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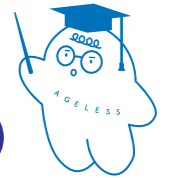
- The information contained herein is general and should not take the place of the users' own application tests. Recommendations are made without guarantee, and we must necessarily disclaim all liability with respect to the use of AGELESS™, supplied by MITSUBISHI GAS CHEMICAL COMPANY, INC. since the conditions of use are beyond our control.
- It is recommended that users of AGELESS™ should carry out application tests with actual materials and equipment in typical operational circumstances.



Oxygen Absorber

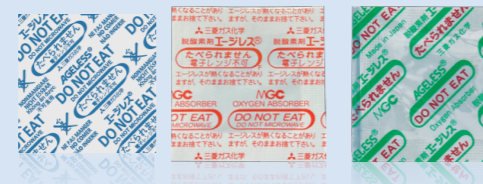
AGELESS™

Instruction manual



Oxygen Absorber to preserve the "taste" and "freshness" of food

AGELESS™



I am an expert of AGELESS™!

Dr. AGELESS

"Iron absorbs oxygen when it rusts." "Prevention of oxidation by eliminating oxygen."

Just by implementing a combination of such simple ideas, Mitsubishi Gas Chemical developed AGELESS™, the world's first oxygen absorber.

AGELESS™ absorbs oxygen in a sealed container to create an oxygen-free state (concentration of oxygen: 0.1% or less) and eliminates the harmful effects of oxygen on food.

AGELESS™ has made it possible to preserve "taste" and "freshness" for a long period in the food field. Owing to its characteristics, AGELESS™ is widely used to prevent deterioration of pharmaceuticals, cosmetics, cultural assets, electronic components, and other products.

AGELESS™ absorbs oxygen to preserve "taste" and "freshness."

- AGELESS™ is an extremely innovative freshness-keeping packaging that continuously removes even small amounts of oxygen permeating through the film surface. This oxygen absorber allows for keeping an oxygen-free state which had never been achieved by conventional storage methods including vacuum and gas replacement packaging.
- The flavor, color, aroma, and nutrition of freshly prepared food can be kept for a long period.

Oxygen absorber AGELESS™ assures "safety" and "quality."

- AGELESS™ prevents the growth of molds and aerobic bacteria, and also prevents harmful insects from growing.
- Oxidized oils and fats are a detriment to good health; oxygen-free packaging with AGELESS™ prevents oxidation oils and fats.
- Unlike food additives, the oxygen absorber AGELESS™ is highly effective by just placing it with food in sealed barrier packaging.
- AGELESS™ is certified according to ISO9001 Quality Management Systems – Requirements, FSSC22000 Food Safety Management Systems, and others.

AGELESS™ is simple and effective.

- Vacuum packaging and gas replacement packaging need devoted facilities, but the oxygen absorber AGELESS™ can be easily used by a sealer.
- The oxygen absorber AGELESS™ can be used in an existing automatic packaging machine by introducing an automatic feeder.

AGELESS™ has brought about "distribution revolution."

- Extended foods' shelf life allows food manufacturers to market greater varieties of food and expand their markets.
- AGELESS™ allows for the simple and easy control of production and inventory.

* "AGELESS™" is a registered trademark of an oxygen absorber of Mitsubishi Gas Chemical Company, Inc.

This innovative development is highly valued by various quarters.

- Mitsubishi Gas Chemical succeeded first in the world in commercialization of an oxygen absorber suitable for practical use and received various awards. AGELESS™ is highly valued as an innovative approach for keeping of freshness.

1981: 5th Kinoshita prize <Japan Packaging Institute Award>	2000: 20th Century Food Industrial Development Award
1983: Prize of Food Science and Technology	2001: Japan Food Journal, Excellent Food Machinery And Material Prize
1984: 11th Japanese Food Industry Technological Distinguished Service Award	2014: Japan Packaging Institute, Excellent Presentation Award
1992: Good Packaging Award (Japan Technology Association)	2015: Japan Packaging Institute, Excellent Presentation Award
1993: Chairman's Prize of the Century Anniversary of Agricultural Experiments and Researches	2016: Japan Packaging Institute, Good Packaging Award and Technical Packaging Award
1995: 28th Food Industry Distinguished Service Award	2019: Food Industry Heisei Contribution Prize
	Received the World Star Award, Medical & Pharmaceutical section

Introduction



This instruction manual is for the correct use of the oxygen absorber AGELESS™. Please read this instruction manual carefully to use AGELESS™ more effectively.

- Please read this instruction manual before use.
- Please keep this instruction manual with care.

Warnings and cautions

In order to prevent hazards to AGELESS™ users and other persons and damage to property, this manual explains matters which should be strictly observed using the following signs.



Warnings

This indicates a hazardous situation which, if not avoided, will "result in death or serious injury."



Cautions

This indicates a hazardous situation which, if not avoided, may "result in minor or moderate injury, or property damage only."

This instruction manual classifies the levels of attention using the following pictograms.



indicates a "compulsory" action that must be performed.



indicates to attention to heat generation.



indicates "calling attention" to an action.



indicates a "prohibited" action.

Before adoption of AGELESS™, please conduct a packing test with actual products under actual packaging and distribution conditions to confirm the effects of AGELESS™.

What is AGELESS™?

What is AGELESS™?	03
Inhibits mold growth	04
Prevents color changes	04
Retains nutrients	05
Preserves food flavor	05
Prevents oxidation of fats and oils	06
Eliminates adult insects and their eggs	06

Type of AGELESS™

List of types of AGELESS™ (loose form)	07
List of types of AGELESS™ (continuous rolls)	09
Self-reacting type for coffee AGELESS™ (E)	11
Freshness-keeping agent for fruits and vegetables (C-P)	12
Oxygen indicator AGELESS EYE™	13
Oxygen-free film AGELESS OMAC™	15

Use of AGELESS™

How to make AGELESS™ Pack	17
Prepare packaging materials	18
Select type of AGELESS™	19
Select size of AGELESS™	20
Seal the packaging	21
Use of AGELESS™	23

Precautions for use

Precautions for use and Safety	27
About microorganisms	29
AGELESS™ Q&A	31
Glossary of terms	33

Others

AGELESS™ related instruments and products	35
Merits of choose AGELESS™	37

What is AGELESS™?

Type of AGELESS™

Use of AGELESS™

Precautions for use

Others

AGELESS™ is used to create an oxygen-free state within a sealed container.



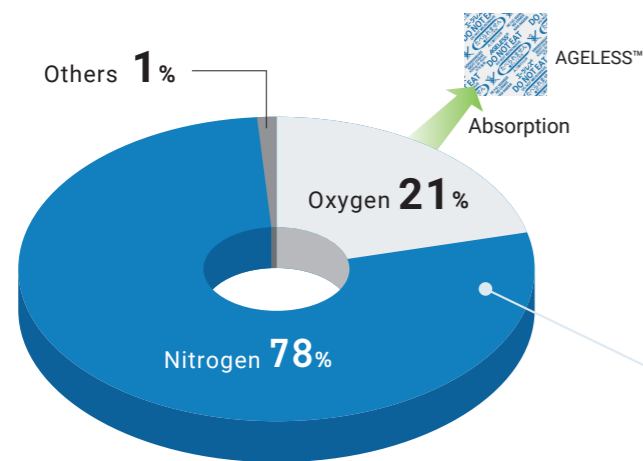
Please note that AGELESS™ cannot be used for any other purpose.

AGELESS™ is the registered trademark of the oxygen absorber manufactured and sold by Mitsubishi Gas Chemical Company, Inc.

AGELESS™ absorbs oxygen in a sealed container by making use of binding reaction of oxygen with iron when iron rusts to prevent harmful effects of oxygen, such as oxidation, on food products.

The main constituent of AGELESS™ (iron type) is a specially treated iron powder.

Other types of AGELESS™ use organic compounds, including vitamin C, as their main constituents.



