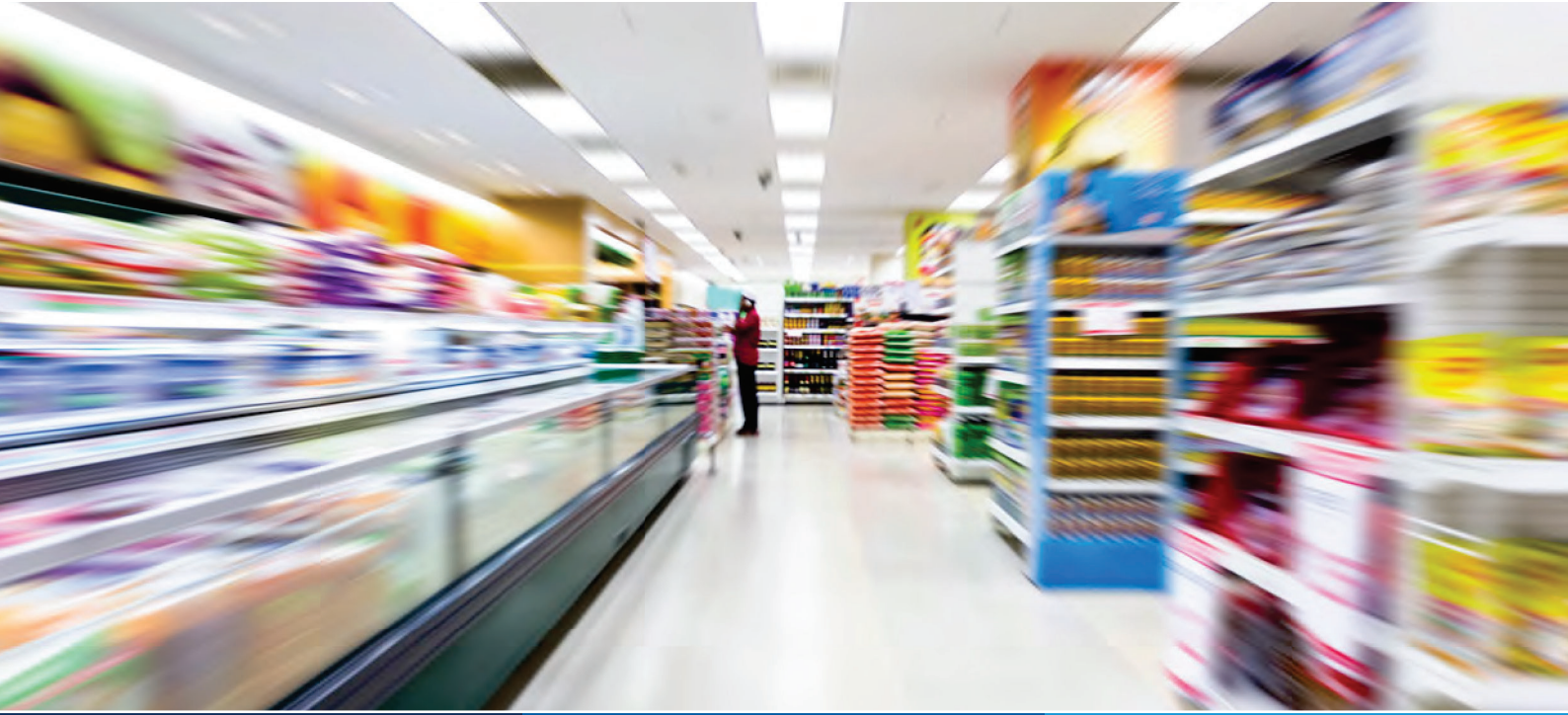


ADHESIVE RESIN

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), polyester (e.g. PET) 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 reaction ADMER™ adheres to ethylene vinyl alcohol (EVOH), polyamide (PA), polyester (PET), polyolefins (PE, PP) and metals.

