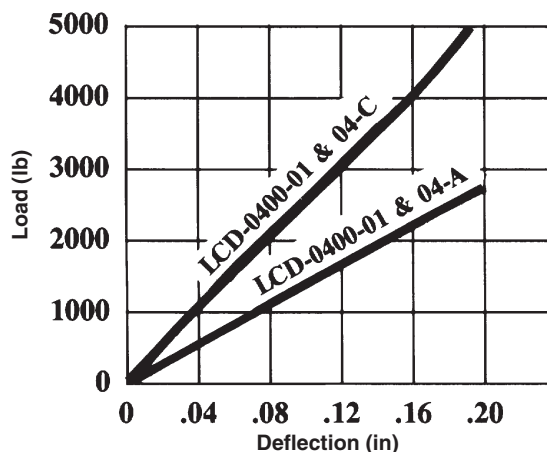


Figure 3 – Radial Load Deflection Curves



Dynamic Torsional Stiffness, K_θ

The dynamic torsional stiffness is higher than the static stiffness at room temperature. When the LCD Series Couplings are attached to diesel engine flywheels, the elastomer gets warm. At an operating temperature in the 170° to 200°F range, the dynamic stiffness is nearly the same as the static stiffness at room temperature. The stiffness values shown in the performance characteristics chart are for computer modelling and in other types of torsional analysis work.

Static Load Deflection Characteristics of LCD-0400-01-A & -C and LCD-0400-04-A & -C

Curves of other LCD parts show similar characteristics and are available upon request.

Typical Applications

Dynaflex LCD Series Couplings are useful for a wide range of rotary drive applications, from off-highway truck drivelines to auxiliary compressor drives on diesel locomotives. The soft torsional stiffness of these couplings makes them ideally suited for diesel applications with remotely mounted driven components. Typical applications include:

Typical End Product	Application
Mining Dump Truck	Increases Engine and Transmission Life
Diesel Locomotive	Eliminates Accessory Driveline Failure
Portable Air Compressor	Replaces Short-Lived Gear Coupling; Smooth Operation
4-Wheel Drive Farm Tractor	Reduces Noise and Extends Drive Train Life
Military Vehicle	Eliminates Accessory Shaft Breakage
Dynamometer	Prevents Driveline Failure
Mining Dump Truck	Prolongs U-Joint Life

In addition, Dynaflex LCD Series Couplings have been used in these types of applications:

- Main Drive

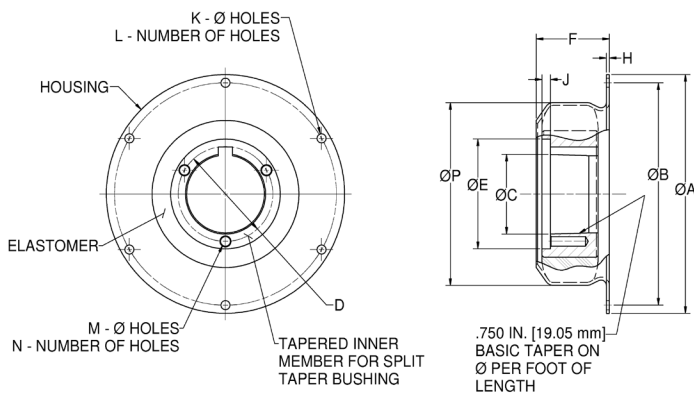
Engine – Generator	Engine – Compressor
Engine – Transmission	Engine – Pump
Electric Motor – Pump	Electric Motor – Compressor
- Accessories

Starters	Fans and Blowers
Alternators	Power Take-Offs

Selection Guide

This selection guide can be used to determine the size and series coupling to suit your general requirements. Final selection of the specific coupling to satisfy all of the application requirements generally necessitates a system engineering analysis. These computerized analyses of torsional systems can be provided by LORD Corporation's Engineering Department.

Figure 4 – Typical Dynaflex LCD Coupling X Series - Type I Housing Couplings (0075, 0150, 0200, 0300) (With Tapered Inner Member)



Note: The LCD-0075-13 design is the same as the "20 Series" except the outer member flange O.D. is very small.

Figure 5 – Typical Dynaflex LCD Coupling XX Series - Type II Housing Couplings (0075, 0150, 0200, 0300) (With Flanged Inner Member)

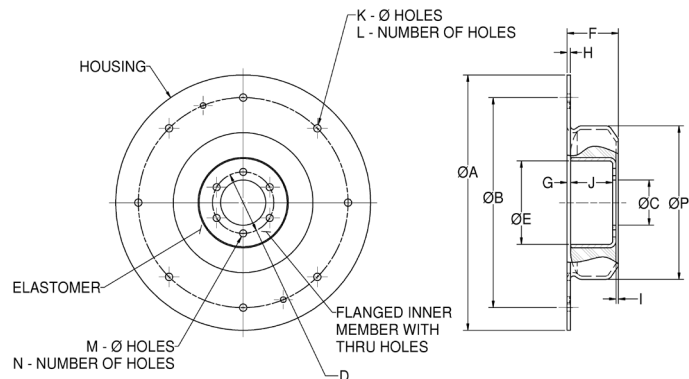
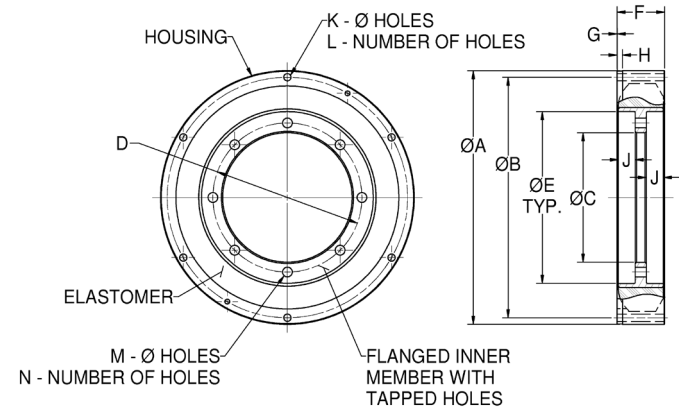


Figure 6 – Typical Dynaflex LCD Coupling 01 Series - Type III Housing Couplings (400 hp and above)



Note: 0400-04 has tapered inner member. 0600 and above do not have tapered inner member.

