

Precautions with Marsh Mellow™ Springs

Temperature

Our standard industrial Marsh Mellow™ springs have an operating range of -40°F to 135°F (-40°C to 57°C). The upper limit is defined by the actual rubber temperature during operation. High frequency inputs or large deflections will cause the rubber temperature to increase.

Design Envelope

Adequate clearance should be provided around the Marsh Mellow spring to prevent rubbing of the outer cover. The outside diameter of the spring at various heights is listed in the table of dynamic characteristics on each individual data page.

Contaminates

Shielding should be used to protect the rubber from exposure to hot metal, petroleum base fluids, acids, etc. Please consult Firestone Industrial Products if you wish to know how the spring will withstand a specific contaminate. (For liquids such as acids, it is important to know both concentration and temperature.)

Storage

The best storage environment is a dark, dry area at normal room temperature.

Percent Compression

The general compression range of a Marsh Mellow spring is 15% to 27%, however this value may vary somewhat among springs and applications. Always follow the load ranges and their corresponding compression percentages as shown in the selection guide.

Allowable Stroke

When applying a Marsh Mellow spring, the stroke throughout the range of motion of the machine being isolated must be considered. Delta strain, defined as the ratio of the stroke to the free length, is restricted to less than 7.5%.

Note that a given stroke is typical of vibrating screen types of applications, where the stroke is designed into the system. In other isolation applications, this stroke may not be known. The stroke is typically not excessive in standard isolation applications, but should be considered. Consult Firestone for assistance.

Disturbing Frequency Range

Marsh Mellow springs are suitable for disturbing frequencies in the 800-1200 CPM (13-20Hz) range or medium stroke applications. High frequency, high stroke applications may lead to overheating the Marsh Mellow spring. Low stroke applications, however, are capable of handling higher disturbing frequencies. Please consult Firestone Industrial Products for assistance.

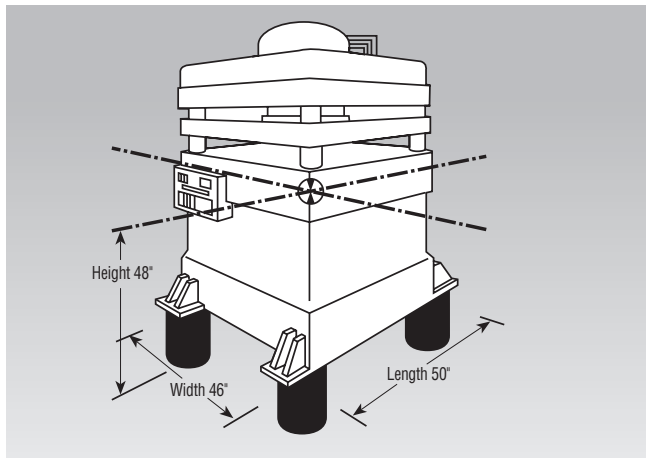
Lateral Stability

The lateral spring rate to load ratio for a Marsh Mellow spring decreases as deflection increases. This is one reason it is important not to exceed the given load capabilities.

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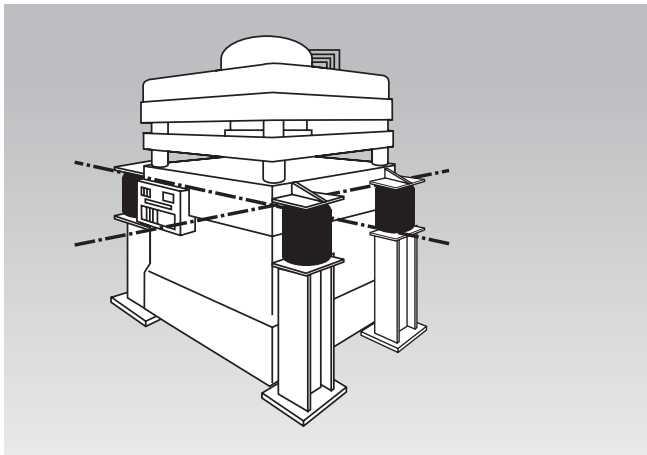
Center of Gravity

A Marsh Mellow™ spring isolation system is inherently soft (easily deflected); therefore, precautions must be taken to insure that the system is stable. First consider the location of the center of gravity (CG). Ideally, Marsh Mellow springs should be located on the same plane (parallel to the ground) as the center of gravity. Where this is not possible, follow this guideline: The distance between the narrowest mounting points should be at least twice the height of the center of gravity.



In the above example, the most narrow distance between two Marsh Mellow springs is 46 inches (117 cm). The height to the CG is 48 inches (122 cm); therefore, this system does not meet our guideline. Two possible solutions would be:

1. Increase the base dimensions to meet our guideline by increasing both the width and length to at least 48 x 2 or 96 inches (122 x 2 or 244 cm).
2. Locate the Marsh Mellow Spring at the CG as shown below.



Startup and Shutdown / Resonance and Amplification

Resonance is the condition where the forced frequency of the vibrating system is equal to the natural frequency of the suspension. When this happens, amplification of movement occurs. If the normal stroke of a vibrating screen, for example, is 5/16 of an inch (8 mm), during startup and shutdown (as the machine goes through resonance), the amplitude of movement will be multiplied. So while the machine is accelerating to normal operating speed and decelerating during shutdown, the stroke may be amplified in the range of 1/2 (12 mm) to 1 1/2 (38 mm) inches. The longer the machine takes to go through resonance (to speed up to, or slow down from full operating speed), the larger the amplitude of movement. Note that in some applications, the addition of viscous or friction dampers may be required to reduce the amplitude of motion during startup and shutdown.

Isolating an Unbalanced Mass

The primary concern in this case is the amplitude of movement. It is dependent on:

1. The ratio of the unbalanced moving mass to the total suspended mass.
2. The ratio of the speed of the unbalanced moving mass (forced frequency) to the natural frequency of the Marsh Mellow spring and supported mass system.

The addition of damping to the isolation system (“shock absorbers”) will reduce the large amplitude of movement experienced during resonance.

If the amplitude of movement is too great, one possible solution would be to add a static inertia base in order to increase the ratio of the total suspended mass to the moving unbalanced mass. A good “rule of thumb” is 10:1, respectively.

See page 10 for additional information.