2. ADHESION DURABILITY

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

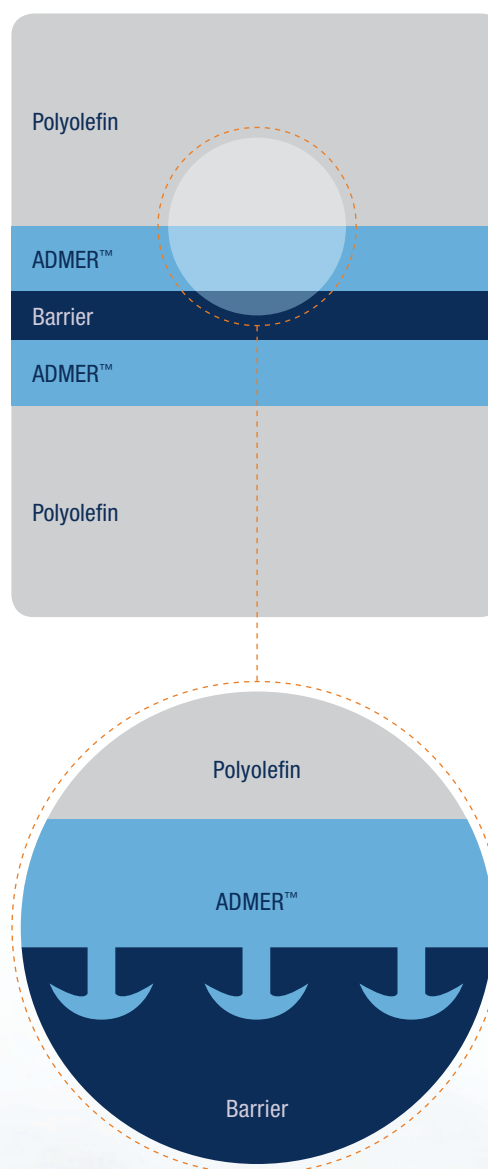
3. POLYOLEFIN-LIKE PROPERTIES

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.

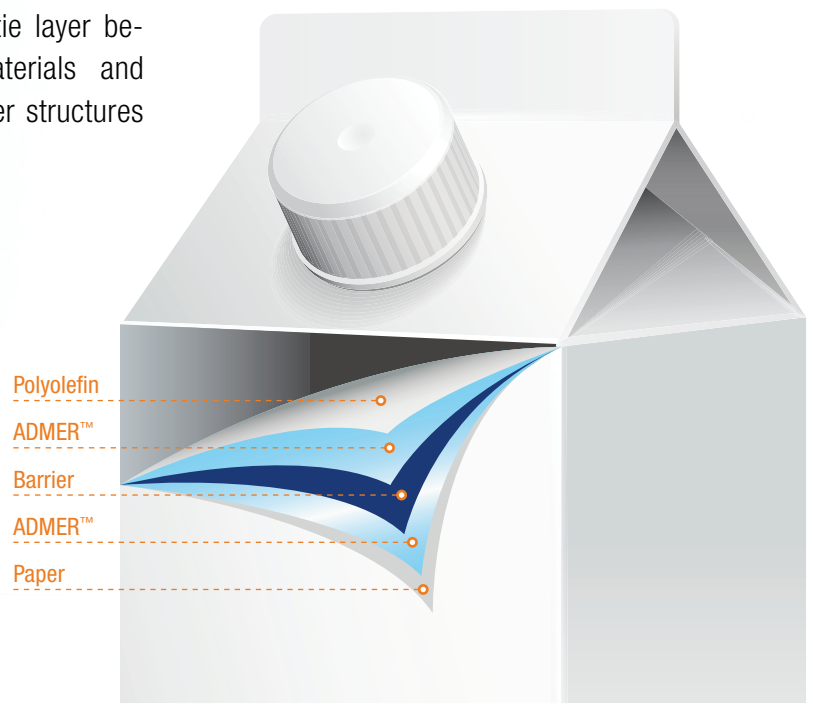
These packaging types are common for fresh meat, cheese, sauces, dairy products and many others. Cosmetics and pharmaceuticals are further areas of application. Coextrusion coating of ADMER™ with other plastics onto paper or foil offers additional opportunities in the packaging area.

