

ADHESIVE RESIN

ADMER™



AUTOMOTIVE



Mitsui Chemicals
Group

ADMER™ Adhesive Resin

ADMER™ KEY FACTS

- ⊕ **MALEIC ANHYDRIDE GRAFTED POLYOLEFIN**
- ⊕ **EXTRUDABLE**
- ⊕ **TIE RESIN**
- ⊕ **ADHERING TO BARRIER MATERIALS**
EVOH, BVOH, PVOH, PA, COATINGS, INORGANICS AND METALS

ADMER™ resins are modified polyolefins with functional groups, designed to bond to a variety of polyolefins, ionomers, polyamides, ethylene vinyl alcohol (EVOH), butenediol vinyl alcohol (BVOH), polyvinyl alcohol (PVOH), polyester (e.g. PET), coatings, inorganics and metals. They serve as **tie layer in multilayer applications** such as films, sheets, bottles, tanks, pipes, tubes and others and, thus, help to combine the excellent properties of incompatible materials, as, for example, gas barrier resins and moisture barrier resins.

ADMER™ resins are also used as coupling agents, compatibilizers and impact modifiers in various types of composites. ADMER™ adhesives are thermoplastics and can be as easily processed as any other polyolefin by (co-)extrusion or powder coating. ADMER™ is famous for its excellent quality and is therefore the world's leading polyolefin-based adhesive. Production sites all over the world assure a constant and convenient availability of our top quality adhesives.

- ⊕ ADMER™ RESINS ARE WELL KNOWN FOR SETTING THE MARKET STANDARDS IN TERMS OF QUALITY AND EFFICIENCY.
- ⊕ ADMER™ RESINS ARE **THE MISSING LINK** FOR YOUR MULTILAYER INNOVATIONS!

Multilayer Structure with ADMER™

Characteristics

1. STRONG ADHESION

By thermal energy ADMER™ adheres to ethylene vinyl alcohol (EVOH), butenediol vinyl alcohol (BVOH), polyvinyl alcohol (PVOH), polyamide (PA), polyester (PET), polyolefins (PE/PP), coatings, inorganics and metals.

2. ADHESION DURABILITY

ADMER™ shows excellent long-term adhesion strength even after secondary processing like pasteurization, hot filling, boiling and sterilization.

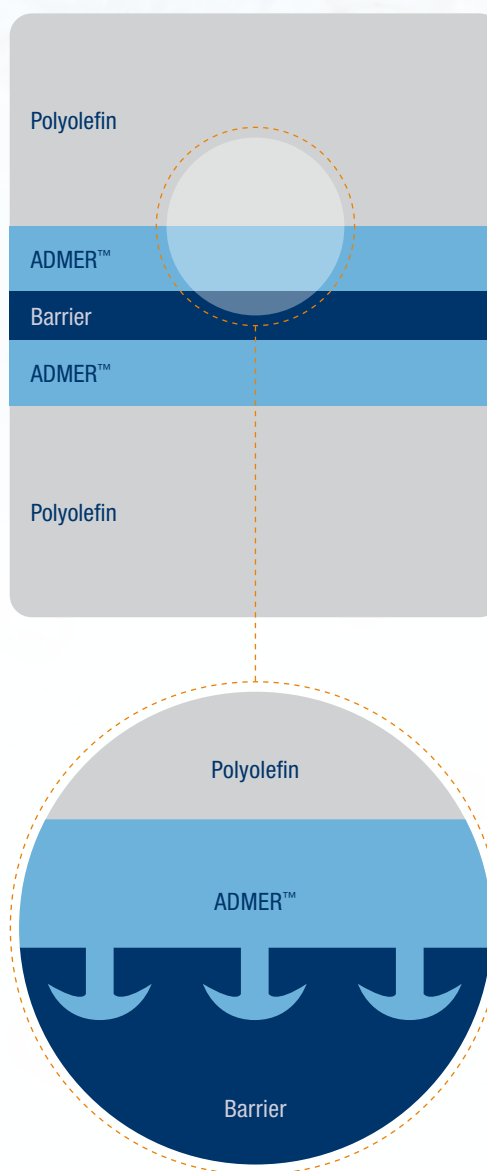
3. POLYOLEFIN-LIKE PROPERTIES

Since ADMER™ is based on polyolefins, it retains the physical properties of each polyolefin or co-polymer including mechanical strength, heat resistance, chemical resistance and recyclability.