Figure 7 – Typical Dynaflex LCD Composite Outer Member (0075, With Tapered Inner Member)

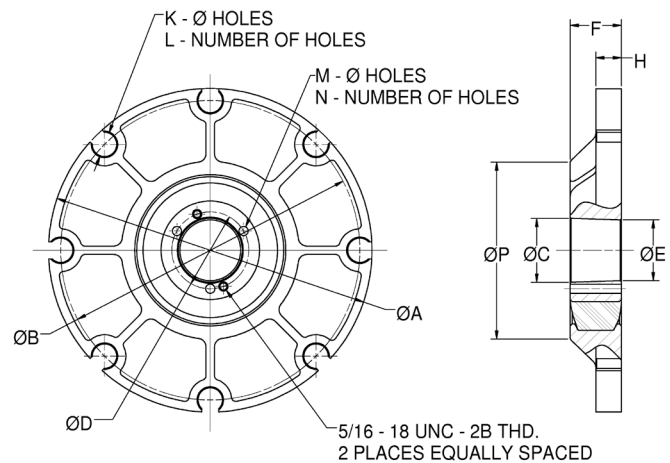


Table 1 – Split Tapered Bushings

Dynaflex LCD Series Coupling Part Number	P/N	Browning Bushing			
		Bore Range			
		Type 1 Dia.		Type 2 Dia.	
		in	mm	in	mm
LCD-0075	Q1	3/4 - 2-1/16	19.05 - 52.3	2-1/8 - 2-11/16	54.0 - 68.3
LCD-0150-XR	Q1	3/4 - 2-1/16	19.05 - 52.3	2-1/8 - 2-11/16	54.0 - 68.3
LCD-0200-XR	R1	1-1/8 - 2-13/16	28.16 - 71.4	2-7/8 - 3-3/4	73.0 - 95.2
LCD-0300-XR	R1	1-1/8 - 2-13/16	28.16 - 71.4	2-7/8 - 3-3/4	73.0 - 95.2
LCD-0400-XX	R1	1-1/8 - 2-13/16	28.16 - 71.4	2-7/8 - 3-3/4	73.0 - 95.2

Application Note: Sustained operation at torsional resonance can produce vibratory torques which might cause damage to the coupling and other driveline components. Please consult LORD Engineering for application review and approval.

Dynaflex LCD Series Couplings

Table 2 – Rated Performance Characteristics

Part Number*		Figure No.	Capacity per 100 rpm		Torque Rating T_N ①		Approximate Slip Torque ①		Torsional Rate K_θ ①		Axial Rate K_A		Radial Rate K_R	
Size	Variation		hp	kW	lb-in	N-m	lb-in	N-m	lb-in/rad	N-m/rad	lb/in	N/mm	lb/in	N/mm
LCD-0075	-XR-A -XXR-A	4 4	4.05	3.02	2,500	282	8,000	900	11,000	1,243	875	153	5,800	1,015
LCD-0075	-XR-C -XXR-C	4 4	4.05	3.02	2,500	282	8,000	900	21,000	2,373	2,100	368	10,000	1,750
LCD-0075 ② ③	-X-C	7	4.05	3.02	2,500	282	8,000	900	21,000	2,373	2,100	368	10,000	1,750
LCD-0150	-XR-A -XXR-A	4 5	8.09	6.04	5,000	565	20,000	2,260	22,000	2,486	1,750	306	11,500	2,012
LCD-0150	-XR-C -XXR-C	4 5	8.09	6.04	5,000	565	20,000	2,260	40,000	4,520	4,000	700	20,000	3,500
LCD-0200	-XR-A -XXR-A	4 5	11.11	8.29	7,000	791	28,000	3,164	35,000	3,955	2,600	455	14,000	2,450
LCD-0200	-XR-C -XXR-C	4 5	11.11	8.29	7,000	791	28,000	3,164	60,000	6,780	5,000	875	22,000	3,850
LCD-0300	-XR-A -XXR-A	4 5	15.87	11.84	10,000	1,130	40,000	4,520	50,000	5,650	3,500	612	11,500	2,012
LCD-0300	-XR-C -XXR-C	4 5	15.87	11.84	10,000	1,130	40,000	4,520	90,000	10,170	8,800	1,540	20,000	3,500
LCD-0400	-X-A -XX-A	6 6	19.83	14.79	12,500	1,412	60,000	6,780	60,000	6,780	1,750	306	12,500	2,188
LCD-0400	-X-C -XX-C	6 6	19.83	14.79	12,500	1,412	60,000	6,780	110,000	12,430	5,700	1,000	25,000	4,375
LCD-0600	-X-A -X-C	6 6	31.75	23.69	20,000	2,260	85,000	9,600	100,000	11,290	1,600	280	12,500	2,188
LCD-0800	-X-A -X-C	6 6	39.67	29.58	25,000	2,825	100,000	11,300	130,000 250,000	14,690 28,250	2,000 6,500	350 1,140	14,000 30,000	2,450 5,250
LCD-1000	-X-A -X-C	6 6	52.91	39.47	32,000	3,616	150,000	16,950	250,000 450,000	28,250 50,850	3,250 9,000	600 1,575	20,000 35,000	3,500 6,125
LCD-1500	-X-A -X-C	6 6	79.37	59.21	50,000	5,650	200,000	22,600	360,000 650,000	40,680 73,450	4,500 13,000	788 2,275	28,000 50,000	4,900 8,750
LCD-2000	-X-A -X-C	6 6	103.15	77.22	65,000	7,345	200,000	22,600	675,000 1,250,000	76,275 141,250	8,500 15,000	1,488 2,625	58,000 100,000	10,150 17,500

* Please consult LORD engineering for application review, approval and availability.

① Prolonged exposure to temperatures in the 0°F range and below produces a significantly reduced slip torque prior to driveline warm-up. This condition may result in the coupling's inability to transmit adequate drive torque for applications experiencing unusual cold temperature related parasitic loading.

② Blind assembly style with a notched periphery provides trouble-free, sliding assembly on flywheel drive pins when bolted access is not possible. Outer member is a composite material.

③ Use Wood's Sure-Grip® Bushing type SK or equivalent.

④ See detail drawings by part number for tolerances.

⑤ Pilot diameter tolerances are + .000/ - .005 in for -A Series diameters and + .005/ - .000 in for -C Series diameters.

⑥ Tapered.

⑦ Refer to SAE J620c for flywheel numbers 6-1/2, 10, 11-1/2, 16; to SAE J927a for numbers 60, 80, 100, 120, 160. See Tables 5 and 6.

Unless otherwise noted:
 .xx dim ± 0.030 in (± 0.762 mm)
 .xxx dim ± 0.015 in (± 0.381 mm)

Sure-Grip is a trademark of Altra Industrial Motion, Inc.

