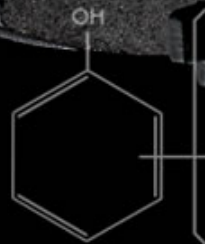


*Phenolic Resin for Brake Pads – Utilizing  
Unique Chemistry Technology for Braking*

Special Phenolic Resin  
**Milex<sup>TM</sup>**

*Reduces Noise, Vibration and Other  
Unpleasant Properties when  
Braking!*



*when braking.*

## What is Milex™?

- *Would like brakes that don't leave black residue on wheels.*
- *Enjoy driving on mountain roads and would like to drive on a race course!*

Milex is a special phenolic resin that features moldability, superior thermal stability, low moisture absorption and high chemical resistance. As a phenolic resin that has a long history, Milex constantly responds to the latest needs and is utilized to take on the challenge of developing cutting-edge technologies.

The XL-series features superior thermal resistance and low moisture absorption.

The RN, RS and RM-series of elastomer modified phenolic resin are provided with the advantages of both elastomer and phenolic resin, and feature superior impact resistance.



**Block**



**Marble**



**Powder**

**Milex™ at work around the globe**

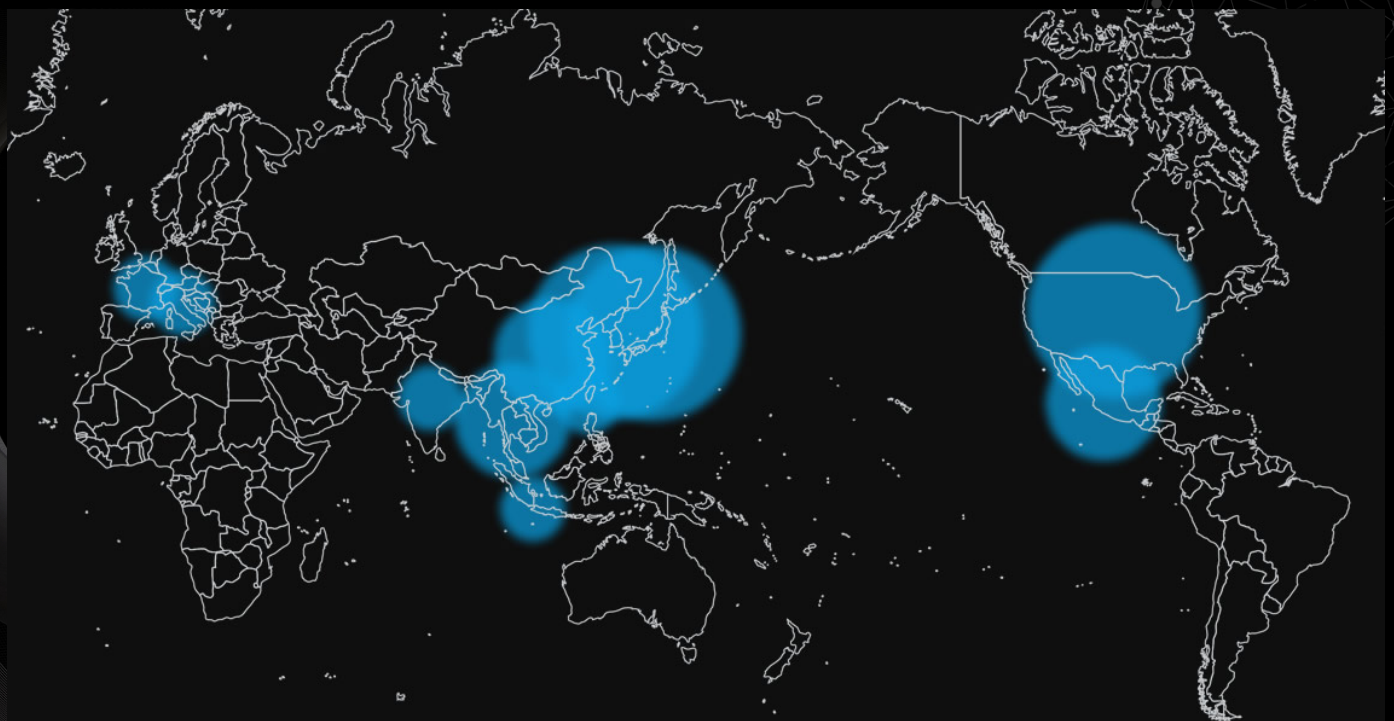
Milex has been involved in the evolution of brake pads for over a quarter century.

This technology which was created in Japan has played a large role in solving the problems of squeaking noise and vibration for brakes.

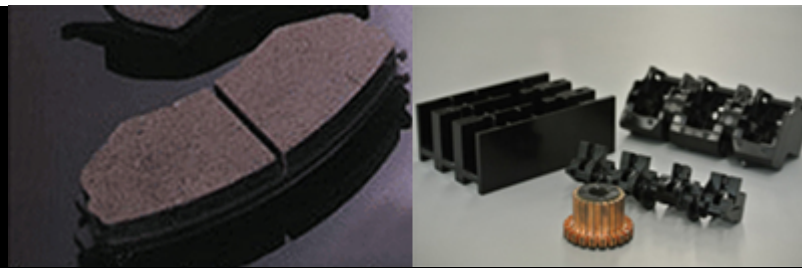
In addition to Japan, it is being extensively utilized in Korea, China, Thailand and Taiwan in Asia, as well as in North America and Europe.