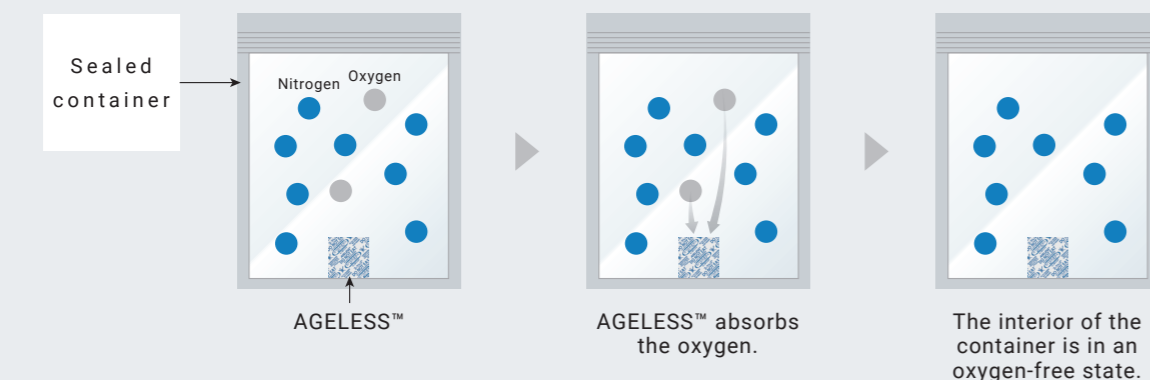
Composition of air

Oxygen makes up approximately 21% of the air in the atmosphere, however AGELESS™ absorbs all oxygen within a sealed container to create an oxygen free condition (maintaining an oxygen concentration of 0.1% or less).

As AGELESS™ absorbs more oxygen, the volume decreases and the gas remaining within the sealed container becomes mostly nitrogen, an inert gas.



The action of AGELESS™



AGELESS™ has six effects.

Effect 1 Inhibits mold growth

Castella (Sponge cake): Prevention of mold (25°C × 1 week)



Oxygen-free state
Inhibitory effect is significant in the oxygen-free state (oxygen concentration: 0.1% or less).

In the case of high gas replacement, the oxygen concentration was increasing daily because of subtle oxygen permeating through the film, and blue mold was detected even at 0.3%.

While, no growth of mold was founded in AGELESS™ Pack during the storage period.

Growth of blue mold and oxygen concentration in castella (sponge cake) (25°C)

Growth of mold colony

- : Not observed, ● : Observed, ●● : Much observed.

[Test method]

Blue mold specimen was implanted in the castella (sponge cake) to compare its growth between AGELESS™ Pack and a nitrogen gas replaced package.

Packaging	Storage period (days) and state of growth of molds								Oxygen concentration (%)	
	3	5	7	9	12	14	16	20	Start	Confirmation of mycelia
AGELESS™ Pack	-	-	-	-	-	-	-	-	0.1 or less	-
Nitrogen gas replacement(99.9% or more)	-	-	-	-	-	-	●	●●	0.1 or less	0.25
Nitrogen gas replacement(97.5%)	-	-	-	●	●●	●●	●●●	●●●	0.5	0.42~0.49
Nitrogen gas replacement(95%)	-	-	●	●●	●●●	●●●	●●●	●●●	1	0.99~1.10
Nitrogen gas replacement(85%)	-	●	●●	●●●	●●●	●●●	●●●	●●●	3	2.94~2.98
Control (air)	-	●	●●	●●●	●●●	●●●	●●●	●●●	21	

Note: The oxygen concentration of AGELESS™ Pack is that measured after reaching an oxygen-free state. The percentages in parentheses of nitrogen gas replacement packaging indicate the rate of replaced gas.

Effect 2 Prevents color changes

Maccha Baum (green tea cake) (25°C, with light, 1 week)

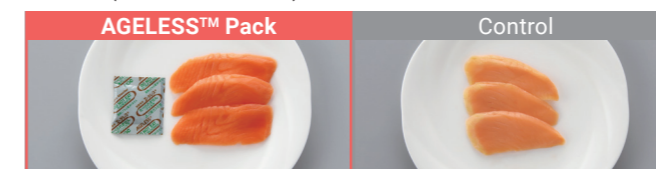


Oxidation of food causes its color to change. Natural pigments such as the chlorophyll (green) and carotenoids (red) change their colors rapidly, which is promoted by light and heat, as with oxidation of oil and fat. AGELESS™ Pack prevents the discoloration of food.

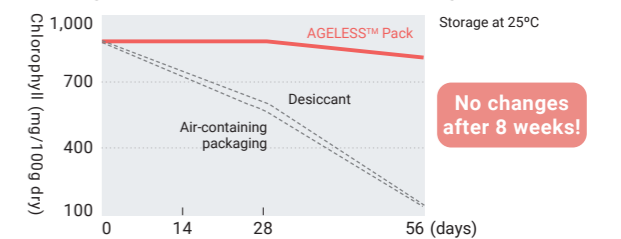
Salami (20°C×1 week)



Salmon (-20°C, 18 months)



Change in dried welsh onions with age



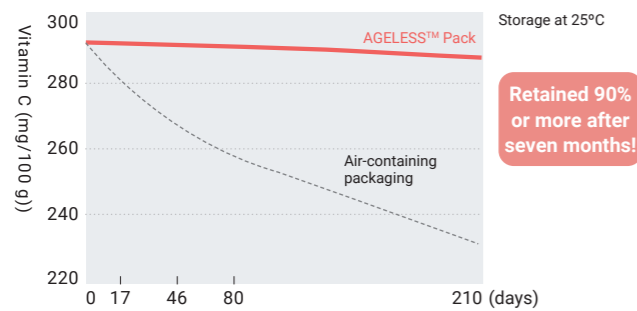
Effect 3 Retains nutrients



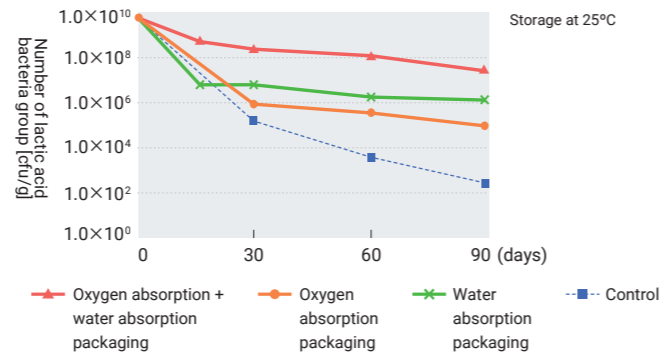
Nutrients, including vitamins C and E, contained in food are also lost or deteriorated through oxidation.

The graph of the change in vitamin C in tea with aged shows that vitamin C is retained in oxygenfree packaging using AGELESS™.

Change in vitamin C in tea with age



Change in the number of lactic acid bacteria with age



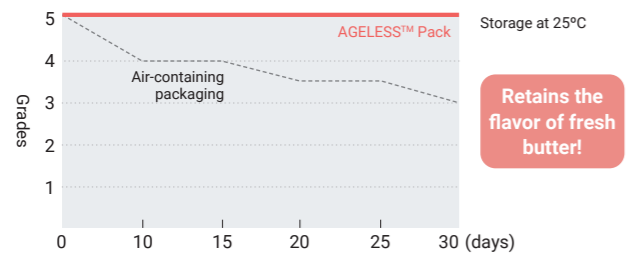
Effect 4 Preserves food flavor



Food flavors, including aroma of coffee, tea, and butter, are lost or deteriorated through oxidation.

AGELESS™ Pack allows for preserving food flavors.

