Mitsui EPT™

Mitsui Chemicals

What is Mitsui EPT™?

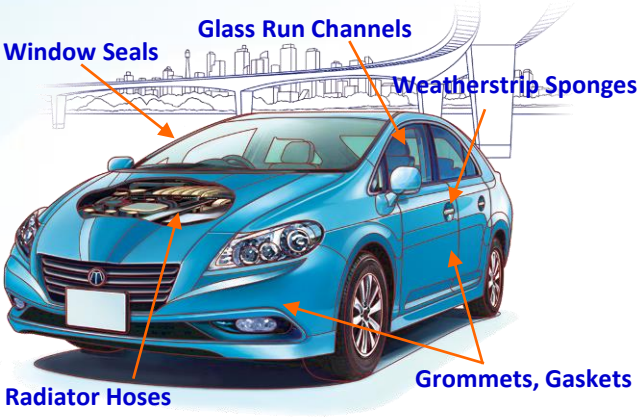
Mitsui EPT™ (Ethylene-Propylene-Terpolymer) is an EPT(EPDM) brand that is produced by Mitsui Chemicals through its state of the art olefinic polymerization technology.
With Mitsui Chemicals' advanced technology, we constantly develop new grades which allow us meet customer demand.

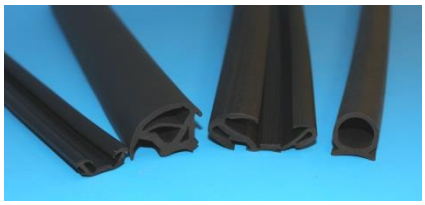
Mitsui EPT™ is a material which excels in processability, weather resistance, heat aging resistance, electrical insulation properties, cold resistance, and chemical resistance.
These properties are ideal in applications such as (but not limited to) automotive weatherstrips and hoses, building materials, and electrical cables.

Mitsui EPT™ specializes in specially designed polymers which competitors cannot match, allowing Mitsui Chemicals to develop not only high performance products but quality products which exceed customer expectations.

Mitsui EPT™ is backed by experts who provide excellent technical support to each and every customer and adjust to their every demand, whether it is a general grade selection for a certain application, formulation adjustments for improved properties, or cost reduction methods using **Mitsui EPT™**.

Automotive Industry





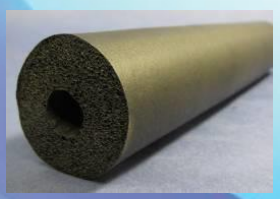
Glass Run Channels, Weatherstrip Sponges

Grommets, Hoses

Electrical and Construction Industries

Cables / Wires

O-Rings / Gaskets



Heat Insulator Sponges

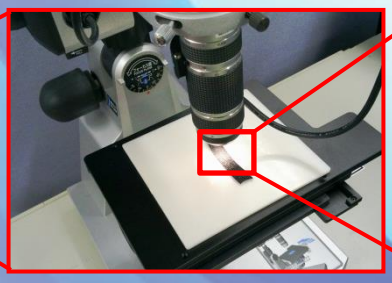
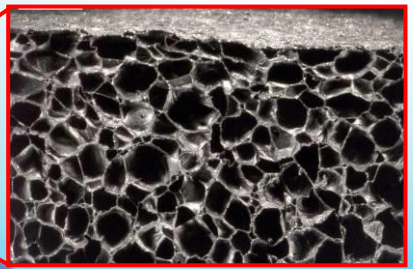
Various Tubes / Hoses

Contents

Introduction of EPT	**Page**
- Technical Properties	**4-5**
- General Characteristics	**6**
Introduction of Mitsui EPT™	
- Mitsui EPT™ Group	**7**
- Features of Mitsui Chemicals' R & D	**8**
- Advantages of Mitsui EPT™	**9**
- Grade List and Packaging	**10-11**
- Selection Guide	**12**
Contact Information	**13**





