AB PNEUMATICS™

Performance Under Pressure

# DONUT SPRINGS

## Vibration Isolation Springs

PRODUCT BROCHURE

NOTE: The material in this booklet is intended for guidance only and the information has been produced using AB Pneumatics own testing through research and development. The information is understood to be accurate, but AB Pneumatics cannot accept liability for the failure of a Donut Spring through wrong selection. For specific applications it is recommended to contact the technical department for guidance. The best storage environment for Donut Springs is a dark, dry area at normal room temperature. If you require further technical information regarding the Donut Spring range or the Tension Bands, please refer to the selection guide and data sheets or alternatively contact our technical department technical@abpneumatics.com

# WHY CHOOSE RUBBER DONUT SPRINGS?

**There are many reasons why this type of spring has been chosen for certain applications. Rubber springs have been used for a long time because of the rubbers natural ability to reduce vibration. The Donut Spring uses both rubber and reinforced fabric to carry greater loads while isolating the vibration.**

The alternative to these types of springs are standard steel coil springs which do not provide the same characteristics as rubber springs. The Donut Spring will provide a nearly constant natural frequency with changing loads.

## ADVANTAGES

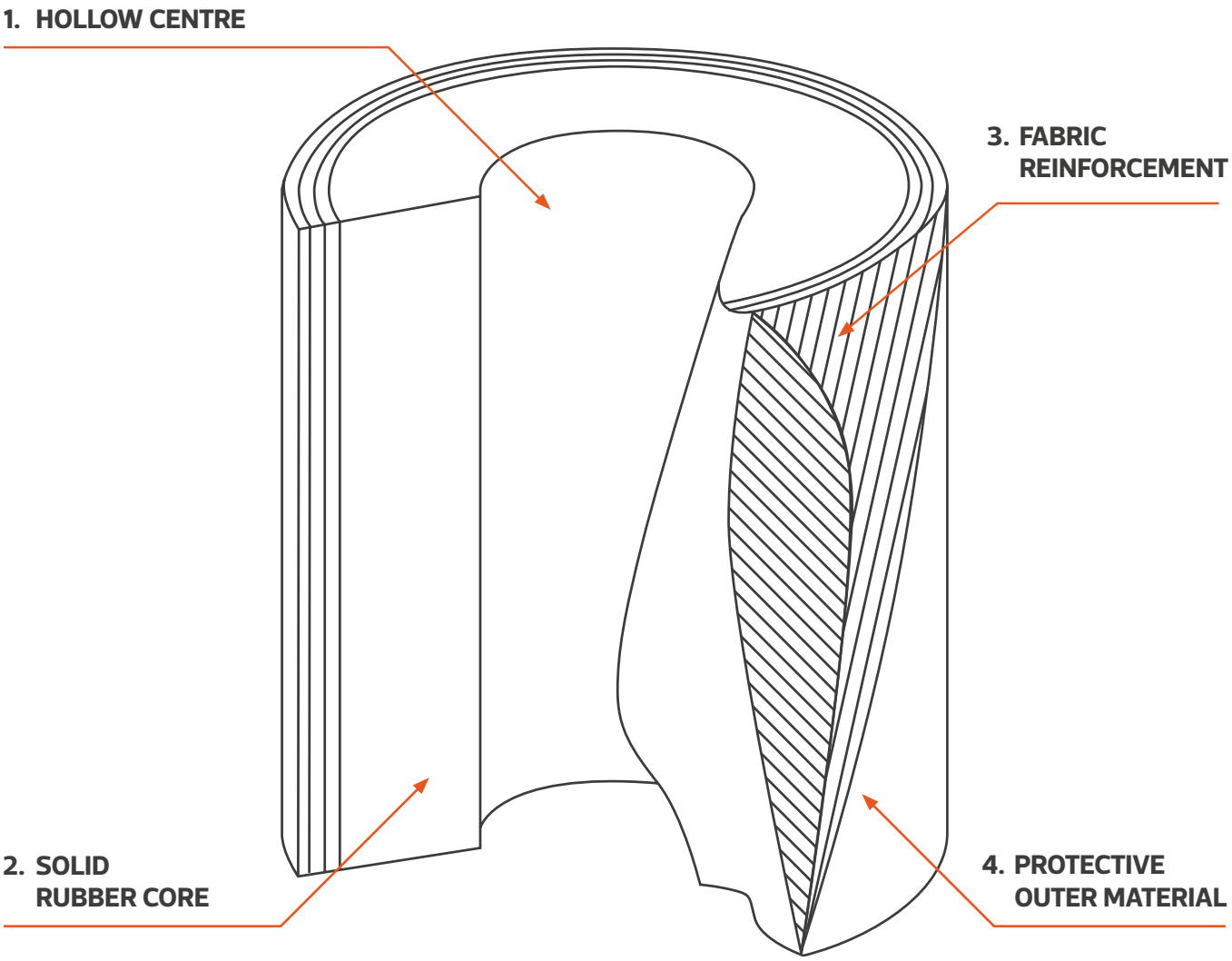
**Some of the Advantages which make the Donut Spring stand out are:**