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/m ³)	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 ✓
NF358E**	1.6	0.91	82	120	+++	PA ✓ EVOH ✓
NF408E	1.4	0.92	100	120	++	PA ✓ EVOH ✓
NF528E	2.5	0.91	69	120	+++	PA ✓ EVOH ✓
NF498E	2.6	0.91	82	120	+	PA ✓ EVOH ✓
NF518E	3.1	0.91	80	120	++	PA ✓ EVOH ✓
NF642E*	4.5	0.92	92	108	depends on blending	PA ✓ EVOH ✓
CAST FILM / COATING						
AT1707E	4.7	0.91	64	120	++	PA ✓ EVOH ✓
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/m ³)	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						
QB520E	1.8	0.90	140	160	++	PA ✓ EVOH ✓
QB510E	2.6	0.90	142	160	+	PA ✓ EVOH ✓
CAST FILM / COATING						
AT1179E***	4.3	0.91	151	163	++	PA ✓ EVOH ✓
QF541E	5.0	0.90	120	–	++	PA ✓ EVOH ✓
QF551E	4.4	0.89	120	147	+++	PA ✓ EVOH ✓ AL ✓
QF300E	7.5	0.91	146	160	+	PA ✓ EVOH –
QE800E*	9.1	0.90	150	–	depends on blending	PA ✓ EVOH ✓ AL ✓
AT1404E	7.0	0.90	120	145	+++	PA ✓ EVOH ✓ AL ✓
QF829E	12.0	0.89	120	–	+++	PA ✓ EVOH ✓ AL ✓
QF825E	22.8	0.91	138	–	+++	PA ✓ EVOH ✓ AL ✓
CO-INJECTION						
QS615E	28.0	0.91	126	–	++	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/m ³)	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	2.6	0.89	62	–	++	PA ✓ EVOH ✓ PET ✓
SF730E	3.0	0.90	54	–	+++	PA ✓ EVOH ✓ PET ✓
AT2614E	3.6	0.90	70	–	++	PA ✓ EVOH ✓ PET ✓

