ADHESIVE RESIN

ADMER™

PACKAGING

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!
- ADMER™ RESINS ARE CATEGORIZED AS POLYOLEFINS IN ACCORDANCE WITH CEFLEX
- ADMER™ RESINS ARE RECYCLABLE IN EXISTING PE OR PP STREAMS.
- ADMER™ RESINS ARE SUITABLE FOR YOUR RECYCLABLE MONO-MATERIAL STRUCTURES!

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.

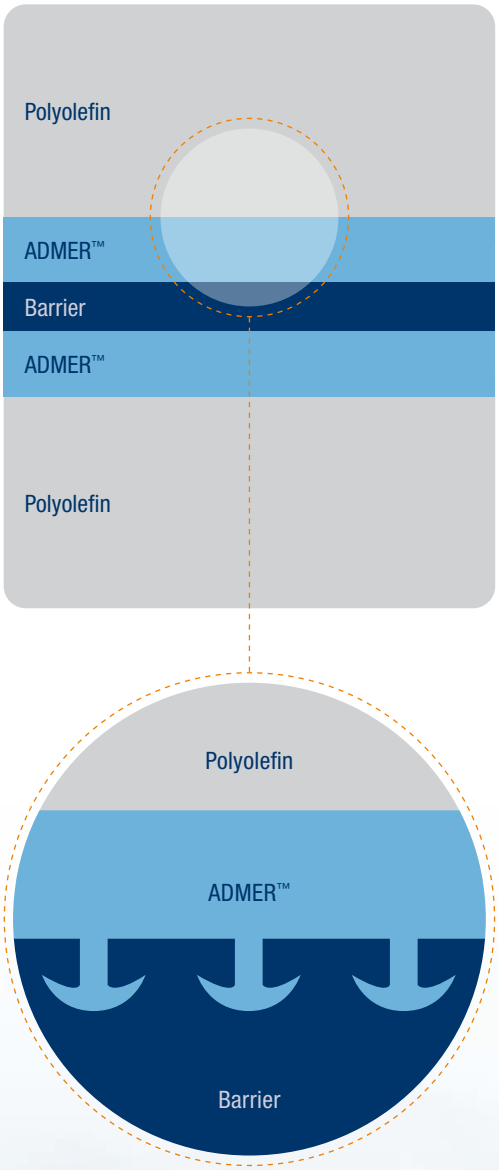
3. POLYOLEFIN-LIKE PROPERTIES

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



Packaging Applications

Nowadays packaging applications are highly demanding. As they can meet a wide range of requirements, multilayer structures become increasingly popular. Food manufacturers, for instance, aim to keep their food fresh by protecting the packed food from oxygen, odour and moisture. Main targets are to prolong shelf life and to reduce food waste. Furthermore, aromas and protective modified atmosphere should be kept inside of the packaging, whereupon the packaging itself should be lightweight, hard-wearing and attractive.

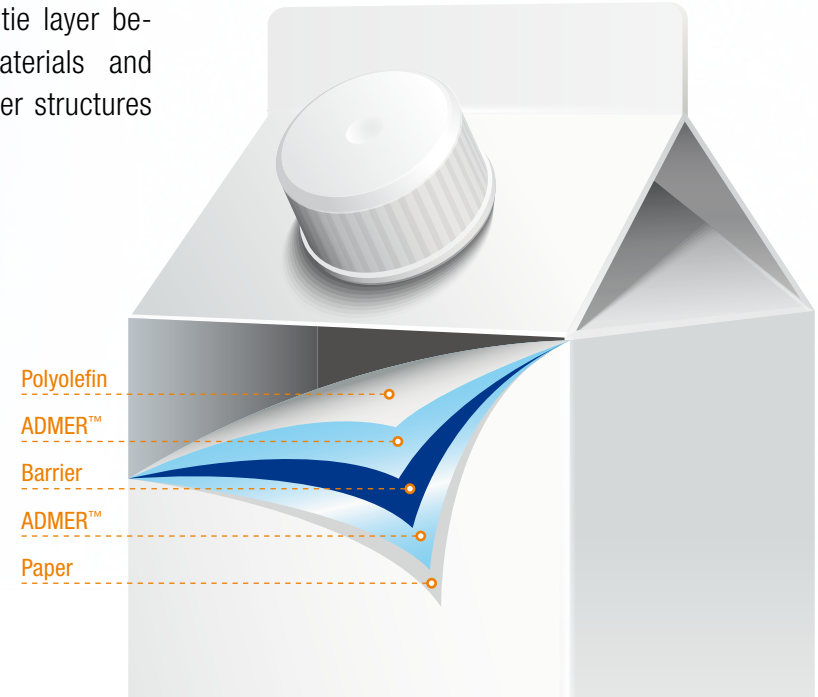
These packaging types are common for fresh meat, cheese, sauces, dairy products and many others. Cosmetics and pharmaceuticals are further areas of application. Coextrusion coating of ADMER™ with other plastics onto paper or foil offers additional opportunities in the packaging area.