4. EASY PROCESSING

ADMER™, a thermoplastic, can be processed as easily as any other polyolefin by the following methods:

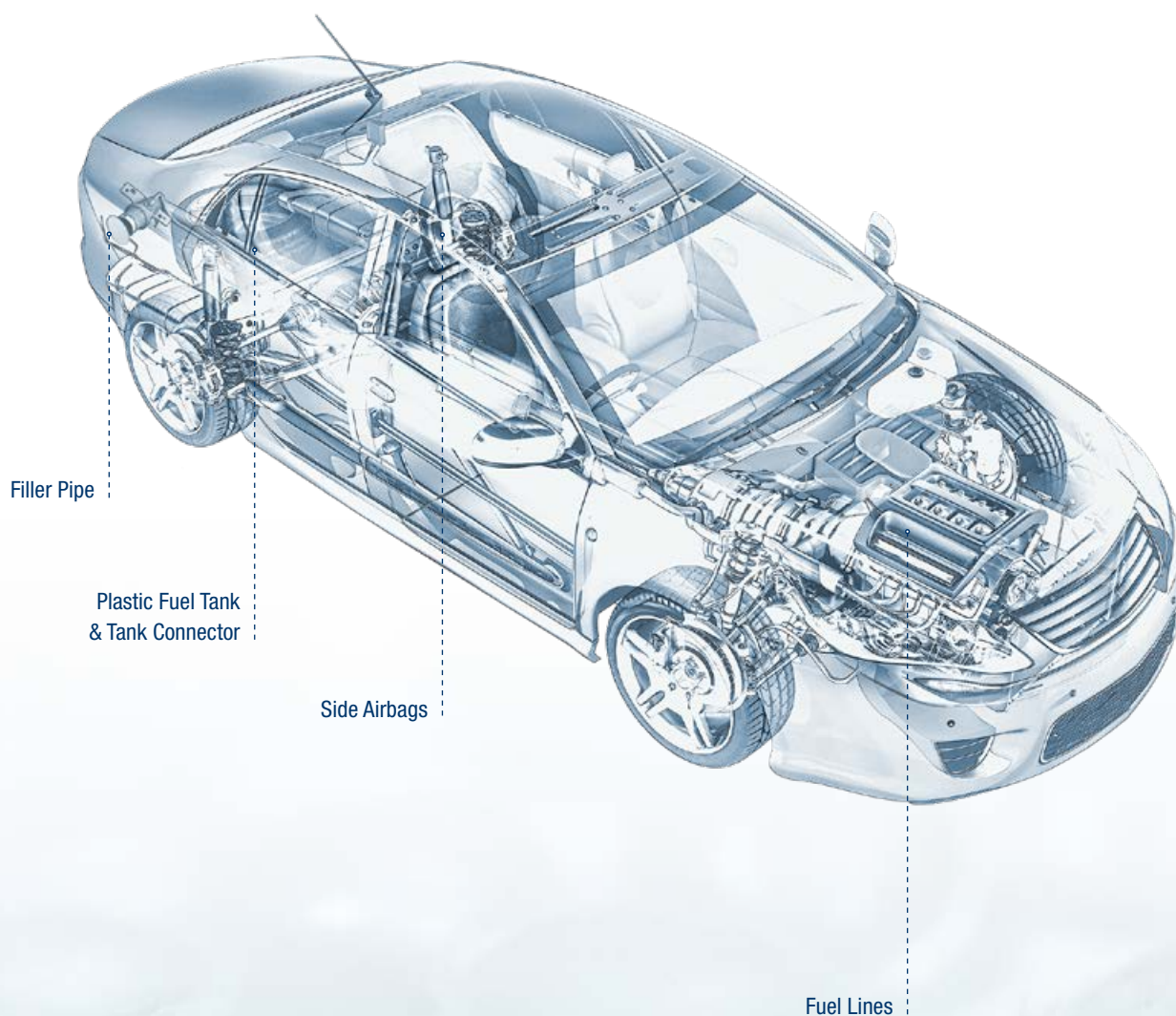
- ⊕ FILM CO-EXTRUSION
(CAST AND BLOWN FILM)
- ⊕ CO-EXTRUSION BLOW MOULDING
- ⊕ SHEET CO-EXTRUSION
- ⊕ TUBE CO-EXTRUSION
- ⊕ CO-EXTRUSION COATING
- ⊕ METAL COATING
- ⊕ CO-INJECTION