Change in raisin butter sand with age



Change in almond cookies with age



Grades of aroma and taste: 5: Good aroma and taste, 4: Slightly lower aroma and good taste, 3: Slight smell of oxidation and lower taste, 2: Smell and taste of oxidation, 1: Strong smell and taste of oxidation

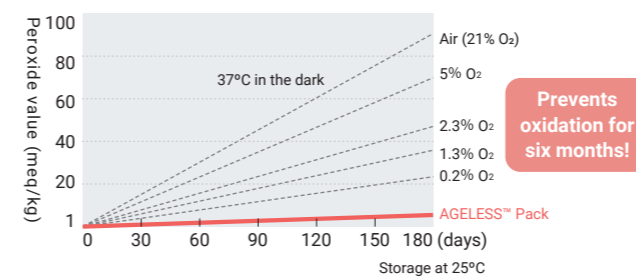
Effect 5 Prevents oxidation of fats and oils



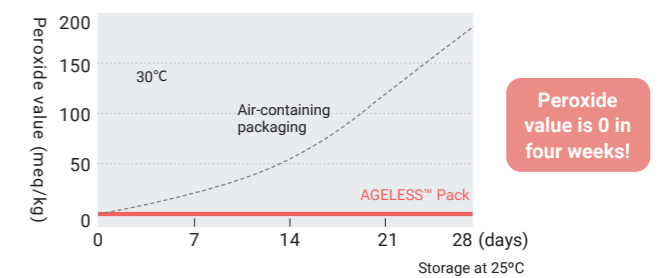
The quality of fats and oils deteriorates when they react with oxygen (oxidation). Light and heat facilitate the oxidation process, which continues even when products are frozen.

Oxidized oils and fats are a detriment to our health, but the oil/fat oxidation can be prevented by oxygenfree packaging with AGELESS™. (The extent of oxidation of oils and fats is determined by a "peroxide value." In general, higher peroxide values indicate the progress of oxidation.)

Change in peroxide value of corn-oil (extract) sprayed rice cakes with age



Change in peroxide value of refined fish oil (containing DHA approx. 30%) with age



Effect 6 Eliminates adult insects and their eggs



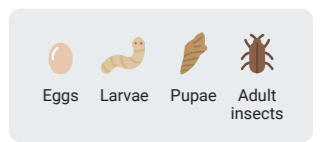
AGELESS™ Pack allows for eliminating not only adult insects but also insects' eggs, which are not destroyed by fumigation.

Use of AGELESS™ allows for killing insects without chemicals.

The following table is examples of insect pests of cereals, including rice, wheat, and beans.

Number of days needed for 100% killing of insects by AGELESS™ Pack

Name of insect pests	Test category													
	2	4	6	8	10	12	14	16	18	20	22	24	26	28
Rust red flour beetle (rice, etc.)	✗	✗	✗	✗										
Maize weevil (rice, etc.)					✗	✗	✗	✗	✗	✗				
Azuki bean weevil (azuki beans, etc.)	✗	✗				✗	✗							
Almond moth (flour, etc.)	✗	✗	✗											

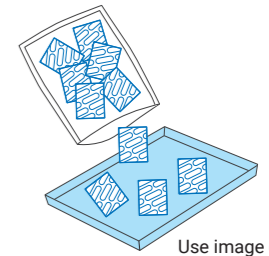




List of types of AGELESS™ (loose form)



Loose form



Use image of the loose form

For use of AGELESS™, it is necessary to select the type most appropriate for your products and packaging forms.

A wide variety of AGELESS™ are lined up for the types and applications of food products.

Iron-based water-dependent type

Type	Product picture	Characteristics	Oil resistance	Application	Water activity	Deoxygenation time	Handling time
FX		Water dependent, standard type	-	Cut rice cake, half raw noodles	0.85-0.99	0.5-1 day	Less than 25°C (For 25-35°C, half of the below) Less than 70% RH: within 8 hours 70% or more RH: within 4 hours
FX-L		For food with high contents of water and oil	○	Japanese and western confectionery, raw bread crumbs	0.85-0.99		
FJ		Environmental small product with less plastic	○	Cut rice cake, individually wrapped confectionery	0.8-0.99		

Size: Length mm × Width mm; Quantity: number of loose form sachets × master bags

	20	30	50	100	200	300	500
Size	37×37	37×37	40×37	50×41	50×52	60×60	
Quantity	500×24	500×16	500×12	500×6	400×5	150×10	
Size	37×37	37×37	40×37	50×41	50×52	60×60	
Quantity	500×24	500×16	500×12	500×6	400×5	150×10	
Size	27×20	30×25.5	37.5×25.5				
Quantity	1,000×15	800×10	800×10				

Iron-based self-reacting type

Type	Product picture	Characteristics	Oil resistance	Application	Water activity	Deoxygenation time	Handling time
ZPT-MBC		Iron type, self-reacting Standard type	○	Mooncake, soft cookies, beef jerky, nuts, milled rice, and pet food, storage foods	-0.95	1-2 days Large product of 500 or more 3-6 days	4 hours (water activity: less than 0.65, 1 hour)
ZP-K		Iron type, self-reacting Non-PFAS type	-	Soft cookies, beef jerky, nuts, milled rice, and pet food, storage foods	-0.95	1-2 days Large product of 500 or more 3-6 days	4 hours (water activity: less than 0.65, 1 hour)
Z-PKC		For low moisture content, available for combination with a desiccant Excellent aroma retaining property	-	Dried confectionery, vegetable chips, and coffee/tea, storage foods	-0.65	3-4 days	4 hours
S		Fast-acting type. For foods with high moisture content Available for refrigerated products	○	Sweet bun, castella (sponge cake), madeleine (butter cake), baumkuchen (layered butter cake), and pizza/nan	0.65-0.95	0.5-1 day	2 hours
SS		Excellent absorption capacity under freezing	○	Frozen foods (fish slices, fish eggs, dumpling)	0.65-0.95	5°C, 0.5-1 day -20°C, 3-5 days	1 hour

	20	30	50	100	200	300	500
Size	40×30	40×35	40×40	45×40	45×55	60×60	60×70
Quantity	400×30	200×40	200×30	100×30	100×15	100×15	100×10
Size	40×30	40×35	40×40	45×40	45×55	60×60	60×70
Quantity	400×30	200×40	200×30	100×30	100×15	100×15	100×10
Size	40×30	40×35	40×40	45×40	45×55	60×65	60×75
Quantity	400×30	200×40	200×30	100×30	100×20	100×15	100×10
Size		40×35	45×40	45×50	45×60	60×65	
Quantity		200×40	200×30	100×30	200×10	100×15	

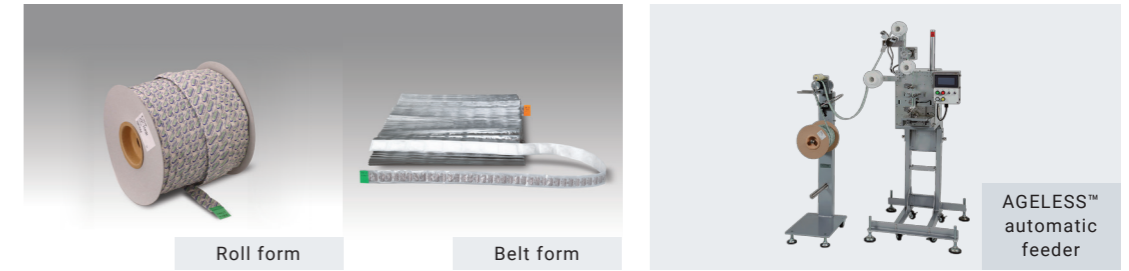
Non-iron-based self-reacting type (available for a metal detector)

Type	Product picture	Characteristics	Oil resistance	Application	Water activity	Deoxygenation time	Handling time
GLS		Non-iron type, standard type	○	Ham, bacon, nugget, and fish products	0.3-0.95	1-3 days	Within 1 hour
GLS-K		Non-iron type, Non-PFAS type	-	Ham, bacon, nugget, and fish products	0.3-0.95	3 days	
GL-MC (GL-M for 100cc)		For microwave oven cooking	○	Microwave confectionery and ready prepared food	0.3-0.95	2-3 days	
GT		Carbon dioxide generation type Generates carbon dioxide in the amount nearly same as that of absorbed oxygen	○	Fragile confectionery (castella, etc.), dried small sardine, nuts, ham, bacon, and nugget	0.3-0.90	1-3 days	

	20	30	50	100	200	300	500
Size	40×35	40×40	45×50	45×60	60×70	100×55	100×70
Quantity	300×20	300×20	300×10	200×10	150×10	100×10	50×10
Size			45×50		60×70		
Quantity			300×10		150×10		
Size	40×35	40×45	40×50	60×55			
Quantity	300×20	300×20	300×10	200×10			
Size	40×32.5	40×37.5	45×45	60×50	60×65	100×55	100×70
Quantity	300×20	300×20	300×10	200×10	150×10	100×10	100×10

● The main applications and scopes are shown as a guide. Please use the most appropriate type and characteristics based on a selection/packing test.