As there is no single material which delivers all these properties by itself, barrier materials need to be combined with polymers, metals or paper. ADMER™ serves as tie layer between those incompatible materials and makes high performing multilayer structures possible!

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!

HIGH PERFORMING STRUCTURES MAY FEATURE:

- BARRIER TO OXYGEN, FLAVOUR, ODOUR, MOISTURE
- MECHANICAL STRENGTH
- SEALABILITY
- PRINTABILITY
- THERMOFORMABILITY
- TRANSPARENCY AND GLOSS
- TEMPERATURE RESISTANCE
- FLEXIBILITY OR RIGIDITY
- PUNCTURE RESISTANCE
- FOOD CONTACT COMPLIANCE



ADMER™ ADHESIVE RESIN EXHIBITS DURABLE ADHESION DURING SECONDARY PROCESSING SUCH AS THERMOFORMING, STERILIZATION AND ORIENTATION.

FLEXIBLE PACKAGING	RIGID PACKAGING	EXTRUSION COATING
Comprises films, casings, pouches, tubes. Usual processing methods are: Co-extrusion blown and cast film, tube co-extrusion, and laminates.	Covers cups, trays, bottles, and containers. Usual processing methods are: Co-extrusion sheet processing and thermoforming, co-extrusion blow moulding.	Covers coated paperboards like retortable carton-based packaging, as well as coated aluminum for pet food packaging.
		
		
		
• Fresh meat	• Baby food	• Retortable carton-based packaging
• Cheese	• Coffee capsules	• Liquid packaging boards
• Fish	• Fresh meat	• Pet food packaging
• Milk pouch	• Convenience food (microwave)	• Tube laminates
• Sausages	• Dairy products	• Lid films
• Poultry	• Agrochemicals	
• Half-baked bread	• Ketchup & mayonnaise	
• Fresh pasta	• Sauces	
• Coffee pouch	• Medical nutrition	
• Bag-in-Box for drinks (e.g. wine, juices)	• Fruits	
• Tomato paste		
• Sauces		
• Medical nutrition		
• IV bags		
• Cosmetics		
• Aseptic packaging		

Standard Grades for Packaging Applications

PE-TYPE (these grades are based on LLDPE)

	MFR (2.16 kg/10 min)	DENSITY (g/m³)	VICAT SOFT. POINT (°C), Load 1 (10 N), Rate A (50 °C/h)	MELTING POINT (°C)	ADHESION PERFORMANCE	ADHERENT TO
BLOW MOLDING / BLOWN FILM / SHEET						
AT2235E*	0.3	0.92	98	–	depends on blending	PA ✓ EVOH ✓
NF408E	1.4	0.92	100	121	++	PA ✓ EVOH ✓
NF358E*2	1.6	0.91	82	–	+++	PA ✓ EVOH ✓
NF528E	2.2	0.91	69	121	+++	PA ✓ EVOH ✓
NF498E	2.6	0.91	82	–	+	PA ✓ EVOH ✓
NF518E	3.1	0.91	80	121	++	PA ✓ EVOH ✓
NF642E*	4.5	0.92	92	108	depends on blending	PA ✓ EVOH ✓
CE518E*6	3.1	0.91	80	121	++	PA ✓ EVOH ✓
CAST FILM / COATING						
NF377E	4.5	0.92	88	120	+	PA ✓ EVOH –
NF837E	10.0	0.92	82	120	+++	PA ✓ EVOH ✓ AL ✓

PP-TYPE (these grades are based on PP)

