

# VIBRATION ISOLATION PRODUCTS CORP.

Engineered Rubber Products



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# Engineered Rubber Products

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Vibration Isolation Products Corp. is a major supplier of engineered rubber products for applications in such diverse industries as transportation, petroleum, construction, mining, military and home appliance.

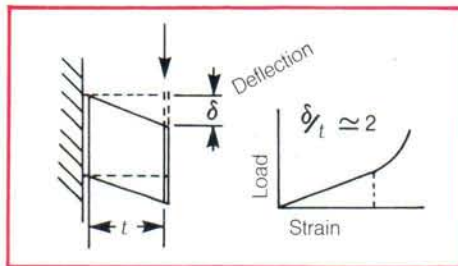
# Elastomer Properties Guide

		NON-OIL RESISTANT						OIL RESISTANT				
		NR Natural Rubber	IR Synthetic Poly-isoprene	SBR Styrene Butadiene	IIR Butyl	BR Poly-butadiene	EPDM Ethylene Propylene	CR Chloro-prene (Neoprene)	NBR Nitrile	CSM Hypalon	ECO Epichloro-hydrin	CM Chlorinated Polyethylene (CPE)
SPECIFIC GRAVITY (Base Elastomer)		0.93	0.94	0.94	0.92	0.93	0.85	1.23	1.00	1.10	1.27	1.19
HARDNESS RANGE (Durometer, Shore A)		20-100	20-100	40-100	30-100	30-100	30-100	20-90	30-100	50-95	40-90	60-90
(MAX.) TENSILE psi	ROOM TEMP.	4000	4000	3500	3000	3000	3000	4000	4000	2800	2600	3000
	250°F	1800	1800	1200	1000	1200	2000	1500	700	500	900	—
	400°F	125	125	170	350	170	400	180	130	200	500	—
ELONGA- TION—%	ROOM TEMP.	700	750	700	700	700	300	600	600	500	800	600
	250°F	500	500	250	250	250	300-500	350	120	60	100	—
	400°F	80	80	60	80	60	0-120	0-100	20	20	60	—
HIGH TEMPERATURE (Max. Service, °F)		212	212	225	250	212	300	250	250	250	325	250
LOW TEMPERATURE (Min. Service, °F)		−60	−60	−60	−50	−80	−60	−40	−60	−40	−65	−40
HEAT AGING		3	2	3	5	2	5	3	3	5	5	5
COMPRESSION SET		3	2	3	2	2	2	3	3	3	3	3
ELECTRICAL RESISTIVITY		5	3	2	4	3	4	3	2	2	2	3
IMPERMEABILITY		3	3	2	6*	3	3	3	3	5	6*	5
RESILIENCE		6*	6*	3	2	6*	3	5	3	3	3	3
RESISTANCE RATINGS	ABRASION		5	5	5	4	5	4	5	5	4	4
	TEARING		5	3	2	3	3	3	3	3	3	3
	CUT GROWTH		5	5	3	5	2	3	3	3	3	3
	FLAME		0	0	0	0	0	0	3	1	3	3
	WEATHER		2	2	2	4	2	5	4	2	5	6*
	OXIDATION		3	5	3	5	3	3	4	3	5	6*
	OZONE		0	0	0	5	0	6*	5	0	6*	6*
	WATER SWELL		3	5	5	5	5	5	3	5	3	4
	ACID		3	3	3	5	3	4	3	3	5	5
	ALKALI		3	3	3	5	3	4	3	3	5	3
	GASOLINE		0	0	0	0	0	0	3	5	2	5
	BENZOL		0	0	0	2	0	1	0	3	1	2
	DEGREASER SOLVENTS		0	0	0	0	0	0	0	0	1	1
	ALCOHOL		3	3	2	4	3	0	2	5	3	4
	OIL (PETROLEUM)		0	0	0	0	0	0	3	4	3	5
	SYNTHETIC LUBRICANTS (Diesters)		1	1	0	2	1	1	0	3	0	1
	HYD FLUID	SILICATES	0	0	1	2	0	3	3	2	3	2
		PHOSPHATES	1	1	0	3	1	4	0	0	1	0
	BONDING TO METALS		5	5	5	4	5	0-3	4	4	3	4
	RELATIVE COST (SBR=100)		115	110	100	125	115	115	125	140	170	300

# Mechanical Design Properties of Elastomeric Springs

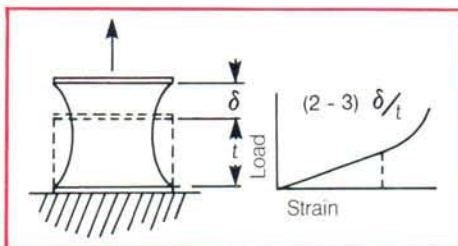
Examine the unique properties of elastomeric parts in mechanical applications as a solution to your design problems.

The stress/strain curve of elastomeric springs changes with changing deformations, so one cannot define the elastic behavior of "rubber" simply by Young's Modulus. The physical dimensions of the spring and the loading direction will dictate a predictable curve. There are five classic curve shapes.



**Shear**

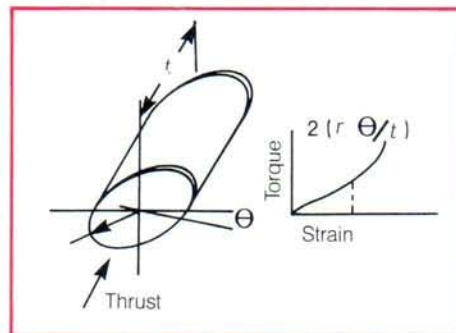
The shear modulus provides linear characteristics to about 200% strain. To this limit, a constant spring rate can be expected.



**Tension**

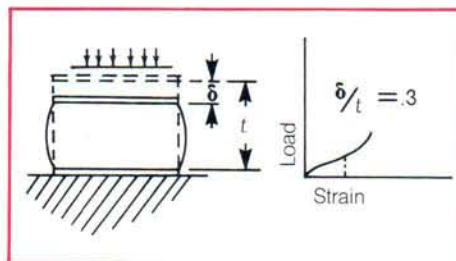
Generally, the shear mode comments apply to tension, except the linearity ends

between 200 to 300% strain. Tensile loading is more notch sensitive.



**Torsion**

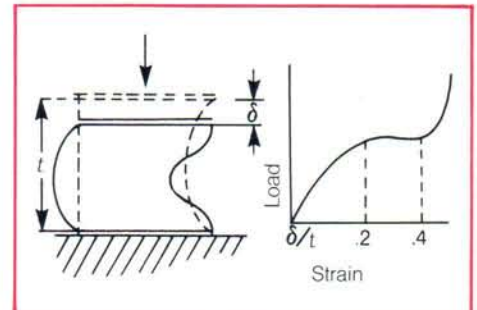
Winding up an elastomeric spring to strain in torsion is a modification of simple shear. Although this mode provides linearity to approximately 200% strain, it introduces fatigue problems if cyclic strain exceeds 100%. It also can induce appreciable axial thrust loads on connected members when the strain exceeds 150%.



**Compression**

Of the five stressing modes, compression is the least effective from an energy storage standpoint. Its linearity is limited to approximately 30% strain. And it should be remembered that springs will buckle when the

slenderness ratio (height/width) exceeds 1.6.



**Buckling**

The buckling mode has the highest energy storage capacity because the load strain curve has two points of inflection. Buckling characteristics may be obtained by constructing a non-uniform cross section in a compression mounting. The points of inflection at which change in spring rate occur are largely dependent on the slenderness ratio and are predictable.

**Designing elastomeric parts with unique properties has been the business of V.I.P. Corp. for many years. Let our engineers solve your design problems with specially engineered products.**

V.I.P. Corp. offers a complete standard line of vibration isolators to help eliminate vibration and improve machinery life and personnel productivity. These vibration isolators are simple to install and require no special tools. In most cases, the mountings may be easily bolted between the legs of the machine to be isolated and the floor, platform, wall, etc., as may be desired.

Experience has shown that V.I.P. Corp. isolators perform very satisfactorily in a wide variety of industrial applications. They have been employed with considerable success under internal combustion engines, motor-generator sets, exhaust fans, machine tools, and virtually every type of machine which vibrates. They have also effectively isolated sensitive instruments and precision machines from objectional external vibrations.

Since rubber is adversely affected by contact with some solvents, such as oil and other petroleum hydro-carbons, consideration should be given to the protection of vibration isolators from these materials wherever possible.

Depending upon the severity of existing conditions, various means may be employed to avoid solvent deterioration.

Under conditions where considerable splash, spray or capillary seepage of oil or solvents prevail (such as under internal combustion engines, machine tools, etc.) mountings of oil-resistant synthetics are often employed. These can be furnished by V.I.P. Corp. for any standard mountings.

In the event that natural rubber isolators are preferred, they may be protected by painting with a flexible lacquer, varnish, or urethane which is impervious to oils and greases. Most of the better grades of nitrocellulose-type lacquers will accomplish this purpose. Some customers have also successfully employed a small umbrella-like metal stamping between isolators and machine bases as shields against occasional dripping oil.

In general, when a vibration object is to be isolated from supporting structures, or a machine or mechanism is to be isolated from external shock, the isolation can only be effected by permitting relative motion between the supporting structure, or container, and the vibrating object or protected mechanism.

The alternative is what is often referred to as "Mass Damping." This method will be discussed on page 9.

To make a proper mounting analysis, the first fundamental data which must be determined

is the frequency, or cyclic rate, of the prime disturbance. In many cases, this takes the form of the rotational speed, in R.P.M., of an out-of-balance mass. Although it is helpful to know the actual amount of unbalance that is present, we recognize that this data is often difficult to obtain without complex instrumentation.

The next information that must be known is the weight of the mechanism and the position of the center of gravity (if the weight of the unit is not equally distributed). In many cases, the vertical position of the center of gravity relative to the mounting plane is very important. If this data is difficult to determine, obtain the load imposed by the machine at each normal support point. Send a sketch of the machine showing this data to V.I.P. Corp.

It is helpful to know something of the working environment for the machine in question. Obviously, a higher degree of isolation is required for a vibrating mechanism used in an office building than for that same machine used in a quarry or foundry. Are service connections such as gas, water or power

flexible or rigid? If rigid, can flexible connections be provided at the time of the isolator installation? What kind of mounting or support is now in use for this machine?

