3M

Ultra-pure Viscoelastic Damping Polymer

242F01 • 242F02 • 242F04

Technical Data **February, 1999**

Description/ Features

- **242F01 - Ultra-pure Viscoelastic Damping Polymer**
  - – .001" thick
  - – Film Liner is a .002" PET, double sided silicone liner, plastic core
  - – Pressure used for lamination and application of the 242 to a substrate
  - – Low outgassing and ionics
  - – Typical temperature range for good damping: 0-65°C
- **242F02 - Ultra-pure Viscoelastic Damping Polymer**
  - – .002" thick
  - – Film Liner is a .002" PET, double sided silicone liner, plastic core
  - – Pressure used for lamination and application of the 242 to a substrate
  - – Low outgassing and ionics
  - – Typical temperature range for good damping: 0-65°C
- **242F04 - Ultra-pure Viscoelastic Damping Polymer**
  - – .004" thick
  - – Film Liner is a .002" PET, double sided silicone liner, plastic core
  - – Pressure used for lamination and application of the 242 to a substrate
  - – Low outgassing and ionics
  - – Typical temperature range for good damping: 0-65°C

Notes: 1) The 242 may be used in some applications outside its suggested damping temperature range with acceptable damping performance. as determined by the user. 2) The typical temperature range for good damping noted above is not a limit for the 242 in an applications' long term temperature exposures or short term higher temperature excursions, but its the temperature range where the 242 typically has good damping performance. The damper's construction and application to a substrate will determine the long and short term performance of a damper in a given application environment.

Application Ideas

- 3M ultra-pure viscoelastic damping polymer 242 is designed to be used in damping applications as part of free-layer damper, constrained layer damper or damped laminate designs.
- 3M polymer 242 is designed to be used in applications that require low outgassing and ionic levels and still provide robust damping performance.
- 3M polymer 242 will typically have damping performance in an area between the 3M™ Viscoelastic Damping Polymers 112 and 130 for Loss Factor and Storage Modulus.
- The polymer 242 can be used in vibration and shock isolation designs.
- 3M ultra-pure viscoelastic damping 3M polymer 242 is an acrylic polymer and offers good thermal performance for long term applications at moderate temperatures and also applications that experience short high temperature excursions.
- Market application areas include: automotive, aerospace, electronics and general industry.
- Potential application users include cover dampers, damped laminate constructions, suspension dampers, isolators, panel dampers, space craft applications, etc.