- Noise levels are reduced dramatically which allows better working conditions for anyone in close proximity to the machine
- The Donut Spring will provide a nearly constant natural frequency even with changing loads, resulting in a consistent level of vibration isolation
- Down time is reduced on a machine as the Donut Spring can still perform even when slight failure has occurred meaning that production is not stopped
- As the spring is made from rubber and fabric it can be more effective and last longer in more corrosive environments
- There are no moving parts in the Donut Spring so they are maintenance free
- Size can be an issue when designing a machine so the range of Donut Springs allows a more compact size of spring to carry greater loads

*If you require further technical information regarding the Donut Spring range, please refer to the selection guide and data sheets.*

# CONSTRUCTION

The hollow central part of the Donut Spring can be produced in a number of sizes that allows for a secure fit when attached to a mounting pin. This is essential in a vibration isolation application to ensure the spring remains in the correct location during use.




The rubber core allows the Donut Spring to naturally reduce vibrations. The physical dimensions for this depends on the application and the required force it has to support.

The fabric reinforcement is made up of layers of bias material and gives the Donut it's unique properties and advantages over steel coil springs. This supports the rubber core and allows the spring to support a higher force. The physical properties of the Spring can be altered by the number of layers of fabric and angle that they are plied.

The outer material adds a layer of protection to the Donuts fabric layers. This gives the outer diameter when unloaded and can be altered depending on the application. This layer can also have a logo or brand image attached were requested.

# SELECTION PROCEDURE FOR VIBRATION ISOLATION APPLICATIONS

**The selection of a Donut Spring is unique to the application, and for known design parameters the 'DONUT SPRING Selection Guide' can be used. For applications were a particular spring is unknown, please request a 'Selection Procedure' questionnaire from AB Pneumatics, or download from our website.**

There are a number of essential design parameters that must be understood before the correct spring is selected. Firstly, an estimation of the maximum and minimum loads that will occur on each spring. The minimum loading can be calculated by knowing the unloaded weight of the machine or screen deck, and dividing by the number of springs required. (For further information contact the OEM or distributor) The maximum loading weight is the unloaded machine weight, plus the weight of material that the machine will carry.

This information can be used along with the selection guide to choose the most suitable Donut Spring. It is recommended to choose a spring that lies mid-range of the maximum and minimum loads. Ideally the spring should not exceed a deflection of 25% free height. The spring itself can support a load deflection of up to 27.5% of it's free height, but the life capacity and natural frequency will be reduced.

For a vibration isolation application, if more than one spring meets the loading criteria then choose the spring with the lower natural frequency. This will allow for a better isolation percentage.

The reference code to each Donut Spring refers to the dimensions of the spring, for example;

**114.050.152 is a 114mm O.D. with an I.D. of 50mm, and a free height of 152mm.**

It is important to take these dimensions, along with the stroke and compressed diameter into account when looking at the design parameters for the spring. This is critical in the installation of the spring where it must have a large enough design envelope to increase in diameter during compression, whilst ensuring the stroke does not exceed the maximum the spring can withstand.

# INSTALLATION OF DONUT SPRINGS

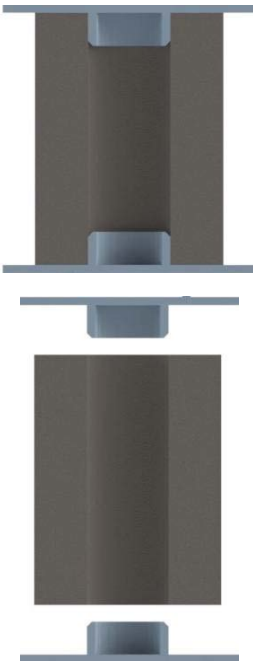
**One key advantage of a Donut Spring is the quick and easy installation in a busy working environment. This can save a company vast amounts of money in comparison to failure of a steel coil spring by drastically reducing the downtime.**

A Donut Spring uses mounting pins attached to the frame of the machine to locate and maintain the position of the spring during use. The diameter of the pin is equal to the internal diameter of the Donut.

The first step is to correctly choose a Donut Spring from the 'Selection Procedure'. The mounting plates / pins can then be designed specific to the selected Spring. The depth of the pin will vary with certain Donuts, for further information please contact AB Pneumatics.

With the spring ready to be installed, the machine can be raised to a height greater than that of the pins and Donut Spring height combined, and the spring set into position. The frame can be lowered carefully into position, ensuring all springs align vertically. This can sometimes require lubrication (water or silicone spray) to avoid damaging the Donut Spring.

It is essential at this point to check the spring height to ensure that it falls within the specification found on the 'Individual Spec. Sheets.' If it does not fall within this range, the wrong spring has been selected. If the height is too large, too much resonance may be experienced during use, and if the height is too low then the springs have been overloaded and may fail prematurely. The machine should be tested during the start-up and shut-down processes 2/3 times to ensure the springs behave in an expected manner.