Automotive Applications



ADMER™ IS THE GLOBALLY LEADING TIE
RESIN IN CO-EXTRUDED PLASTIC FUEL TANKS



AUTOMOTIVE DEMANDS

Every vehicle contains about 30,000 parts. Industry demands for lightweight, recyclable parts have increased in line with needs for environment-friendly vehicles.



STRUCTURE OF MULTILAYER PLASTIC FUEL TANK

HDPE / **ADMER™** / EVOH / **ADMER™** / REGRIND / HDPE

ADMER™ is used as a tie layer resin in integrated plastic fuel systems. Available in pellet form, this high performance adhesive resin shows superior long term adhesion, toughness, aging resistance and enables fuel system suppliers and OEMs to deliver fuel components with low permeation and superior durability.

LOW-PERMEATION IN FUEL SYSTEMS

For many years, Mitsui Chemicals has been working with automotive suppliers to develop improved multilayer plastic fuel systems. The tie layer resin is used extensively by the automotive industry worldwide, and Mitsui Chemicals is continuously making improvements to accommodate alternate fuels and advances in fuel system technologies.

The industry's premier multilayer fuel system components benefit from the application of EVOH as low-permeation barrier material.

By chemical reaction to the EVOH, ADMER™ enables the cost efficient production of multilayer tanks. Main feature of these co-extruded tanks is a consistent permeation resistance to evaporative emissions. This superior resistance to gasoline permeability ensures that OEMs meet environment, regulatory and industry requirements which are constantly reinforced.

Standard Grades for Automotive Applications

PLASTIC FUEL TANKS (PFT) AND FILLER PIPES

GT6E: Our standard and top-selling PFT grade. ADMER™ GT6E is a maleic anhydride grafted, LLDPE-based adhesive designed for multilayer plastic fuel tanks composed of PE and EVOH.

GT6E

PE-Grade
MFR: 1.1
Density: 0.92

ITEM	VALUE	UNIT	ASTM TESTING METHOD
MFR (190°C , 2.16kg)	1.1	g /10 min	D1238
Density	0.92	g /cm ³	D1505
Tensile Strength at Yield	11	MPa	D638
Tensile Strength at Break	25	MPa	D638
Elongation at Break	> 500	%	D638
Izod Impact Strength	No Break	J/m ²	D256
Shore Hardness	51	D scale	D2240
Vicat Softening Point	102	°C	D1525
Melting Point	122	°C	D3418

GT7: Next generation grade with improved adhesion performance. ADMER™ GT7 is a maleic anhydride grafted, LLDPE-based adhesive designed for multilayer plastic fuel tanks composed of PE and EVOH. It offers advanced adhesion durability, fuel resistance and processability.

GT7

PE-Grade
MFR: 1.0
Density: 0.93

ITEM	VALUE	UNIT	ASTM TESTING METHOD
MFR (190°C , 2.16kg)	1.0	g /10 min	D1238
Density	0.93	g /cm ³	D1505
Tensile Strength at Yield	15	MPa	D638
Tensile Strength at Break	29	MPa	D638
Elongation at Break	> 500	%	D638
Izod Impact Strength	No Break	J/m ²	D256
Shore Hardness	59	D scale	D2240
Vicat Softening Point	108	°C	D1525
Melting Point	127	°C	D3418

Standard Grades for Automotive Applications

NEW: COOLING PIPES FOR ELECTRIC VEHICLES (EV)

GT7: Next generation grade with improved adhesion performance. ADMER™ GT7 is a maleic anhydride grafted, LLDPE-based adhesive designed for multilayer plastic fuel tanks composed of PE and EVOH. It offers advanced adhesion durability, fuel resistance and processability.