*Concentrate / **Anti-fog / ***BOPP

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

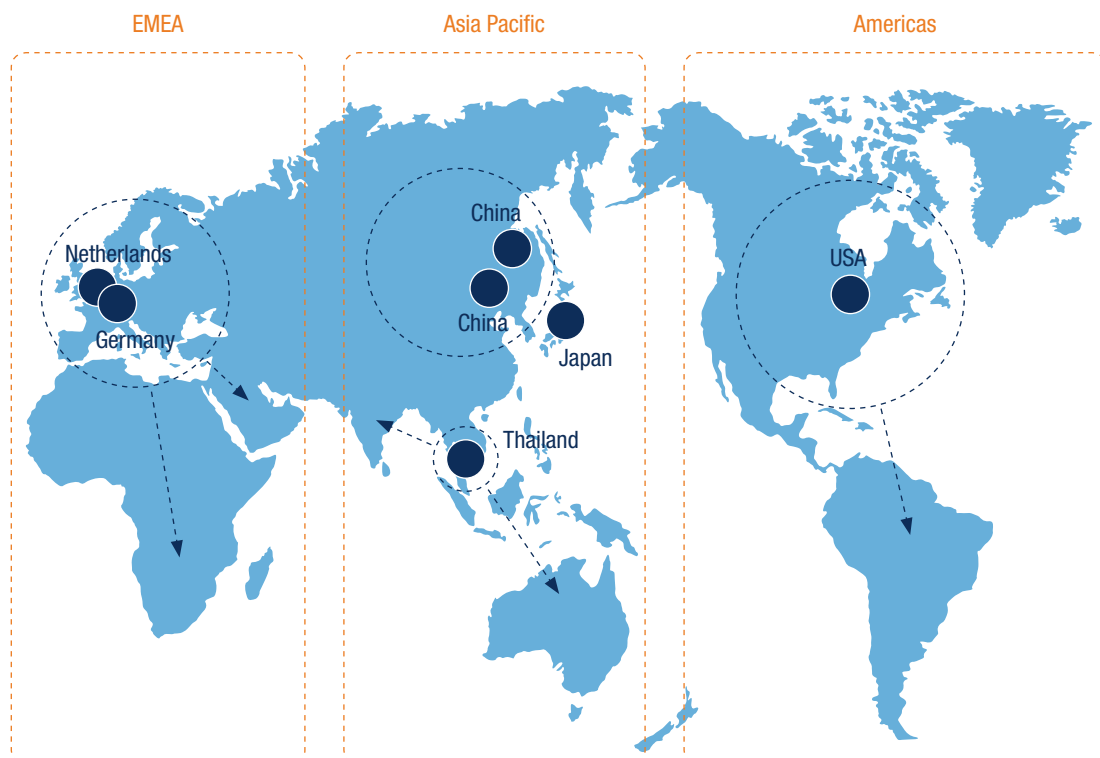
ADMER™ Production



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

Dear Sarit,

Please allow me to compliment your company, as agent for MITSUI, and Mitsui themselves, for the excellent service provided to us. No other agent nor supplier manages to supply as you and Mitsui do.

With 25 years in Plastopil, in import, I do have with what to compare! – and can only thank you and Mitsui; and let you know that your excellent customer service is much appreciated.

Best regards,

Barbara Hazan | Imports
Plastopil Hazorea Company Ltd.

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



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



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

As long as ADMER™ is stored under good conditions, it does not require any special care in storage. 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 carefully its Product Group Safety Information Sheet according to Article 32 of Regulation (EC) No. 1907/2006 (REACH). Safety Data Sheets according to Article 31 are not required for ADMER™.



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.

Regulatory Compliance

⊕ COMPLIANCE WITH REACH:

All ADMER™ monomers and additives subject to registration have been registered either by MCE or our suppliers.

ADMER™ is in compliance with the requirements of Annex XVII of the REACH Regulation (EC) No. 1907/2006.

Substances listed on the REACH Candidate List of SVHCs are not contained in ADMER™ concentrations at or above 0.1% by weight. (Status 16.07.2019)

⊕ FOOD STATUS:

EU: ADMER™ is intended for use as an adhesive in multilayer structures. Following the definitions given in Commission Regulation (EU) No. 10/2011 and the Union Guidance to this Regulation published in November 2013, ADMER™ is a non-plastic intermediate for which a Declaration of Compliance as described in Annex IV to Commission Regulation (EU) No. 10/2011 does not have to be issued. To support our customers in their compliance work we provide adequate information for that purpose.

All monomers and additives of ADMER™ are listed as authorized substances in Annex I of Commission Regulation (EU) No. 10/2011 as amended. Please refer to our Food Status Certificates regarding substances restricted by SMLs. Some ADMER™ grades contain a Dual Use Additive subject to a restriction in food.

USA: All ADMER™ grades conform to FDA 21CFR, §175.105 (Adhesives) for indirect food contact. Some grades are also suitable for direct food contact.

Please contact us for further details or the food status of ADMER™ in other countries.

⊕ COMPLIANCE WITH FURTHER LEGISLATION RELEVANT TO FOOD CONTACT MATERIALS:

- * Commission Directive 2006/125/EC as amended (Baby Food Directive)
- * Regulation (EU) No. 1169/2011 as amended (Absence of Allergenic Food Ingredients)
- * Directive 94/62/EC as amended (Packaging and Packaging Waste Directive)
- * US CONEG
- * French Décret No. 98/638

⊕ COMPLIANCE WITH FURTHER LEGISLATION RELEVANT TO ELECTRICAL AND ELECTRONIC EQUIPMENT:

- * Directive 2011/65/EU as amended (RoHS2)
- * Directive 2012/19/EU as amended (WEEE)

⊕ PHARMACEUTICAL PACKAGING

Most ADMER™ grades are in compliance with the definition of polyolefins given in chapter 3.2 of the European Pharmacopoeia Monograph. Pharmaceutical packaging always has to be tested and approved together with the respective pharmaceutical product. We will support our customers in any of those approval processes if required. Please contact us for further details.