Is the current problem one of excessive noise, excessive vibration transmission, structural failure or something not listed above?

In its simplest form, mounting a machine to isolate dynamic unbalance within the machine from its supporting structure requires the following procedures:

1. Since transmissibility is a function of the ratio of the System Natural Frequency ( $F_n$ ) and the frequency of the unbalance in the machine, or Forcing Frequency ( $F_f$ ), changing the natural frequency of the suspended machine should provide a reduced degree of transmissibility.

$$\% T = \frac{100}{(F_f/F_n)^2 - 1}$$

Of course the degree of isolation, in percent, is  $100 - T$ .

2. The Natural Frequency of the suspended machine is a function of the spring rate, or stiffness, of the mounting system.

The Natural Frequency, ( $F_n$ ) is most easily obtained, however, from what is called the "Effective Deflection" ( $d$ ) of the resilient mountings under the weight of the machine they support. By this method  $F_n = 187.6/\sqrt{d}$  (C.P.M.) if damping is ignored so the meaning of "Effective Deflection" will be discussed later.

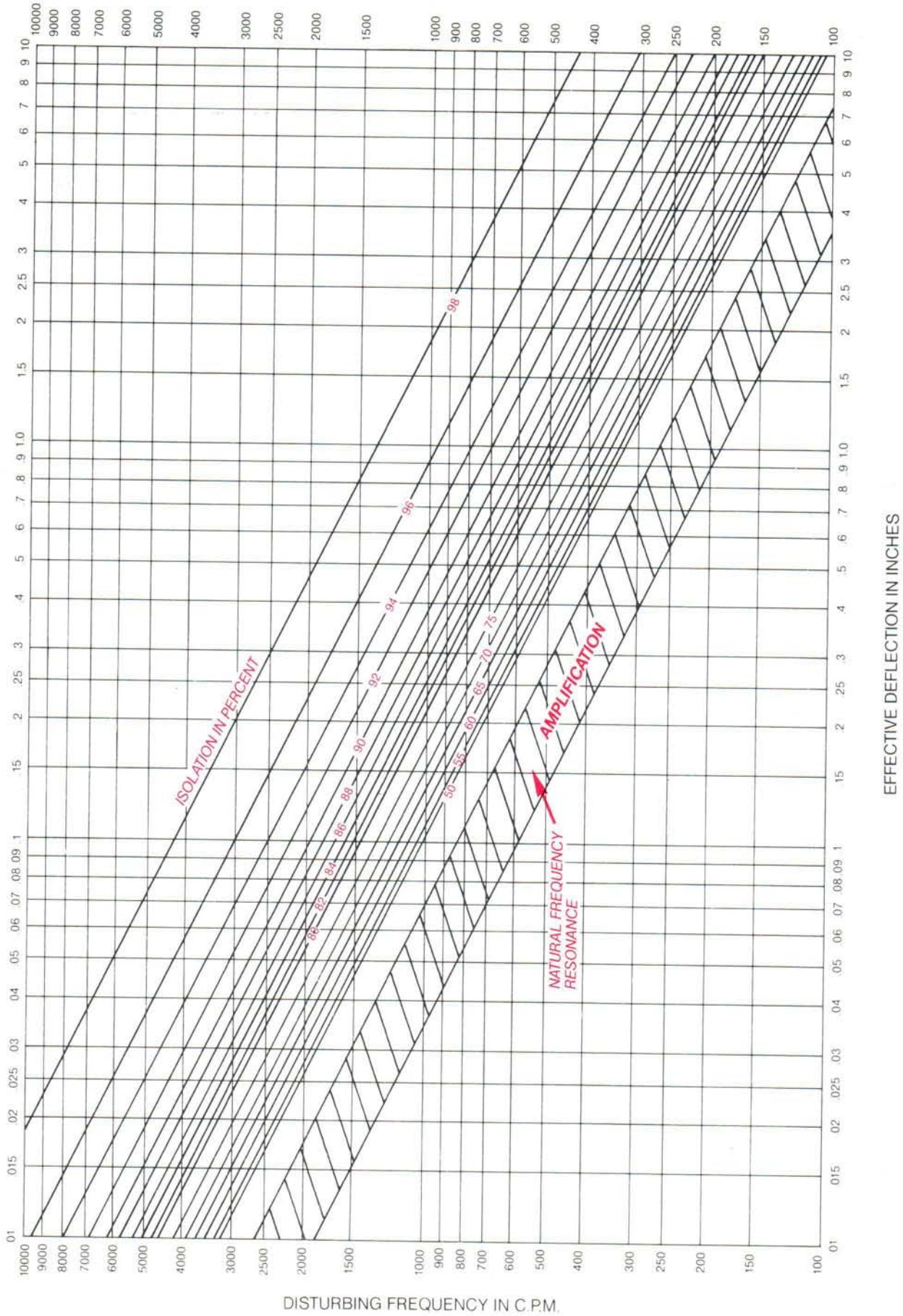
3. The amount of "Effective Deflection" required for any degree of isolation over a wide range of forced frequencies can be determined by referring to Chart No. 1. Notice that low frequency disturbances require much more "Effective Deflection" than higher frequency disturbances for the same degree of isolation.

In general, damping can be ignored when considering mountings in this catalog, so that Chart No. 1 can be used correctly. Dry friction damping due to a constant normal force on a friction surface will reduce amplitude without affecting the System Natural Frequency. Visco-elastic damping will increase the spring rate and increase the System Natural Frequency. While normally undesirable, the Amplitude of Vibration at resonance will decrease. Normally a mounting system for constant state vibration should be designed with the minimum possible damping. An exception to this is when a unit must, because of available power or basic design,

accelerate slowly through a critical speed (a speed at which the mounted system is at resonance). In this case, damping can be used to limit peak amplitudes during momentary periods of resonance. The same is true of machines which decelerate slowly through critical speeds on shut-down. In a system where the problem is a repeated disturbance, or shock, with a relatively long cycle time, it is usually advantageous to include enough damping to have the mounted machine back at rest before the next disturbance occurs.

The meaning of the term "Effective Deflection" is best explained by a graph such as Chart No. 2. Earlier it was explained that the natural frequency of a mounting system is a function of spring rate, or suspension stiffness (the deflection of the mountings under the weight of the mounted machine is used as a measure of stiffness). It is obvious that part "A", on Chart No. 2, has a constant rate, or stiffness, in this load range. It is equally obvious that part "B" is a part with a rate, or stiffness, that is increasing rapidly when it is loaded over 100 pounds. Both parts have been deflected .125" under a load of 325 pounds, but the spring rate

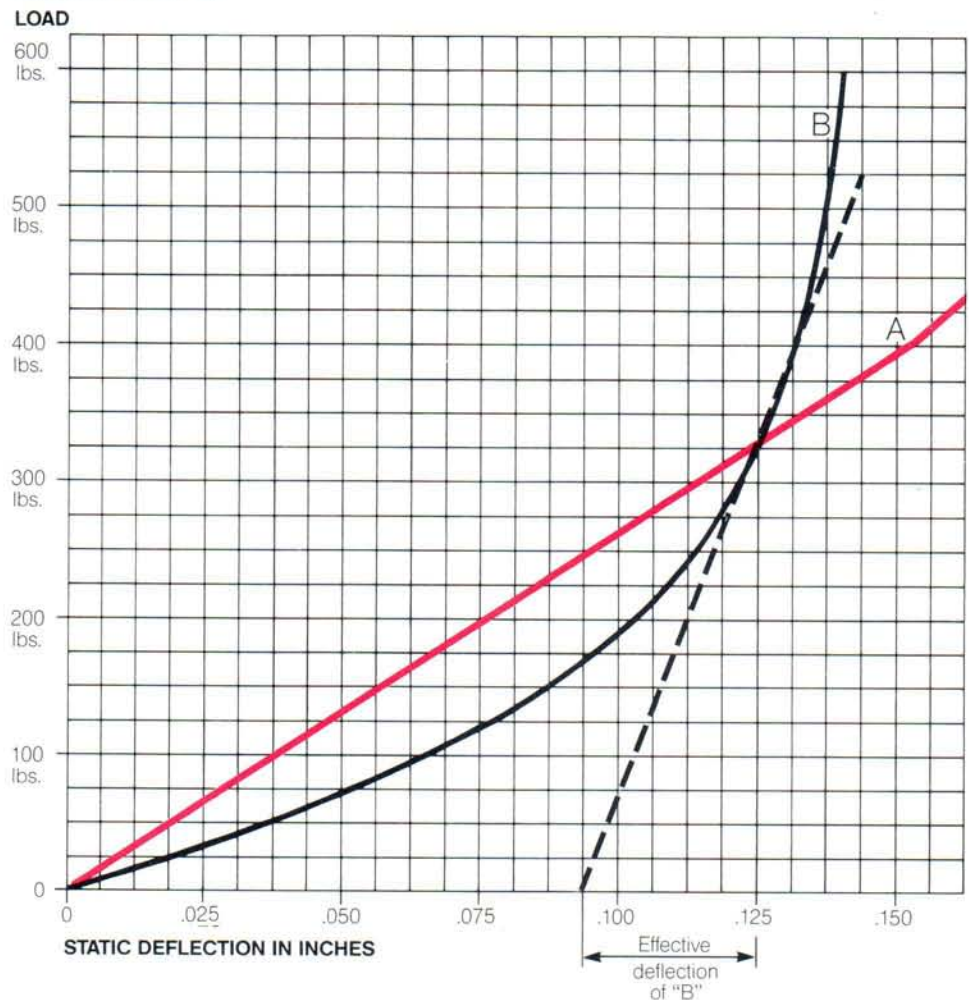
# Vibration Isolation Chart No. 1



of part "B" at this load is much greater than that of part "A". The "Effective Deflection" is the load at a specific point on a load-deflection curve divided by the spring rate (or slope of the curve) at that point. Graphically the "Effective Deflection" of a part under a specific load can be obtained by drawing a line tangent to the curve at the point in question (see broken line on Chart No. 2) and extending the tangent line to the deflection axis of the graph. The "Effective Deflection" is then read from the deflection scale, but the intersection of the tangent line and the deflection axis is taken as an adjusted zero on the scale. To put it another way, the "Effective Deflection" is the indicated static deflection due to load minus an amount of deflection as indicated at the intersection of the tangent line and the deflection scale.