3M™ Ultra-pure Viscoelastic Damping Polymer

242F01 • 242F02 • 242F04

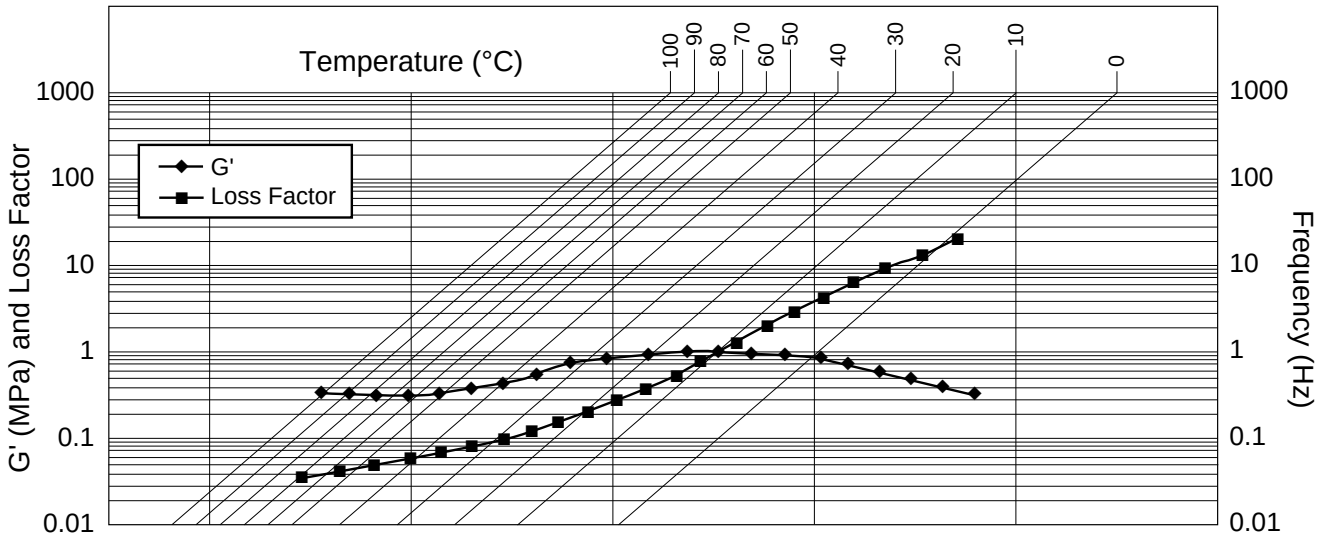
Nomograph

The 3M ultra-pure viscoelastic damping polymer 242 damping properties are shown in the "reduced temperature format" nomograph. The nomograph shows the Viscoelastic Damping Polymer's Loss Factor and Storage Modulus for various frequencies and temperatures in a single graph. The Shear (Storage) Modulus and Loss Factor are intensive properties of the Viscoelastic Damping Polymer alone.

The Loss Factor and Storage Modulus are the key measurement parameters and determine the level of potential damping capability that exists in the 3M viscoelastic damping polymer 242 at a specific temperature and frequency.

The Loss Factor and Storage Modulus for the 3M viscoelastic damping polymer 242 is found by selecting the frequency desired of an application and extending a horizontal line from that frequency until the desired application temperature isotherm is intersected. Extend a vertical line from this first intersection point of the desired frequency and temperature isotherm so that it intersects the Loss Factor and Storage Modulus curves. The Loss Factor and Storage Modulus values are found on the left hand scale by extending a line horizontally from these second intersection points on the Loss Factor and Storage Modulus performance cures.

242 Viscoelastic Damping Polymer Nomograph



Outgassing

Typical Total Outgas Material by GC/MS (Modified ASTM 4526)

- 242F01 < 1.8 µg/cm^2 (Hydrocarbons, Organic acids, Esters, Alcohols, Phenols, Siloxane)
- 242F02 < 2.5 µg/cm^2 (Hydrocarbons, Organic acids, Esters, Alcohols, Phenols, Siloxane)
- 242F04 < 8.0 µg/cm^2 (Hydrocarbons, Organic acids, Esters, Alcohols, Phenols, Siloxane)

Ionics

Typical Total Ionics by Ion Chromatograph

- 242F01 - < 0.15 µg/cm^2 (Chloride, Nitrate, Sulfate)
- 242F02 - < 0.15 µg/cm^2 (Chloride, Nitrate, Sulfate)
- 242F04 - < 0.15 µg/cm^2 (Chloride, Nitrate, Sulfate)

3M™ Ultra-pure Viscoelastic Damping Polymer

242F01 • 242F02 • 242F04

Adhesion

Typical adhesion data with 2 mil aluminum backing and a 90-degree peel test at 12"/min (ounce / 0.5 inch width)

Substrate @ dwell conditions	3M Ultra-pure Viscoelastic Damping Polymer 242F01	3M Ultra-pure Viscoelastic Damping Polymer 242F02	3M Ultra-pure Viscoelastic Damping Polymer 242F04
SS @ 15 min RT	20	25	30
SS @ 72 Hr RT	35	40	60
SS @ 72 Hr & 158°F	70	100	130

Liner Release

Typical Liner Release Values (180 degree Liner removal)

- 242F01 - 30 g/inch width
- 242F02 - 32 g/inch width
- 242F04 - 37 g/inch width

Viscoelastic Damping Polymer Application Instructions

In many applications of the 3M ultra-pure viscoelastic damping polymer 242 to a constraining layer or substrate, the 3M polymer 242 needs only pressure to provide adequate bonding at room temperature (21°C).