ITEM	VALUE	UNIT	ASTM TESTING METHOD
MFR (190°C , 2.16kg)	1.0	g /10 min	D1238
Density	0.93	g /cm ³	D1505
Tensile Strength at Yield	15	MPa	D638
Tensile Strength at Break	29	MPa	D638
Elongation at Break	> 500	%	D638
Izod Impact Strength	No Break	J/m ²	D256
Shore Hardness	59	D scale	D2240
Vicat Softening Point	108	°C	D1525
Melting Point	127	°C	D3418

GT7

PE-Grade
MFR: 1.0
Density: 0.93

AT3523E: Our new grade for PP-based cooling pipe applications. ADMER™ AT3523E is a maleic anhydride grafted, homo-PP based adhesive resin with a lower MFR for pipes composed of PP with EVOH or PA.

ITEM	VALUE	UNIT	ASTM TESTING METHOD
MFR (230°C, 2.16kg)	1.6	g /10 min	D1238
Density	0.90	g /cm ³	D1505
Tensile Strength at Yield	24	MPa	D638
Tensile Strength at Break	24	MPa	D638
Elongation at Break	280	%	D638
Izod Impact Strength	470	J/m ²	D256
Shore Hardness	64	D scale	D2240
Vicat Softening Point	140	°C	D1525
Melting Point	161	°C	D3418

AT3523E

PP-Grade
MFR: 1.6
Density: 0.90

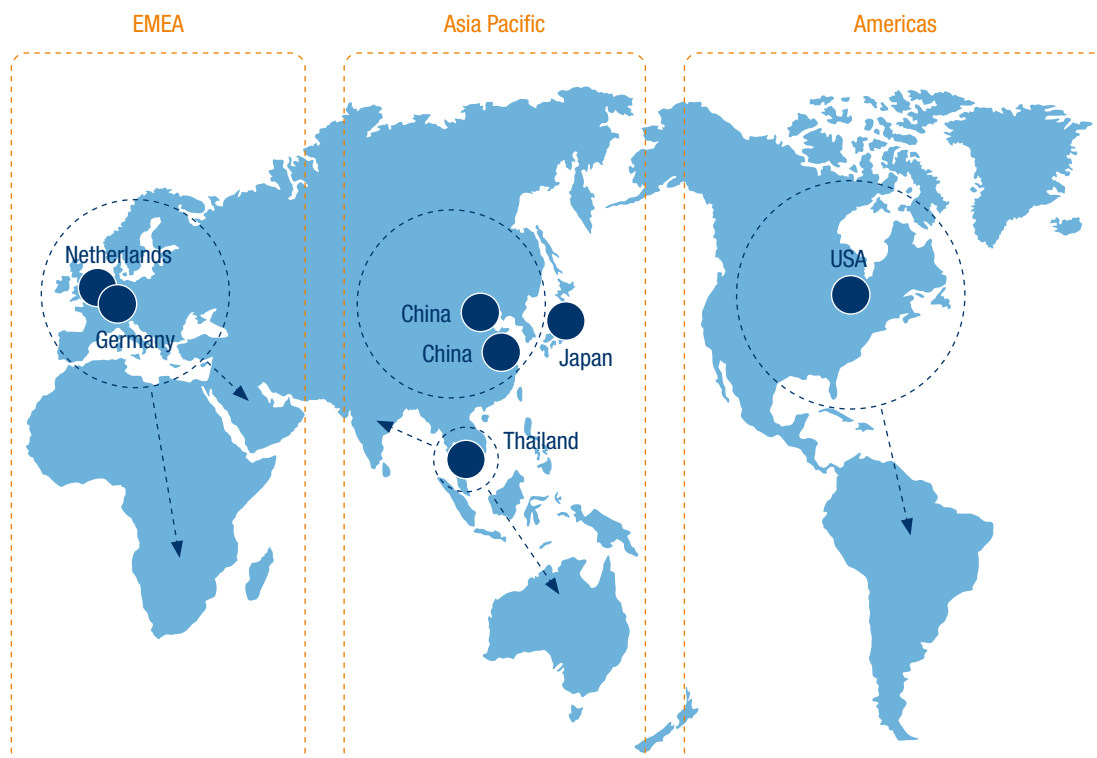
ADMER™ Production



ADMER™, the global market leader in extrudable tie resins, is produced in Europe, Asia and America – hence, worldwide availability is assured. The European market is served from our production sites in Germany and the Netherlands.