In this hypothetical case, part "A" has both a static deflection and "Effective Deflection" which is .125" under load. If the disturbing frequency is 2000 C.P.M., referring to Chart No. 1 shows that this mount will give approximately 92% isolation. Mount "B" has a static deflection under load of .125", but the "Effective Deflection" is only .031". In this case, if the disturbing frequency is 2000 C.P.M., only 60% isolation is achieved. Obviously, using the static deflection of a mounting in determining the

**Chart No. 2**



degree of isolation from Chart No. 1 is valid only when the load-deflection curve is almost straight up to the loading in question. Since all rubber mounts, except simple shear parts, have a load-deflection curve resembling that of part "B", in Chart No. 2, it is important to remember that if you overload a typical rubber mounting into the rapidly rising rate part of its curve, you have decreased the mountings' effectiveness.

In shock protection type suspensions, the limiting factor is normally the amount of freedom that can be allowed for displacement of the protected mechanism. The more the mechanism can move under impact, or shock, the less will be the forces imposed on the mechanism by the mountings. Normally, such suspensions have a built-in rising

rate to permit low initial resistance to motion followed by an increasing rate (stiffness) to snub the mass to a stop at the end of the permitted excursion. Many shock mounting systems also require additional damping (over that inherent in the mountings) to decrease the length of time of free vibration after the shock has occurred. Thus, the system can often be made to be at rest before another shock might normally occur. The recoil mechanism of artillery is a good example of a highly damped shock mounting. This is an extreme case, of course, in which a system is said to be "Critically Damped." That is, no vibratory oscillation (free vibration) is permitted after the initial displacement of the system. In normal industrial applications, much less damping is employed. Where excursion space is limited, break-away, high constant rate systems are required for maximum energy absorption. Such systems require specialized design studies.

### **Mass Damping**

Going back to Chart No. 1, we can see that under some conditions the use of a resilient mounting can make a system worse (amplification at resonance)

rather than improve it. Where the disturbing frequency is so low that it is impractical to provide a sufficiently low spring rate, or the use of such a system would introduce stability problems, we must resort to "Mass Damping." Likewise, in the case where large amplitudes, or excursions, of the mounted machine cannot be permitted to isolate low frequency disturbances, one must resort to "Mass Damping." This system in its simplest form is that in which the vibrating machine, or the part under-going shock, is firmly attached to a foundation whose mass is very large in relation to the mass of the vibrating mass. A familiar example of this principle is that of a firearm. A 30-06 rifle weighing 9 to 10 pounds can be fired repeatedly with little discomfort due to recoil, but the same caliber rifle weighing 6 pounds delivers a punishing blow to the shooter's shoulder.

Low cyclic rate, constant state, vibrations can often be isolated from surrounding structures by a combination of "Mass Damping" and resilient suspension. An example is a large commercial air-conditioner with a degree of unbalance in low speed fans that cannot induce any appreciable amplitude in the mass of this large unit. In this case, standard V.I.P. Corp. parts are placed under the whole unit to act simply as

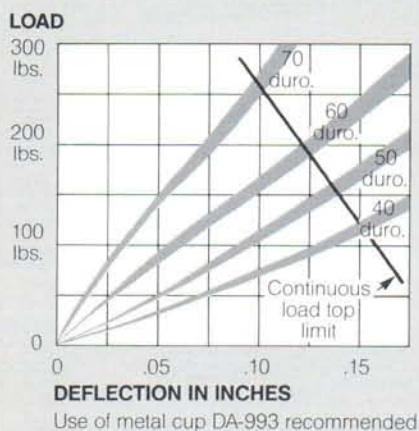
noise filters. It must be understood that panels, or other structural parts, of such a machine cannot have a natural frequency that is near the frequency of the internal disturbance if such a system is to be successful.

The present line of V.I.P. Corp. mountings will not provide more than .200" of effective deflection within their normal load range. Thus, unless we stack them one upon another, which is seldom practical beyond a double unit, we should not try to use catalog parts to isolate disturbing frequencies lower than 870 C.P.M. for a single unit or 620 C.P.M. for a double unit. Notice in Chart No. 1 that at these disturbing frequencies an isolation of only 70% is achieved which, in many installations, would not be satisfactory. Where greater effective deflections are needed, V.I.P. - Corp. special springs may be applicable.

# Machinery Mounts and Rebounds

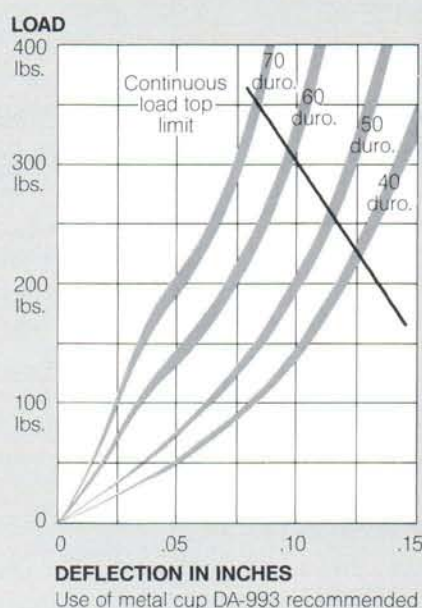
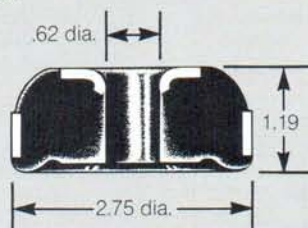
## CA-368 No. 1

When ordering specify:  
Part No. CA-368 No. 1 and durometer  
hardness



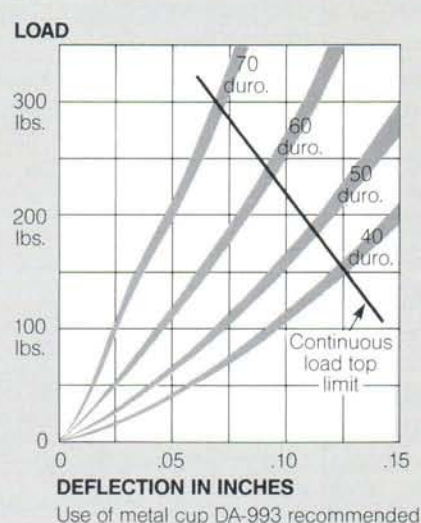
## CA-368 No. 2

When ordering specify:  
Part No. CA-368 No. 2 and durometer  
hardness



## CA-368 No. 3

When ordering specify:  
Part No. CA-368 No. 3 and durometer  
hardness



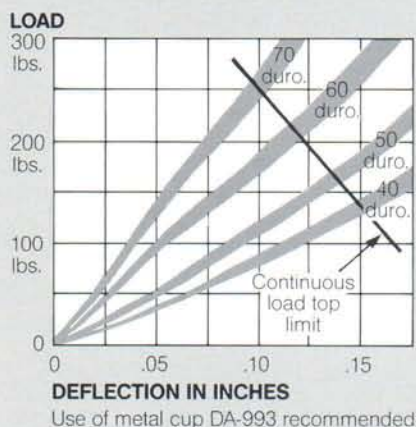
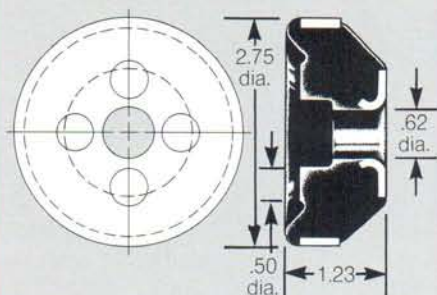
These mountings should be used in a manner similar to the typical installations as depicted on sheet titled "Application of Type CA-368 Machinery Mountings." They may be used in conjunction with rebound mountings, type CA-368 No. 6, 7, or 8, in pairs, or in combination with any CA-368 mounting. This unit restricts the free movement of the machine to be isolated, to some extent, which is very desirable in some installations.

Care must be taken when making any installation to see that the nut is not drawn too tightly as this would put too much pre-compression on both the mounting and the rebound unit, and, as a result, the set-up will not function properly. The use of a shoulder bolt is desirable to prevent an excess of initial compression.

Use of metal cup DA-993 recommended.

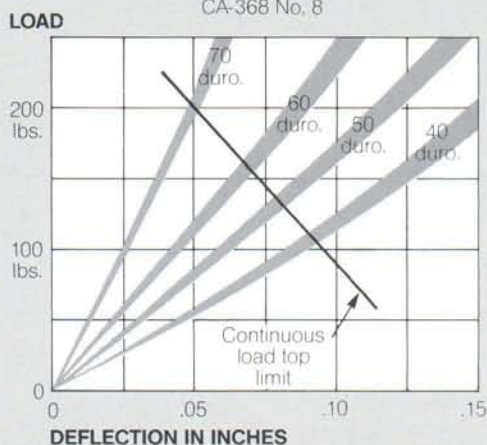
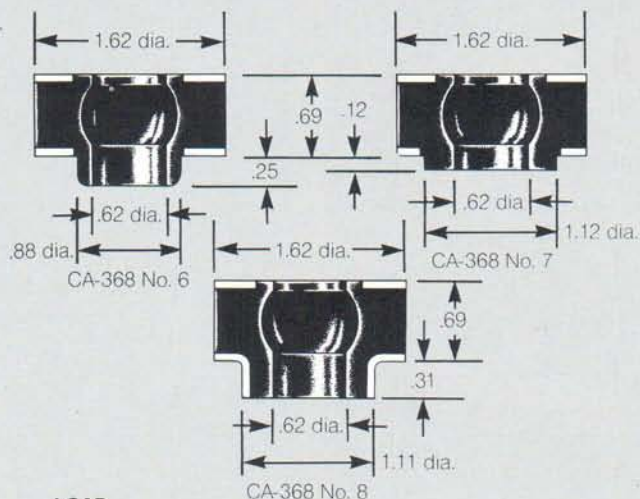
## CA-368 No. 5

When ordering specify:  
Part No. CA-368 No. 5 and durometer hardness



## CA-368 No. 6, 7 and 8

When ordering specify:  
Part No. CA-368 No. 6, 7 or 8 and durometer hardness



These units were specifically designed to be used in conjunction with the CA-368 No. 1, 2, 3, or 5 mountings as depicted on the sheet titled "Application of Type CA-368 Machinery Mountings." The rebound unit is used to limit the movement of the machine on the rebound which is caused by the shock or vibration. Care must be taken when making any installation to see that the nut is not drawn too tightly as this would put too

much pre-compression on both the mounting and the rebound unit, and, as a result, the set up will not function properly.