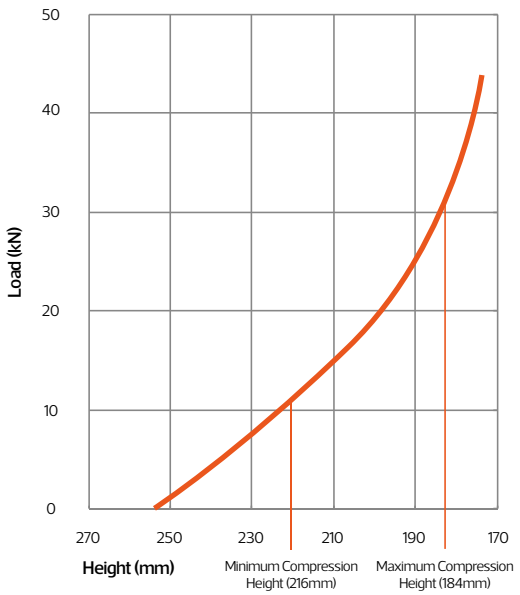
Mounting Pin with Chamfered edge.

## WORKING TEMPERATURE

The Donut Springs have a recommended working temperature range of **-40°C to +75°C**. This value represents the actual rubber spring temperature. Higher forced loads or frequencies past the recommended working conditions can cause this to increase.

# COMMON SPECIFICATIONS

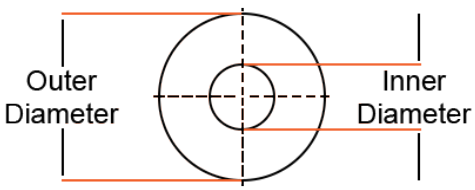
| | Unloaded Size | | | Minimum Loading | | | Maximum Loading | | |
|---|---|---|---|---|---|---|---|---|---|
| **Donut Spring** | **Outside Diameter (mm)** | **Inside Diameter (mm)** | **Free Height (mm)** | **Minimum Loading (kN)** | **Compressed Height (mm)** | **Natural Frequency (Hz)** | **Maximum Loading (kN)** | **Compressed Height (mm)** | **Natural Frequency (Hz)** |
| 076.025.102 | 76 | 25 | 102 | 1.67 | 86 | 5.01 | 5.21 | 74 | 5.27 |
| 089.025.152 | 89 | 25 | 152 | 3.34 | 130 | 3.57 | 6.98 | 112 | 3.71 |
| 102.050.152 | 102 | 50 | 152 | 4.24 | 130 | 3.42 | 9.25 | 112 | 3.46 |
| 114.025.178 | 114 | 25 | 178 | 5.22 | 152 | 3.16 | 13.71 | 130 | 3.76 |
| 114.050.152 | 114 | 50 | 152 | 3.22 | 130 | 3.71 | 8.29 | 112 | 3.94 |
| 127.025.178 | 127 | 25 | 178 | 4.37 | 152 | 3.87 | 14.96 | 130 | 4.05 |
| 140.050.178 | 140 | 50 | 178 | 4.86 | 152 | 3.78 | 14.8 | 130 | 3.67 |
| 152.025.152 | 152 | 25 | 152 | 9.99 | 130 | 3.9 | 24.42 | 112 | 3.77 |
| 152.076.152 | 152 | 76 | 152 | 5.5 | 130 | 3.87 | 14.21 | 112 | 3.81 |
| 165.076.203 | 165 | 76 | 203 | 6.24 | 173 | 3.17 | 17.23 | 147 | 3.5 |
| 191.089.203 | 191 | 89 | 203 | 11.53 | 173 | 3.33 | 30.31 | 147 | 3.32 |
| **191.089.254** | **191** | **89** | **254** | **12.31** | **216** | **2.65** | **30.73** | **184** | **2.91** |
| 203.050.203 | 203 | 50 | 203 | 12.58 | 173 | 3.85 | 49 | 147 | 3.19 |

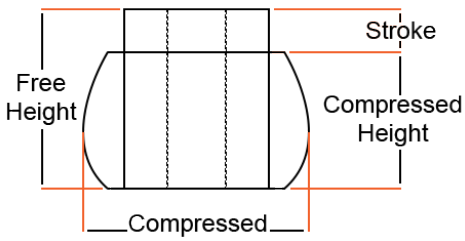



**191.089.254 Donut Spring**

| Compression (%) | 15 | 20 | 22.5 | 25 | 27.5 |
|---|---|---|---|---|---|
| Load (kN) | 12.31 | 17.65 | 21.36 | 24.85 | 30.73 |
| Height (mm) | 216 | 203 | 197 | 191 | 184 |
| Spring Rate (kN/m) | 347 | 489 | 541 | 709 | 1043 |
| Effective Deflection | 35 | 36 | 39 | 35 | 29 |
| Natural Frequency (Hz) | 2.64 | 2.63 | 2.52 | 2.67 | 2.91 |
| Maximum OD (mm) | 205 | 208 | 211 | 214 | 220 |
| Weight (Kg) | 6.5 | | | | |

## LOAD REQUIREMENTS



Designed & produced by ICON | www.icon-creative.com

AB PNEUMATICS

**AB Pneumatics Ltd**
20 Glenavy Road
Moira
Co. Antrim
BT67 0LT
Northern Ireland

**T.** +44 (0)28 9210 6061
**www.abpneumatics.com**