List of types of AGELESS™ (continuous rolls)



Iron-based water-dependent type

Type	Product picture	Characteristics	Oil resistance	Application	Water activity	Deoxygenation time	Handling time
FX		Water dependent, standard type	-	Cut rice cake, half raw noodles	0.85-0.99	0.5-1 day	Less than 25°C (For 25-35°C, half of the below) Less than 70% RH: within 8 hours 70% or more RH: within 4 hours
FX-L		For food with high contents of water and oil	○	Japanese and western confectionery, raw bread crumbs	0.85-0.99		
FJ		Environmental small product with less plastic	○	Cut rice cake, individually wrapped confectionery	0.8-0.99		

Iron-based self-reacting type

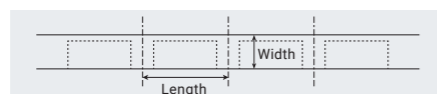
Type	Product picture	Characteristics	Oil resistance	Application	Water activity	Deoxygenation time	Handling time
ZPT-MBC		Iron type, self-reacting. Standard type	○	Mooncake, soft cookies, beef jerky, nuts, milled rice, and pet food, storage foods	-0.95	1-2 days Large product of 500 or more 3-6 days	1,000 sachets/hour
ZP-K		Iron type, self-reacting. Non-PFAS type	-	Soft cookies, beef jerky, nuts, milled rice, and pet food, storage foods	-0.95	1-2 days Large product of 500 or more 3-6 days	
ZS		Environmental small product with less plastic	○	Individually wrapped confectionery, cassette coffee, and tea	-0.90	2-3 days	
Z-PKC		For low moisture content, available for combination with a desiccant Excellent aroma retaining property	-	Dried confectionery, vegetable chips, and coffee/tea, storage foods	-0.65	3-4 days	
S		Fast-acting type. For foods with high moisture content Available for refrigerated products	○	Sweet bun, castella (sponge cake), madeleine (butter cake), baumkuchen (layered butter cake), and pizza/nan	0.65-0.95	0.5-1 day	
SS		Excellent absorption capacity under freezing	○	Frozen foods (fish slices, fish eggs, dumpling)	0.65-0.95	5°C, 0.5-1 day -20°C, 3-5 days	

● The handling time for some item is not 1,000 sachets/hour. The detailed information is written at product information sheet.

Non-iron-based self-reacting type (available for a metal detector)

Type	Product picture	Characteristics	Oil resistance	Application	Water activity	Deoxygenation time	Handling time
GLS		Non-iron type, Standard type	○	Ham, bacon, nugget, and fish products	0.3-0.95	1-3 days	1,000 sachets/hour
GLS-K		Non-iron type, Non-PFAS type	-	Ham, bacon, nugget, and fish products	0.3-0.95	3 days	
GL-MC (GL-M for 100cc)		For microwave oven cooking	○	Microwave confectionery and ready prepared food	0.3-0.95	2-3 days	
GT		Carbon dioxide generation type Generates carbon dioxide in the amount nearly same as that of absorbed oxygen	○	Fragile confectionery (castella, etc.), dried small sardine, nuts, ham, bacon, and nugget	0.3-0.90	1-3 days	

Size of AGELESS™: length × width (mm)
Sachets of continuous rolls are connected in a belt shape in the direction of length.



Size: Length mm × Width mm; Quantity: number of loose form sachets × master bags

	10	20	30	50	100	200	300	500
Size				40×37	50×41			
Quantity				3,000×2*	3,000×1*			
Size		37×37	37×37	40×37	50×41	50×52	60×60	
Quantity		6,000×2	4,000×2	3,000×2	1,500×2	750×2	750×2	
Size	20×20	27×20	30×25.5	37.5×25.5				
Quantity	1,000×4	3,750×4	3,500×4	2,500×4				

*Belt

	10	20	30	50	100	200	300	500
Size		40×20	40×35	40×40	45×40	45×55		60×70
Quantity		6,000×2	4,000×2	3,000×2	1,500×2	2,000×1		500×2
Size		40×20	40×35	40×40	45×40	45×55	60×60	60×70
Quantity		6,000×2	4,000×2	3,000×2	3,500×1	2,000×1	1,500×1	500×2
Size		30×25	30×30					
Quantity		10,000×2	7,500×2					
Size	30×20	40×30	40×35	40×40	45×40			
Quantity	12,000×2	6,000×2	4,000×2	3,000×2	1,500×2			
Size	30×25	40×30	40×35	40×40	45×40	45×55	60×65	60×75
Quantity	15,000×2	6,000×2	4,000×2	3,000×2	1,500×2	750×2	750×2	500×2
Size					45×50	45×60		
Quantity					1,500×2	1,000×2		

	10	20	30	50	100	200	300	500
Size	40×30	40×35	40×40	45×50	45×60	60×70		
Quantity	6,000×2	3,000×2	3,000×2	1,500×2	1,000×2	750×2		
Size				45×50	60×50			
Quantity				1,500×2	1,000×2			
Size		40×35	40×45	40×50	60×55			
Quantity		3,000×2	3,000×2	1,500×2	1,000×2			
Size		40×32.5	40×37.5	45×45	60×50			
Quantity		3,000×2	3,000×2	1,500×2	1,000×2			

Self-reacting type for coffee AGELESS™ (E)

- Absorbs oxygen and carbon dioxide simultaneously.
- Starts to absorb oxygen at the same time when the product comes into contact with air.
- Preserves the coffee flavor and prevents expansion of the bag.
- The number of the product name indicates the amount of absorbed carbon dioxide, one-tenth of which is the amount of observed oxygen.

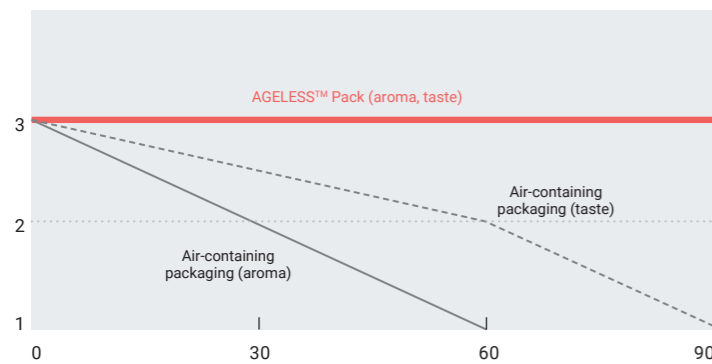


Principal use: Coffee Scope (Aw): 0.3 or less

Line-up

Type	Size (length × width, mm)	Quantity		Standard of amount of coffee
		Loose form (sachets × bags)	Roll form (sachets × rolls)	
E-150	45×40	6,000(300×20)	6,000(3,000×2)	Less than 80g
E-250	45×50	5,000(250×20)	-	80-120g
E-500	60×50	3,000(200×15)	-	150-250g

Change in coffee flavor with age



Evaluation: Aroma
 3: No smell of oxidation. The aroma is kept well.
 2: Slight smell of oxidation. The aroma is fading.
 1: Smell of oxidation. The aroma has gone.

Taste
 3: The taste is like just after roasting.
 2: Slight taste of oxidation.
 1: The taste has gotten worse.