It is advisable to refer to drawing of coupling before ordering since it is not practical to show all details in this catalog.

Definition of Part Numbering System

Part Type	hp Rating	Attachment Variation	Torsional Stiffness Variation
LCD	-0400	-X -XX	-A

Torque Requirements:

$$\text{Torque (lb-in)} = \frac{63025 \times \text{hp}}{\text{rpm}}$$

Table 3 – Specifications and Dimensions

Part Number*		Physical Characteristics (Nominal) ④																	
		Weight Mass		Inertia				A ⑤ Pilot O.D.		B B.C. Dia.		C Dia.		D ⑤ Dia.		E Dia.		F Length	
				Inner Member		Outer Member													
Size	Variation	lb	kg	lb-in- sec²	kg-m²	lb-in- sec²	kg-m²	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
LCD-0075	-XR-A -XXR-A	6.5 8.3	2.95 3.76	0.04	0.004	0.21 0.35	0.024 0.039	8.500 12.375	215.90 314.33	7.875 11.625	200.03 295.28	2.875 ⑥	73.03 ⑥	3.375	85.73	No Counter Bore	No Counter Bore	2.62	66.55
LCD-0075	-XR-C -XXR-C	6.5 8.3	2.95 3.87	0.04	0.004	0.21 0.35	0.024 0.039	8.500 12.375	215.90 314.33	7.875 11.625	200.03 295.28	2.875 ⑥	73.03 ⑥	3.375	85.73	No Counter Bore	No Counter Bore	2.62	66.55
LCD-0075 ② ③	-X-C	6.3	2.87	0.04	0.004	0.07	0.007	10.340	262.58	9.625	244.48	2.813	71.45	3.313	84.14	2.688	68.28	2.00	50.8
LCD-0150	-XR-A -XXR-A	20 13.8	9.07 6.26	0.13 0.08	0.015 0.009	0.29	0.033	12.375	314.33	11.625	295.28	2.875 2.500	73.03 63.50	3.375 3.400	85.73 86.36	4.25 4.57	107.95 120.65	2.80	71.12
LCD-0150	-XR-C -XXR-C	20 13.8	9.07 6.26	0.13 0.08	0.015 0.009	0.29	0.033	12.375	314.33	11.625	295.28	2.875 ⑥ 2.500	73.03 ⑥ 63.50	3.375 3.400	85.73 86.36	4.25 4.57	107.95 120.65	2.80	71.12
LCD-0200	-XR-A -XXR-A	21 16	9.52 7.26	0.22 0.09	0.025 0.010	0.69	0.078	13.875	352.42	13.125	333.38	4.000 ⑥ 2.500	101.60 ⑥ 63.50	4.625 3.400	117.47 86.36	5.50 5.33	139.70 135.38	2.80	71.12
LCD-0200	-XR-C -XXR-C	21 16	9.52 7.26	0.22 0.09	0.025 0.010	0.69	0.078	13.875	352.42	13.125	333.38	4.000 ⑥ 2.500	101.60 ⑥ 63.50	4.625 3.400	117.47 86.36	5.50 5.33	139.70 135.38	2.80	71.12
LCD-0300	-XR-A -XXR-A	33 18	14.96 8.16	0.59 0.25	0.067 0.028	0.92	0.104	13.875	352.42	13.125	333.38	4.000 ⑥ 4.000	101.60 ⑥ 101.60	4.625 5.125	117.47 130.18	6.00 6.69	152.40 170.00	3.06	77.72
LCD-0300	-XR-C -XXR-C	33 18	14.96 8.16	0.59 0.25	0.067 0.028	0.92	0.104	13.875	352.42	13.125	333.38	4.000 ⑥ 4.000	101.60 ⑥ 101.60	4.625 5.125	117.47 130.18	6.00 6.69	152.40 170.00	3.06	77.72
LCD-0400	-X-A -XX-A	45 48	20.41 21.77	0.57 0.93	0.065 0.150	2.83	0.320	13.875	352.42	13.125	333.38	6.000 ⑥ 4.000	152.40 ⑥ 101.60	7.000 4.625	177.80 117.47	8.00 6.00	203.20 152.4	2.75	69.85
LCD-0400	-X-C -XX-C	45 48	20.41 21.77	0.57 0.93	0.065 0.150	2.83	0.320	13.875	352.42	13.125	333.38	6.000 ⑥ 4.000	152.40 ⑥ 101.60	7.000 4.625	177.80 117.47	8.00 6.00	203.20 152.4	2.75	69.85
LCD-0600	-X-A -X-C	62	28.11	1.12	0.127	5.23	0.591	15.500	393.70	14.625	371.47	6.000 ⑥	152.40 ⑥	7.000	177.80	8.00	203.20	3.00	76.20
LCD-0800	-X-A -X-C	81	36.60	1.25	0.141	8.21	0.928	17.000	431.80	16.250	412.75	7.500	190.50	8.500	215.90	9.50	241.30	3.50	88.90
LCD-1000	-X-A -X-C	105	47.62	3.51	0.397	14.57	1.647	19.000	482.60	18.125	460.37	8.825	224.16	10.125	257.18	11.52	292.61	4.00	101.60
LCD-1500	-X-A -X-C	160	72.58	6.23	0.704	32.50	3.673	22.500	622.22	21.375	542.93	10.000	254.00	11.500	292.10	13.25	336.55	4.25	107.95
LCD-2000	-X-A -X-C	160	72.58	7.40	0.836	31.48	3.557	22.500	622.22	21.375	542.93	11.500	292.19	13.250	336.55	15.25	387.35	4.25	107.95

* Please consult LORD engineering for application review, approval and availability.

① Prolonged exposure to temperatures in the 0°F range and below produces a significantly reduced slip torque prior to driveline warm-up. This condition may result in the coupling's inability to transmit adequate drive torque for applications experiencing unusual cold temperature related parasitic loading.

② Blind assembly style with a notched periphery provides trouble-free, sliding assembly on flywheel drive pins when bolted access is not possible. Outer member is a composite material.

③ Use Wood's Sure-Grip® Bushing type SK or equivalent.

④ See detail drawings by part number for tolerances.

⑤ Pilot diameter tolerances are + .000/ -.005 in for -A Series diameters and + .005/ -.000 in for -C Series diameters.

⑥ Tapered.

⑦ Refer to SAE J620c for flywheel numbers 6-1/2, 10, 11-1/2, 16; to SAE J927a for numbers 60, 80, 100, 120, 160. See Tables 5 and 6.