We would like to continue to help vehicles around the world to stop safely, while making them more comfortable and environmentally friendly.

We hope that you will try out Milex special phenolic resin products.



Milex has been utilized in a wide range of fields, mainly as a binder for brake pads



### [Main Applications]

Binder for friction materials  
 Binder for molding materials  
 (compounds)  
 Binder for grinding wheels  
 Heat-resistant adhesive  
 Binder for heat-  
 resistant/powder coatings

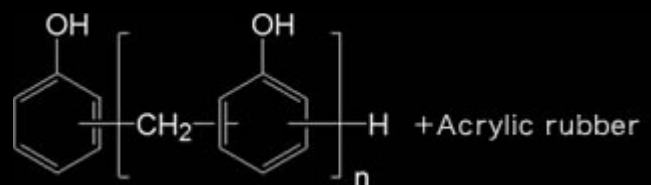
Various series respond to wide variety of demands

## RN/RS-Series

This is a novolac type of phenolic resin. The RN-series is a special acrylic rubber modified resin and the RS-series is a silicone rubber modified resin. Both of these series feature superior moldability, heat resistance, impact resistance and chemical resistance.

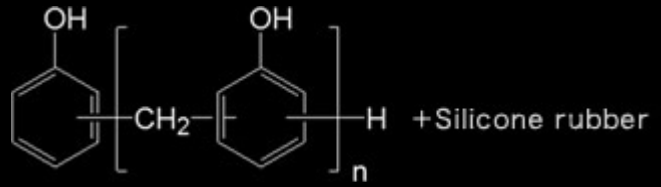
RN-Series Acrylic rubber modified resin

- Flexibility
- Crack resistance
- Chemical resistance



## RS-Series Silicone rubber modified resin

- Flexibility
- Water resistance

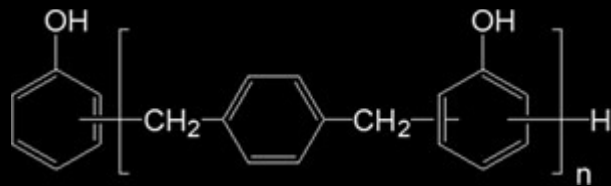


## XL-Series

This series utilizes a Phenol-Aralkyl resin that features high heat resistance, wear resistance and chemical resistance, and exhibits superior vibration properties.

## XL-Series Phenol-Aralkyl resin

- Flexibility
- Water resistance



## RX-Series

This resin combines thermal stability and moldability in an optimum balance.

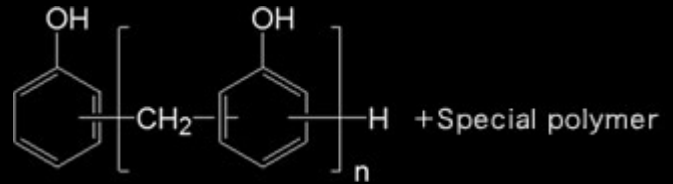
## RM-Series

Special polyolefin is dispersed in order to provide vibration absorption and wear resistance.