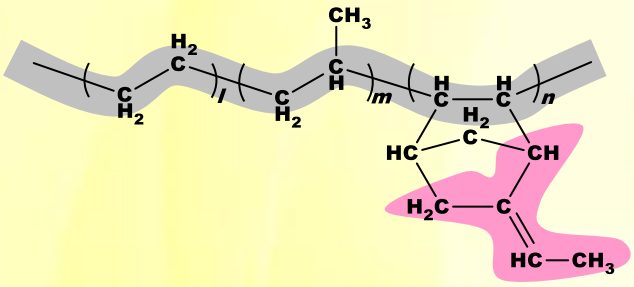
Basic Introduction of EPT and Comparison to Other Rubbers

1. Weather and Ozone Resistance Properties

The weather and ozone resistance of EPT is excellent and surpasses most rubbers due to its chemical structure.
The main chain of EPT consists of a very stable saturated hydrocarbon preventing the main chain from degrading even after being exposed to sunlight and/or high concentrations of ozone for long periods of time.

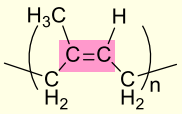
EPT Polymer Structure

Polymer Backbone; Saturated Hydrocarbon

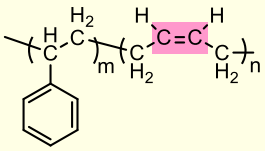


Diene Rubber Polymer Structure

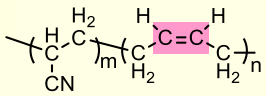
Natural Rubber (NR)



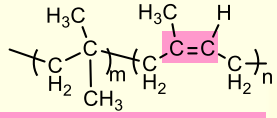
Styrene-Butadiene Rubber (SBR)



Nitrile Rubber (NBR)



Butyl Rubber (IIR)



Unsaturated Moiety in Polymer Backbone

EPT can be blended with other diene rubbers such as SBR and NR which have poor weather and ozone resistance, in order to significantly improve these characteristics.

Appearance Change Under Ozone Atmosphere

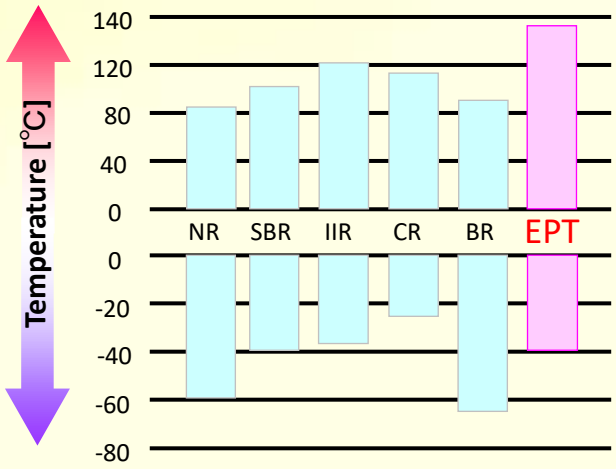
Ozone Condition : (EPT/IIR/CR 100pphm x 40°C x 600hr), (SBR/BR/NR 100pphm x 40°C x 300hr), (EPT:SBR 50 pphm x 40°C x 300hr)

Basic Introduction of EPT and Comparison to Other Rubbers

2. Heat and Cold Resistance Properties

The heat and cold resistance limits for EPT are broader than any other type of rubber due to its chemical structure.
The main chain of EPT consists of a very stable saturated hydrocarbon allowing it to have excellent heat aging resistance.
It can be used for longer periods of time and in higher temperatures compared CR (Chloroprene Rubber) and other diene rubbers such as SBR and NR.

Heat Aging Measurement



3. Electrical Insulation Properties

EPT has excellent characteristics as an insulation material.
The corona resistance is better than that of SBR, NR and IIR, and the tracking resistance is also excellent.