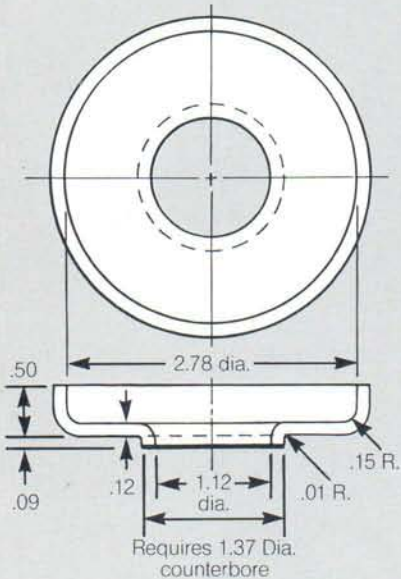
In certain instances it might be desirable to use the rebound unit itself as a mounting or vibration dampener. (This application is also shown on the sheet titled "Application of Type CA-368 Machinery Mountings").

Use of metal cup DA-993 recommended.

# Machinery Mounts and Rebounds

## DA-993

### METAL CUP

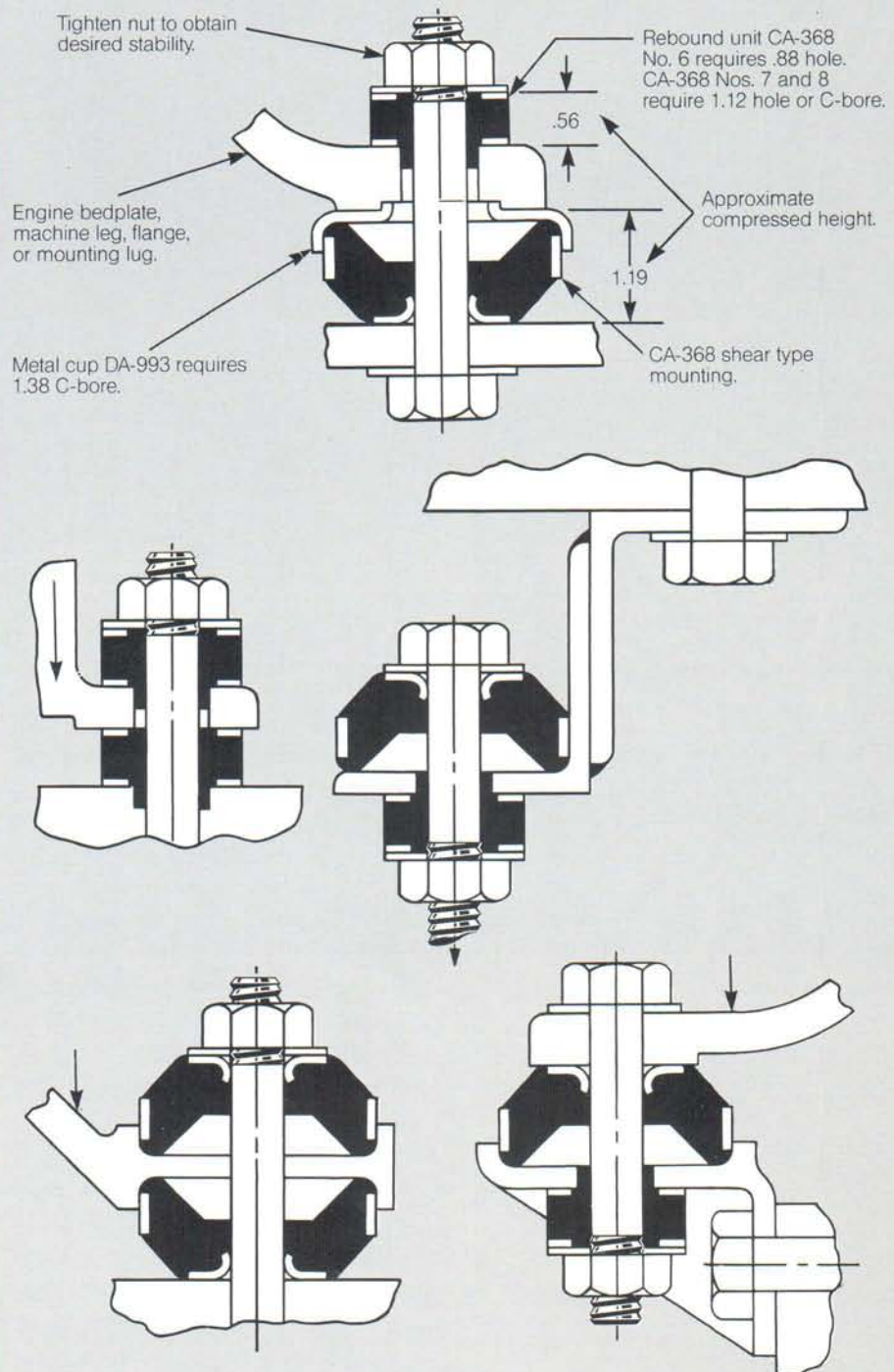


This metal cup was designed for use with CA-368 machinery mountings.

It should be employed as depicted on sheet titled, "Application of CA-368 Machinery Mountings."

It may be purchased separately or as a part of a complete unit, which includes the desired CA-368 Mounting, CA-368 Rebound, and the DA-993 Metal Cup.

## Application of Type CA-368 Machinery Mountings



## CA-244 No. 5, CA-244 No. 7

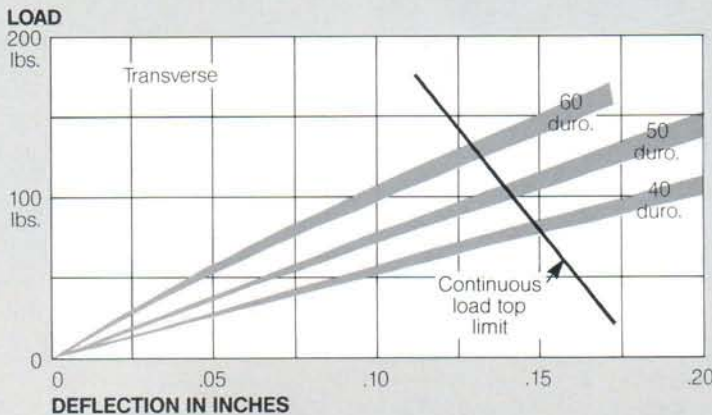
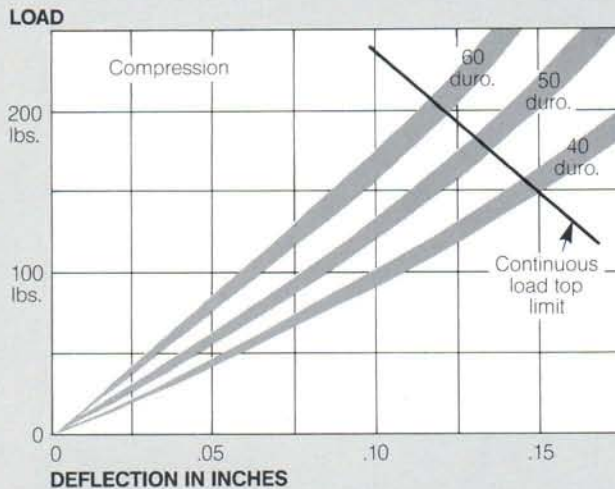
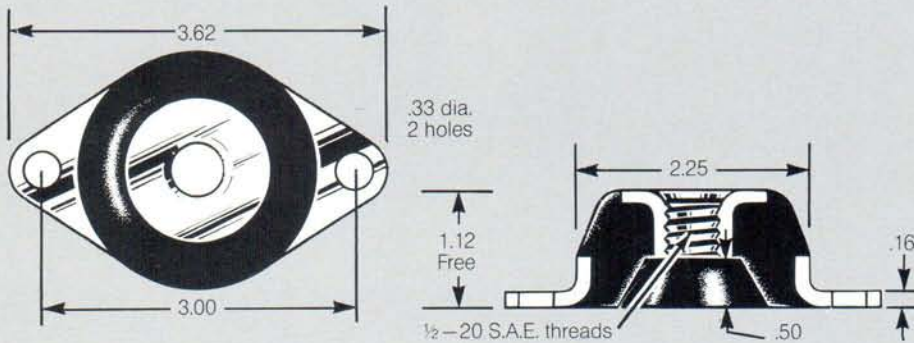
When ordering specify:

Part No. CA-244, No. 5 and durometer hardness

Part No. CA-244, No. 7 and durometer hardness

CA-244 No. 5 has  $\frac{1}{2}$ -20 S.A.E. threads

CA-244 No. 7 has  $\frac{3}{8}$ -16 S.A.E. threads



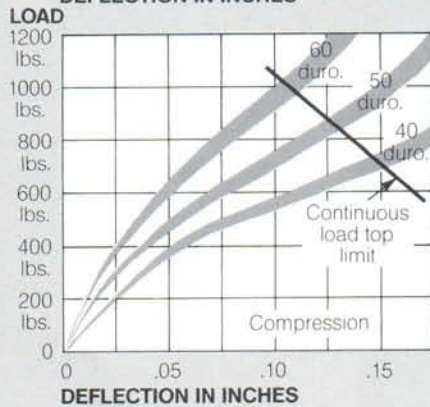
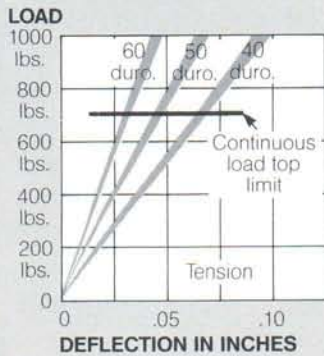
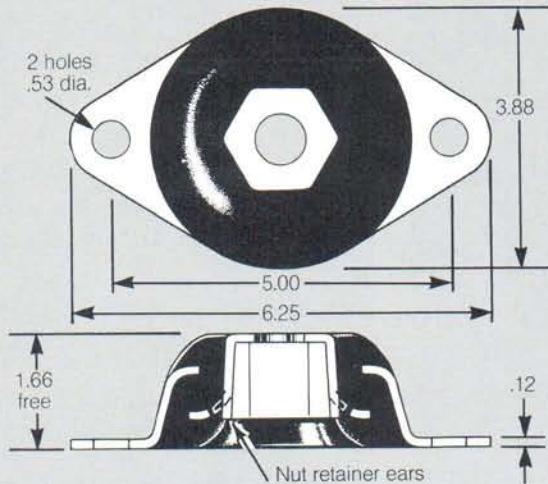
This mounting was designed for relatively light compressive loads in the range of 100 to 400 pounds. It is composed of a ring-like stamping, with two ears suitable for anchoring mounting, and an upper metal insert which is tapped to receive a standard  $\frac{1}{2}$ "-20 bolt. The ring-like stamping and the upper metal insert are displaced one from the other by a layer of rubber. Both the stamping and insert are vulcanized to the rubber.