RM-Series Special polymer modified resin

- Flexibility
- Wear resistance



## Verification of Milex™ features

Milex™ RN-Series focuses on improving NVH with high vibration absorption

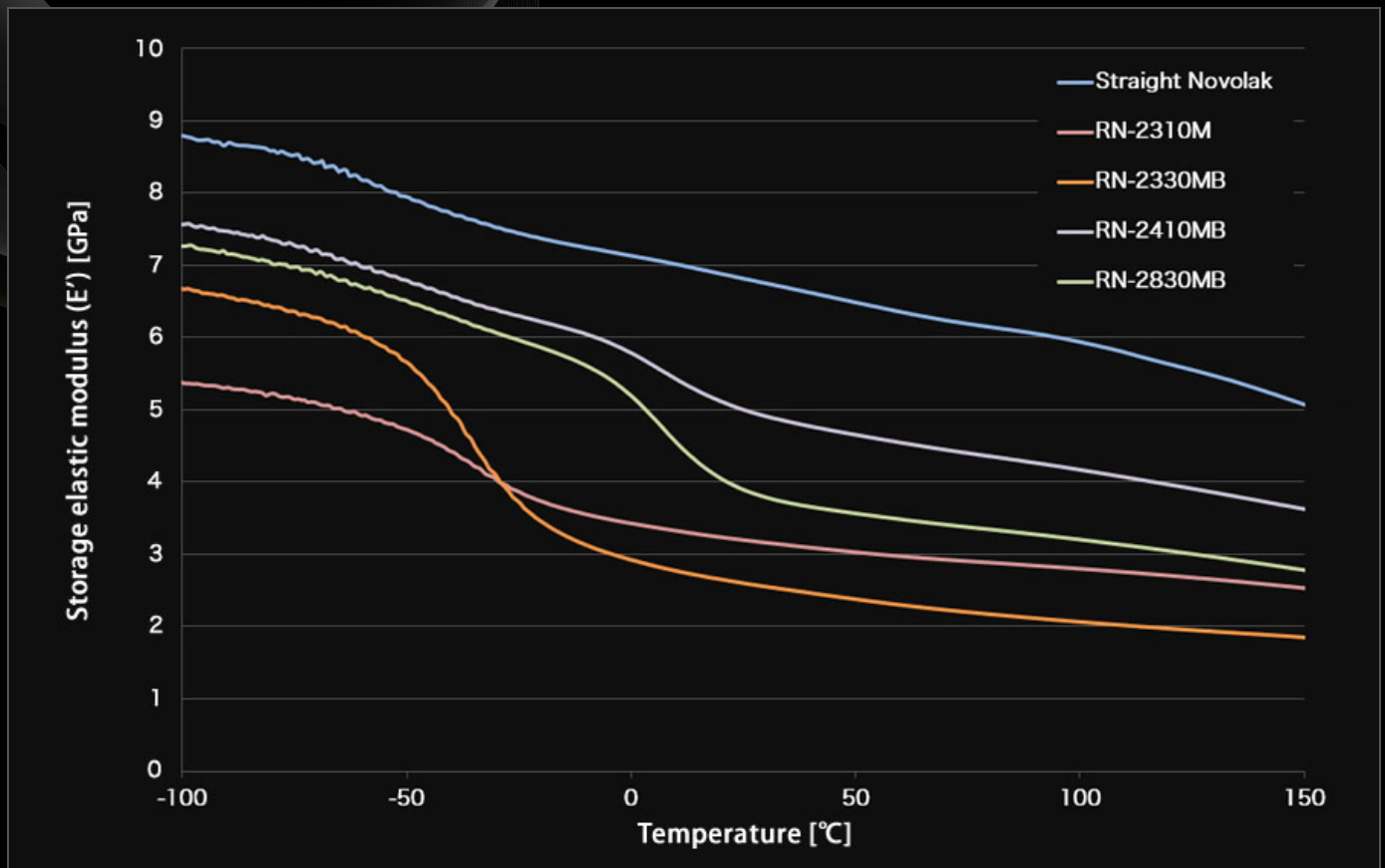
The Milex RN-Series exhibits particularly superior vibration absorption by uniformly dispersing special