	MFR (2.16 kg/10 min)	DENSITY (g/m³)	VICAT SOFT. POINT (°C), Load 1 (10 N), Rate A (50 °C/h)	MELTING POINT (°C)	ADHESION PERFORMANCE	ADHERENT TO
BLOW MOLDING / BLOWN FILM / SHEET						
AT3523E	1.8	0.90	140	161	++	PA ✓ EVOH ✓
QB509E	2.6	0.90	143	160	+	PA ✓ EVOH ✓
CP510E*6	2.6	0.90	142	160	+	PA ✓ EVOH ✓
CAST FILM / COATING						
AT1179E*3	4.3	0.91	151	163	++	PA ✓ EVOH ✓
QF551E	4.4	0.89	115	147	+++	PA ✓ EVOH ✓ AL ✓
QF541E	5.0	0.90	120	144	++	PA ✓ EVOH ✓
AT3177E*4	6.5	0.89	135	149	++	PA ✓ EVOH ✓ AL ✓
AT3355E*4	7.0	0.90	136	160	++	PA ✓ EVOH ✓ AL ✓
AT1404E	7.0	0.90	120	146	+++	PA ✓ EVOH ✓ AL ✓
QF300E	7.5	0.91	146	163	+	PA ✓ EVOH –
QF829E	12.0	0.89	120	–	+++	PA ✓ EVOH ✓ AL ✓
CO-INJECTION						
AT3481E	30	0.90	117	–	++	PA ✓ EVOH ✓

SOFT GRADES FOR SPECIAL APPLICATIONS LIKE DOUBLE BUBBLE, TRIPLE BUBBLE, POLYESTER ADHESION (these grades are based on plastomers)

	MFR (2.16 kg/10 min)	DENSITY (g/m³)	VICAT SOFT. POINT (°C), Load 1 (10 N), Rate A (50 °C/h)	MELTING POINT (°C)	ADHESION PERFORMANCE	ADHERENT TO
NF927E	1.3	0.90	72	–	++	PA ✓ EVOH ✓ PET ✓
NF911E	2.5	0.90	74	97	++	PA ✓ EVOH ✓ PET ✓
AT1955E*5	2.6	0.89	62	–	++	PA ✓ EVOH ✓ PET ✓
SF730E	3.0	0.90	54	–	+++	PA ✓ EVOH ✓ PET ✓

* Concentrate / *2 Anti-fog / *3 BOPP / *4 BOPP-ILC / *5 MDO (PE structures) / *6 ISCC+ Certified

EXAMPLES OF PACKAGING STRUCTURES (OUTSIDE < > INSIDE)