Electrical Insulation Properties (General tendency of base polymer)

	EPT	NR	SBR	IIR	CR	Crosslinked Polyethylene
Dielectric constant (23°C)	3～4	3～4	3～7	3～4	6～8	2.5
Dielectric breakdown voltage (kV/mm)	30～60	20～30	20～50	20～30	10～20	50～70
Volume resistivity value (23°C, Ω・cm)	10^{13}～10^{16}	～10^{15}	10^{14}～10^{15}	10^{15}～10^{16}	10^{10}～10^{12}	～10^{17}
Tracking resistance	★★★	★★	★★	★★★	★	★★★
Arc reistance	★★★	★★	★★	★★★	★	
Corona resistance	★★★	★★	★★	★★★	★	★★

★★★ Excellent, ★★ Fair, ★ Poor

4. Chemical Resistance Properties

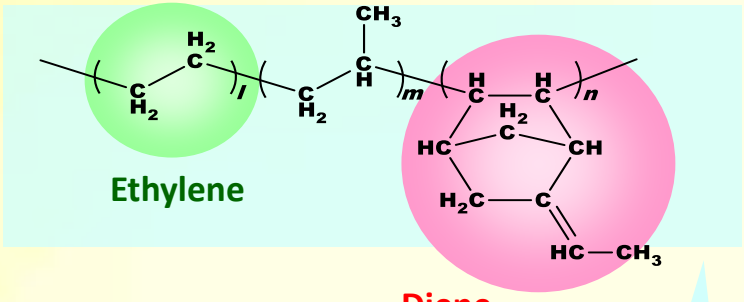
EPT has good chemical resistance against organic solvents with relatively higher polarity (alcohol, ketone, glycol, etc.), water solution of inorganic salt, acid and alkali.

Chemical Resistance Properties (Room Temperatue)

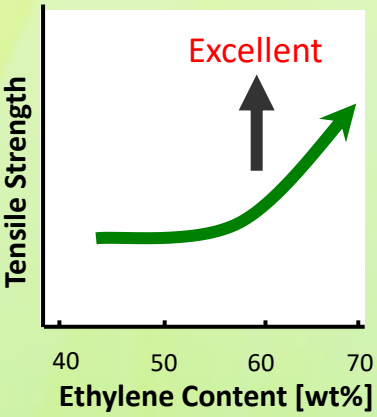
Acetone	★★★	Ethyl Alcohol	★★★	Freon® 11	★
Ammonia Water 25%	★★★	Glycol	★★★	Freon® 12	★★
Phosphate Ester	★★★	Nitric Acid 30%	★	Freon® 13	★★★
Methyl Ethyl Ketone	★★★	Hydrogen Peroxide 10%	★★★	Silicon Oil	★★★
Detergent	★★★	Hydrochloric Acid 30%	★★★	Paraffinic Oil	★
Sodium Hydroxide	★★★	Sulfuric Acid 50%	★★★	★★★ Excellent, ★★ Fair, ★ Poor	

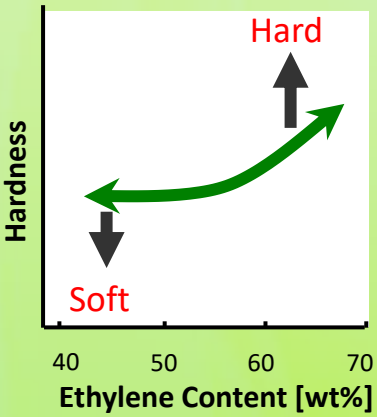
General Characteristics

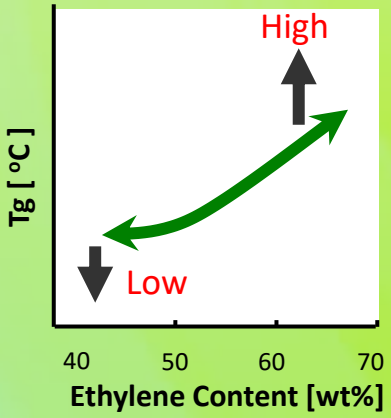
EPT structure's effects on various physical properties