acrylic rubber inside the resin. Vibration absorption bands in various temperature ranges can be selected according to the type of rubber and the amount of modification.

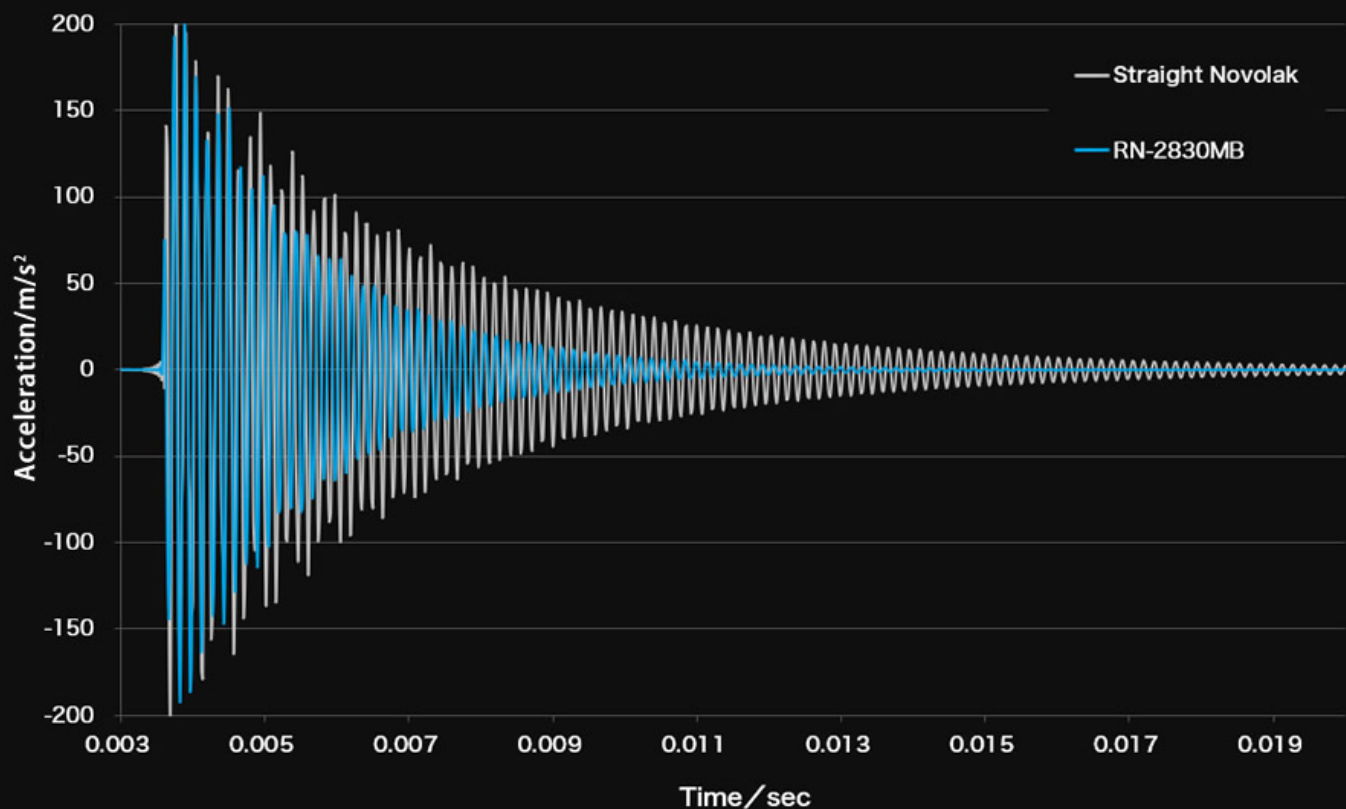
Product	Softening Point (°C)	Flow/125°C (mm)	Gel Time (s)	Amount of Modification (phr)
RN-2410MB	93~102	25~45	80~130	10