GLOBAL SUPPLY CAPABILITY OF ADMER™

Global Market Coverage from 3 Regions



Packaging Units



1,000 kg net pallet weight
big bags or delivery in silo
truck (bulk) available on
request.



25 kg PE-bags on CP1
wooden pallets;
Pallet dimension in m:
 $1.10 \times 1.30 \times 1.80$
(width \times length \times height)

500 kg octabins (cardboard
boxes) on CP3 wooden pallets;
Pallet dimension in m:
 $1.15 \times 1.15 \times 1.20$
(width \times length \times height)



Handling Procedure



Store inside



Keep dry



Keep out of sun

STORAGE

ADMER™ resins are supplied in the form of small, free flowing pellets and can be easily handled with commercially available equipment.

We recommend to store ADMER™ at a dry and clean place at room temperature without sunlight exposure. Precaution should be taken in opening the package to avoid contamination by foreign materials.

DRYING

Since ADMER™ is a non-hygroscopic material, it absorbs less moisture than non-polyolefinic polymers. Therefore, ADMER™ does not require drying prior to processing.

DISPOSAL

ADMER™ can be re-used, recycled or incinerated with energy recovery. We do not recommend to dispose of ADMER™ on a landfill. ADMER™ should not be dumped into the environment.

Prior to using ADMER™ products, please read the corresponding Safety Data Sheet carefully. It is available on request.



Processing Parameters

PROCESSING

The recommended temperatures for ADMER™ are as follows:

PE-BASED GRADES					
C1	C2	C3	C4	AD	Die
180 - 200 (°C)	180 - 200 (°C)	200 - 230 (°C)	200 - 230 (°C)	200 - 230 (°C)	200 - 230 (°C)
PP-BASED GRADES					
C1	C2	C3	C4	AD	Die
200 - 230 (°C)	200 - 230 (°C)	200 - 250 (°C)	230 - 250 (°C)	230 - 250 (°C)	230 - 250 (°C)

- ⊕ MAXIMUM TEMPERATURE: 300°C
- ⊕ TEMPERATURES ABOVE THE UPPER LIMIT OR LONG RESIDENCE TIMES OF MOLTEN RESIN MAY LEAD TO DECOMPOSITION OF THE POLYMER.
- ⊕ DECOMPOSITION PRODUCTS MAY BE CARBON MONOXIDE, CARBON DIOXIDE, HYDROCARBONS AND WATER.

SHUTDOWN

The following procedure is recommended whilst the extrusion process is either interrupted or terminated.

- ⊕ **LESS THAN 2 HOURS:** SCREW ROTATION CAN BE STOPPED MAINTAINING TEMPERATURE.
- ⊕ **MORE THAN 2 HOURS:** PURGE OUT AND SHUT DOWN IN ACCORDANCE WITH COMMON PROCEDURE.