Freshness-keeping agent for fruits and vegetables (C-P)

- Dedicated for fruits and vegetables.
- Absorbs carbon dioxide generated from fruits and vegetables and keep their freshness.
- **It is not an oxygen absorber.**



Principal use: Cut yam, cut apples, persimmon, bamboo shoot, and broccoli Scope (Aw): Applied to fruits and vegetables

Precautions for use

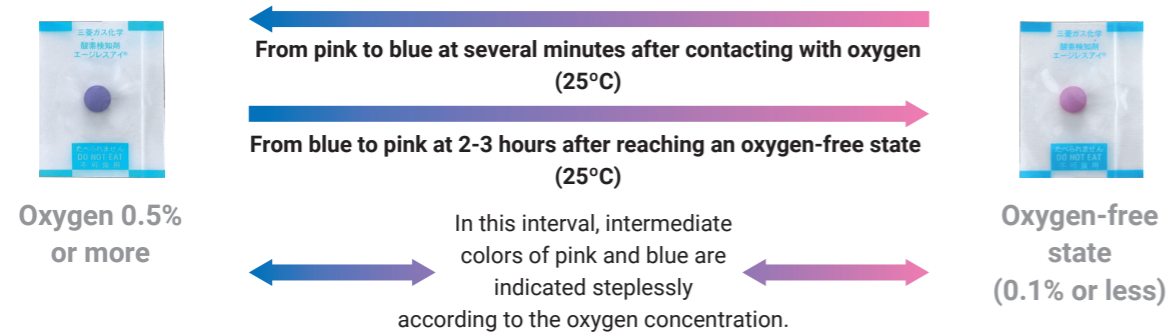
Effects may be different depending on cultivar and ripeness of fruits and vegetables, and packaging and storage conditions. Please perform an adequate confirmation test.

Application of a packaging film with high gas barrier properties to fruits and vegetables may cause problem in breathing of fruits and vegetables.

Line-up

Type	Size (length × width, mm)	Quantity		Absorption amount of carbon dioxide
		Loose form (sachets × bags)		
C-250PS	45×40	4,000(1,000×4)		250ml
C-500PS	60×50	3,000(1,000×3)		500ml
C-1001P	70×75	2,000(100×20)		1,000ml
C-2005P	100×75	1,000(50×20)		2,000ml

Color tones indicate whether the inside of the packaging is in an oxygen-free state.



The pink tone of AGELESS-EYE™ indicates that the inside of the packaging is in an oxygen-free state. The color does not directly indicate the quality of the food products in the packaging.

* The oxygen concentration and time required for discoloration are rough standards and not guaranteed values. Discoloration occurs more slowly at low temperatures.

Color tone sample

Color tone	With oxygen			Intermediate color		Without oxygen		
Deteriorated	2102	2202	2302	2402	2502	2602	2702	2802
Standard	2104	2204	2304	2404	2504	2604	2704	2804
	2117	2217	2317	2417	2517	2617	2717	2817
Deteriorated	2118	2218	2318	2418	2518	2618	2718	2818

* For determination of the color tone, please contact us.

List of AGELESS-EYE™ products

Type	Form	Size (length × width)	Quantity (Number of products × master bags)	Conditions for use
Tablet	EYE-LS (loose) EYE-LSR (roll)	41×33mm	6,000 (loose: 500 × 12 bags) (roll: 3,000 × 2 rolls)	5~35°C, Aw 0.10~0.99

How to use AGELESS-EYE™



Take out a required quantity from an master bag.

Enclose AGELESS-EYE™ together with AGELESS™ one by one.

- Do not expose it to air for long time. The handling time of AGELESS-EYE™ is within 12 hours.
- Avoid direct sunlight and strong light.** Use it under environment avoiding exposure to strong light (brightness: 500 lux or less).
- Non-reusable** The color change is reversible, but the color change ability degrades gradually, so it is not reusable.

Precautions for storage of AGELESS-EYE™

AGELESS-EYE™ is delivered at ambient temperature. Just after arrival, place it in a refrigerator at a temperature of 15°C or lower with light shielding.

Precautions for storage

- When left in air for a long time, exposed to light for a long time, or stored at a high temperature (over room temperature), the performance of AGELESS-EYE™ is degraded.
- After unpacking, store AGELESS-EYE™ in a refrigerator at a temperature of 15°C or lower, with self-reacting type AGELESS™ Z or S type (size: 100 or more) enclosed, hermetically sealed, and shielded from light in an oxygen-free state.

For storage and use, avoid the following environment.

Direct light

Exposure to direct sunlight may cause discoloration error.

High humidity

Discoloration error occurs under high humidity (the color may turn to be blue under high humidity, while the color turns to clear pink in an oxygen-free condition).

High temperature

Discoloration error occurs under high temperature for a long time (the color turns to clear pink in an oxygen-free state, while under high temperature the color turns to orange and the color is not changed).

Low temperature

At low temperatures (below 5°C), discoloration errors may occur, such as turning blue in an oxygen-free environment. When pink is shown again at a normal temperature, it is not a problem.

Do not take out the tablet from the small bag for use.

Make sure to perform a test using actually packaged products before use.

Confirmation before use

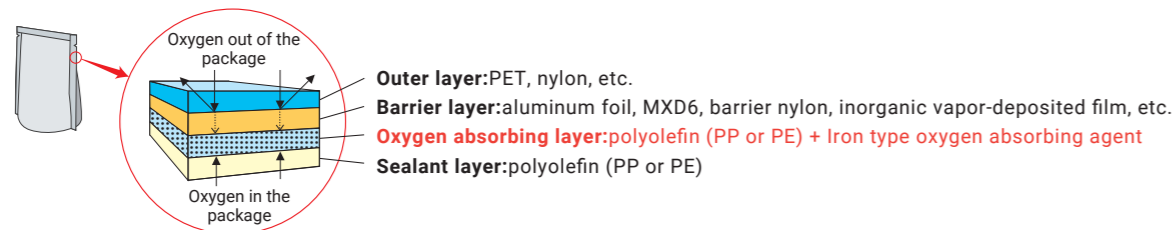
	Confirmation before use	Guarantee period
Tablet	The master bag is an oxygen-free packaging. Confirm that the color AGELESS-EYE™ inside is pink before unpacking before use.	6 months after shipment/15°C

AGELESS OMAC™ is an innovative hybrid film with barrier properties and oxygen absorption function.



Available for wide applications, including retort food, boiled food, and unheated food with nitrogen gas replacement.

Basic structure



Specification of oxygen-free film

- Total thickness of film:** 70-130 μm (depending on the layer structure)
- Water activity of product to be applied:** 0.85 or more
- Handling time:** 24 hours after opening the master bag (23°C, 60% RH or less)
- Guarantee period:** 6 months after shipment

Precautions for Use



AGELESS OMAC™ is detected by a metal detector.



The oxygen absorbing film is not transparent.



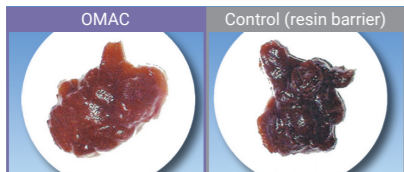
Determine adoption of AGELESS OMAC™ after an application test is performed.

Performance and effects of oxygen absorption

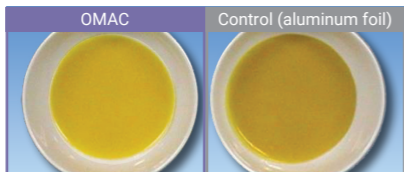
- Absorbs oxygen in the headspace and dissolved oxygen in the contents of heat-treated products (retort, boil, hot-fill) and unheated products with gas displacement to preserve the original flavor, color, and taste of the food for a long time.
- Completely removes residual oxygen within the bag to prevent retort shock caused during heat processing and to suppress reduction of nutrients, including vitamin C.

