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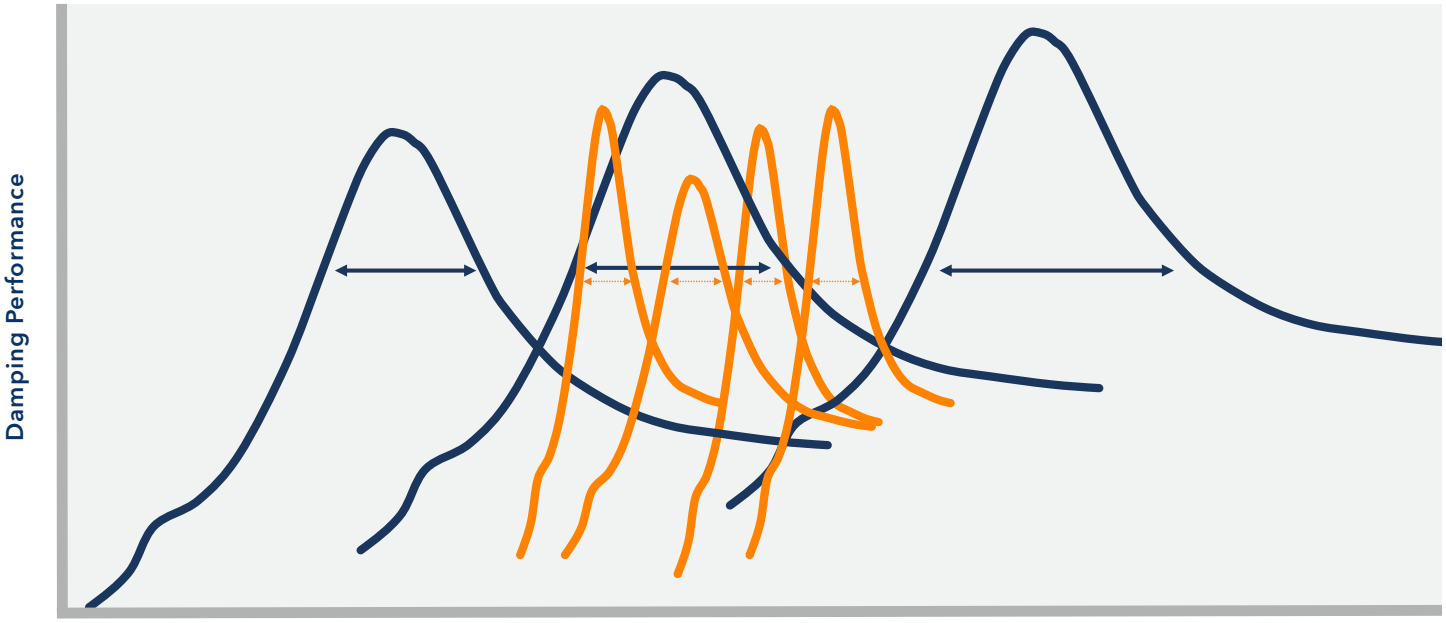
SilGrip™ NVH PSA Kit

Noise, Vibration and Harshness Damping

Momentive's SilGrip NVH PSA Kit is a fully customizable noise and vibration damping product used primarily as a contact adhesive, as well as pressure sensitive tapes and transfer films. It can be applied in minutes if used as a contact adhesive, or immediately when used as a pressure sensitive tape or transfer film. The kit allows a wide damping range over low temperatures, room temperatures and high temperatures, depending on the chosen mix ratio.

Excellent Damping Performance at Various Temperature Ranges



Test data. Actual results may vary.

Key	Damping Material	NVH Properties
	SilGrip NVH PSA Kit	At suggested mixing ratios, SilGrip PSA demonstrates excellent performance at low, room and high temperatures intervals.
	Other Viscoelastic Options	Other viscoelastic material options such as acrylic and rubber-based adhesives showed damping performance capabilities at very narrow temperature ranges.

Current Applications

Momentive's SilGrip NVH Kit is used in demanding applications where other options such as acrylics and rubber damping materials are known to fail. Applications include automotive vibration damping, truck and rail noise reduction, light powered vehicle harshness reduction, small engine noise reduction (including generators and compressors), aerospace engine vibration reduction, aviation noise insulation or passenger cabins, and applications requiring both damping and UV resistance at extreme high and low temperatures.