Unless otherwise noted:

.xx dim ± 0.030 in (± 0.762 mm)

.xxx dim ± 0.015 in (± 0.381 mm)

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It is advisable to refer to drawing of coupling before ordering since it is not practical to show all details in this catalog.

Definition of Part Numbering System

Part Type	hp Rating	Attachment Variation	Torsional Stiffness Variation
LCD	-0400	-X -XX	-A

Torque Requirements:

$$\text{Torque (lb-in)} = \frac{63025 \times \text{hp}}{\text{rpm}}$$

Table 4 – Specifications and Dimensions

Part Number*		Physical Characteristics (Nominal) ④														
		G Length		H Length		I Length		J Length		K Hole Dia.		L No. of Holes	M Hole Size in (mm)	N No. of Holes	Fits SAE ⑦ Flywheel No.	P Ref. Dia.
Size	Variation	in	mm	in	mm	in	mm	in	mm	in	mm					in mm
LCD-0075	-XR-A -XXR-A	0.375	9.53	0.125	3.18	0.25	6.35	No Counter Bore	No Counter Bore	0.321 0.406	8.15 10.31	6 8	3/8 - 16 UNC-2B	3	6-1/2 10	6.50 165.1
LCD-0075	-XR-C -XXR-C	0.375	9.53	0.125	3.18	0.25	6.35	No Counter Bore	No Counter Bore	0.321 0.406	8.15 10.31	6 8	3/8 - 16 UNC-2B	3	6-1/2 10	6.50 165.1
LCD-0075 ② ③	-X-C	–	–	0.75	19.1	–	–	–	–	0.710	18.03	6	0.330 (8.38)	3	8	6.80 172.7
LCD-0150	-XR-A -XXR-A	0.1875	4.76	0.1875	4.76	0.125	3.18	0.75 2.31	19.05 58.72	0.406	10.31	– 8	3/8-16 UNC-2B 0.394 (10.00)	3 6	10	8.50 215.9
LCD-0150	-XR-C -XXR-C	0.1875	4.76	0.1875	4.76	0.125	3.18	0.75 2.31	19.05 58.72	0.406	10.31	8	3/8-16 UNC-2B 0.394 (10.00)	3 6	10	8.50 215.9
LCD-0200	-XR-A -XXR-A	0.0625	1.59	0.1875	4.76	–	–	0.75 2.56	19.05 65.07	0.406	10.31	16	3/8-16 UNC-2B 0.394 (10.00)	3 6	11-1/2 OR 60/80/100	9.38 238.3
LCD-0200	-XR-C -XXR-C	0.0625	1.59	0.1875	4.76	–	–	0.75 2.56	19.05 65.07	0.406	10.31	16	3/8-16 UNC-2B 0.394 (10.00)	3 6	11-1/2 OR 60/80/100	9.38 238.3
LCD-0300	-XR-A -XXR-A	0.125	3.18	0.1875	4.76	0.25	6.35	0.75 2.56	19.05 65.07	0.406	10.31	16	3/8-16 UNC-2B 0.660 (16.76)	3 6	11-1/2 OR 60/80/100	11.38 289.1
LCD-0300	-XR-C -XXR-C	0.125	3.18	0.1875	4.76	0.25	6.35	0.75 2.56	19.05 65.07	0.406	10.31	16	3/8-16 UNC-2B 0.660 (16.76)	3 6	11-1/2 OR 60/80/100	11.38 289.1
LCD-0400	-X-A -XX-A	0.125	3.18	0.50	12.70	–	–	0.88 0.75	22.23 19.05	0.406	10.31	12	1/2-13 UNC-2B 3/8-16 UNC-2B	6 3	60/80/100	– –
LCD-0400	-X-C -XX-C	0.125	3.18	0.50	12.70	–	–	0.88 0.75	22.23 19.05	0.406	10.31	12	1/2-13 UNC-2B 3/8-16 UNC-2B	6 3	60/80/100	– –
LCD-0600	-X-A -X-C	–	–	0.50	12.70	–	–	1.00	25.40	0.406	10.31	12	1/2-13 UNC-2B	6	120	– –
LCD-0800	-X-A -X-C	–	–	0.50	12.70	–	–	1.00	25.40	0.406	10.31	8	1/2-13 UNC-2B	8	–	– –
LCD-1000	-X-A -X-C	0.125	3.18	0.25	6.35	–	–	1.00	25.40	0.406	10.31	12	5/8-11 UNC-2B	8	14 or 140 with Adapter	– –
LCD-1500	-X-A -X-C	0.125	3.18	0.50	12.70	0.50	12.70	1.50	38.10	0.644	16.36	6	5/8-11 UNC-2B	8	18 or 180	– –
LCD-2000	-X-A -X-C	0.125	3.18	0.50	12.70	0.50	12.70	1.50	38.10	0.644	16.36	6	3/4-10 UNC-2B	8	18 or 180	– –

* Please consult LORD engineering for application review, approval and availability.

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④ See detail drawings by part number for tolerances.

⑤ Pilot diameter tolerances are + .000/ -.005 in for -A Series diameters and + .005/ -.000 in for -C Series diameters.

⑥ Tapered.

⑦ Refer to SAE J620c for flywheel numbers 6-1/2, 10, 11-1/2, 16; to SAE J927a for numbers 60, 80, 100, 120, 160. See Tables 5 and 6.

Unless otherwise noted:

.xx dim ± 0.030 in (± 0.762 mm)

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Definition of Part Numbering System

Part Type	hp Rating	Attachment Variation	Torsional Stiffness Variation
LCD	-0400	-X -XX	-A

Torque Requirements:

$$\text{Torque (lb-in)} = \frac{63025 \times \text{hp}}{\text{rpm}}$$

Dynaflex® LCD Series Couplings Installation Guide

Specifications

Materials: The elastomer used in the Dynaflex LCD Series Coupling is a high-quality natural rubber which meets LORD specifications (available upon request) and exceeds SAE standards. Natural rubber is used because of its excellent physical properties, such as tensile strength, tear and abrasion resistance, fatigue resistance and low temperature characteristics. The elastomer-to-metal bonds are even stronger than the elastomers.

Standard LCD catalog parts are all made in two stiffnesses of natural rubber. The A elastomer is per LORD Spec MAP092, having a durometer of approximately 45. The C elastomer is LORD Spec MAP094, having a durometer of approximately 57. The metal parts for this series are of alloy steel or ductile iron.