⊕ MEDICAL DEVICES

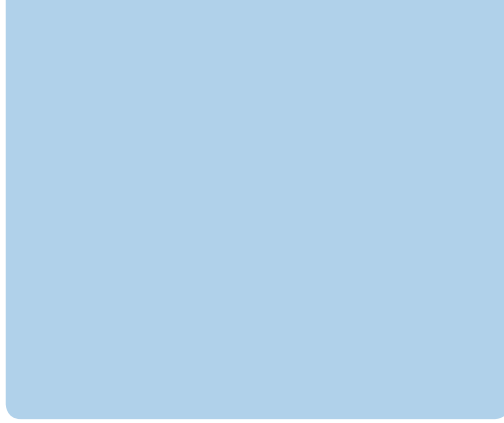
ADMER™ is a product dedicated to food packaging, automotive and industrial applications. We do not recommend to use ADMER™ in medical applications. It is the sole responsibility of the manufacturer of medical devices to ensure the suitability of raw materials for the intended application. We are willing to support our customers in approval processes after receiving prior written information on the details of such applications.

Mitsui Chemicals Europe GmbH cannot assume any liability regarding the use of ADMER™ in medical applications or medical devices.

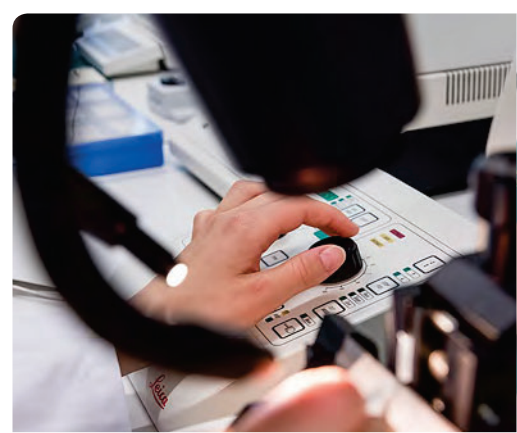
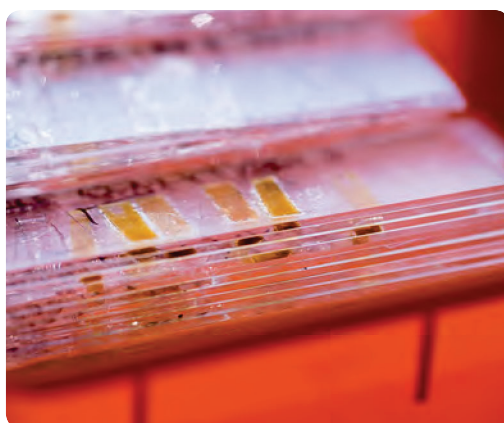
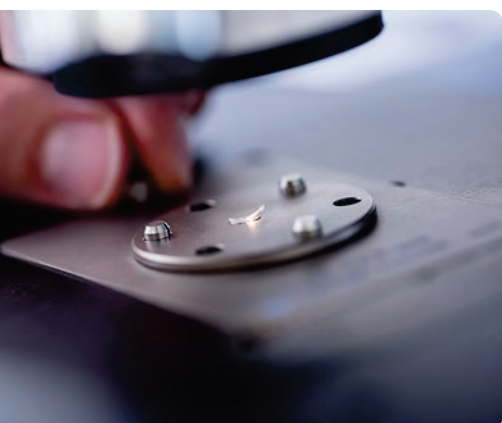
⊕ FURTHER LEGISLATIVE COMPLIANCE