Effects of preventing discoloration and retaining flavor

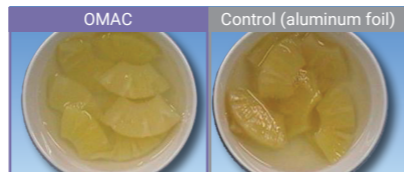
Red bean paste (14-day storage at 25°C after retort treatment)



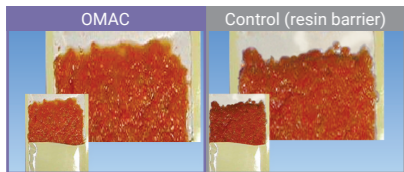
Pumpkin soup (6-month storage at 25°C after retort treatment)



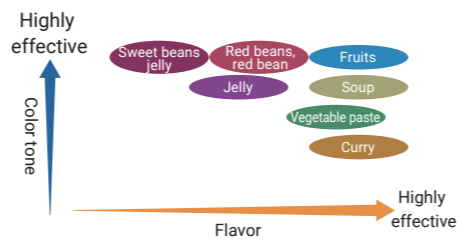
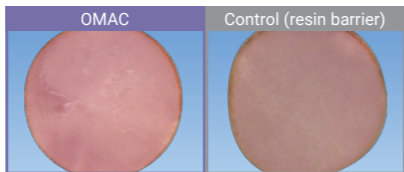
Pineapple in syrup (1-month storage at 35°C after boiling)



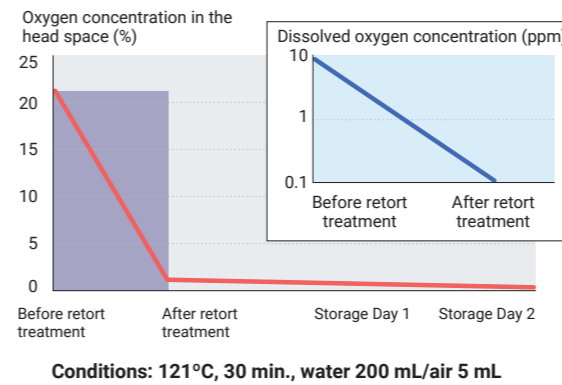
Vegetable paste (carrot) Just after retort treatment



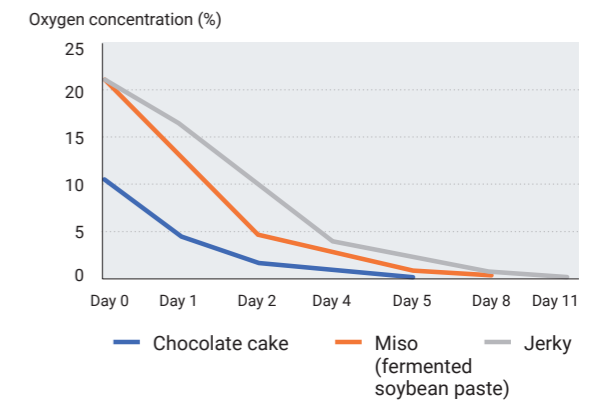
Ham/ready prepared food (ready prepared/unheated, gas replacement, 1.5-month storage at 10°C)



Change in oxygen concentration in the head space during retort treatment



Deoxygenation rate during non-heating



List of oxygen-free film/AGELESS OMAC™

Application	Shape (with corner cut, with notch)			Type	Size (mm)	Quantity	Standard volume (mL)
	One side transparent	Three-sided bag	Stand pouch				
For retorting and boiling		○		P-RAP220300	220 × 300	800 sheets	800-1,000
			○	P-RAQS130175	130 × 175 × 35	1,600 sheets	200-250
For boiling (not for retorting)	○	○		P-SBMWP220300A	220 × 300	800 sheets	800-1,000

Size: width × length (× gusset)

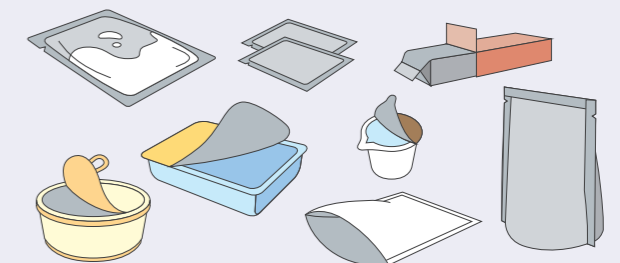
Example of film structure

Type	Film structure	Print	Position	Total thickness (μm)
P-RAP	PET/NY/AL/OA·CPP	Plain	Both surfaces	Approximately 100-130
P-RAS	PET/NY/AL/CPP	Plain	Side surface	Approximately 100-130
			Bottom surface	Approximately 100-130
P-SRAWP	PET/NY/AL/OA·CPP	Plain	Oxygen absorption surface	Approximately 100-130
	Inorganic vapor-deposited PET/NY/CPP		Transparent surface	Approximately 100
P-SBMWP	Inorganic vapor-deposited PET/NY/OA·PE	Solid white	Oxygen absorption surface	Approximately 100-130
	Inorganic vapor-deposited PET/NY/PE		Transparent surface	Approximately 100
P-SBMWS	Inorganic vapor-deposited PET/NY/OA·PE	Solid white	Oxygen absorption surface	Approximately 100-130
	Inorganic vapor-deposited ET/NY/PE		Transparent and bottom surfaces	Approximately 80

OA : Oxygen absorption film

AGELESS OMAC™ can be used in various packaging forms.

We can also consider providing the requested dimensions, design, and laminate configuration.



Four steps to AGELESS™ collectly



STEP. 1

Prepare packaging material with high gas barrier properties.

Prepare materials with high gas barrier properties such as films, trays, metal cans, and glass bottles.

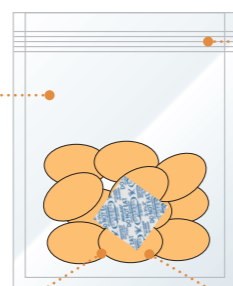
Prepare packaging material. → P.18

STEP. 2

Select the type and size of AGELESS™ depending on the characteristics of the product and air volume inside the packaging.

Select the AGELESS™ type for the product's characteristics and packaging form and an AGELESS™ size for the amount of oxygen in the packaging.

Select type. → P. 19 Select size. → P. 20



AGELESS™ Pack

AGELESS™ absorbs oxygen within sealed packaging to create an oxygen free state for a certain period.

STEP. 3

Seal the packaging with a sealing machine.

To create an oxygen-free state by complete sealing, use a heat sealer, etc.

Seal the packaging. → P. 21

STEP. 4

Correct handling of AGELESS™.

Inappropriate handling of AGELESS™ can render the product useless. As handling methods differ according to the type, handle AGELESS™ accurately according to the conditions of each type.

Use of AGELESS™. → P. 23

Effect confirmation test using AGELESS™

Test implementation procedure

1. Insert the prepared product into the packaging.

2. Insert AGELESS™ and AGELESS-EYE™ into the packaging.

The deoxygenation time may differ depending on the position of AGELESS™. Perform a test for AGELESS™ and AGELESS-EYE™ placed in the actual position.

3. Use a heat sealer or wrapping machine to seal the packaging completely.

4. Enter the expected opening date of the packaging and store under the prescribed storage conditions (temperature etc.).

POINT Determine the expected opening date based on the intended best-before date, etc. Determine a longer period to unpackaging for highly preservable foods and a shorter period for perishable foods.

POINT For a packing test with many conditions, preparation in advance of a test plan table is recommended.

5. Check the oxygen-free state within packaging and the quality of the product on the scheduled dates.

Confirm the oxygen free state by color tone of AGELESS-EYE™ before unpackaging (immediately after opening in the case of a can). Then, open the packaging and check the appearance, smell, and taste of the product.

POINT Use all products from the same manufacturing lot.

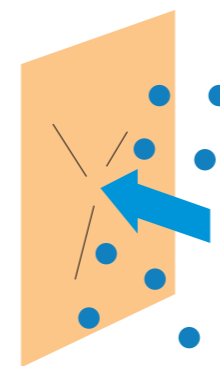
POINT Each quality check should be performed by the same, more than one inspector.

6. Determine the best-before date according to comprehensive evaluation of the appearance, smell, and taste which the customer wants.

Perform a packing test according to the conditions for use and environment, and confirm the effects and defects.



Packaging material with low oxygen permeability is necessary to keep the inside of the container in the state of oxygen free for a certain.



Precautions for selecting packaging material

In principle, choose packaging material with oxygen permeability of **20mL/m², atm, 24 hours or less.**

Generally, the oxygen and water vapor permeabilities of packaging material change according to the temperature and humidity of the preservation environment, water activity of the content, etc.

The oxygen permeability of some packaging materials drastically rises (declines in gas-barrier properties) when preserved in a high temperature environment or applied to foods with high water activity. Be sure to conduct a packing test in advance to check the suitability of the packaging materials.



For low moisture product

Use packaging materials with a high gasbarrier property regardless of preservation period when using AGELESS™ together with desiccant.