Environmental: Extensive experience with similar parts indicates that heavy-duty Dynaflex couplings will perform satisfactorily when exposed to the normal fluid, temperature and other environmental conditions found in driveline systems. For operation in ambient temperatures exceeding 170°F (77°C), consult LORD Corporation. Dynaflex LCD Series Couplings are often recommended for use in applications where the temperature is above 170°F (77°C). Temperatures above 200°F (93°C) could present problems. Customers should know what the ambient operating temperature is and whether additional air circulation can be provided. Consultation with LORD Corporation engineers is necessary if the ambient temperature is above 170°F (77°C).

Misalignment: Misalignment capability applies to speeds up to 2500 rpm. Operation up to 3500 rpm is permitted with reduced misalignment. (Consult LORD when a potential application requires special consideration).

At normal rated operating conditions, the Dynaflex LCD Series Couplings are designed to accommodate misalignment.

Angular: 1-1/2° maximum

Parallel: 1/64 inch

Axial: +1/16 inch dynamic
+1/8 inch static

Testing/Performance: Periodic load deflection tests are run to assure consistency of torsional spring rate and slip torque characteristics.

Damping Coefficient, C_D : The natural rubber elastomer used in LCD couplings offer hysteresis damping which dissipates energy at resonance.

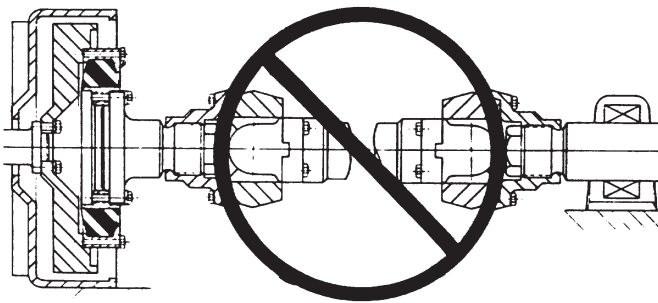
The “damping coefficient” is a function of many variables. Among them are dynamic strain, frequency, elastomer type and stiffness, temperature and torque loading. Damping coefficients for this series have been determined and can be provided for torsional analysis work by contacting LORD.

Installation

For engine applications, the outer member is usually bolted directly to the flywheel; for other applications, to a suitable adaptor. The inner member normally attaches to the driven shaft. The smaller LCD couplings generally have a tapered bore, which accommodates a standard split tapered bushing which grips the drive shaft. (Refer to Table 1 - Split Tapered Bushings). This configuration provides easy installation.

Figures 15 and 16 on the next page show typical installations involving universal joints.

Figure 8



This arrangement must not be used. Suitable bearing supports are required to react cardan-induced cocking loads. Consult LORD Engineering for application review.

Figure 9 – Flywheel Drawing for Tables 5 and 6

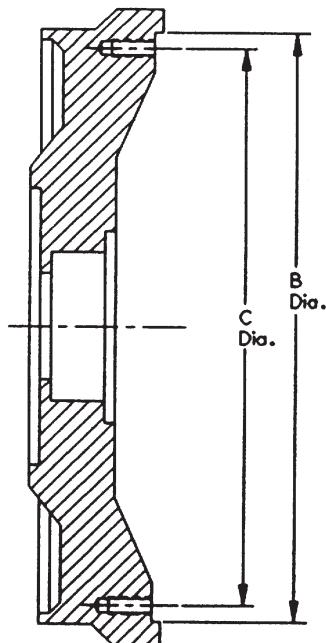


Table 5 – Flywheels for Engine Mounted Torque Converters - SAE J927 Nov 88

Converter Flywheel No.	B		C		Tapped Holes	
	in	mm	in	mm	No.	Size
20	9.50	241.30	8.750	222.25	12	5/16-18
40	10.375	263.52	9.625	244.48	12	5/16-18
60	13.875	352.42	13.125	333.38	12	3/8-16
80	13.875	352.42	13.125	333.38	12	3/8-16
100	13.875	352.42	13.125	333.38	12	3/8-16
120	15.500	393.70	14.625	371.48	12	3/8-16
140	18.375	466.72	17.250	438.15	12	1/2-13
160	20.375	517.52	19.250	488.95	12	1/2-13
180	22.500	571.52	21.375	542.92	12	5/8-11
210	26.500	673.10	25.250	641.35	12	5/8-11
240	28.875	733.42	27.250	642.15	12	3/4-10

Table 6 – Flywheels for Industrial Engines with Industrial Power Take-Offs - SAE J620 Oct 88

Clutch Size	B		C		Tapped Holes	
	in	mm	in	mm	No.	Size
165 (6-1/2)	8.500	215.90	7.875	200.02	6	5/16-18
190 (7-1/2)	9.500	241.30	8.750	222.25	8	5/16-18
200 (8)	10.375	263.52	9.625	244.48	6	3/8-16
255 (10)	12.375	314.32	11.625	295.28	8	3/8-16
290 (11-1/2)	13.875	352.42	13.125	333.38	8	3/8-16
355 (14)	18.375	466.72	17.250	438.15	8	1/2-13
405 (16)	20.375	517.52	19.250	488.95	8	1/2-13
460 (18)	22.500	571.50	21.375	542.92	6	5/8-11
530 (21)	26.500	673.10	25.250	641.35	12	5/8-11
610 (24)	28.875	733.42	27.250	692.15	12	3/4-10

Typical Installations

Figure 10 – Engine Flywheel to Keyed Shaft - Direct

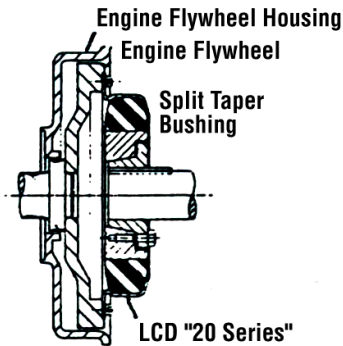


Figure 11 – Flywheel to Flanged Shaft - Direct (LCD -25 Series)

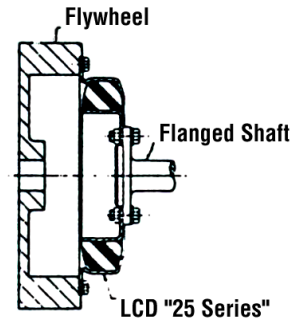


Figure 12 – Flywheel to Flanged Shaft - Direct (LCD -01 Series)