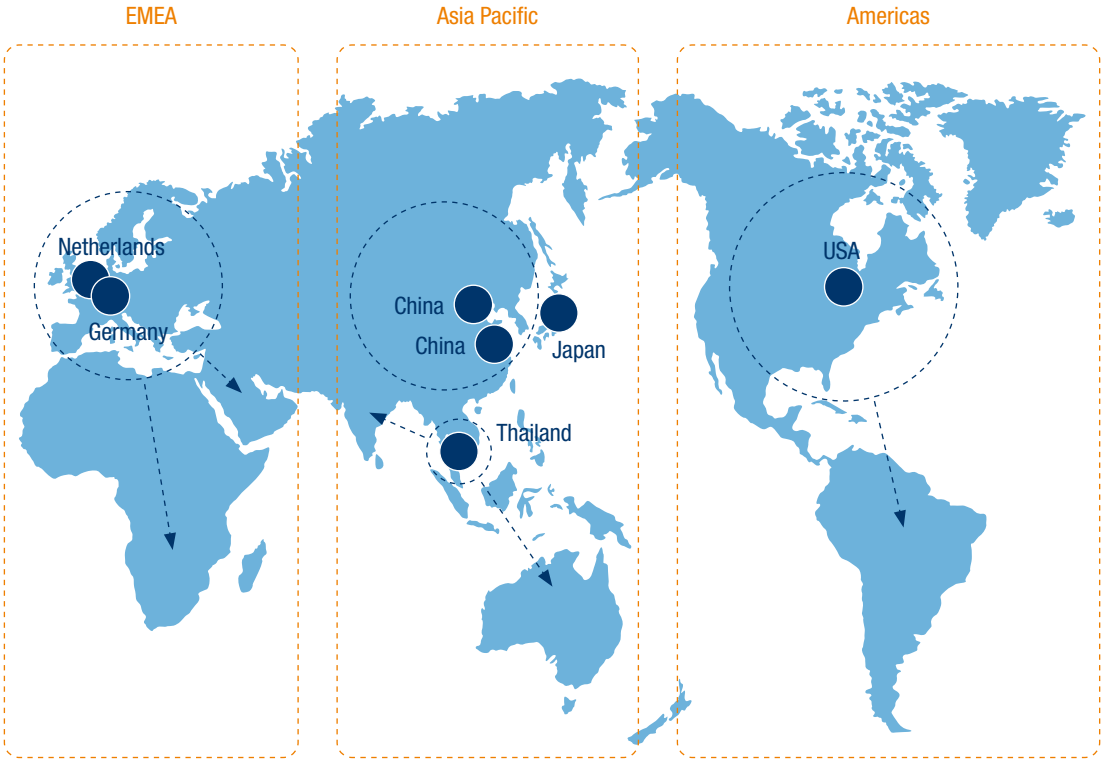
PROCESS	STRUCTURES	APPLICATIONS
FLEXIBLE		
· FILM	PA/ADMER™/PE	Meat
	PA/ADMER™/EVA	Processed meat
	PE/ADMER™/PA/ADMER™/PE	Cheese
	PE/ADMER™/PA/EVOH/PA/ADMER™/PE	Fresh pasta, half-baked bread
	PE/ADMER™/EVOH/ADMER™/PE	Meat, Cheese
	PET/ADMER™/EVOH/ADMER™/PE	Meat, Cheese
	PA/ADMER™/PE/ADMER™/EVOH/ADMER™/PE	Meat, Cheese
	PET/ADMER™/PE/PE/ADMER™/PA/EVOH/PA/ADMER™/PE	Meat, Cheese
· CASING · SHRINK BAG	PA/ADMER™/PE/ADMER™/PA	Meat, Sausage
	PA/EVOH/PA/ADMER™/PE	Meat, Sausage
	PE/ADMER™/PA/EVOH/PA/ADMER™/PE	Meat, Sausage
	PET/ADMER™/PA/EVOH/PA/ADMER™/PE	Meat, Sausage
· TUBE	PE/ADMER™/PA	Cosmetics
	PE/ADMER™/PA/ADMER™/PE	Food, Cosmetics
	PE/ADMER™/EVOH/ADMER™/PE	Pharmaceuticals, Cosmetics
	PP/ADMER™/PE	Cosmetics
RIGID		
· BOTTLE · CONTAINER	PP/ADMER™/EVOH/ADMER™/PP	Ketchup, Mayonnaise, Sauce
	PE/ADMER™/EVOH/ADMER™/PE	Juice, Milk
	PE/ADMER™/PA	Agrochemicals, Chemicals
	PE/ADMER™/EVOH	Agrochemicals, Chemicals
· CUP · TRAY · JAR	PS/tie/EVOH/ADMER™/PE	Dairy products, Meals
	PS/tie/EVOH/ADMER™/PP	Pudding, Yoghurt
	PP/ADMER™/EVOH/ADMER™/PP	Retortable food, Sauces
COATING		
· COATING	PE/Paper/PE/ADMER™/EVOH/ADMER™/PE	Beverages, Liquid carton
	PE/Paper/PE/ADMER™/AL/ADMER™/PE	Beverages, Liquid carton
	PE/Paper/PE/ADMER™/AL/ADMER™/EVOH/ADMER™/PE	Beverages, Liquid carton
	PET/print/ADMER™/AL/ADMER™/PE	Pharmaceuticals
	Paper/PE/ADMER™/AL/ADMER™/PE/PU-foam/PE/ADMER™/AL/ADMER™/PE	Paper building insulation
	PP/Paper/PP/ADMER™/EVOH/ADMER™/PP	Beverages, Liquid carton
	PP/Paper/PP/ADMER™/AL/ADMER™/PP	Beverages, Liquid carton
	PP/Paper/PP/ADMER™/AL/ADMER™/EVOH/ADMER™/PP	Beverages, Liquid carton
	AL/ADMER™/PE	Pet food, Coffee
	AL/ADMER™/PP	Pet food, Coffee

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 × 1.30 × 1.80
(width × length × height)

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

Handling Procedure

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.