For long-term preservation

For longer preservation period, use packaging materials with higher gasbarrier properties.



For molded container (cup, tray, etc.)

Even material with a low gas-barrier property may be available according to thickness. Check the gas-barrier property of the container by testing with an AGELESS-EYE™.

Aptitude and oxygen permeability of a film container * Values and aptitude are reference values.

Aptitude	Type	Composition	Thickness (μm, standard)	Oxygen permeability/20-25°C, 40-60% RH (mL/m ² , atm, 24 h)*	Vapor permeability/40°C, 90% RH (g/m ² , 24 h)
Appropriate	Aluminum foil	PET/Al/PE	12/7/40	0	0
	Aluminum vapor-deposition	Al vapor-deposited PET/PE	12/40	0.5-1.5	1-1.5
	Ceramics vapor-deposition	Ceramics vapor-deposited PET/PE	12/60	0.3-1.5	0.3-1.5
	Ethylene vinyl alcohol	OPP/EVOH/PE	20/17/40	0.3-4	7
	Barrier nylon	Barrier nylon/PE	15/40	5-10	9
	Polyvinylidene chloride coat		PVDC coating OPP/PE (same high barrier type)	20/40	5-15 (1-5)
PVDC coating PET/PE			12/50	6-10	4
PVDC coating ONY/PE			15/50	6-10	7
PVA coating or extruded articles		PVA coating OPP/PE	12/40	1-5 (200/90%RH)	4
		EVOH coating OPP/PE	12/40	1-5 (90/90%RH)	4
Apply to food with high AW or being stored under high humidity with great care.					
★	Nylon	2-layer extruded film	100	11-30	7-9
		3-layer extruded film (same highbarrier type)	60-90	25-70 (1-9)	5-15
		ONY/PE	15/40	30-120	16
	Polyester	PET/PE	12/40	50-120	15
Inappropriate	Polypropylene	OPP/PE	20/40	1,500-2,000	6
	Polyethylene	PE	40-	2,000-	

★: When using packaging material falling under this mark for AGELESS™ Pack, conduct a packing test, etc. very carefully to determine the appropriateness of adoption.

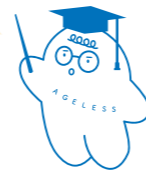
* Oxygen permeability is also indicated with SI unit (mL/m², MPa, 24h). The oxygen permeability in SI unit is obtained by multiplying 9.87 by the corresponding value of the table based on 1MPa = 9.869 atm.

Abbreviations:

PET = polyester, Al = aluminum, PE = polyethylene, OPP = oriented polypropylene, EVOH = ethylene-vinyl alcohol copolymer, PVA= polyvinyl alcohol, PVDC = polyvinylidene chloride, ONY = oriented nylon, CPP = cast polypropylene

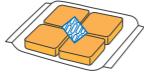

Select type of AGELESS™

Select the type most appropriate for the types, properties, packaging forms, and applications of products.



- Basically, select the water-dependent type when AGELESS™ is placed in “direct” contact with foods containing high moisture which causes “mold” to grow.
- When such product is individually packaged or placed in a tray or a fancy box, and AGELESS™ is “indirectly” placed on the outside of such packaging, choose the self-reacting type.
- Most self-reacting types with water- and oil- resistance are available for “direct” and “indirect” placement of AGELESS™ food with medium to high moisture irrespective of packaging forms.
- However, use quick-acting type AGELESS™ for foods with high moisture because of fast growth of “mold.”
- For low-moisture foods, use self-reacting standard type, which allows for “direct” and “indirect” placement irrespective of packaging forms.

Standard of for selecting AGELESS™ types by food moisture content and packaging forms

Moisture content of food (standard of water activity)	Packaging form (position to place AGELESS™)		
	Place AGELESS™ “directly” contacting with the food product. 	Oil-free food products 	Place AGELESS™ “indirectly.” AGELESS™ is placed outside of an individual package, tray, box, etc.
Particularly high moisture content (0.95 or more)	FX-L	FX-L	—
High moisture content (0.85-0.95)	FX-L, S, ZPT-MBC, GLS	FX, ZP-K, GLS-K	ZP-K, GLS-K
Medium moisture content (0.65-0.85)	S, ZPT-MBC, GLS		ZP-K, GLS-K
Low moisture content (0.3-0.65)	S, ZPT-MBC, GLS		ZP-K, GLS-K
Particularly low moisture content (0.3 or less)			Z-PKC, E, ZP-K

* Sufficient effects may not be obtained even by the AGELESS™ types with water- and oil-resistance, depending on the moisture and oil levels in food products. As penetration of alcohols as well as moisture and oil may inhibit the oxygen absorption function of AGELESS™, perform a confirmation test using actual packaged products. Change of packaging form, including use of trays, may be required in order to isolate AGELESS™ from moisture and oil.

Selection of AGELESS™ type by specific applications and foods (specify types)

Applications, products	Type	Remarks
Concomitant use with desiccant	Z-PKC	Effective for food products with extremely little moisture content (Aw 0.3 or less) such as freeze-dry products.
Use of a metal detector	GLS, GL-M, GT	Metal detector sensitivity is equivalent to or lower than iron ball φ1.0 mm. Depending on a metal detector, setting to non-ferrous ball may be required.
Avoidance of shrinkage of package	GT	AGELESS™ generates carbon dioxide in the nearly same amount as that of absorbed oxygen. Carbon dioxide dissolving into the moisture and/or oil of food items may change food taste or cause a gradual shrinking of the package. In that case, combination of other types and nitrogen gas filling are effective.
Frozen storage	SS	For cold storage, use S.
Microwave oven heating/thawing	GL-M	Please consult us in advance.
Roasted coffee beans and powder	E	The carbon dioxide generation rate varies in accord with kind of coffee beans and degree of roasting. Confirm the effects with actually packaged products before use.
Food products containing acids	S	Contact us for foods with particularly high acidity, such as kelp flakes.
Fruits and vegetables	C-P	This is not an oxygen absorber. Absorbs carbon dioxide and maintains the freshness of fruits and vegetables.

Select size of AGELESS™

Select the appropriate size in order to ensure an oxygen-free state within an intended time.



Measure the volume of oxygen in a container and select the size available for fully absorbing oxygen.

AGELESS™ size = nominal oxygen absorbed (mL)

Example: For <S-100>, a sachet can absorb 100 mL of oxygen within the deoxygenation time (1 day). (25°C)

* S indicates an AGELESS™ type.

How to measure the oxygen in a container

$$\text{Oxygen in a container} = \left[\text{Volume of a container (mL)} - \frac{\text{Weight of the content (g)}}{\text{Density of the product (g/mL)}} \right] \times 0.21 \text{ (percentage of oxygen in air)}$$

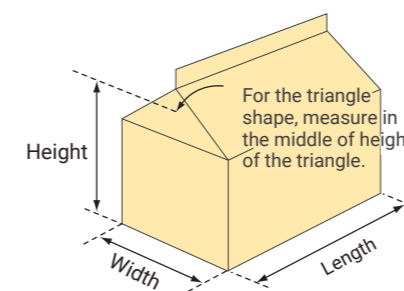
Volume of the content of the product

The density of the product is the weight per 1 mL, and in general can be estimated using by the food density of 1 g/mL. Food products of which the density is calculated using the density other than 1 g/mL include rice cake: 1.2, cereals: 1.4, sweet beans jelly/Uiro (sweet rice jelly):1.3, raw noodles: 1.2. For metals, the specific density is applied.

How to select the size

■ Almost cuboid shaped container

Measure the volume of a container by width × length × height and calculate the oxygen amount to select the size.



Example

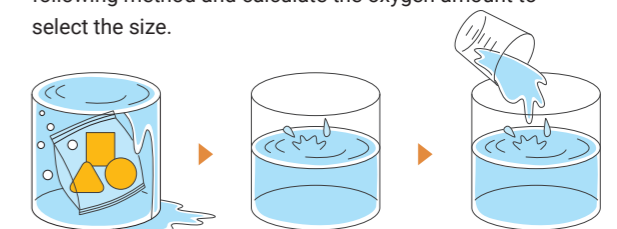
Container size: 15 × 10 × 10 cm, weight of product: 600 g (density: 1 g/mL).

$$\text{Amount of oxygen} = \left[(15 \times 10 \times 10) - \frac{600}{1} \right] \times 0.21 = 189 \text{ mL}$$

▶ Select the slightly larger and closest size **200**.