Product	Softening Point (°C)	Flow/125°C (mm)	Gel Time (s)	Amount of Modification (phr)
RN-2330MB	90~108	12~27	80~140	30
RN-2830MB	93~103	20~32	92~148	30
RN-2830MR	88~100	18~32	40~100	30

Moldability is provided by adding acrylic rubber, which also improves NVH since this boosts vibration absorption.

Upper graphic: Dynamic viscoelasticity, Lower graphic: Vibration absorption





Milex™ RS-Series features water resistance, heat resistance and vibration absorption

The Milex RS-series is a product that provides the optimum balance of water resistance, heat resistance and vibration absorption by uniformly dispersing silicone rubber inside the resin with unique technology.

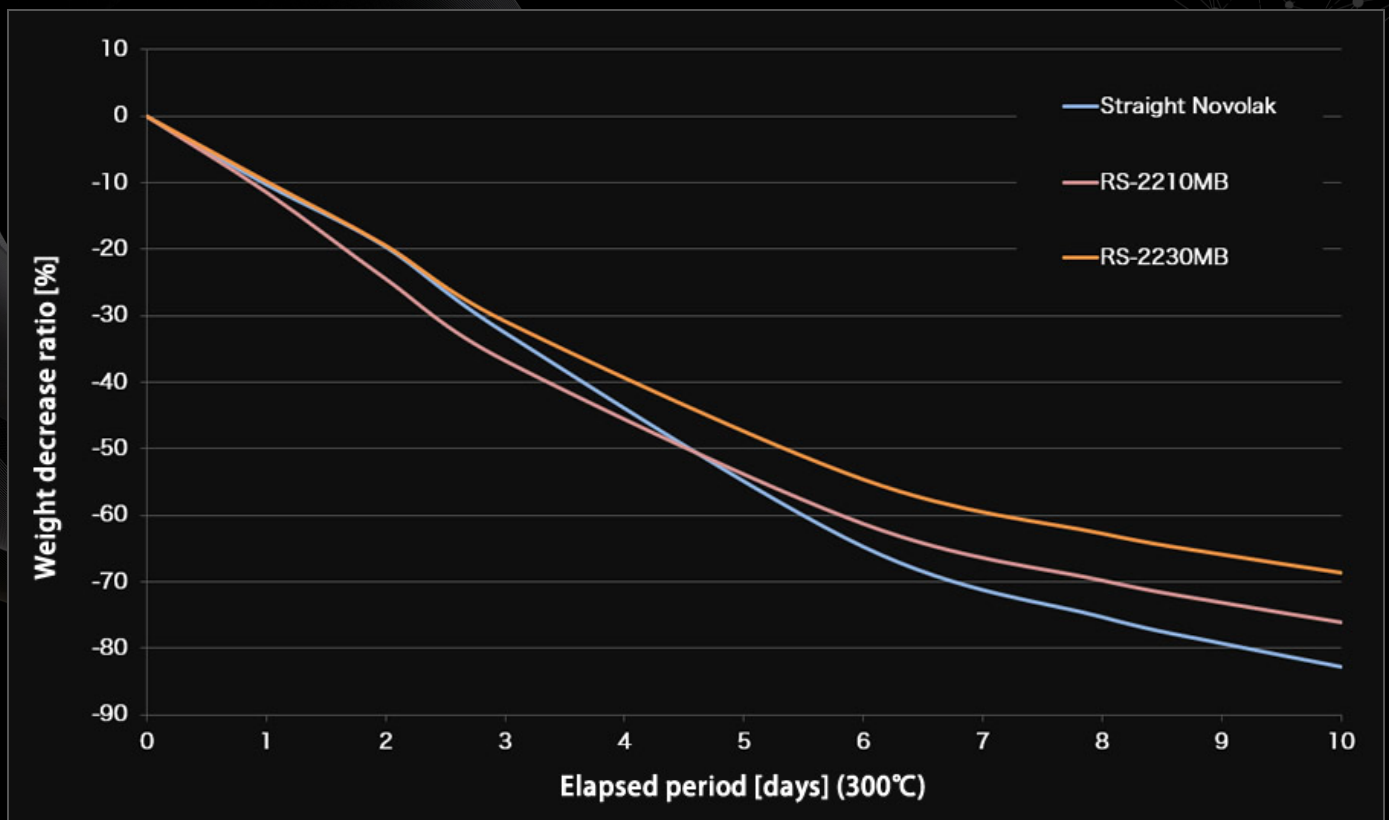
Product	Softening Point (°C)	Flow/125°C (mm)	Gel Time (s)	Amount of Modification (phr)
RS-2210MB	93~103	30~46	74~130	10