For high strain applications and/or some surface types or geometries, the damping polymers may require an additional surface attachment means, such as a surface primer or epoxy bonding material to provide an adequate bond to a surface.

- **Surface Preparation**

For an acceptable bonding of the 3M ultra-pure viscoelastic damping polymer 242 to a surface, it is necessary for surfaces to be dry and free of any wax, grease, dust, dirt, oil, scale or any other contaminants or loose or weakly attached surface finishes or coatings. The importance of contamination free surfaces cannot be over emphasized. Typical cleaning solvents like isopropyl alcohol or heptane can be used. More aggressive solvents may be needed for difficult to remove contaminates.

Note: Carefully read and follow manufacturer's precautions and directions for use when using cleaning solvents.

Extremely contaminated surfaces may require special attention. Sanding or grinding will remove heavy contamination. Follow with a solvent wipe as indicated above. Sandblasting and grinding to finish should be done ONLY on surfaces completely free of oil, grease, wax, silicone-based materials or other organic residues. Sandblasting and grinding can drive or push oils and other residual materials into the substrate surface leading to adhesion reduction or bond failure of the polymer after an initial bond is made. Sandblasting and grinding should be done with materials that do not leave a residue or grit remaining on or in the surface.

Note: Wear appropriate personal protective equipment for sandblasting and grinding operations.

- **Surface Type:**

The 3M ultra-pure viscoelastic damping polymer 242 will form good bonds when properly applied to many high surface energy materials. Materials with a surface energy below 100 dynes/cm^2 should be tested to determine if a suitable development of an adequate bond for a given end use application will occur.

- **Application**

The 3M ultra-pure viscoelastic damping polymer 242 is tacky at room temperature (21°C). The 3M polymer 242 requires only rolling or squeegeeing methods to apply pressure to the 3M polymer 242 to make an adequate bond to a contamination free surface. Air entrapment should be avoided to ensure a good bond.

3M™ Ultra-pure Viscoelastic Damping Polymer

242F01 • 242F02 • 242F04

Viscoelastic Damping Polymer Application Instructions *(continued)*

A good method is to first attach one edge of the damping polymer with the liner intact (or a previously laminated damper with it's liner removed) to the substrate, then gradually lower the damper or damping polymer onto the surface at an angle (30-90°) while continually applying uniform pressure to the damper or damping polymer of 10-15 psi (6.9-10.3 x 10^4 pascals). A squeegee or wood/rubber roller will help maintain uniform pressure across a wide area. Every effort must be made to avoid air entrapment while placing the damping polymer and/or damper on to a substrate.

The 3M polymer 242 bond will typically build with time or exposure to higher temperature.

Lamination pressures above 50 psi (3.45 x 10^4 pascals) and temperatures above 250°F should be avoided for 3M polymer 242 bonding. The liner does not remain with a final damper when applied in an end-use application or when the 3M polymer 242 is laminated between substrates for a laminate construction.

Note: The above technical information and data should be considered representative or typical only and should not be used for specification purposes.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-362-3550. Address correspondence to: 3M Bonding Systems Division, 3M Center, Building 220-7E-01, St. Paul, MN 55144-1000. Our fax number is 651-733-9175. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-809-750-3000. In Mexico, phone: 5-728-2180.

Important Notice

3M MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of application. Please remember that many factors can affect the use and performance of a 3M product in a particular application. The materials to be bonded with the product, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a 3M product. Given the variety of factors that can affect the use and performance of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

Limitation of Remedies and Liability

If the 3M product is proved to be defective, THE EXCLUSIVE REMEDY, AT 3M'S OPTION, SHALL BE TO REFUND THE PURCHASE PRICE OF OR TO REPAIR OR REPLACE THE DEFECTIVE 3M PRODUCT. 3M shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including negligence, warranty, or strict liability.

ISO 9002

This Bonding Systems Division product was manufactured under a 3M quality system registered to ISO 9002 standards.

3M

Bonding Systems Division

3M Center, Building 220-7E-01
St. Paul, MN 55144-1000

Recycled Paper
40% pre-consumer
10% post-consumer

Printed in U.S.A.
 70-0707-6250-8