The mounting is small, compact and easy to install. It can be fastened to the floor, or other base, with bolts through the two ears of the metal stamping. The machine to be isolated may be set directly on the mountings and fastened to them by screwing a  $\frac{1}{2}$ " bolt directly into the upper metal insert of the mounting.

# Machinery Mounts and Rebounds

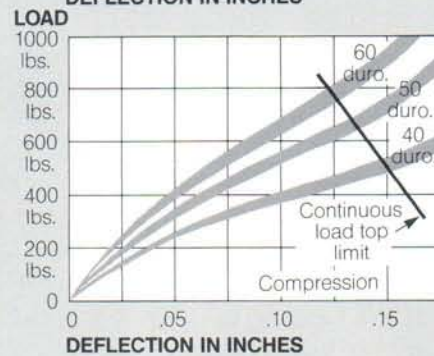
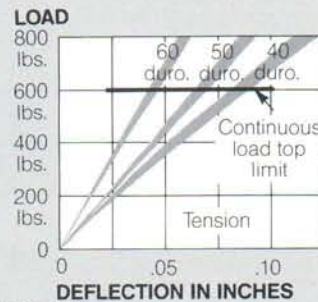
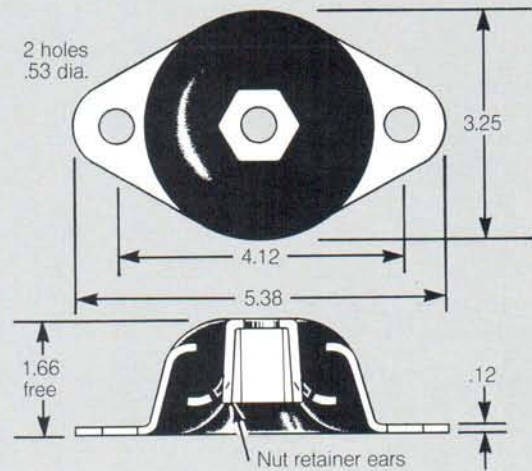
## CA-1290

When ordering specify:  
Type CA-1290, bolt size and durometer hardness



## CA-1595

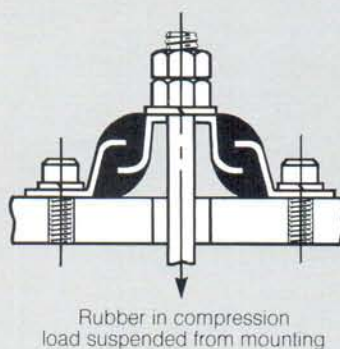
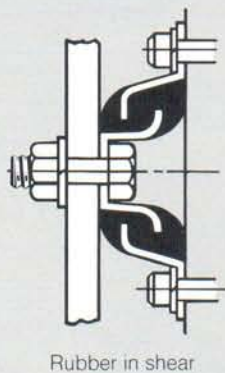
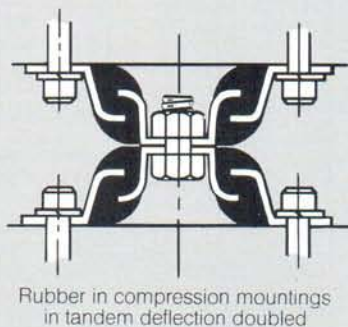
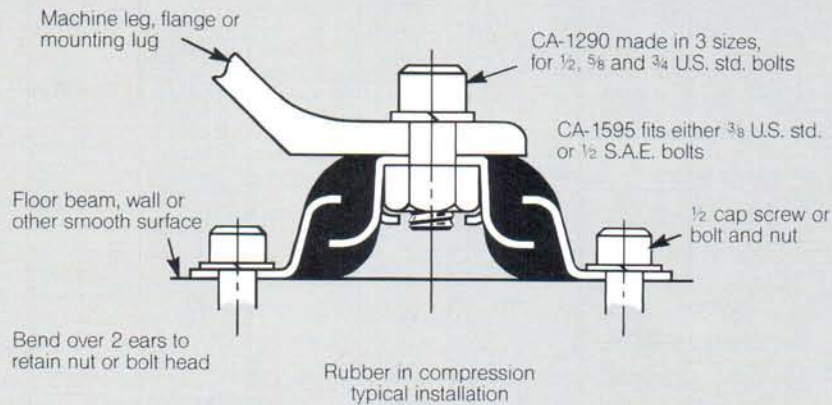
When ordering specify:  
Type CA-1595, bolt size and durometer hardness



Available for use with the following sizes of bolts:  
 $\frac{1}{2}$ ,  $\frac{5}{8}$ , or  $\frac{3}{4}$  UNC.

This mounting will accommodate either a  $\frac{1}{2}$  dia. UNC bolt head or a  $\frac{7}{16}$  dia. UNC heavy hex nut.

## Applications of Type CA-1290 and CA-1595



### The chief features of this mounting are:

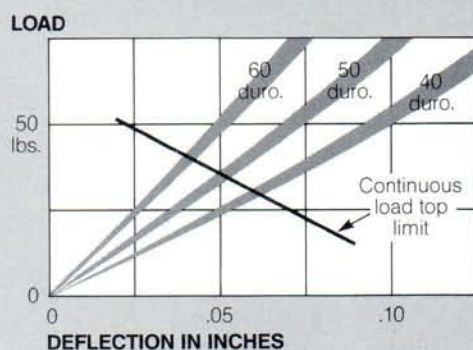
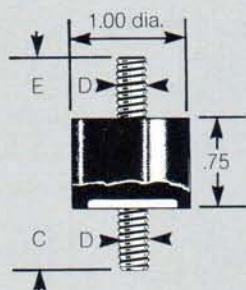
1. Ease of installation—the underside of the center insert is a socket, adapted to receive a standard hexagon nut, and is provided with two ears which can be bent over with a cold chisel to retain the nut in place, thereby allowing the machine to be placed on the mounting and a bolt or cap screw inserted from the top.

2. Factor of safety—the telescopic inserts provide considerable stability in all directions in a horizontal plane. Also, because of the vertically interlocking flanges, a factor of safety is provided such that unforeseen dynamic forces or complete disintegration of the rubber by fire etc., will not permit the machine to topple from its foundation.

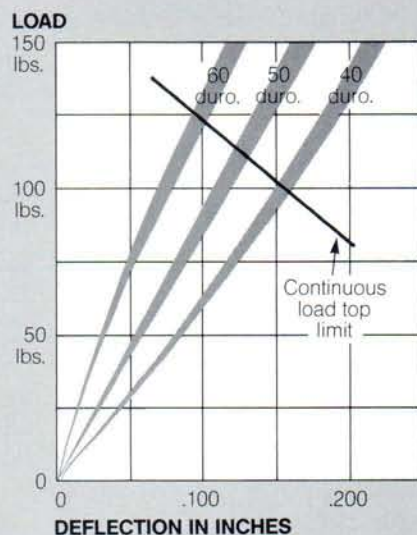
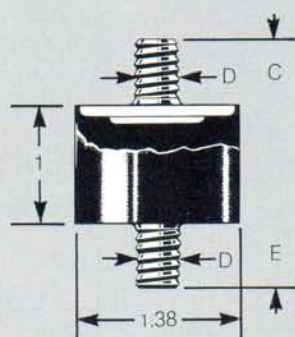
# Small Motor and Instrument Mounts

## Cushion Connectors

TYPE I



HEAVY DUTY



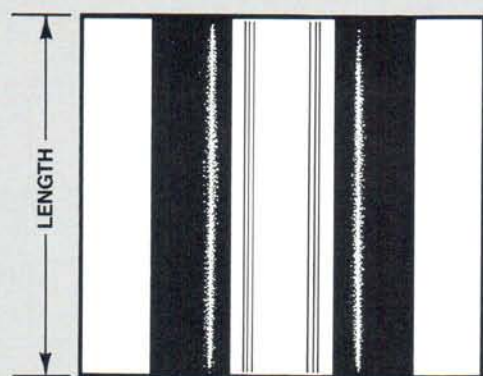
The mountings shown are designed for carrying light loads in compression. Under certain conditions shear or tension loadings may be contemplated, but the ratings diminish in the latter applications.