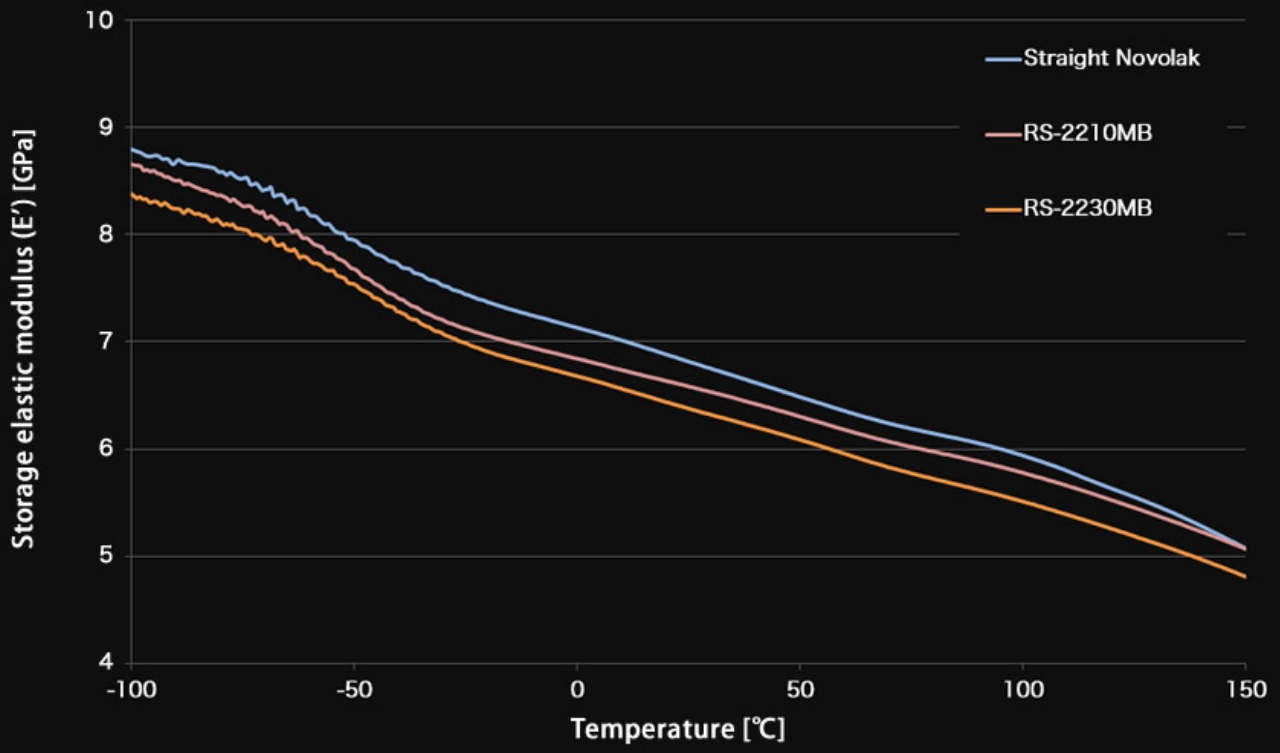


Product	Softening Point (°C)	Flow/125°C (mm)	Gel Time (s)	Amount of Modification (phr)
RS-2230MB	107~115	18~26	83~105	30

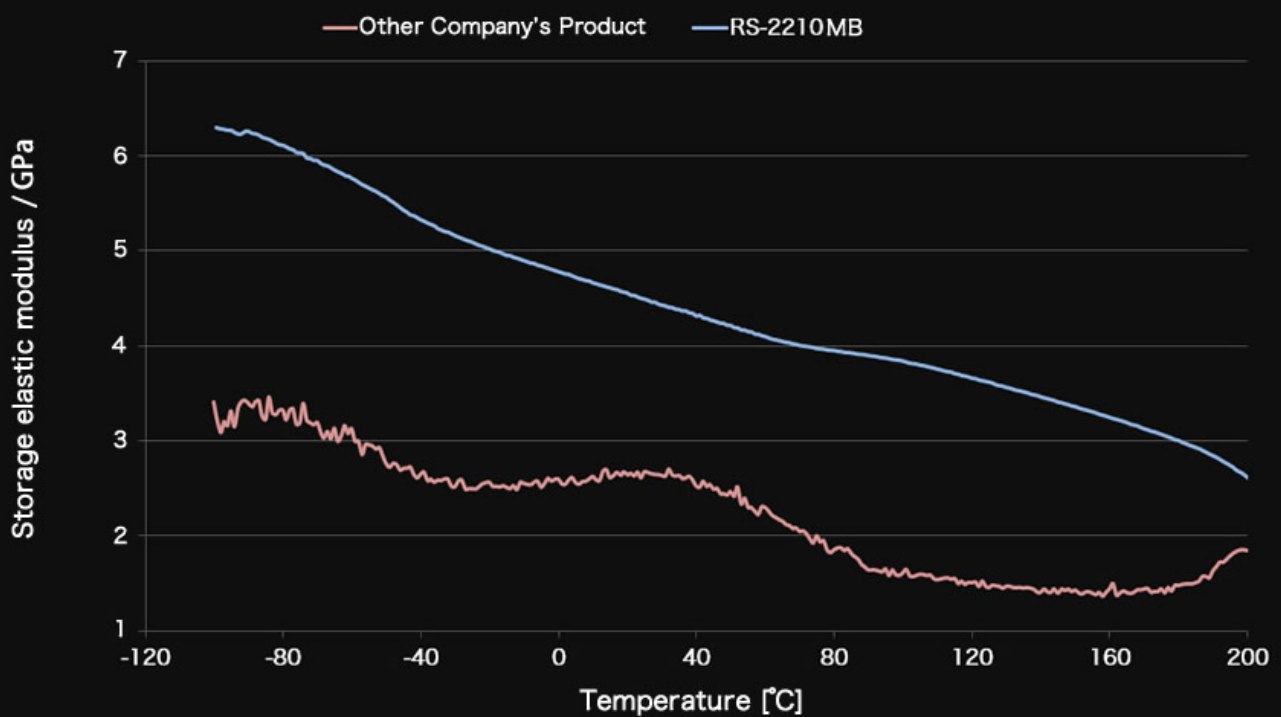
An improvement in NVH can be expected since heat resistance is the same or higher than straight novolac, and this series has superior moldability.