SilGrip NVH PSA Kit Technical Features and Typical Benefits

- **Wide formulation latitude**
- **Damping performance capabilities over a wide temperature range of -54°C (-65°F) to 204°C (400°F)**
- **UV light resistance**
- **Resistance to water and solvent exposure**
- **Moisture and weathering resistance**

Formulation Guide Based on Target Damping Performance

By mixing NVH-PSA1 with either NVH-HT1 or NVH-LT1, damping properties for a desired temperature range can be achieved. Several other potential variables may, however, factor into determining the final damping properties of an adhesive, including target frequency, adhesive thickness, cross-linker type and cross-linker amount. The chart and mixing instructions that follow serve as a general guide to determining the optimum mix ratio for your specific application. Contact Momentive for further formulation assistance.

Once you have determined your desired mix ratio, choose a catalyst that is best for your application. Momentive SRC18 catalyst offers excellent condensation cure activation for contact adhesive applications that continues to build adhesion over time. Benzoyl peroxide (BPO), a common catalyst in the tape and label industry, is recommended for transfer film or tape applications. See pages 3 and 4 for "Suggested Mixing Ratios" and pages 5 and 6 for "How to Apply" instructions.

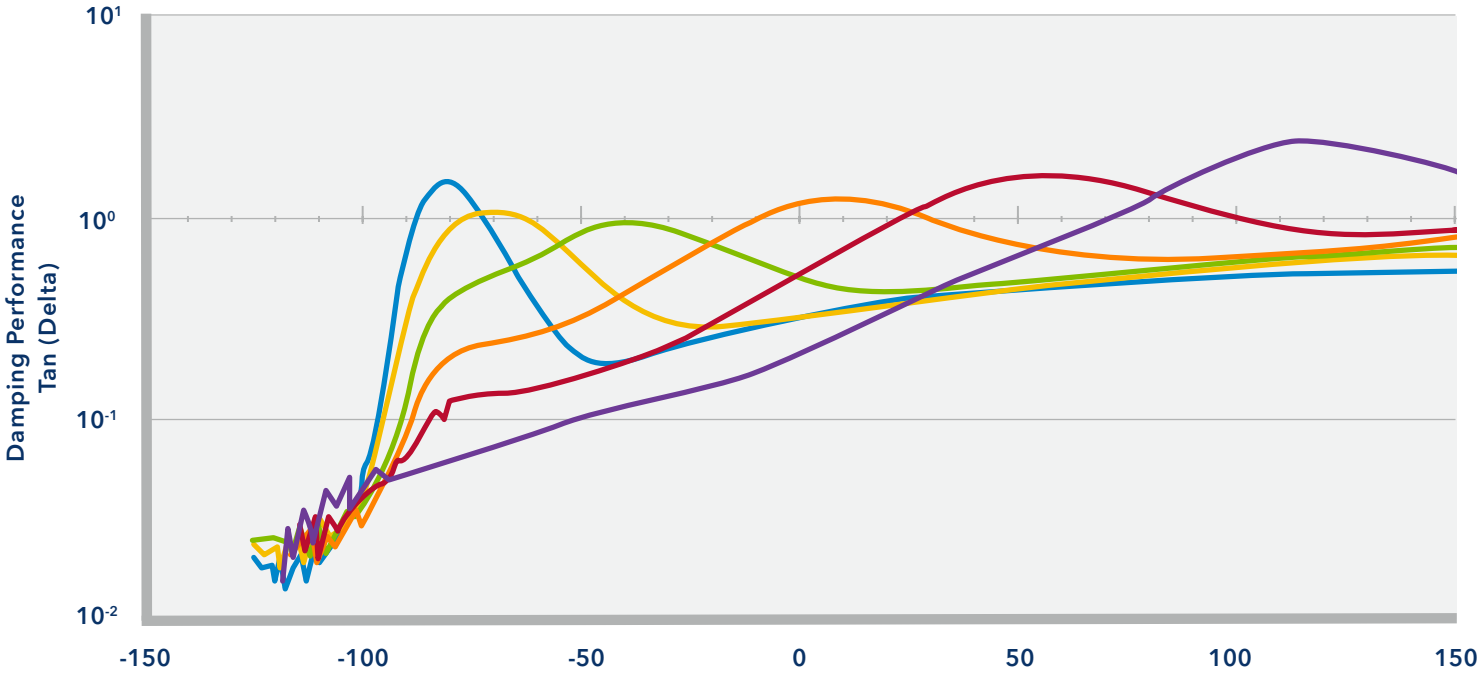
Typical Uncured Properties

Property	NVH-PSA1	NVH-HT1	NVH-LT1
Silicone Solids, %	55	59.5-60.5	39-41
Viscosity @ 25˚C (77˚F), cps Brookfield RVF, #5 Spindle @ 4 rpm	17,000	9-11.5	18,000
Solvent	Toluene, VM&P Naphtha	Toluene	Toluene, VM&P Naphtha
Specific Gravity	.98	1.04	.853
Density, lbs/gal	8.3	8.7	7.1

Typical properties are average data and are not to be used as or to develop specifications.