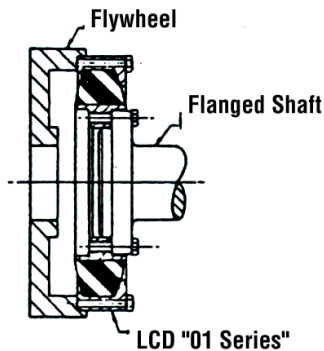


Figure 13 – Flywheel to Internally Splined Shaft - Free Floating Splined Connection

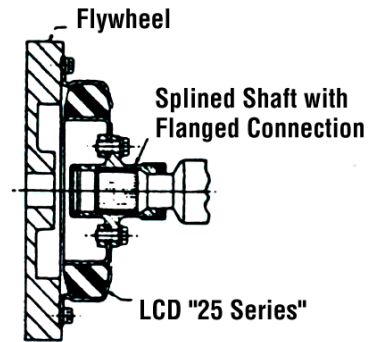


Figure 14 – Flywheel to Adapter to Coupling and Through an Internally Splined Connection

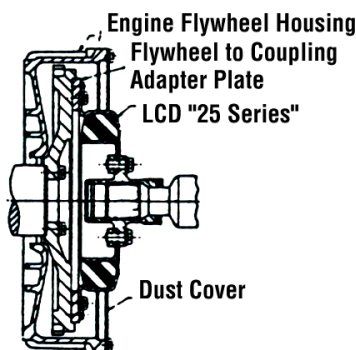


Figure 15 – Stationary Engine to Load by Use of a Pillow Block on a Common Frame - Permits Large Drive Angles

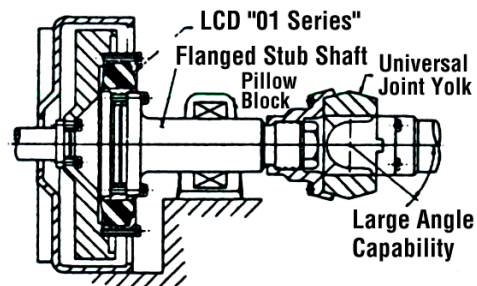


Figure 16 – Vehicle Engine with Large Angle Drive Requirements

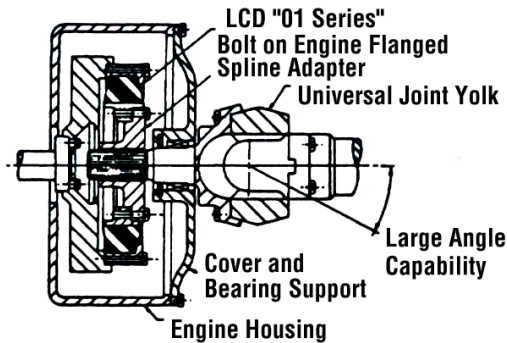


Figure 17 – Flywheel to Flanged Hub to Splined Shaft - Free Floating Splined Connection

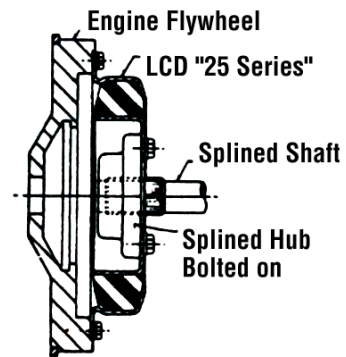


Figure 18 – Stationary Equipment Having a Tapered Shaft Connection

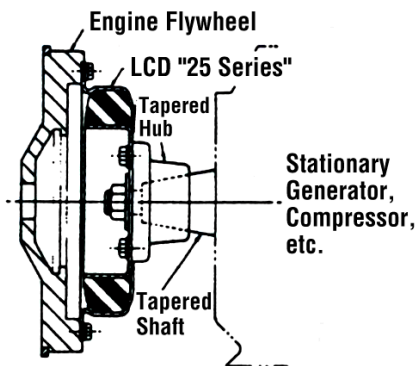


Figure 19 – Shaft to Shaft Arrangement Using Split Taper Bushings at Both Sides

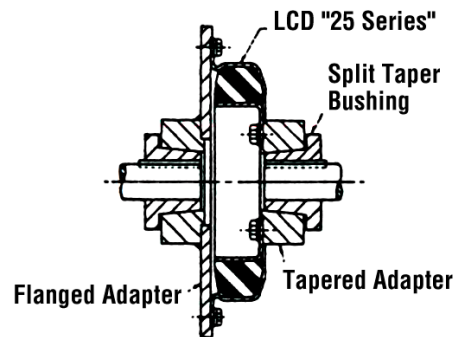


Figure 20 – Two Dynaflex LCD Couplings in Series for Increased Flexibility in All Directions

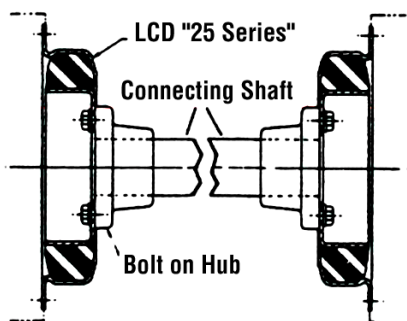
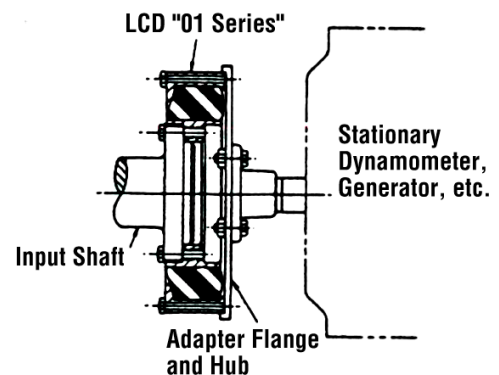


Figure 21 – Stationary Equipment Having Input Shaft Attached to Coupling Inner Member



Dynaflex® LCD Series Couplings Torsional System Analysis Input Requirements

Dynaflex couplings offer unique advantages with the soft torsional spring rate that isolates torsional vibration, mitigates shock and reduces noise transmission. In order to benefit from these advantages, an analysis must be made of the application and a coupling selected which meets the specific requirements. The following checklist sets forth the information required to initiate the analysis:

Application Data

- What is the driving unit, driven unit? Include enough information to determine disturbing frequencies (e.g., type of engine, number of cylinders, number of cycles).
- What is the operating torque (normal, maximum)?
- What is the operating speed (range, at normal torque and at maximum torque)?
- What are the environmental conditions (temperature, oil type and amount of exposure, corrosive factors, other factors)?