PURGING

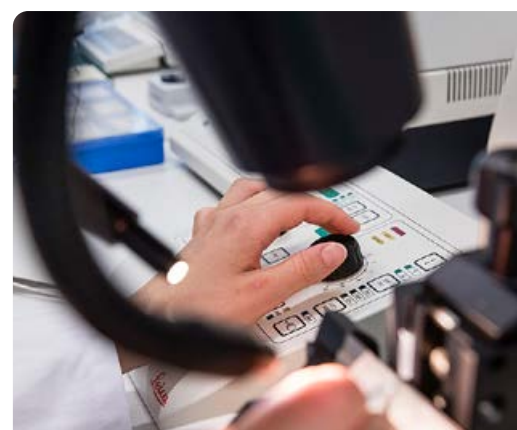
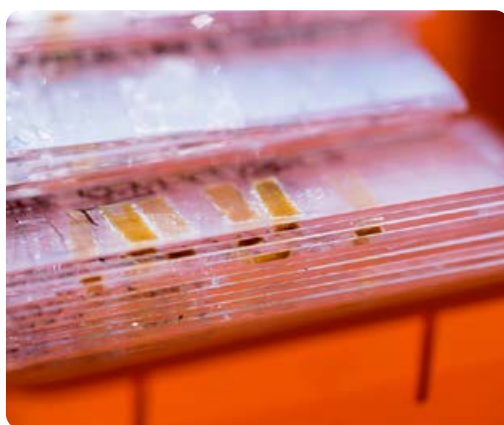
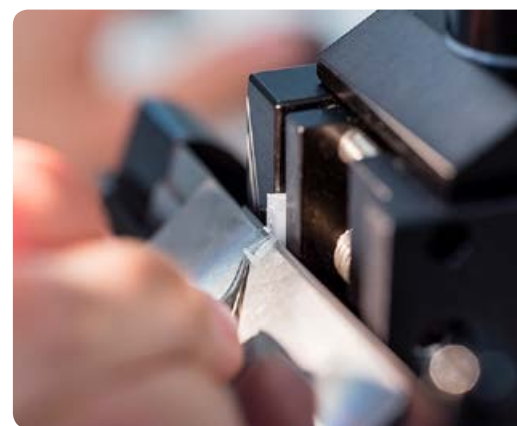
Below you will find the recommended purging materials and their extrusion temperatures for a permanent shutdown.

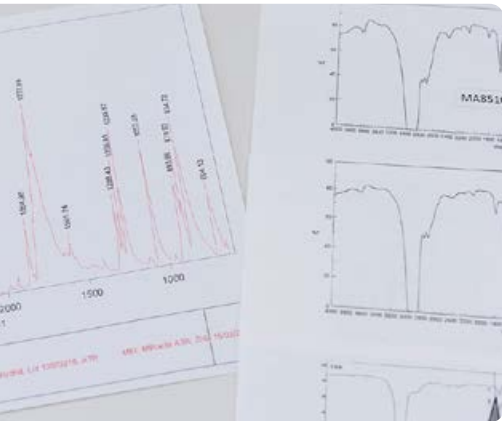
	MATERIALS	TEMPERATURE (°C)
PE-based grades	Polyethylene*	200 - 230
PP-based grades	Polypropylene	230 - 250

*Low density polyethylene (LDPE) is recommendable.

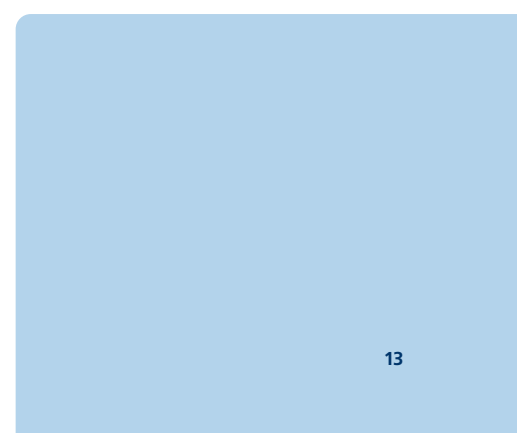
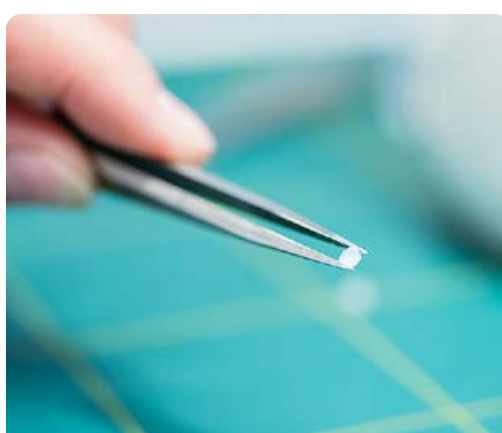
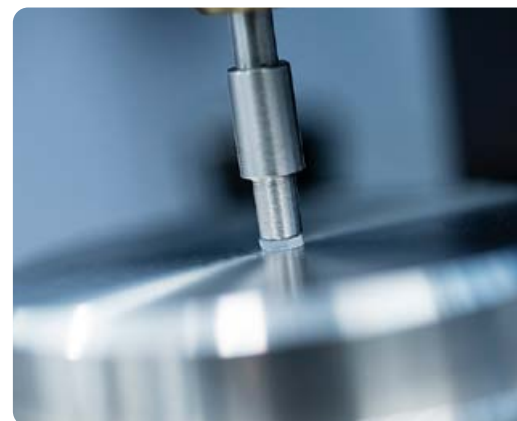