Test data. Actual results may vary.

Damping Performance at Suggested Mixing Ratios



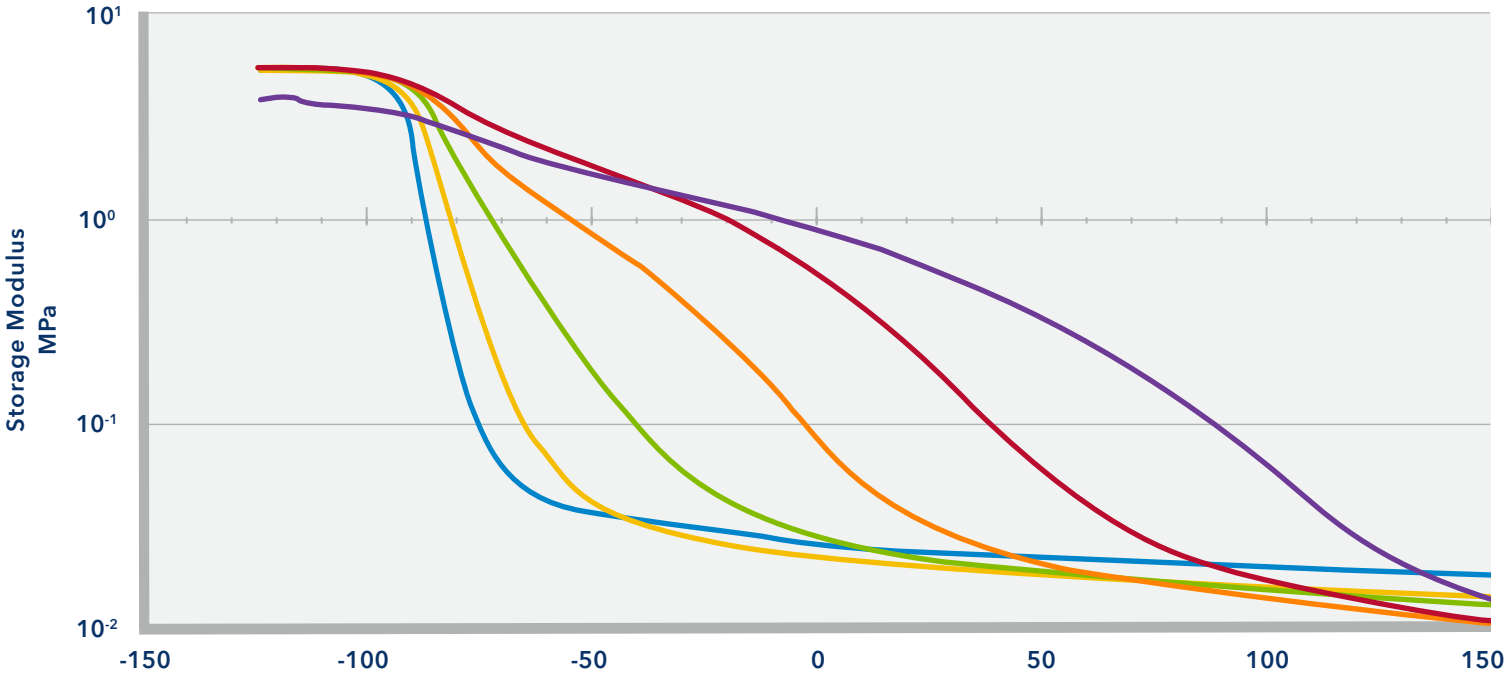
Test data. Actual results may vary.

Target Damping Range		Base PSA		Temperature Modifier				Catalyst Options
Graph from Chart Above		NVH-PSA1		NVH-HT1		NVH-LT1		SRC18 activator or BPO
	=	-	+	-	OR	100%	+	See notes below on curing agent type and suggested amounts
		25%		-		75%		
		50%		-		50%		
		75%		-		25%		
		100%		-		-		
		80%		20%		-		

The catalyst options for driving crosslinking include Momentive SRC18 cure activator and BPO. As a rule of thumb, the more catalyst used, the lower the peak damping properties will be. Therefore, use of the minimum amount of catalyst necessary to achieve good cure is recommended in order to help maximize damping performance.