### Bolt

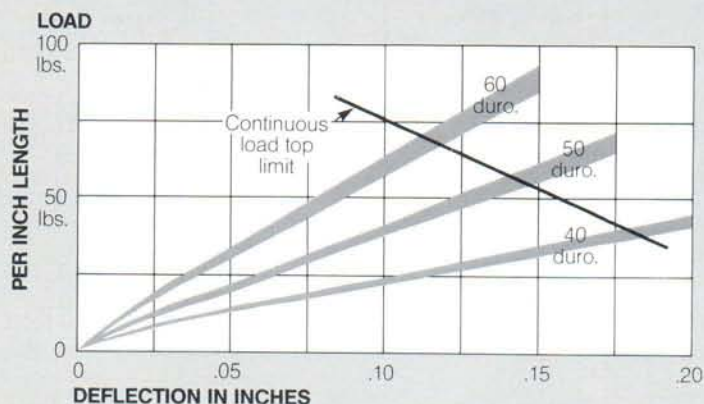
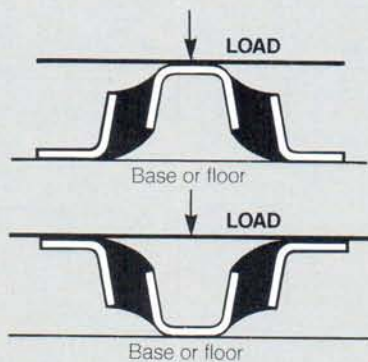
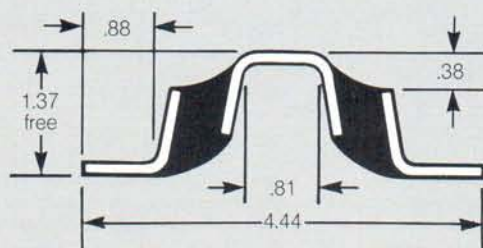
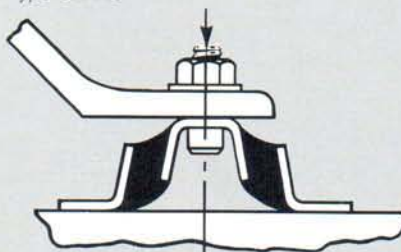
Diameter D	Length C & E
10-24	3/4
1/4-20	3/4
1/4-20	1 1/2
5/16-18	3/4
5/16-18	1 1/2
3/8-16	3/4
3/8-16	1 1/2

When ordering specify: Style and type, diameter and length of bolt.

## CA-148



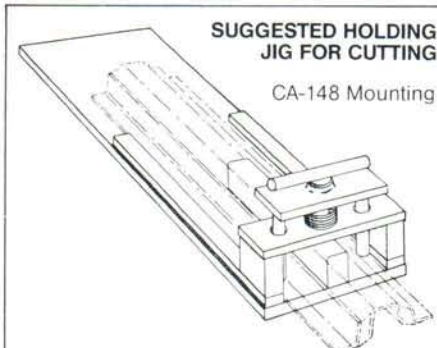
Industrial vibration dampener  
Type CA-148



The V.I.P. Corp. Industrial Vibration Dampener, CA-148 is a very versatile mounting, well adapted for a wide variety of industrial purposes. This mount is available in standard 36 inch lengths, or you may cut the CA-148 to fit your requirements. Other lengths can be furnished on special order.

Shown are two suggested methods of installation of this mounting.

Selection of the proper length for a given durometer hardness may be quickly made from the table.

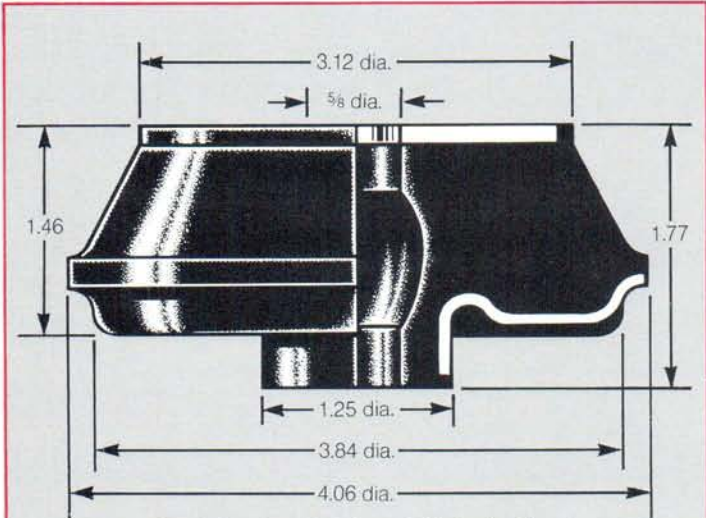


The CA-148 Mounting is rather difficult to cut by hand or in a power saw without a jig to hold the steel inserts solid. Pictured above is a jig which has been designed and used with satisfactory results.

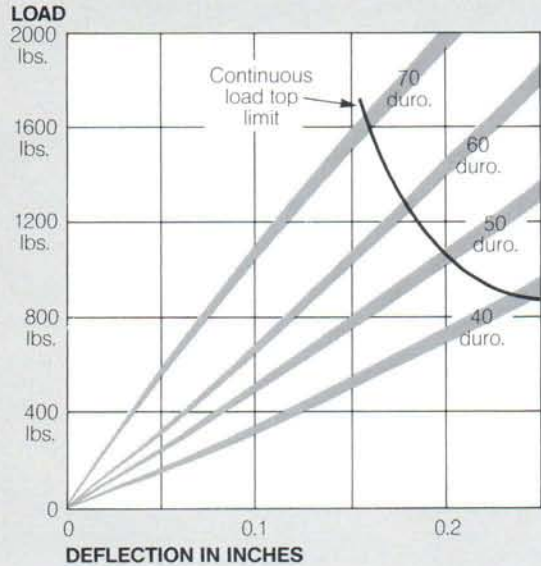
When cutting the mounting by hand, the jig may be clamped in a standard bench vise and the mounting clamped in the jig, leaving the portion to be cut off extended as shown above in dot-dash lines. If many pieces are to be cut, a standard power hack saw can be used. The jig may be clamped in the vise of the power saw and the mounting clamped in the jig as explained above. Care must be taken when using a power saw to control the heat generated, by use of ample water or cooling solution, so that the temperature does not rise high enough to affect the rubber to metal bond of the mounting.

# Multi Purpose Vibration Isolators

## NBD-320



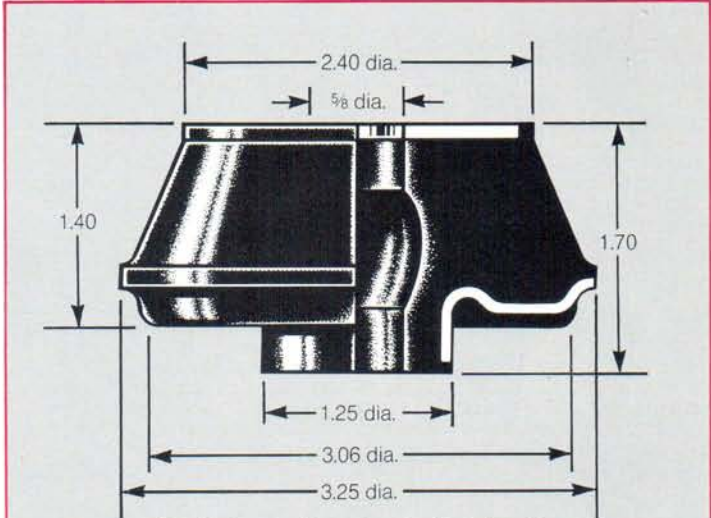
Use 5/8 dia. shoulder bolts or 1/2 dia. bolts with 1/16 wall tubular pre-load spacer.



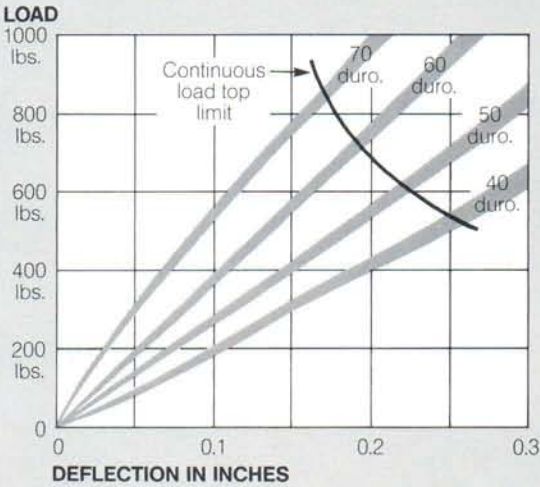
The NBD-320 is normally used in conjunction with rebound NDD-455.

See application proposal pages for other suggested mounting configurations.

## NBD-321



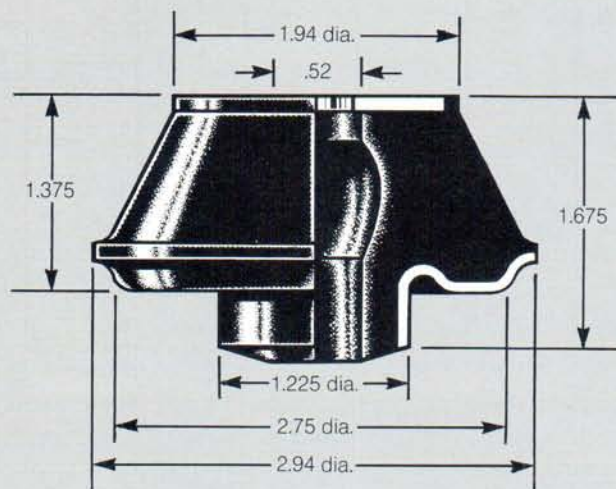
Use 5/8 dia. shoulder bolts or 1/2 dia. bolts with 1/16 wall tubular pre-load spacer.



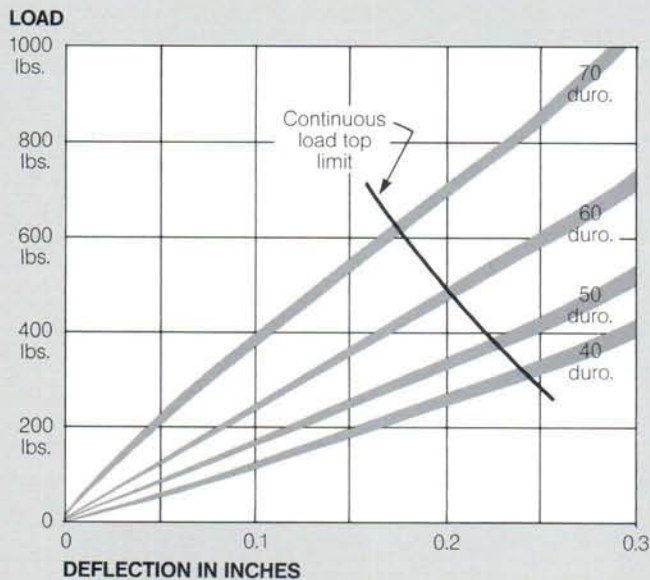
The NBD-321 is normally used in conjunction with rebound NDD-455.