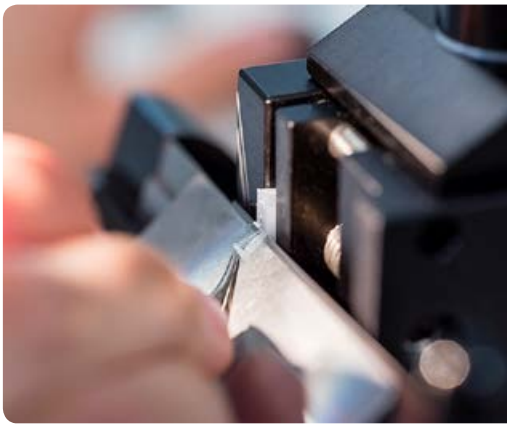
PURGING

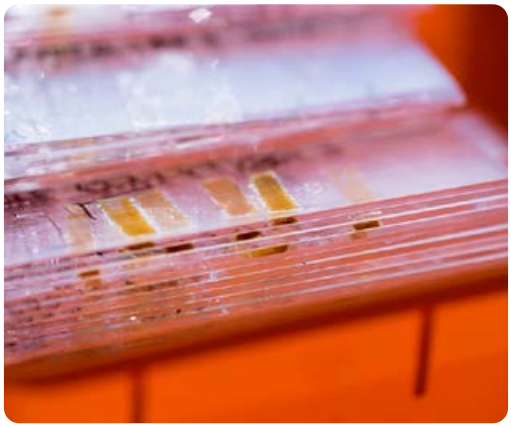
Below you will find the recommended purging materials and their extrusion temperatures for a permanent shutdown.

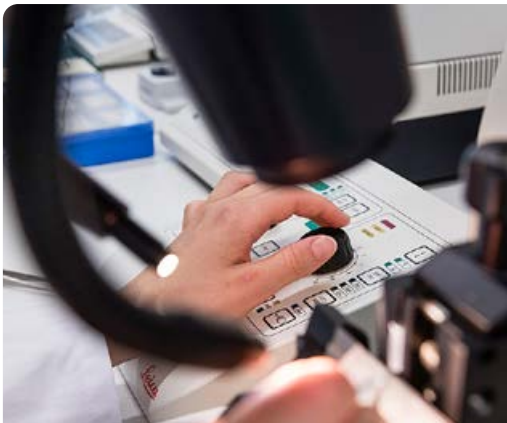
	MATERIALS	TEMPERATURE (°C)
PE-based grades	Polyethylene*	200 - 230
PP-based grades	Polypropylene	230 - 250

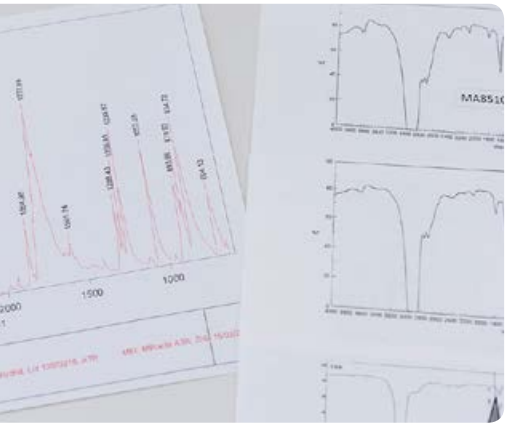
*Low density polyethylene (LDPE) is recommendable.

Laboratory

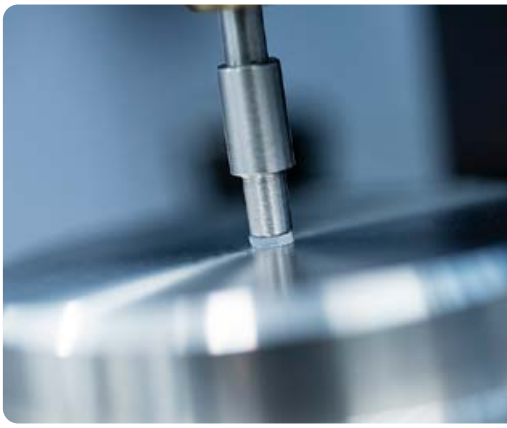


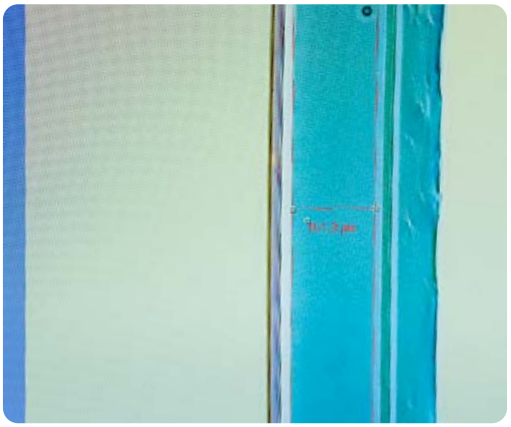






Our customer service laboratory is designed to evaluate and rate our customers' products. We are well equipped for microscopic, mechanical, thermal and physical evaluations of plastic products from the packaging, automotive and industrial sector, e.g. films, tubes, bottles, fuel tanks and pipes. Some 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