Coupling Requirements

- What are the primary functions of the coupling (torsional vibration isolation, torsional shock mitigation, noise attenuation, shaft misalignment accommodation – angular, parallel, axial)?
- If known, what torsional spring rate should the coupling have?
- If the required torsional spring rate is not known, what are the rotational moments on inertia of the driving and driven masses?
- How much misalignment must the coupling accommodate (angular, parallel, axial)?
- How much, if any, axial thrust will be on the coupling?

Design Parameters

- What space is available for the coupling (maximum length, diameter)?
- What is the maximum weight the coupling can be, if weight is limited?
- What are the shaft diameters and method of attachment (keyway, spline, set screws, flange)?
- What special features are required? (Inner member design – hubs, flanges, splines, etc. Outer member design – pilot diameter bolt pattern, etc.)

Remote Driven Units

Multiple U-joint shafts (especially longer shafts) and the speed at which the shaft rotates (especially higher rpm's) can create complex stability problems. To assure satisfactory coupling performance, all design layouts for remote mounted driven units should be reviewed by LORD Engineering. LORD analytical capability is only one part of the engineering service available on all coupling applications.

What Else?

If your application is unique or unusual, include any information that you believe will have an effect on the coupling design or selection. If you have any questions as you prepare this data, call us. See following page for data form.

Reference Literature from Lord Corporation

Design Monograph 1107

Understanding Torsional Vibration

Data Required for LORD Coupling Recommendation**Toll Free Number (in United States and Canada): +1 877 ASK LORD (275 5673)****All Information in This Box is Required Data.**

Date _____	LORD Recommended P/N _____
Company Name _____	Field Engineer _____
Address _____	Discussed With _____
_____	Title _____
General description of problem and equipment _____	

<input type="checkbox"/> Retrofit <input type="checkbox"/> New System	

APPLICATION**Driving Unit**

- * Description _____
- * Model No. _____ * Manufacturer _____
- * ☐ 2-Stroke/Cycle ☐ 4-Stroke/Cycle
- * Rotational Inertia and Torsional Spring Rate Data (attach tabulated data)
- * Radial Support Needed: ☐ Yes ☐ No

Driven Unit

- * Description _____
- * Model No. _____ * Manufacturer _____
- * Rotational Inertia and Torsional Spring Rate Data (attach tabulated data)
- * Parasitic Torque required _____ lb-ft

SYSTEM DYNAMICS

- * Mass elastic schematic of entire system (please attach sketch)

Test data (attach if available)

Speeds of Driving Unit: Idle _____ RPM Normal _____ RPM Maximum _____ RPM

% Time: @ Idle _____ @ Normal _____ @ Maximum _____

Speed Ratio Driving to Driven Unit: _____ to _____

* Torque: Normal _____ lb-ft Maximum _____ lb-ft (@ _____ RPM)

Present Vibration: Peak-to-Peak Response Maximum _____ lb-ft @ _____ CPM

* Transient Shock: Magnitude: _____ lb-ft

Duration: _____ milliseconds

How Often: _____ times per hour

* Briefly describe any peculiarities or special circumstances of the dynamic system _____

*** Required data****(OVER)**

COUPLING REQUIREMENTS**Primary Function**

Shaft Misalignment

_____ Axial
 _____ Angular
 _____ Parallel
 _____ Torsional Vibration Isolation
 _____ Torsional Shock Loads
 _____ Noise Attenuation

Specific Requirements

_____ Inches
 _____ Degrees
 _____ Inches
 _____ % Isolation @ _____ RPM
 _____ Maximum Amplitude

Parameters

* System Operating Temperature: Normal _____ °F Maximum _____ °F Minimum _____ °F
 * Environment: Oil Immersion _____ Oil Splash _____
 Other _____ Mil Spec _____
 * Space Envelope: Maximum Length _____ Maximum Diameter _____
 * Attachments: Driving ☐ Spline ☐ Flange ☐ Keyways ☐ Set Screws
 Driven ☐ Spline ☐ Flange ☐ Keyways ☐ Set Screws
 * Shaft Diameters: Driving _____ Driven _____
 Fail-Safe Feature Required: ☐ Yes ☐ No
 Maximum Allowable Weight: _____
 * Minimum Hours Life Required: _____

Please attach the following:

- 1. A layout of the available space envelope and other pertinent drawings showing connecting drive-line components.**
- 2. A system mass-elastic diagram including all rotational mass moments of inertia and torsional stiffnesses.**

Remarks _____

*** Required data**

Please return to: LORD Corporation
 2000 West Grandview Blvd.
 P.O. Box 10038
 Erie, PA 16514-0038
 Fax: 814 866 1773

English Units – Coarse Thread Series

Thread Size & Pitch	GRADE 1		GRADE 2		GRADES 5, 5.1 & 5.2		GRADES 8, 8.1 & 8.2	
	Clamp Load (lb)	Tightening Torque (ft-lb)	Clamp Load (lb)	Tightening Torque (ft-lb)	Clamp Load (lb)	Tightening Torque (ft-lb)	Clamp Load (lb)	Tightening Torque (ft-lb)
6 - 32	225	0.52	375	0.86	579	1.33	818	1.88
8 - 32	347	0.95	578	1.58	893	2.44	1260	3.44
10 - 24	433	1.37	722	2.29	1116	3.53	1575	4.99
12 - 24	599	2.16	998	3.59	1543	5.55	2178	7.84
1/4 - 20	787	3.28	1312	5.47	2027	8.45	2862	11.9
5/16 - 18	1297	6.75	2162	11.3	3341	17.4	4716	24.6
3/8 - 16	1918	12.0	3197	20.0	4941	30.9	6975	43.6
7/16 - 14	2631	19.2	4385	32.0	6777	49.4	9567	69.8
1/2 - 13	3512	29.3	5853	48.8	9046	75.4	12771	106
9/16 - 12	4505	42.2	7508	70.4	11603	109	16380	154
5/8 - 11	5594	58.3	9323	97.1	14408	150	20340	212
3/4 - 10	8267	103	13800	173	21293	266	30060	376
7/8 - 9	11435	167	11435	167	29453	430	41580	606
1 - 8	14999	250	14999	250	33633	561	54540	909
1-1/8 - 7	18884	354	18884	354	42347	794	68670	1288
1-1/4 - 7	23983	500	23983	500	53780	1120	87210	1817
1-3/8 - 6	28586	655	28586	655	64103	1469	103950	2382
1-1/2 - 6	34774	869	34774	869	77978	1949	126450	3161