Upper graphic: 300°C heat resistance, Lower graphic: Dynamic viscoelasticity





Uniform dispersion of silicone rubber inside the resin eliminates lowering of the elastic modulus when the temperature rises, and provides stable braking performance in all temperature ranges.



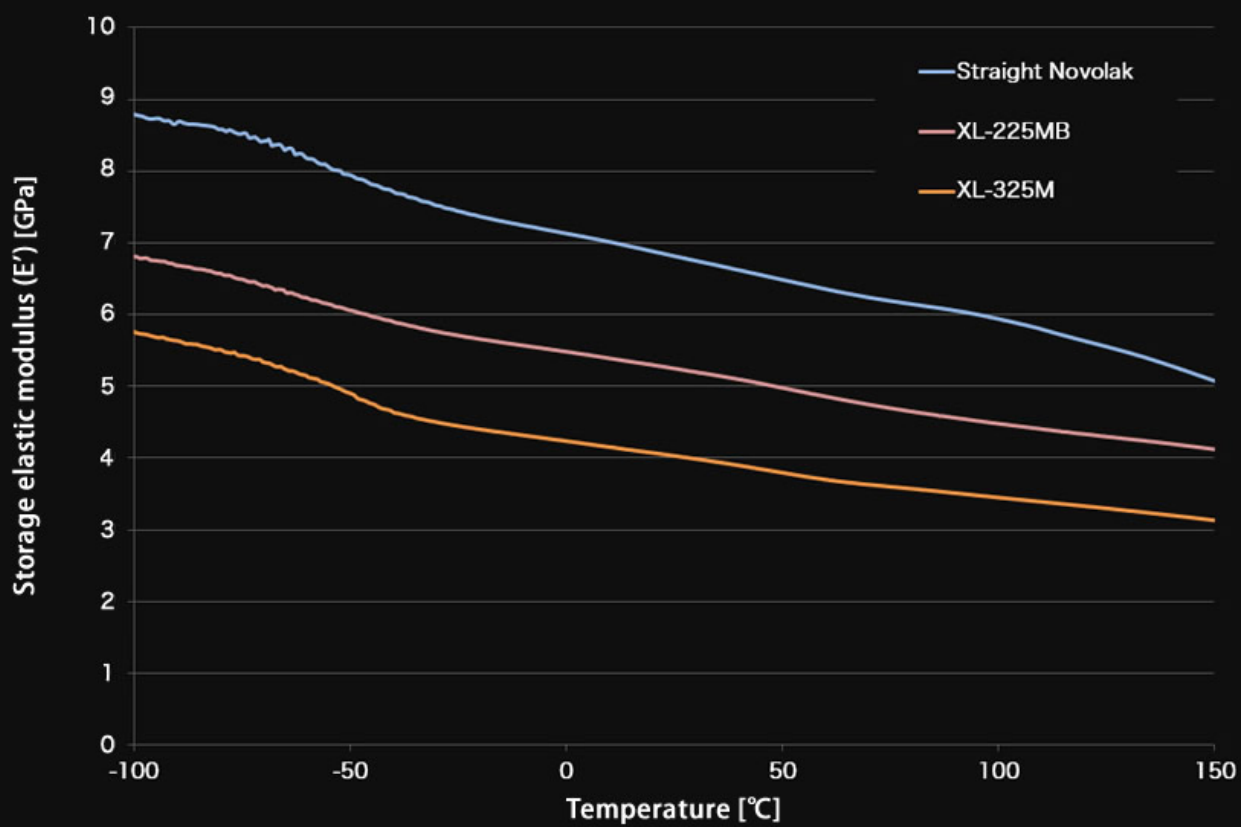
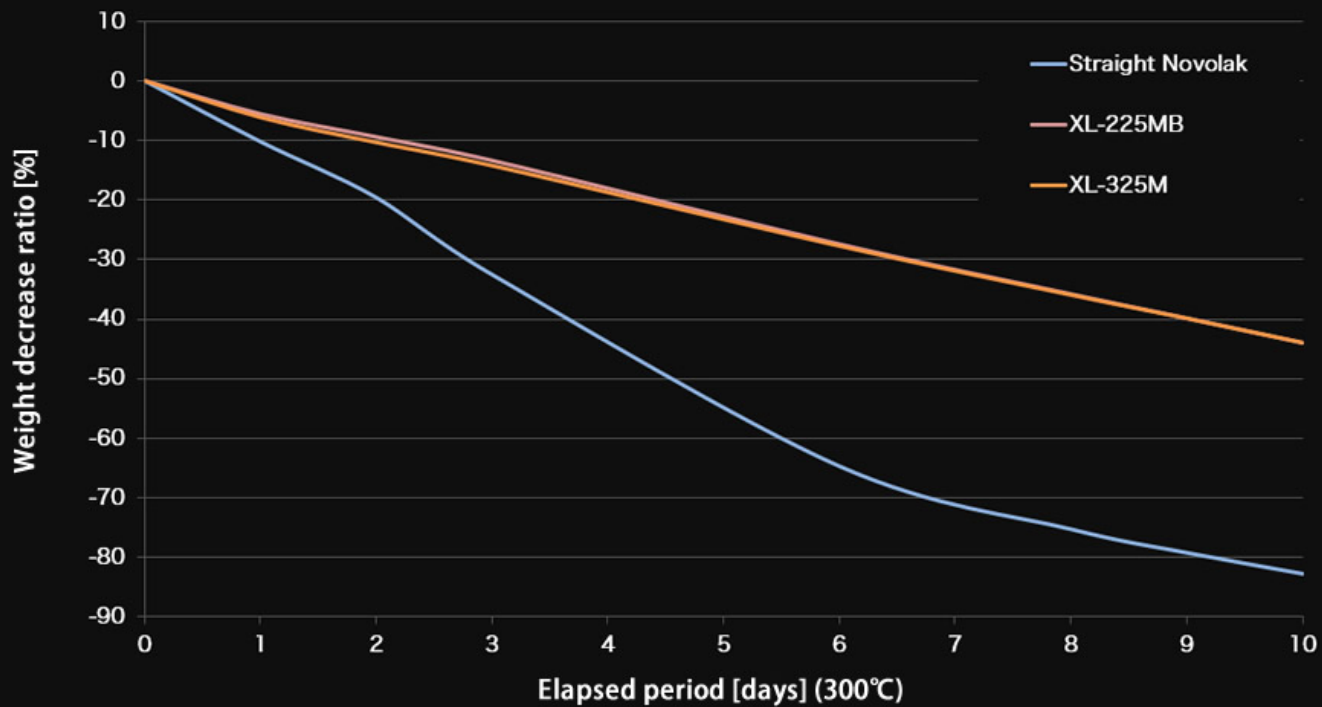
## Milex™ XL-Series provides substantially higher heat resistance and moldability than straight type