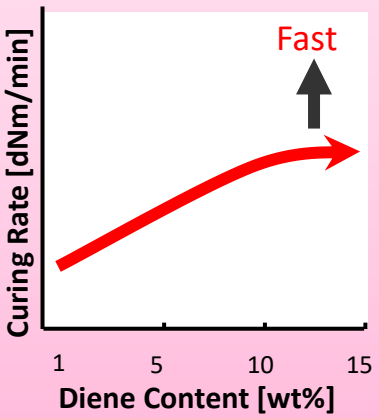
Ethylene Content

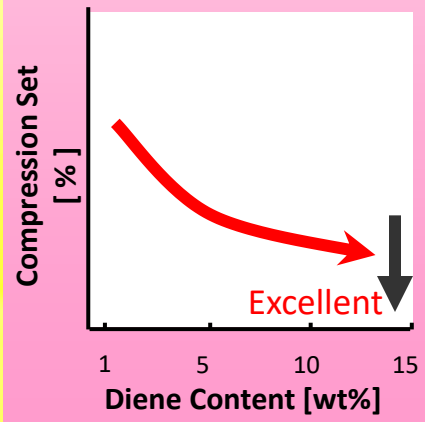




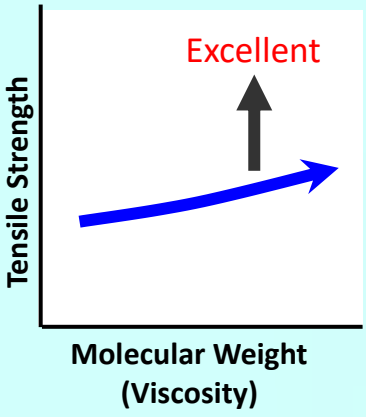


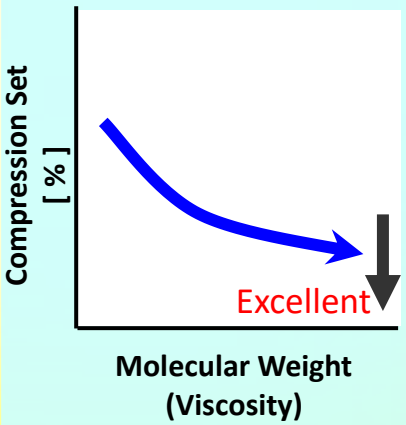
Diene Content





Molecular Weight





Mitsui EPT™ Group

Customers

Various demands

Mitsui EPT™ & Technical Support

Mitsui EPT™ Group

Mitsui EPT™ is a High Quality Product, which is backed with Valuable Insight and Technical Support to propose the best solution for each customer.

Valuable Insight:
Mitsui Chemicals Inc. has sales professionals located globally to quickly support and assist customers whenever needed

Sales & Marketing

Technical Support:
Mitsui Chemicals Inc. provides EPT formulation designs to achieve customer's target along with ongoing technical support to adjust to customer requests

One Team

Production

Research & Development

High Quality Products:
Mitsui Chemicals Inc. produces stable supply and quality through strict quality checks.

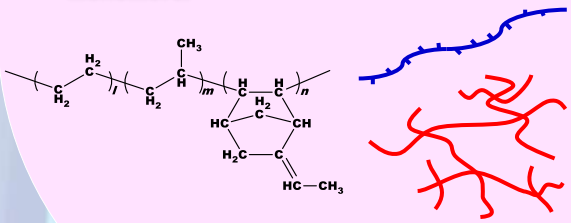
Features of Mitsui Chemicals' R & D

◆Research and Development Cycle to Create Innovative Products

Mitsui Chemicals is an extensive company which actively works on research and development and offers a wide range of products from basic monomers to catalysts and plant designs as well. Through this active cycle of research and development throughout the entire company, Mitsui Chemicals offers new and innovative products the exceed market expectations.

Polymer Design

Various high performance products can be achieved by our original polymerization technology along with unique catalysts and monomers.



Production Design

- Quality stability
  (Very Low Amount of Gels)
  (Stable Viscosity)
- Unique Polymer Alloy

Formulation Design

We provide sample formulations accumulated through over 40 years of experience.