See application proposal pages for other suggested mounting configurations.

## NBD-322



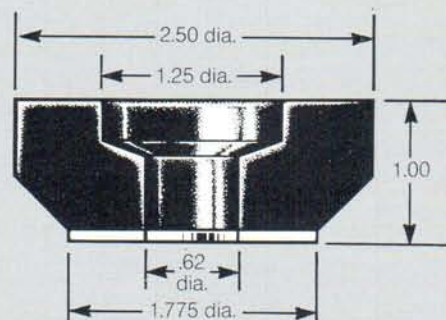
Use  $\frac{5}{8}$  dia. shoulder bolts or  $\frac{1}{2}$  dia. bolts with  $\frac{1}{16}$  wall tubular pre-load spacer.



The NBD-322 is normally used in conjunction with rebound NDD-456.

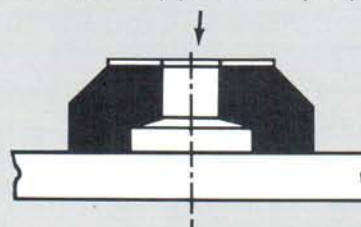
See application proposal pages for other suggested mounting configurations.

## NDD-455



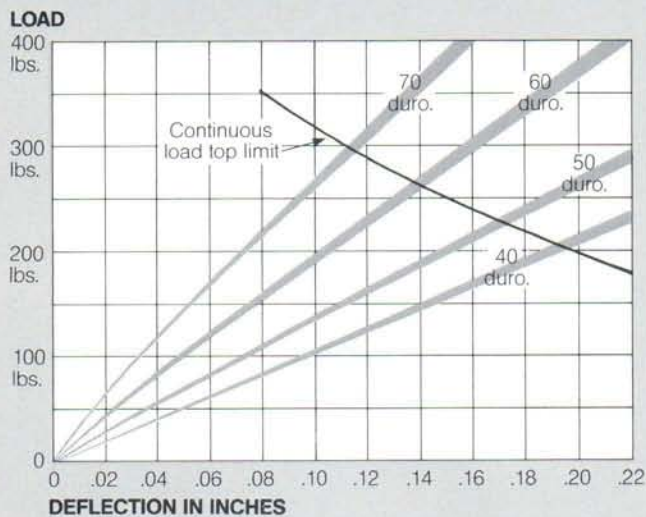
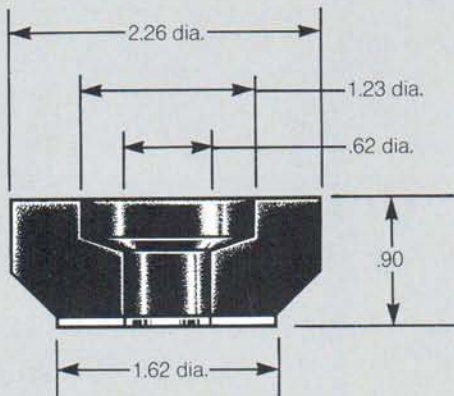
The NDD-455 is the normal rebound for NBD-320 and NBD-321 mountings.

NDD-455 may be used as a mounting in itself as illustrated on the application proposal pages.



# Multi Purpose Vibration Isolators

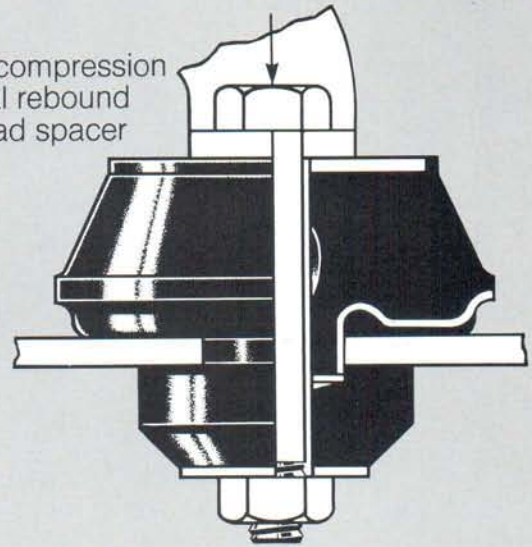
## NDD-456



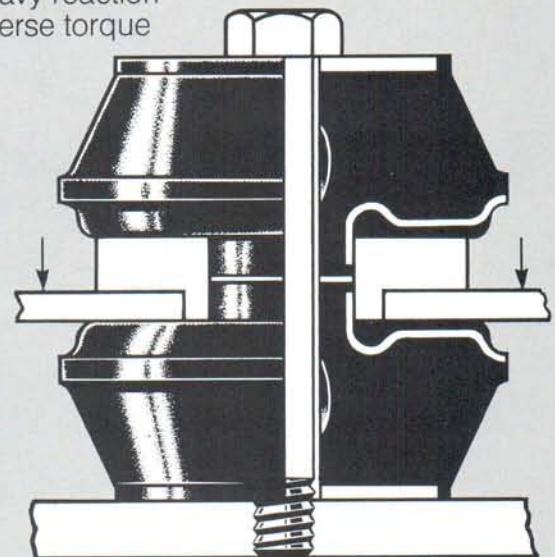
The NDD-456 is the normal rebound for the NBD-322 mounting.  
NDD-456 may be used as a mounting in itself as illustrated at right.