The Milex XL-series is a product that provides a large increase in heat resistance and vibration absorption by introducing the benzyl group into the molecular structure.

Product	Softening Point (°C)	Flow/125°C (mm)	Gel Time (s)	Remarks
XL-225MB	88~96	38~60	150~290	
XL-325M	90~100	15~45	120~140	High molecular mass type

This product features moldability and substantially increases heat resistance compared to straight type by introducing the benzyl group into the molecular structure.

Upper graphic: 300°C heat resistance, Lower graphic: Dynamic viscoelasticity



## Milex™ RM-Series dramatically enhances wear resistance

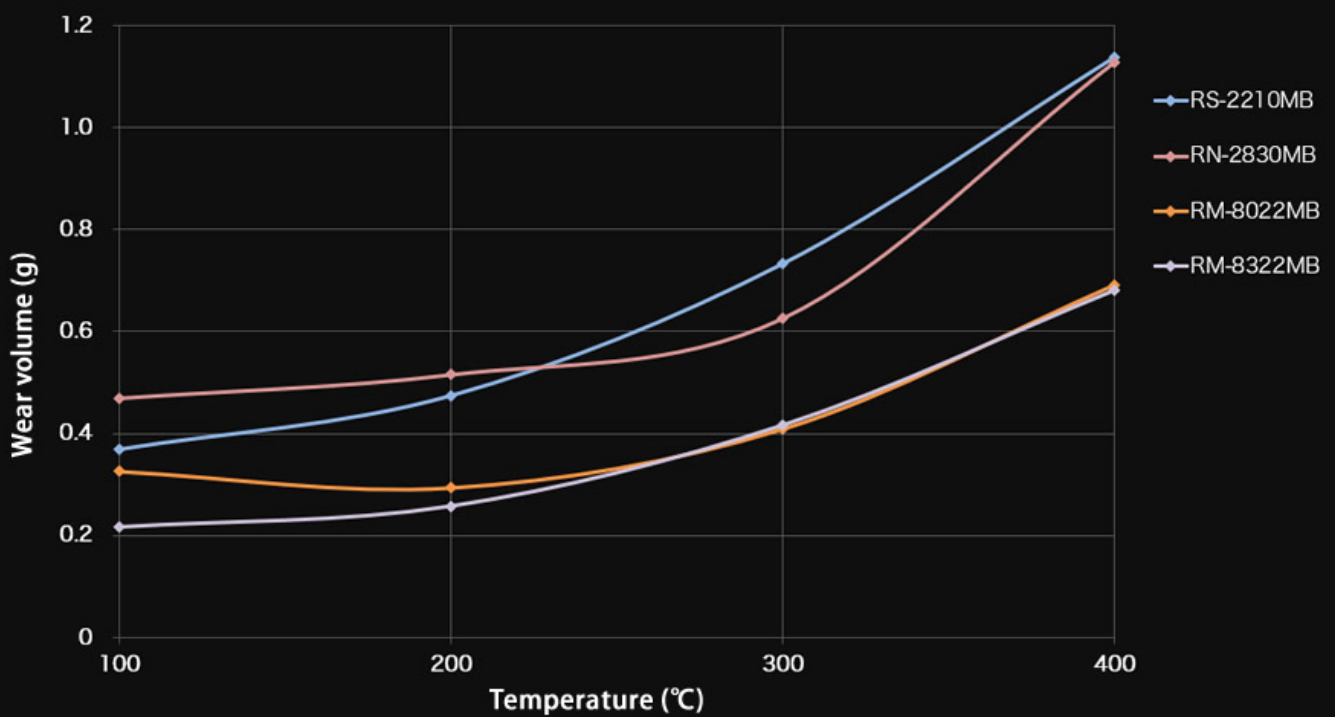
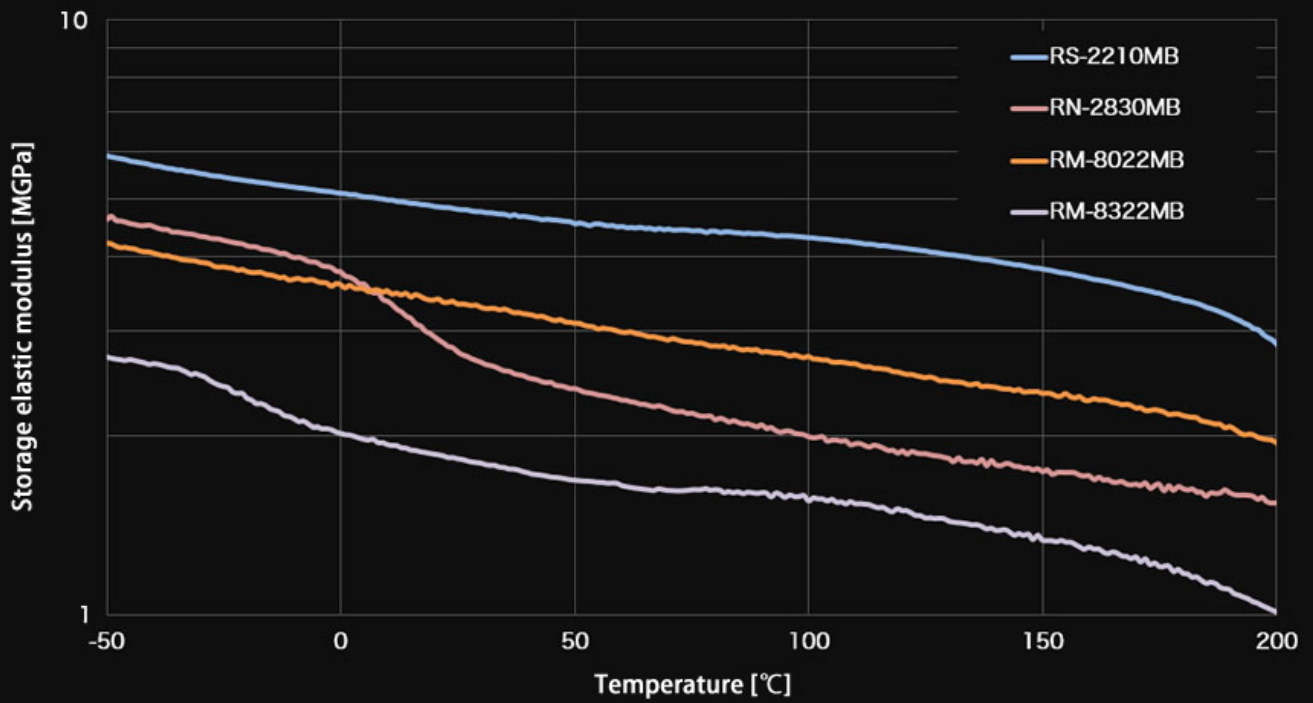
This product features moldability and substantially increases heat resistance compared to straight type by introducing the benzyl group into the molecular structure.

Product	Softening Point (°C)	Flow/125°C (mm)	Gel Time (s)	Remarks
RM-8022MB	108~118	21~28	94~137	
RM-8322MB	108~113	23~29	103~118	

This product increases wear resistance by blending special polyolefin that has higher interface strength with phenolic resin, and RM-8322MB features vibration absorption through the moldability of a special polymer.

Upper graphic: Dynamic viscoelasticity, Lower graphic: Wear resistance





Please feel free to send an inquiry.

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+81-27-353-1800

## Glossary

A

C

D

F

H

J

L

N

P

S

W

Term	Explanation
<b>AK Master</b>	One measurement method in Europe using dynamometer.
<b>Asbestos material</b>	Asbestos was widely used before as a reinforcement material for friction materials because of its high heat resistance, but usage in Japan has been prohibited since the 1990s after it was determined that it is harmful to health.

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