Evaluation & Analysis

Mixing & vulcanization processability, physical & chemical properties are investigated based on the applications.

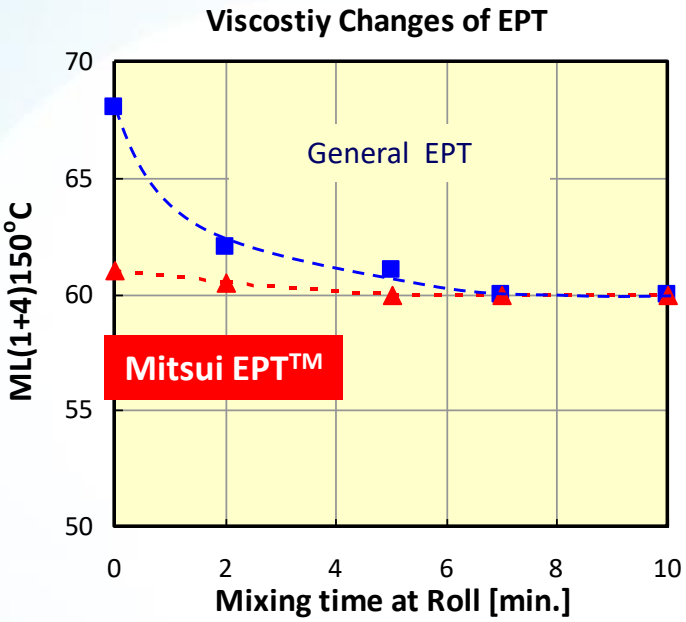
Advantages of Mitsui EPT™

◆Unique Production Process

Mitsui Chemicals uses a state of the art production process which allow the materials produced to have **excellent and stable quality.**

Quality benefits include:

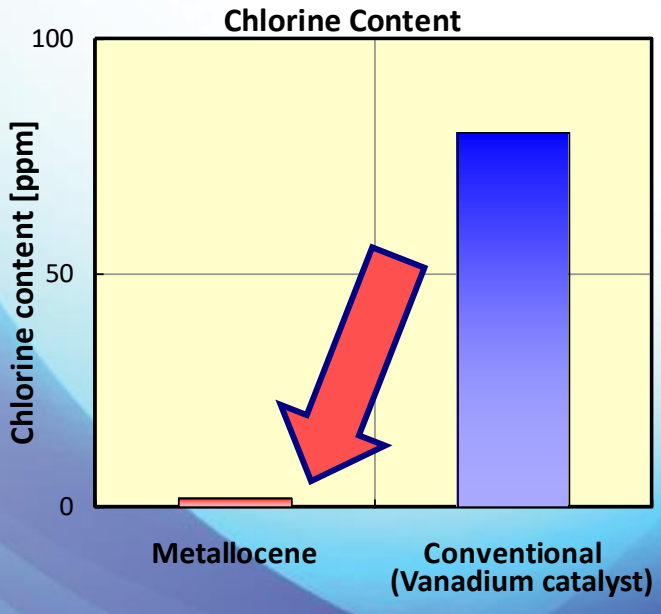
- Low gel content within the material
- Stable viscosity when mixing



◆Grades Produced Using the Metallocene Catalyst Technology

The Metallocene catalyst technology allows new and exciting potential to the long existing EPT world.

- Low chlorine content for longer lasting products
- Narrow MWD for higher properties
- Extremely low gel content within the material
- Possibilities to realize versatile polymer design
- A simple and more environmentally friendly production process.