## Typical Applications...

No. 1 compression  
normal rebound  
pre-load spacer

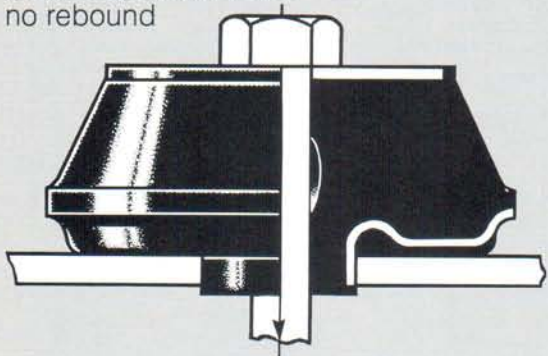


No. 2 top-side rebound  
for heavy reaction  
or reverse torque

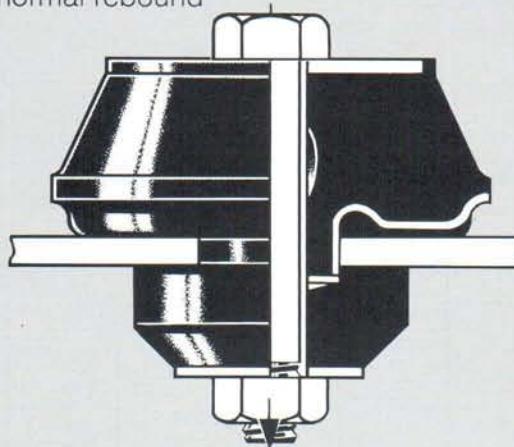


## Type NBD-320, 321, 322, NDD-455 and NDD-456

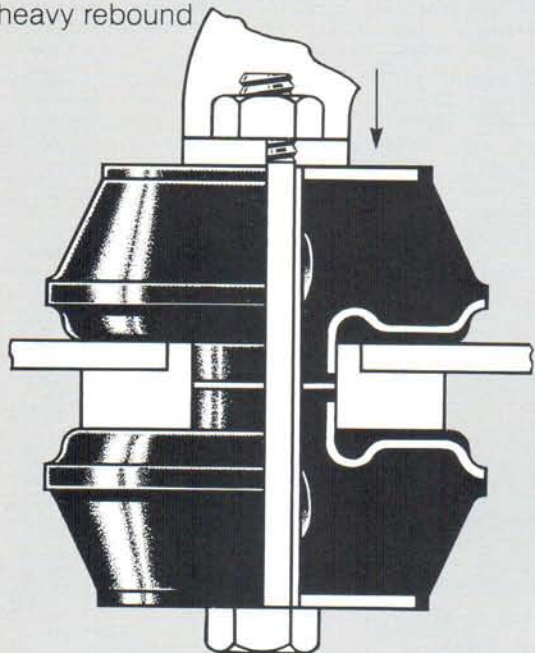
No. 3 load suspended  
no rebound



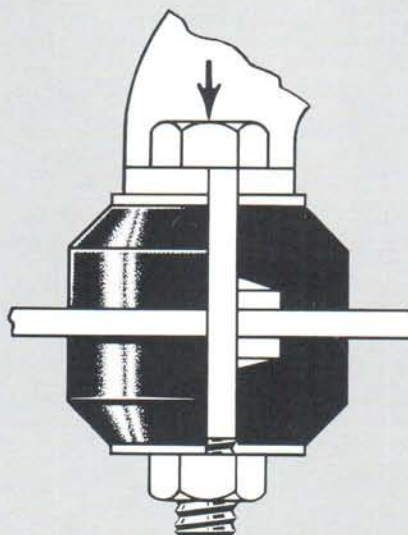
No. 5 load suspended  
normal rebound



No. 4 back side  
heavy rebound

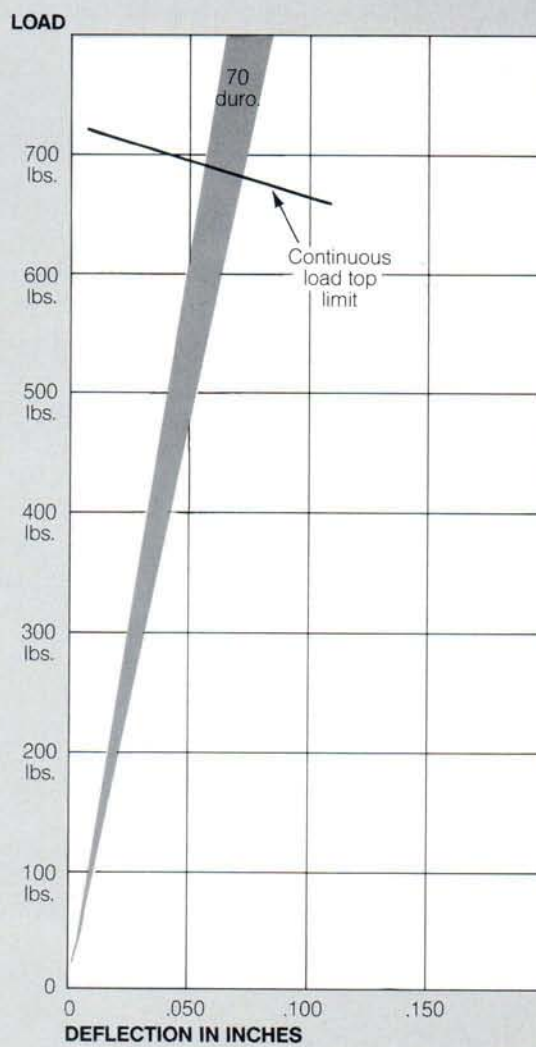
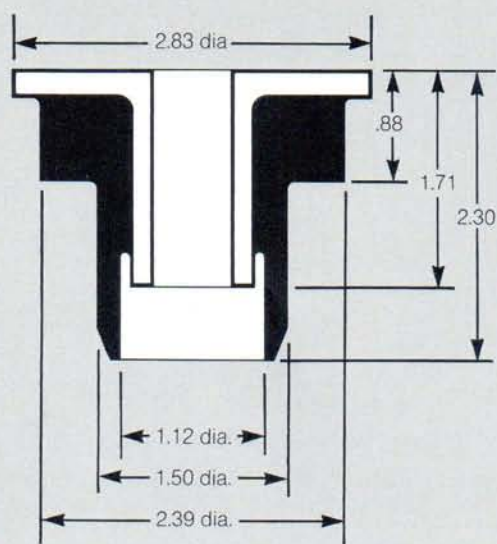
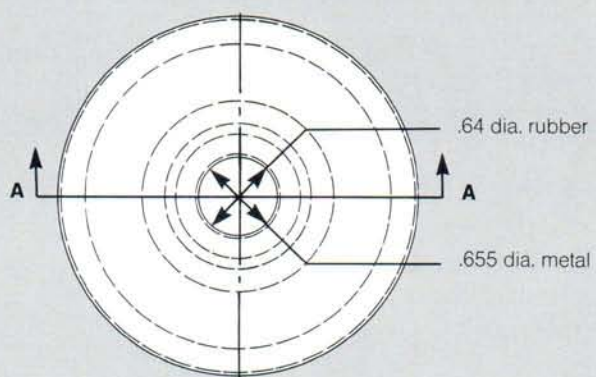


No. 6 Part NDD-455  
and NDD-456 rebounds  
used as primary mounting system



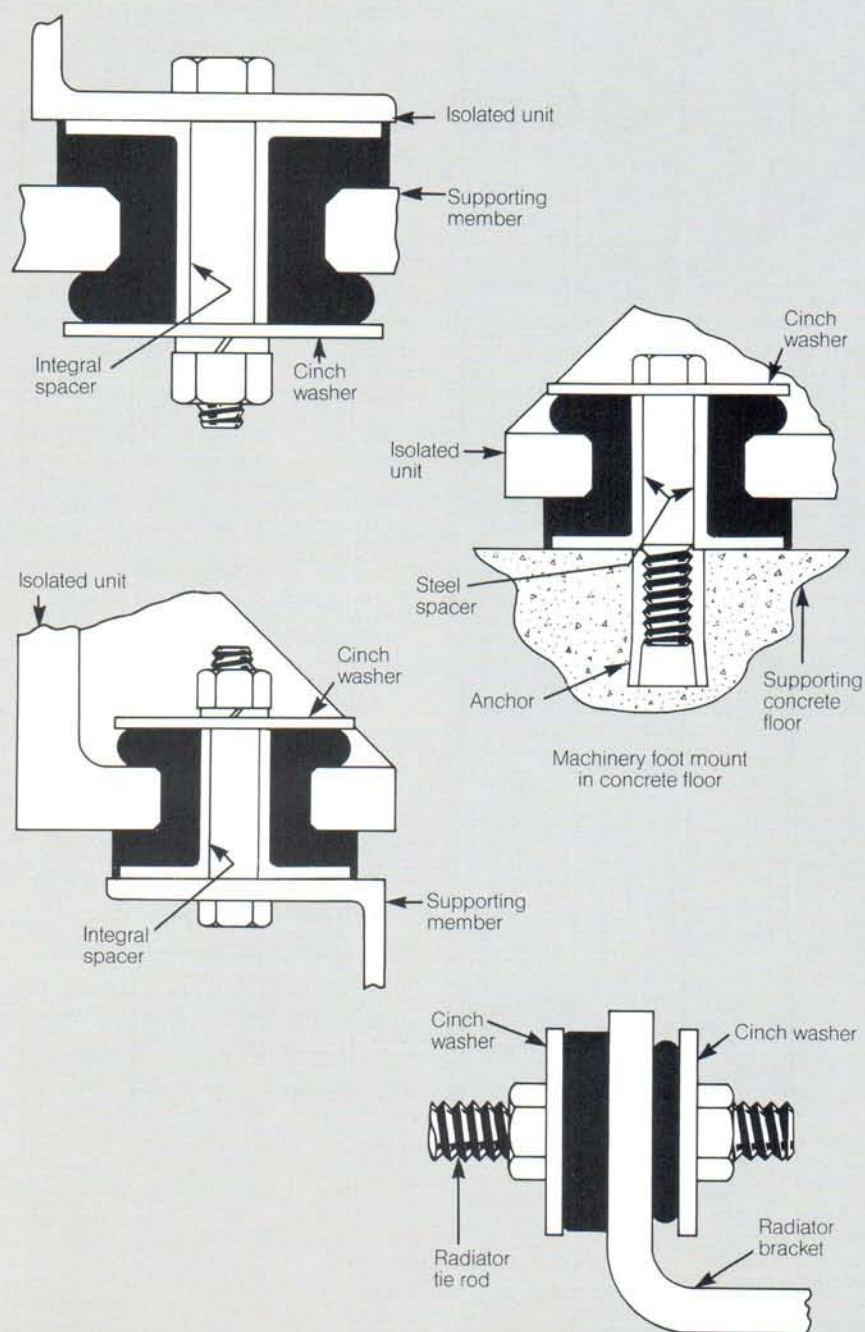
# Multi Purpose Vibration Isolators

## NBD-6310 "T" Type Mount



This curve represents load-deflection in an assembled state. Durometer may vary to meet load-deflection curve.

## Typical Applications of "T" Type Mountings



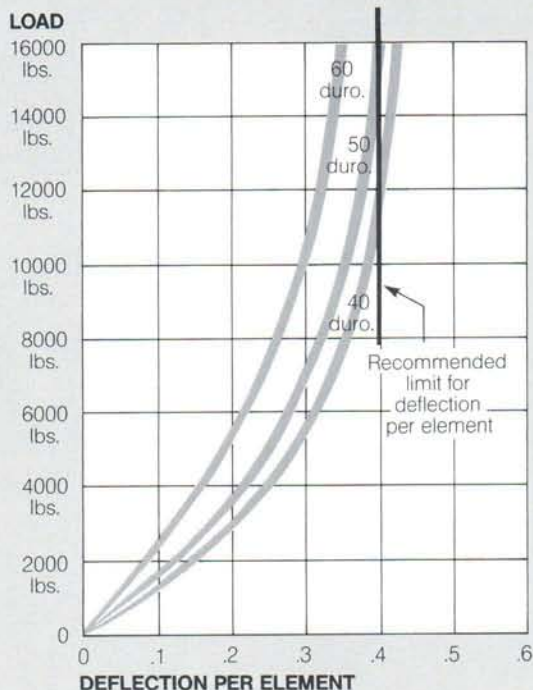
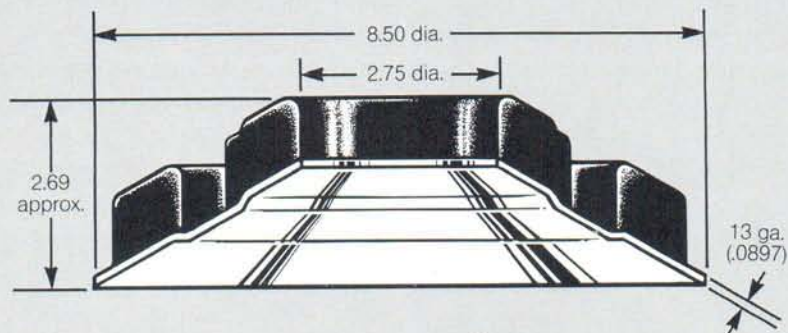
The load rating can be custom designed to fit your specific isolator requirements. One piece construction eliminates need for additional rebound mounting. "T" type mounts provide high frequency vibration isolation, shock control, help reduce noise, and can accommodate relative motion. Typical applications include engines, radiators, vehicle cabs, and heavy duty vehicles (both on and off-highway).

Should your particular design requirements involve low or high temperatures, oil base or other active solvents, V.I.P. Corp's special elastomeric formulations are available for a wide variety of operating conditions.

# Heavy Duty Spring Disc

## BA-2691

When ordering specify:  
Part No. BA-2691 and durometer hardness



This spring disc was designed to replace heavy steel springs, such as those used in the trucks of the modern day railroad coach. However, it is felt that it may lend itself to many other applications in industry where a rubber spring is more desirable than steel. It is contemplated that in the near future we will produce parts of similar design which will carry loads up to 30,000 pounds.

These discs may be stacked one on the other in order to obtain the length of spring and the deflection which is desired. When used in this manner, the vertical height of each disc is approximately  $1\frac{1}{8}$ " when unloaded. A center rod may be used for stability if needed.

Where a stack preload is provided by a bolt, or rod passing through the center of the stack a maximum rod diameter of 1.75 diameter is recommended. This clearance is required to prevent interference due to rubber distortion under high peak loads.

These spring discs are not carried in stock but can be manufactured to order in the durometer hardness specified.