



# Vibration Damping Tapes

434 • 435 • 436

**Technical Data**

**November, 1994**

Supersedes March, 1993

## Product Description

These 3M™ Vibration Damping Tapes are a pressure sensitive viscoelastic material (SJ-2015, Type 830) coated on dead soft aluminum that can be furnished in either roll form or die cut pieces. They are ideal for application to panels and steel support members for vibration damping purposes. The combination of the Type 830 viscoelastic material and the aluminum foil backing has ability to damp resonant vibrations in the temperature range of -60° to 20°C (-76° to 68°F) depending on the resonant frequency.

## Features

- Excellent for use in many low temperature damping applications
- Excellent moisture resistance – Water Vapor Transmission Rate < 0.1 gm./100 in<sup>2</sup>/24 hr/mil
- Good resistance to most hydrocarbon solvents
- Excellent aging qualities and fatigue resistance provide long term performance
- Can be used in multiple layer configurations
- Liner allows for die cutting

## How Vibration Damping Tapes Work

Strain energy from a vibrating panel is introduced into the SJ-2015, Type 830 viscoelastic damping polymer. The viscous portion of the response of the SJ-2015, Type 830 viscoelastic damping polymer results in mechanical energy being dissipated to negligible heat. This energy dissipation results in (1) attenuated amplitudes of vibration when systems are being continuously excited at frequencies which match their natural frequencies, or (2) more rapid decay in systems that are freely oscillating at their natural frequencies as a result of a momentary excitation such as an impact. The attenuation of resonant amplitudes in the panels results in reduction of noise emanating from the panels.

## Construction

| Products               | 434 Tape                             | 435 Tape           | 436 Tape           |
|------------------------|--------------------------------------|--------------------|--------------------|
| Aluminum Backing:      | 5.5 mils (0.14 mm)                   | 8 mils (0.20 mm)   | 12 mils (0.30 mm)  |
| Viscoelastic Material: | 2 mils (0.051 mm)                    | 5.5 mils (0.14 mm) | 5.5 mils (0.14 mm) |
| Liner:                 | 2.5 mil (0.063 mm) Blue Polyethylene |                    |                    |

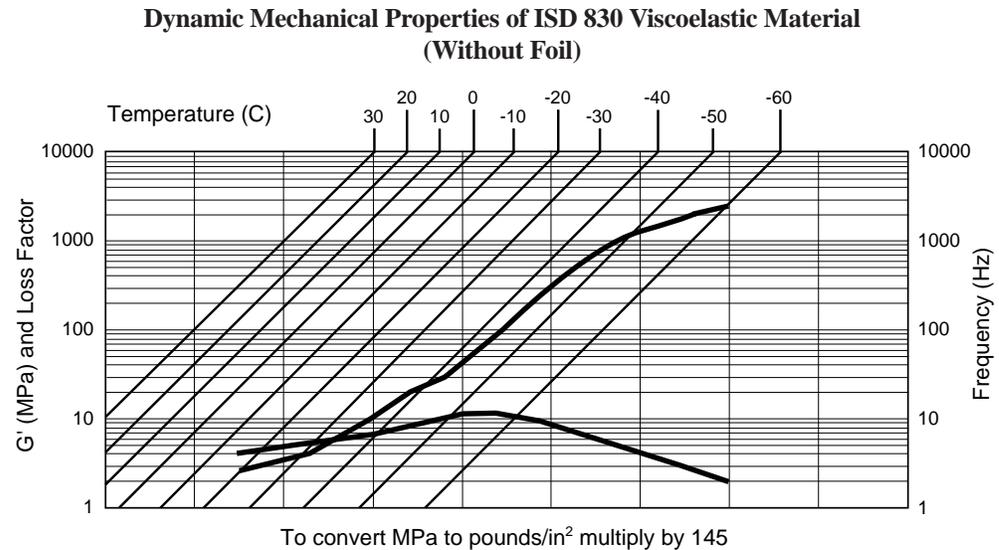
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## Typical Dynamic Mechanical Properties

**Note:** The following technical information and data should be considered representative or typical only and should not be used for specification purposes. Contact customer service at 1-800-223-8893 to determine 3M technical contact for assistance with or information about specifications.

The figure below illustrates the typical dynamic mechanical properties of SJ-2015, Type 830 viscoelastic material.



### Note Regarding Dynamic Mechanical Properties:

The shear storage modulus ( $G'$ ) and loss factor of a viscoelastic material are two parameters used to partially define the damping performance when used in the form of a constrained layer damping treatment. The above curves illustrate these data as a function of frequency and temperature in the form of a reduced temperature nomograph.

While the damping performance of a constrained layer damping treatment depends largely on the dynamic mechanical properties of the viscoelastic material alone, it is also dependent on other parameters. Namely the geometry, stiffness, mass and mode shape of the combination of the damper and the structure to which it is applied will also affect the damping performance.

To determine the dynamic mechanical properties at the desired temperature and frequency proceed as follows:

1. Locate the desired frequency on the right vertical scale.
2. Follow the chosen frequency horizontally to the desired temperature isotherm.
3. From the intersection move vertically up and or down until crossing both the shear storage modulus and loss factor curves.
4. Read the shear storage modulus and loss factor values from the left vertical scale.

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## Typical Physical Properties (Per ASTM D3330, D3759 and D3652)

| Property           | 434 Tape   | 435 Tape   | 436 Tape   |
|--------------------|--|--|--|
| Adhesion to Steel: | 65 oz./in. width<br>(724 gm/cm width)                                      | 65 oz./in. width<br>(724 gm/cm width)                                      | 65 oz./in. width<br>(724 gm/cm width)                                      |
| Tensile Strength:  | 10,500 lbs./in. <sup>2</sup><br>(7.24 x 10 <sup>7</sup> N/m <sup>2</sup> ) | 10,500 lbs./in. <sup>2</sup><br>(7.24 x 10 <sup>7</sup> N/m <sup>2</sup> ) | 10,500 lbs./in. <sup>2</sup><br>(7.24 x 10 <sup>7</sup> N/m <sup>2</sup> ) |
| Elongation:        | 12%  | 12%  | 12%  |
| Total Thickness:   | 7.5 mils<br>(0.19 mm)  | 13.5 mils<br>(0.343 mm)  | 17.5 mils<br>(0.445 mm)  |
| Weight:            | 0.09 lbs./ft. <sup>2</sup><br>(0.44 kg/m <sup>2</sup> )                    | 0.138 lbs./ft. <sup>2</sup><br>(0.675 kg/m <sup>2</sup> )                  | 0.194 lbs./ft. <sup>2</sup><br>(0.949 kg/m <sup>2</sup> )                  |

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## Directions For Use

SJ-2015, Type 830 viscoelastic damping polymer is pressure sensitive. Best results are obtained when SJ-2015, Type 830 viscoelastic damping polymer is applied at ambient temperatures above 50°F (10°C) on a clean, dry surface (free of oil, wax, dust, rust, etc.) and the bond is continuous (void free) throughout the interface between the damper and the panel surface to be bonded.

For best results apply as follows:

1. Clean surface of the substrate by removing any surface contaminants such as dirt, dust, processing oils or waxes. Assure that surface is completely dry before proceeding to Step 2.

**Note:** When using solvents to clean surfaces, be sure to extinguish ignition sources and follow the manufacturer's precautions and directions for use when handling such materials.

2. Remove the liner and apply to the surface of the panel.

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## For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-223-8893. Address correspondence to: 3M Vibration Control, 3M Center, Building 220-8E-04, St. Paul, MN 55144-1000. Our fax number is 612-736-4133.

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