Mitsui EPT™ Grade Nomenclature

Quantity of the Third Component
- 0-No Diene
- 2-Low Diene Content
- 3-Medium Diene Content
- 4-High Diene Content
- 8/9-High Diene Content (2 types)
  Branched Structure EPT

Mooney Viscosity
- 01-ML1+4(100℃)≒10
- 04-ML1+4(100℃)≒40
- 07-ML1+4(100℃)≒70
- 09-ML1+4(100℃)≒90
- 12-ML1+4(100℃)≒120

3 07 2 EPM

Characteristics of the grade
- 0-Low Ethylene Content
  Excellent Low Temperature Characteristics
- 1-Broad Molecular Weight Distribution
  Excellent Processability
- 2-High Ethylene Content
  High Tensile Strength
- 5-Well Balanced Processability and Tensile Strength
  (Between 0 and 1, Mitsui EPT™ Special Grades)

- E-Oil Extended Grades
- P-Pellet Grades
- (H)*-Wrapped in a High Density Polyethylene Film.
  Remove before use.
- M-Metallocene Catalyst Grades

(*: All Grades are normally wrapped in Low Density PE film but there is an option to wrap in High Density PE Film. Refer to the next page for packaging details)

Standard Bale

Friable Bale

Pellet

Mitsui EPT™ Grade List

■Mitsui EPT™

		Grade	Mooney Viscosity ML(1+4) 125°C	Mooney Viscosity ML(1+4) 100°C	Ethylene Content (%)	Diene Content (%)	Oil Content (PHR)	Polymer Design *1	Bale Weight (kg)	Bale Form	Packaging Wrapping *2	Packaging kg/ Steel Box	Shipping kg/ 20'Container
No Diene	Non-Oil Extended	**0045**	-	40	51	-	-	Broad	25	Standard	LDPE, HDPE	1,050	16,800
Low Diene	Non-Oil Extended	**2060M**	40	-	55	2.3	-	Narrow	25	Standard	LDPE	1,050	16,800
Medium Diene	Non-Oil Extended	**3045**	-	40	56	4.7	-	Broad	25	Standard	LDPE, HDPE	1,050	16,800
		3070	47	-	58	4.7	-	Narrow	25	Standard	LDPE, HDPE	1,050	16,800
		3092M	61	-	65	4.6	-	Narrow	25	Friable	LDPE, HDPE	750	12,000
		3110M	78	-	56	5.0	-	Narrow	25	Friable	LDPE, HDPE	750	12,000
	Oil Extended	**X-3042E**	-	37	66	4.7	120	Narrow	25	Standard	LDPE, HDPE	1,050	16,800
		3062EM	43	-	65	4.5	20	Narrow	25	Standard	LDPE, HDPE	1,050	16,800
									25	Friable	LDPE, HDPE	750	12,000
		3072EM	51	-	64	5.4	40	Narrow	25	Standard	LDPE, HDPE	1,050	16,800
									25	Friable	LDPE, HDPE	750	12,000
		3090EM	59	-	48	5.2	10	Narrow	25	Standard	LDPE	1,050	16,800
High Diene	Non-Oil Extended	**X-4010M**	-	8	54	7.6	-	Narrow	25	Standard	Low Melt POE	1,050	16,800
		4021	-	24	51	8.1	-	Broad	25	Standard	LDPE, HDPE	1,050	16,800
		4045	-	45	54	8.1	-	Broad	25	Standard	LDPE, HDPE	1,050	16,800
		4045M	-	45	45	7.6	-	Narrow	25	Standard	LDPE, HDPE	1,050	16,800
		4070	47	-	56	8.1	-	Narrow	25	Standard	LDPE, HDPE	1,050	16,800
		8030M	-	32	47	9.5	-	Hyper Branched	25	Standard	LDPE	900	14,400
		9090M	58	-	41	14.0	-	Branched	25	Standard	LDPE	900	14,400

■Mitsui EPT™ Pellet Grades

Characteristics		Grade	Mooney Viscosity ML(1+4) 125°C	MFR 190°C, 2.16kg	Ethylene Content (%)	Diene Content (%)	Oil Content (PHR)	Polymer Design *1	Pellet Weight (kg)	Pellet Form	Packaging Wrapping	Packaging kg/ Pallet	Shipping kg/ 20'Container
Medium Diene	Non-Oil Extended	**X-3012P**	15(100°C)	5g/10min	72	3.6	-	Narrow	25	Pellet	Paper Bag	750	12,000
		3092PM	61	-	65	4.6	-	Narrow	25	Pellet	Paper Bag	750	12,000
	Oil Extended	**3072EPM**	51	-	64	5.4	40	Narrow	25	Pellet	Paper Bag	750	12,000