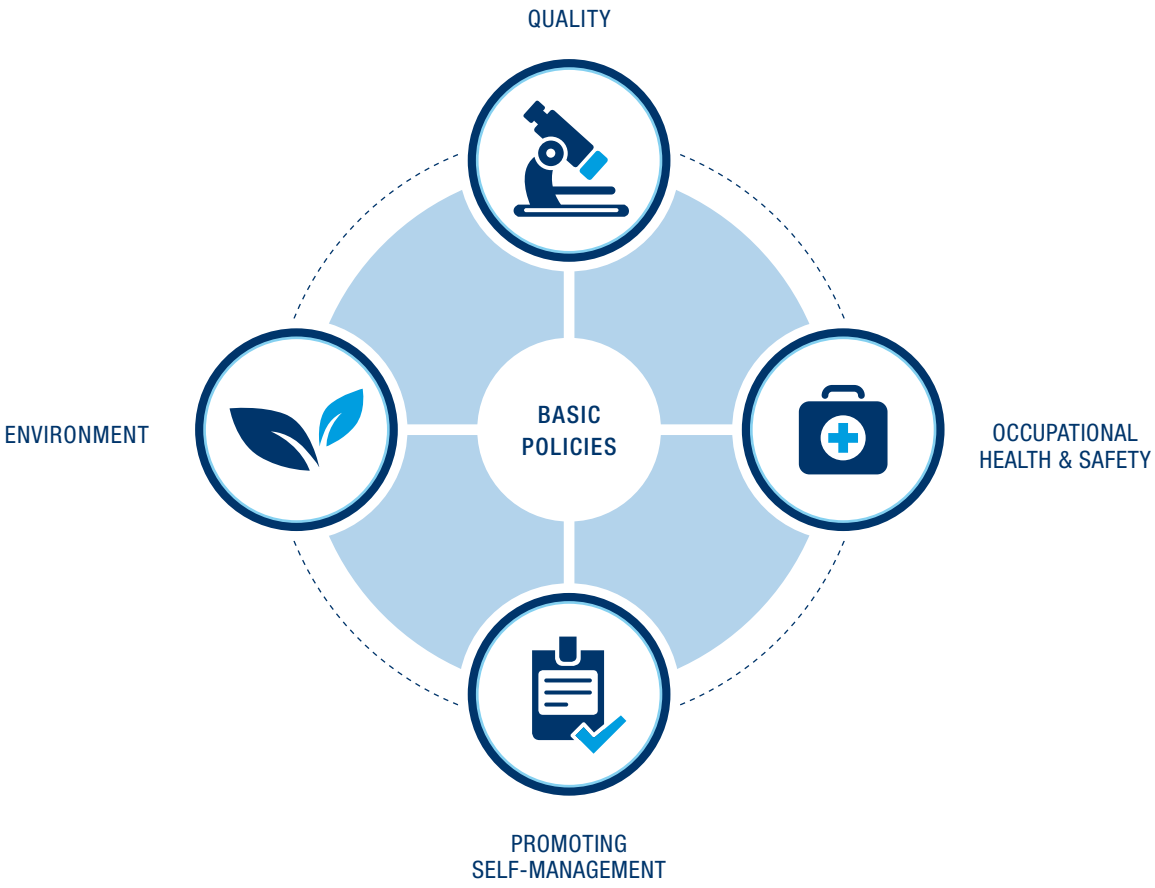
- **IATF 16949:2016** (QUALITY MANAGEMENT SYSTEM)
- **ISO 45001:2018** (OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM)
- **ISO 14001:2015** (ENVIRONMENTAL MANAGEMENT SYSTEM)
- **ISO 9001:2015** (QUALITY MANAGEMENT SYSTEM)
- **DIN EN ISO 50001:2018** (ENERGY MANAGEMENT SYSTEM)

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

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Minato-ku, Tokyo 105-7117 Japan
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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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