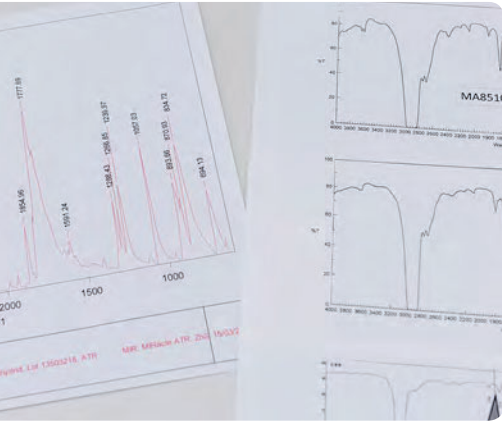
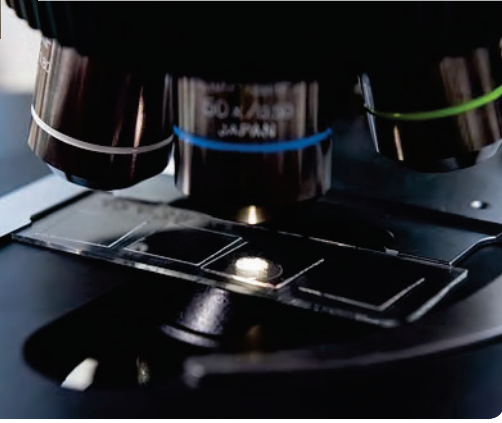
- * DIN EN 71-3 on Toys
- * Cosmetic Products Regulation (EC) No. 1223/2009
- * California Proposition 65 (Status 28.06.2019)

Status: August 2019

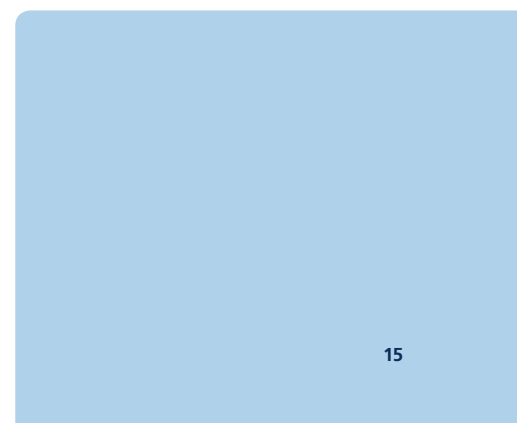
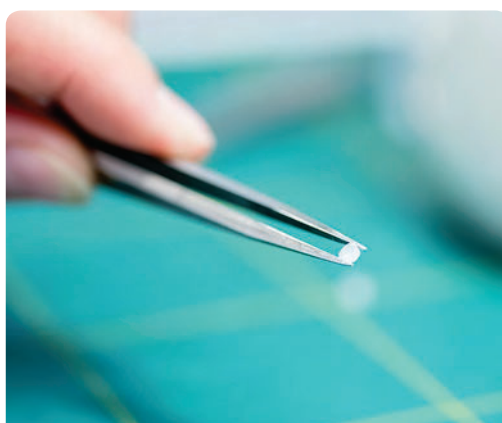
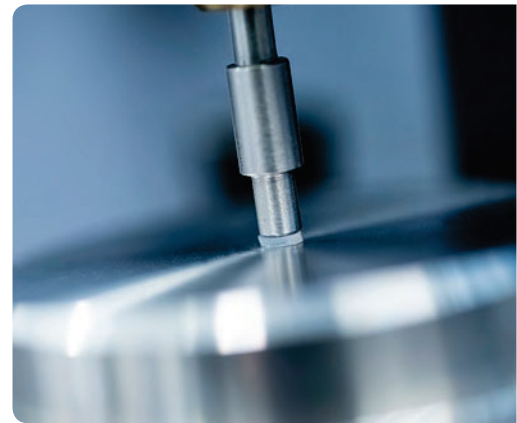


Laboratory





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)
- ⊕ **OHSAS 18001:2007** (OCCUPATIONAL HEALTH- AND RISK MANAGEMENT SYSTEM)
- ⊕ **ISO 14001:2015** (ENVIRONMENTAL MANAGEMENT SYSTEM)
- ⊕ **ISO 9001:2015** (QUALITY MANAGEMENT SYSTEM)
- ⊕ **DIN EN ISO 50001:2011** (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

Tsutomu Tannowa

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

17743 (Consolidated / As of March 31, 2019)

Subsidiaries & Affiliates

135

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

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GmbH**

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