■Ethylene 1-Butene Terpolymer (Pellet Grade)

Characteristics		Grade	Mooney Viscosity ML(1+4) 125°C	MFR 190°C, 2.16kg	Ethylene Content (%)	Diene Content (%)	Oil Content (PHR)	Polymer Design *1	Pellet Weight (kg)	Pellet Form	Packaging Wrapping	Packaging kg/ Pallet	Shipping kg/ 20'Container
High Diene	Non-Oil Extended	**K-9720**	20(100°C)	2g/10min	77	10.4	-	Broad	25	Pellet	Paper Bag	750	12,000

■Mitsui Eptalloy™

Characteristics		Grade	Mooney Viscosity ML(1+4) 125°C	Polyetheylene Content (PHR)	Ethylene Content (%)	Diene Content (%)	Oil Content (PHR)	Polymer Design *1	Bale Weight (kg)	Bale Form	Packaging Wrapping	Packaging kg/ Steel Box	Shipping kg/ 20'Container
Medium Diene	Oil Extended	**PX-049PEM**	36(150°C)	20	56	5.0	10	Narrow	25	Friable	LDPE	750	12,000

*1: **Polymer Design**
Broad: Broad Molecular Weight Distribution,
Narrow: Narrow Molecular Weight Distribution,
Branched: Designed Long Chain Branched EPT,
Hyper Branched: Designed Hyper Long Chain Branched EPT

*2: **Melting point of wrapping materials:**
LDPE: ～ 110°C
HDPE: ～ 120°C (Remove before use)
Low Melt POE : ～ 70°C

Selection Guide by Application

※Applications are representations and can differ depending on the formulation. Please contact a sales professional for details.

■Mitsui EPT™ Representative Applications

Grade	Automotive				Life, Buildings & Constructions, Electronics, Industrial parts					Specialties & Modifiers					Polymer Features
	Weather Strip (solid)	Weather Strip (sponge)	Corner Joint Sponges	Grommets, Gaskets	Sheet, Roofing, Linings	Belts, Inner Tube, Hoses	Cables, Wires	OA Rolls, Packings	Anti-vibration	TPE / TPV Modifier	Low Density Sponge	High Hardness	Low Hardness	Viscosity Modifier	
0045					★	★★	★								High Heat Resistance, Processability
2060M					★★	★★	★								Heat Resistance
3045					★	★	★★				★★				Heat Resistance, Processability
3070				★★	★	★	★								Processability, Excellent Low Temperature Properties
3092M	★★			★★		★				★		★			High Hardness
3110M	★★			★		★									Good Balance of Strength and Low Temperature Properties
X-3042E								★★	★★				★★		High Molecular Weight, Highly Oil Extended
3062EM	★★		★	★★		★	★★					★			High Hardness
3072EM	★			★★		★			★★	★					High Molecular Weight
3090EM	★★			★★		★★	★								Excellent Low Temperature Properties
X-4010M			★★											★★	Low Viscosity
4021			★		★	★					★			★	Low Viscosity, Processability
4045					★	★	★★	★			★★				Heat Resistance, Processability
4045M			★	★★	★	★	★	★							Heat Resistance, Excellent Low Temperature Properties
4070				★★											Rapid Curing, Processability, High Cross-linking Density
8030M		★★				★	★				★★				Processability, High Cross-linking Density, Excellent Low Temperature Properties
9090M		★★			★					★	★				High Diene Content, Rapid Curing, High Cross-linking Density, Excellent Low Temperature Properties

■Mitsui EPT™ Pellet Grades

X-3012P										★		★★		★★	Low Viscosity, Pellet Grade
3092PM	★★									★★		★			High Hardness, Pellet Grade
3072EPM	★			★★					★★	★★					Oil Extended Pellet Grade