The typical catalyst usage range is 1-3% by solids weight. Contact Momentive or Momentive's distributor network for support.

Modulus at Suggested Mixing Ratios



Test data. Actual results may vary.

Target Damping Range		Base PSA		Temperature Modifier				Catalyst Options
Graph from Chart Above		NVH-PSA1		NVH-HT1		NVH-LT1		SRC18 or BPO
	=	-	+	-	OR	100%	+	See notes below on curing agent type and suggested amounts
		25%		-		75%		
		50%		-		50%		
		75%		-		25%		
		100%		-		-		
		80%		20%		-		

The catalyst options, SRC18 or BPO, drive crosslinking. As a rule of thumb, the more catalyst used, the lower the peak damping properties will be. It is suggested to use as little catalyst as necessary to achieve good cure. This will help maximize damping performance.

The typical catalyst usage range is 1-3% by solids weight. Contact Momentive or Momentive's distributor network for further support.

Preparation and application of Momentive SilGrip NVH PSA Kit

Guidelines for use as a contact adhesive

Before you begin using the SilGrip NVH PSA Kit, please be sure to review the product's Safety Data Sheet. Be sure to work in a well-ventilated area and follow all other appropriate safety protocols.

Things you will need to apply SilGrip PSA NVH Kit

- SilGrip NVH PSA Kit
- Momentive's SRC18 catalyst
- The substrates you will bond together
- 3 cups or containers
- A stick to mix the materials together
- A roller, brush or other suitable coating tool
- A cloth or towel to clean the substrates to be bonded
- An appropriate solvent for cleaning

General Instructions

Step 1: Select a desired mix ratio (see table on page 4). Keep in mind that damping performance can vary depending on adhesive thickness, crosslink density, substrates, frequency (hz) of application, and other factors; as such, you may need to perform preliminary tests at various ratios to determine the optimal levels needed to achieve the desired results.

Step 2: To begin, clean and dry all surfaces to be bonded. A lint free towel with some solvent can be used to ensure all grease, oil and debris is removed.

Step 3: Turn on your scale. Place the cup or container on the scale. Zero out the scale.

Step 4: Pour Momentive NVH-PSA1 adhesive into cup or container on scale. Once complete, zero out the scale again.

Step 5: Next, add Momentive's NVH-HT1 or NVH-LT1 modifier to the NVH-PSA1 adhesive. You may want to pre-pour your components to make mixing easier. Again, zero out the scale.

Step 6: Finally, add the SRC18 catalyst to the NVH-PSA1 adhesive and modifier mixture using the amount of catalyst suggested as a guideline. You may want to pre-pour your components or use a medicine dropper for the SRC18 catalyst. Stir the liquid thoroughly until the SRC18 catalyst is well mixed in the adhesive (consult the applicable Safety Data Sheets prior to use). Note: It is necessary to add an amount of SRC18 catalyst that will eventually cause complete cure of the adhesive. Adhesive completely cured with SRC18 catalyst will be tack-free and as such, will not bear the properties typically required for making tapes or transfer films, but should meet the requirements of contact adhesive applications. When using SRC18 catalyst with the NVH PSA kit for laminating (bonding) dissimilar materials, follow SRC18 catalyst data sheet (document #CDS5187) precautions carefully. You are now ready to apply.

Step 7: Apply the catalyzed adhesive to one of the two substrates to be bonded using your brush, roller or suitable coating device.

Step 8: Before assembling the pieces, you must allow for the solvent in the adhesive to evaporate. This is known as drying time. The length of drying time will depend on solvent used, adhesive thickness, and temperature. A good starting point is 20 minutes. A heat gun could also be used to speed up drying time.

Step 9: After 20 minutes, check the substrate. Depending on which ratio and NVH additive product you use, tack may be higher or lower. If solvent is evaporated from the adhesive, the surfaces to be bonded should be firmly pressed together and the adhesive allowed to cure.

Step 10: Cure is a function of time and temperature. Room temperature cure around 24°C (75˚F) will need 3-7 days for the catalyzed adhesive to develop maximum strength. The cure time can be shortened by elevating temperature to a maximum of 165°C (329˚F). A typical shortened cure cycle is 24 hours at 25°C (77˚F) followed by 24 hours at 100°C (212˚F).

Step 11: If any catalyzed adhesive remains (NVH-PSA1 adhesive with or without modifiers blended with SRC 18 catalyst), store it in tightly closed containers and use within 48 hours.