Tightening Torque = K * D * P

where: K = 0.2 (dry, unlubricated)

D = Nominal Thread Size

P (Clamp Load) = 75% of the Proof Load

Metric Units – Coarse Thread Series

Thread Size & Pitch	CLASS 4.6		CLASS 5.8		CLASS 9.8		CLASS 10.9	
	Clamp Load (kN)	Tightening Torque (N*m)	Clamp Load (kN)	Tightening Torque (N*m)	Clamp Load (kN)	Tightening Torque (N*m)	Clamp Load (kN)	Tightening Torque (N*m)
M6 x 1	3.41	4.09	5.73	6.87	9.80	11.76	12.5	15
M7 x 1	4.90	6.86	8.24	11.5	14.1	19.72	18.0	25
M8 x 1.25	6.20	9.93	10.4	16.7	17.8	28.55	22.8	36
M10 x 1.5	9.8	19.7	16.5	33.1	28.3	56.55	36.1	72
M12 x 1.75	14.3	34.3	24.0	57.7	41.1	98.63	52.5	126
M14 x 2	19.5	54.6	32.8	91.8	56.1	157	71.6	200
M16 x 2	26.6	85.2	44.7	143	76.5	245	97.7	313
M18 x 2.5	32.5	117	54.7	197	93.6	337	120	430
M20 x 2.5	41.5	166	69.8	279	119	478	153	610
M22 x 2.5	51.4	226	86.4	380	148	650	189	830
M24 x 3	59.8	287	101	483	172	826	220	1055
M27 x 3	77.8	420	131	706	224	1208	286	1543
M30 x 3.5	95.1	571	160	959	273	1641	349	2095
M33 x 3.5	118	776	198	1305	338	2233	432	2851
M36 x 4	138	997	233	1676	398	2868	509	3662
M39 x 4	165	1290	278	2170	476	3711	608	4739

Tightening Torque = K * D * P

where: K = 0.2 (dry, unlubricated)

D = Nominal Thread Size

P (Clamp Load) = 75% of the Proof Load

The values presented in these tables are representative and have been compiled for the user's benefit. Results can be influenced by any number of variables including 1) excessive lubrication, 2) excessive design clamp load, 3) nicked or binding threads, 4) non-parallel mating surfaces, and 5) inadequate torque control, to name a few. Therefore, LORD expressly disclaims liability of any kind associated with the application of the data shown herein.

A part's listing in this catalog does not guarantee its availability.
To download/print the most current catalog, go to www.LORD.com.

English Units – Fine Theard Series

Thread Size & Pitch	GRADE 1		GRADE 2		GRADES 5, 5.1 & 5.2		GRADES 8, 8.1 & 8.2	
	Clamp Load (lb)	Tightening Torque (ft-lb)	Clamp Load (lb)	Tightening Torque (ft-lb)	Clamp Load (lb)	Tightening Torque (ft-lb)	Clamp Load (lb)	Tightening Torque (ft-lb)
6 - 40	251	0.58	419	0.96	647	1.49	914	2.10
8 - 36	365	1.00	608	1.66	940	2.57	1327	3.63
10 - 32	495	1.57	825	2.61	1275	4.04	1800	5.70
12 - 28	639	2.30	1064	3.83	1645	5.92	2322	8.36
1/4 - 28	901	3.75	1502	6.26	2321	9.7	3276	13.7
5/16 - 24	1436	7.48	2393	12.5	3698	19.3	5220	27.2
3/8 - 24	2173	13.6	3622	22.6	5597	35.0	7902	49.4
7/16 - 20	2938	21.4	4896	35.7	7567	55.2	10683	77.9
1/2 - 20	3958	33.0	6596	55.0	10194	84.9	14391	120
9/16 - 18	5024	47.1	8374	78.5	12941	121	18270	171
5/8 - 18	6336	66.0	10560	110	16320	170	20340	240
3/4 - 16	9232	115	15375	192	23779	297	33570	420
7/8 - 14	12598	184	12598	184	32449	473	45810	668
1 - 12	16409	273	16409	273	36797	613	59670	995
1-1/8 - 12	21186	397	21186	397	47508	891	77040	1445
1-1/4 - 12	26557	553	26557	553	59552	1241	96570	2012
1-3/8 - 12	32546	746	32546	746	72983	1673	118350	2712
1-1/2 - 12	39130	978	39130	978	87746	2194	142290	3557

Tightening Torque = K * D * P

where: K = 0.2 (dry, unlubricated)

D = Nominal Thread Size

P (Clamp Load) = 75% of the Proof Load

Metric Units – Fine Theard Series

Thread Size & Pitch	CLASS 4.6		CLASS 5.8		CLASS 9.8		CLASS 10.9	
	Clamp Load (kN)	Tightening Torque (N*m)	Clamp Load (kN)	Tightening Torque (N*m)	Clamp Load (kN)	Tightening Torque (N*m)	Clamp Load (kN)	Tightening Torque (N*m)
M8 x 1	6.64	10.6	11.2	17.9	19.1	30.6	24.4	39.0
M10 x 1.25	10.4	20.7	17.4	34.9	29.8	59.7	38.1	76.2
M12 x 1.25	15.6	37.5	26.2	63.0	44.9	108	57.3	138
M14 x 1.5	21.2	59.3	35.6	100	60.9	171	77.8	218
M16 x 1.5	28.3	90.6	47.6	152	81.4	261	104	333
M18 x 1.5	36.6	132	61.6	222	105	379	134	484
M20 x 1.5	46.1	184	77.5	310	133	530	169	677
M22 x 1.5	56.4	248	94.9	418	162	714	207	912
M24 x 2	65.1	312	109	525	187	899	239	1147
M27 x 2	84.1	454	141	763	242	1306	309	1667
M30 x 2	105	632	177	1062	303	1816	387	2319
M33 x 2	129	851	217	1431	371	2449	474	3127
M36 x 3	147	1056	247	1775	422	3036	538	3877
M39 x 3	175	1362	294	2290	502	3917	641	5001

Tightening Torque = K * D * P

where: K = 0.2 (dry, unlubricated)

D = Nominal Thread Size

P (Clamp Load) = 75% of the Proof Load

The values presented in these tables are representative and have been compiled for the user's benefit. Results can be influenced by any number of variables including 1) excessive lubrication, 2) excessive design clamp load, 3) nicked or binding threads, 4) non-parallel mating surfaces, and 5) inadequate torque control, to name a few. Therefore, LORD expressly disclaims liability of any kind associated with the application of the data shown herein.

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