■Ethylene 1-Butene Terpolymer (Pellet Grade)

K-9720							★			★★		★★			High Hardness, Pellet Grade

■Mitsui Eptalloy™

PX-049PEM	★★			★★											EPT / Polyethylene (PE) Blend

★★ : excellent ★ : good

Contact Information

Japan Sites

Tokyo Head Office
EPT Group, Elastomers Division, Mobility Solutions Business Sector, Tokyo Midtown Yaesu, Yaesu Central Tower, 2-2-1 Yaesu, Chuo-ku, Tokyo 104-0028
TEL: +81-3-6880-7308 FAX: +81-3-6880-7565

Osaka Branch
Elastomers Group, Functional Polymers Department, Shinanobashi Mitsui Bldg., 11-7, Utsubohonmachi 1-chome, Nishi-ku, Osaka 550-0004
FAX:+81-6-6446-3883

Nagoya Branch
Elastomers Group, Functional Polymers Department, Nagoya Mitsui Main Bldg., 24-30, Meiekiminami 1-chome, Nakamura-ku, Nagoya 450-0003
TEL: +81-52-587-3604 FAX:+81-52-587-3622

Overseas Branches

Mitsui Chemicals Europe GmbH.
Functional Polymeric Materials Division
Oststrasse 10, 40211 Düsseldorf, GERMANY
TEL: +49-211-173320 FAX:+49-211-323486

Mitsui Chemicals Asia Pacific, LTD.
Functional Materials Division
3 HarbourFront Place
#10-01 HarbourFront Tower 2, SINGAPORE 099254
TEL:+65-6534-2611 FAX:+65-6535-5161

Mitsui Chemicals America, Inc.
Functional Polymeric Materials Division
800 Westchester Avenue, Suite S-306 Rye Brook, New York 10573, U.S.A
TEL:+1-914-253-0777 FAX:+1-914-253-0790

Mitsui Chemicals Korea, Inc.
15F, Building-B, PINE AVENUE, 100,Eulji-ro, Jung-gu, Seoul, KOREA 04551
TEL: +82-2-6031-0200 FAX: +82-2-6031-02

Mitsui Chemicals India Pvt. Ltd.
Automotive & Industrial Materials Division
Regd Office: 2nd Floor, B-Wing, D3,
District Centre, Saket, New Delhi – 110017, INDIA
TEL: +91-11-3010 7400 FAX: +91-11-3010 7499

Shanghai Sinopec Mitsui Elastomers, CO.,LTD (SSME)
Marketing & Technical Services Department
Room E 23F, Zhao Feng World Trade Building, No.369 Jiangsu Rord, Shanghai P.R.C. 200050, CHINA
TEL: +86-21-6212-1316 FAX: +86-21-6212-1552

Disclaimer

The information contained in this brochure is, to the best of our knowledge, accurate and reliable, but all suggestions are made without warranty, either expressed or implied. The values relevant to properties or the like of the product stated herein were obtained using laboratory test specimens prepared in Mitsui Chemicals laboratories and are not to be used as product specifications, nor assumed to be identical to values obtained on the finished product manufactured by our customers. Nothing herein shall be construed as permission or as recommendation for uses which infringe valid industrial properties or as extending a license under valid industrial properties. Because the conditions and methods of use on the part of our customers are beyond our control, Mitsui Chemicals, disclaims any liability incurred in connection with the use of our products.

Warning

For safety details, please refer to the Safety Data Sheet (SDS).

Mitsui EPT™ is designed for industrial applications only. Do not use Mitsui EPT™ for medical applications, anything that may be implanted, injected, come in direct contact with skin, or any products which come in direct contact with food and/or beverages. We do not guarantee the safety of Mitsui EPT™, expressed or implied, for medical, or food and beverage related applications.
Please consider and confirm the safety properties of the application based on the intended final product.
Please contact a sales representative if unsure of the safety of an application, before using this product.

▲ Mitsui EPT website

▲ New lineup rubber website

Email coc@mitsuichemicals.com