Preparation and application of Momentive SilGrip NVH PSA Kit

Guidelines for use on a coater

Before you begin using the SilGrip NVH PSA Kit, please be sure to review the product's Safety Data Sheet. Remember to work in a well-ventilated area and follow all appropriate safety protocols.

Things you will need to apply SilGrip PSA NVH Kit

- SilGrip NVH PSA Kit
- Benzoyl peroxide catalyst
- Solvent
- The substrates you will bond together
- 3 cups or containers
- A mixing device

General Instructions

Step 1: Select a desired mix ratio from the table (see page 4). Keep in mind, damping performance can vary depending on adhesive thickness, crosslink density, substrates, frequency (hz) of application, and other factors; as such, you may need to perform preliminary tests at various ratios to determine the optimal levels for achieving the desired results.

Step 2: To begin, prepare your bonding surface. Make sure all grease, debris and oil are removed.

Step 3: Turn on your scale. Place the cup or container on the scale. Zero out the scale.

Step 4: Pour Momentive NVH-PSA1 adhesive into cup or container on scale. Once complete, zero out the scale again.

Step 5: Next, add Momentive's NVH-HT1 or NVH-LT1 modifier to the NVH-PSA1 adhesive and mix. You may want to pre-pour your components to make mixing easier. The SilGrip PSA NVH Kit silicone adhesive is supplied at a viscosity compatible with conventional coating equipment. However, if necessary, it may be thinned with toluene, xylene or other appropriate solvents.

Step 6: Add the benzoyl peroxide catalyst to solvent in the amount suggested as a guideline. Momentive recommends using a high purity, 98% benzoyl peroxide. The BPO should be dispersed in solvent prior to being mixed with the adhesive. Remove the PSA mixture from the scale. Place a clean cup on the scale and add solvent. Zero out your scale. Add the BPO to the solvent and mix. You may want to pre-weigh the BPO before adding it to the solvent. In applications requiring low temperature cure, 2,4-dichlorobenzoyl peroxide, which is activated at 132°C (270°F), can be an effective option. However, it should be noted that 2,4-dichlorobenzoyl peroxide may generate polychlorinated biphenyls during the curing process. Please refer to Code of Federal Regulations, title 40, part 761 regarding incidental PCB byproducts if 2,4-dichlorobenzoyl peroxide is to be utilized.

Step 7: Finally, add the BPO and solvent solution to the adhesive and thoroughly mix to achieve a homogeneous dispersion, as this is essential for the consistency of the finished product. Once thoroughly mixed, you are ready to coat. Coating the adhesive is a 2-step process: solvent removal and curing.

Processing of SilGrip PSA NVH Kit on a Coater

Step 8: **Solvent Removal:** To achieve optimum adhesive properties, it is essential that the solvent is removed from the adhesive film before the curing step of the process initiates. Improper drying will result in residual solvent entrapment within the adhesive. If the adhesive is then exposed to temperatures higher than 93.5°C (200°F), decomposing peroxide catalyst can cause crosslinking reaction between solvent and adhesive through methyl groups on siloxane chains and on solvent molecules, and adversely affect the properties of the adhesive. Effective drying can generally be achieved at temperatures ranging from 83°C (180°F) to 90°C (194°F). The typical drying cycle is ~2 minutes at 90°C (194°F).

Step 9: **Curing Process:** Once the solvent is removed from the adhesive film, the peroxide cure should be initiated by exposure to heat. The typical curing cycle is ~2 minutes at 165°C (329°F). Longer exposure time and higher temperature, up to 204°C (400°F), can generally be used without adverse effects. Actual conditions under which complete cure is achieved will depend largely upon oven length and efficiency, peroxide type, and type of substrate used, and should be established during preliminary trials.

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Patent Status

Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute the permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

Product Safety, Handling and Storage

Customers should review the latest Safety Data Sheet (SDS) and label for product safety information, safe handling instructions, personal protective equipment if necessary, emergency service contact information, and any special storage conditions required for safety. Momentive Performance Materials (MPM) maintains an around-the-clock emergency service for its products. SDS are available at www.momentive.com or, upon request, from any MPM representative. For product storage and handling procedures to maintain the product quality within our stated specifications, please review Certificates of Analysis, which are available in the Order Center. Use of other materials in conjunction with MPM products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.

Limitations

Customers must evaluate Momentive Performance Materials products and make their own determination as to fitness of use in their particular applications.

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GracoRoberts
3200 Avenue E East
Arlington, TX 76011

Phone: +1 817-535-3200
www.gracoroberts.com