Laboratory





Our customer service laboratory is designed to evaluate and rate our customers' products. We are well equipped for microscopic, mechanical, thermal and physical evaluations of plastic products from the packaging, automotive and industrial sector, e.g. films, tubes, bottles, fuel tanks and pipes. Some of our standard evaluations are: Adhesive strength measurement, determination of layer thicknesses, structural analysis of multilayer films, gel analysis and thermal analysis.



Our Quality Policies

More than 40 years experience in adhesive technologies and an outstanding expertise in various industries make us a competent partner for your business. ADMER™ resins for Europe, Middle East and Africa (EMEA) are produced in Germany and the Netherlands. The production in the heart of Europe assures highest quality standards, which are reflected by the following certifications:

CERTIFICATIONS

- ⊕ **IATF 16949:2016** (QUALITY MANAGEMENT SYSTEM)
- ⊕ **ISO 45001:2018** (OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM)
- ⊕ **ISO 14001:2015** (ENVIRONMENTAL MANAGEMENT SYSTEM)
- ⊕ **ISO 9001:2015** (QUALITY MANAGEMENT SYSTEM)
- ⊕ **DIN EN ISO 50001:2018** (ENERGY MANAGEMENT SYSTEM)

CHEMICAL MANAGEMENT

Mitsui Chemicals sets to achieve its long-term chemical management goal, which is in line with guidelines set by the World Chemical Summit for Sustainable Development (WSSD), by 2020.

To contribute to a sustainable society, Mitsui Chemicals will establish LCIA technology for assessment of environmental impact of its economic activities and establish sustainability indices to support development of environment friendly products while staying in harmony with the global environment.

To contribute to a safe society, Mitsui Chemicals will employ product stewardship concepts to assess risks of its products and share this information with its stakeholders.



ENVIRONMENT

- ⊕ Contribute to environmental preservation through new products and technologies.
- ⊕ Assess and reduce the environmental load of products through their entire life cycle from research and development to final disposal.



QUALITY

- ⊕ Supply high-quality products and services that earn the trust and satisfaction of customers so that they feel confident when using them.



OCCUPATIONAL HEALTH & SAFETY

- ⊕ Give priority to safety, and aim for accident and injury-free operations.
- ⊕ Promote the formation of an appropriate work environment and support a proactive health program for employees.
- ⊕ Implement safety measures and procedures for handling chemical substances to prevent injury or harm to workers and others associated with those activities on site and in distribution, as well as customers.



PROMOTING SELF-MANAGEMENT

- ⊕ Strive for continuing improvements in environmental measures, occupational health and safety, and quality, beginning with compliance with applicable laws and regulations based on voluntary adherence to RC principles.

Mitsui Chemicals around the World



OVERSEAS SITES

- Offices
- Manufacturing Sites
- R & D Facilities



Company Name

Mitsui Chemicals, Inc.

Established

October 1, 1997

President & CEO

Hashimoto Osamu

Head Office

Shiodome City Center, 1-5-2 Higashi-Shimbashi
Minato-ku, Tokyo 105-7117 Japan
Telephone: +81-3-6253-2100
Facsimile: +81-3-6253-4245
www.mitsuichem.com

Paid-in Capital

125 billion yen

Employees

18,870 (consolidated / as of March 31, 2022)

Subsidiaries & Affiliates

161 (including equity-method affiliates)

Domestic Manufacturing Sites

6

Domestic Sales Offices

Head Office and three branches

Number of Shares

1,022,020,076

Business Groups

Functional Chemicals
Functional Polymeric Materials
Polyurethane
Basic Chemicals
Petrochemicals
Film / Sheets

Targeted Business Domains

Life & Healthcare Solutions
Mobility Solutions
ICT Solutions
Basic & Green Materials

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GmbH**

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