■ Irregular container, such as bags

Measure the volume of the container by means of the following method and calculate the oxygen amount to select the size.



Fill vessel with water. Place the product container into the vessel and let water overflow.

Take out the product container.

Fill up water with a measuring cup, and measure the volume by the make-up water volume.

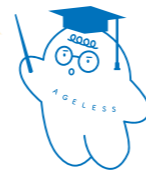
Example

Make-up water volume 900 mL, weight of product 500 g (density 1 g/mL)

$$\text{Amount of oxygen} = \left(900 - \frac{500}{1} \right) \times 0.21 = 84 \text{ mL}$$

▶ Select the larger, nearer size **100**.

AGELESS™ achieves no effects unless it is completely heat-sealed or seamed.

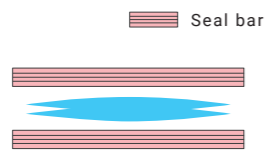


Points to note for heat sealing

Mechanism of heat sealing

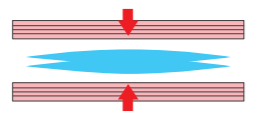
1. Heating

Melt the adhesive layer (sealant material) on the packaging material by heat.



2. Pressing

Apply pressure to allow the molten adhesive layer to fill the clearance and allow films to adhere tightly together.



3. Cooling (decreased temperature)

Cool the adhesive layer to solidify, and the films are hermetically sealed.



The quality of heat sealing depends on temperature and time of heating and pressure.

In principle, use a heat sealer with heating both sides.

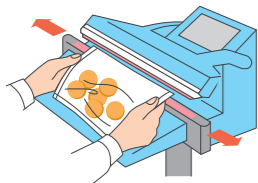
In the case of one-side heating, perfect sealing might not be achieved depending on heat sealer models or shapes of packaging bags.



Foot-operated or hand-operated sealer

For sealing, lightly pull both edges of the film to prevent wrinkles from being formed on the sealing portion.

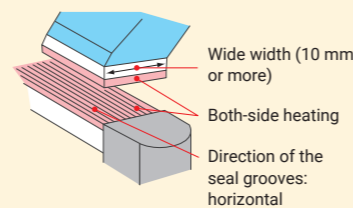
The seal pressure or seal condition may vary depending on workers. Every time the worker is changed, make sure the seal is correctly made.



Be careful not to jam the sealing portion with wrinkles, powder, or fluid.

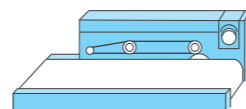
Good sealer

A sealer with wider width is recommended. When using a sealer with narrow width, foreign matter may be stuck or wrinkles occur to fail in sealing.



Belt sealer

In the case of an endless type belt sealer, properly adjust the parallelism of hot platens and belt speed (seal speed) as well as heating temperature and time and pressure.



Points to note for each bag shape

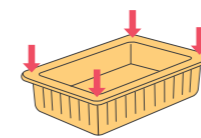
Film containers

In the case of a one-side heating sealer, care must be taken because perfect sealing might not be achieved depending on shapes of packaging bags.

Shapes of packaging bags	Seal properties
<p>3-way seal bag Tubular-shape bag Standing pouch</p>	<p>Can be sealed by a one-side heating sealer.</p>
<p>Backlining (pillow) package</p> <p>The backlining portion tends to form a tunnel.</p>	<p>A both-side heating sealer is recommended. With a one-side heating sealer, direct the side with no backlining to the hot platen.</p>
<p>Gusset package</p> <p>The folded portion tends to form a tunnel.</p>	<p>A one-side heating sealer is not recommended. Select packaging materials with good adhesion and use a bothside heating sealer.</p>

Molded container

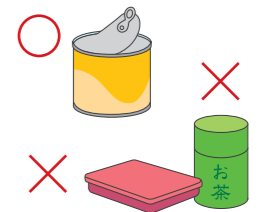
When a molded container is top sealed, apply even pressure to the whole container.



In particular, be careful about corners of a square container.

Metal container

Be careful not to fail to seam metal containers (cans).

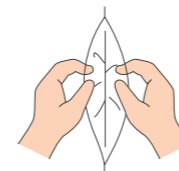


Tea and cosmetic cans generally lack air-tightness and cannot be used for AGELESS™ Pack.

How to check the seal condition

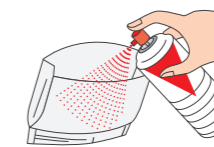
Check the seal condition before sealing operation.

Check by pulling the package



Pull the package as illustrated above when the sealed portions are cooled. If the sealed portion is easily separated, it is adhesion failure.

Check by AGELESS™ seal check



To check the backlining portion or gusset portion, use AGELESS™ seal check.

For AGELESS™ seal check, see p. 35.

Check in water



Firmly press the bag containing food by both hands in water to confirm whether bubbles come out from the bag. Be careful about the printed portion of a hot printer.

The handling method of AGELESS™ depends on types. Properly unpack, use, and store AGELESS™ according to the conditions of each type.



Handling of AGELESS™

! When mishandled, AGELESS™ absorbs oxygen in air before placing it in packaging and does not exert the expected effects.

1. Storage method and guarantee period (AGELESS™ only when the master bag is unopened).

Type	AGELESS™ Standard-type
Storage method	Avoid from direct sunlight and store below 30°C
Guarantee period	12 months after shipment

* Guarantee period of some item is not 12 months after shipment. The detailed information is written at the product information issued by MGC.

2. **!** When opening the carton box, do not use a cutter.

Master bags may be damage by a cutter. * Pinholes created by a cutter when opening cannot be returned and exchanged.

3. **!** Check a degassed state before opening and use.

AGELESS™ is degassed-packed in an oxygen-permeable master bag. By checking a degassed state, it is able to confirm in advance the generation of pinholes during transportation and handling and product defects caused by breakage of a master bags.

! As AGELESS™ in a master bag under a less degassed condition is defective, do not use it. We will replace the products if a master bag is not in a degassed state when the carton box is opened. Please contact our distributor.

4. Handling time

The proper handling time is specified for each type. Place AGELESS™ in packaging and seal it within the handling time. As long as within the specified handling time, the remaining AGELESS™ that is degassed-packed and stored can be used from the next time, however, use AGELESS™ as early as possible.

Handling of AGELESS™ loose form

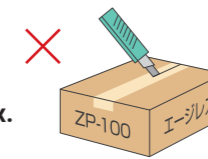


Loose form is separated into individual sachets, which can be used manually as they are.



Handling procedures to place AGELESS™ and precautions

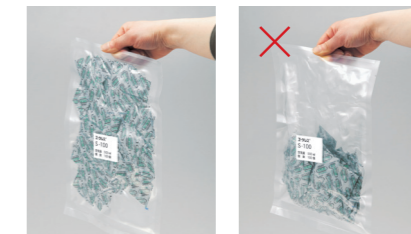
1. Take out the master bag from the carton box.



! When opening the carton box, do not use a cutter.

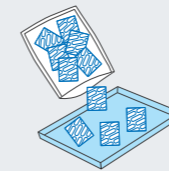
2. Check a degassed state.

Pinch the end of the master bag and lift up and make sure the content does not slip down. If the content slip down, do not use them because the degassed condition in the master bag is decreased.

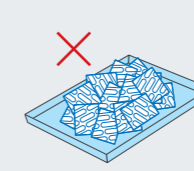


3. Open the master bag and take out the required quantity of AGELESS™.

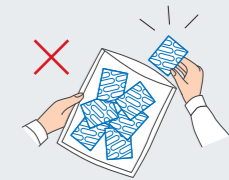
After opening, take out the required quantity in a box or on a tray for use. Do not replenish until the box or the tray becomes completely empty. Use AGELESS™ spread out, preventing them from lying one on top of another.



Use AGELESS™ spread out, with care to prevent them from lying one on top of another.



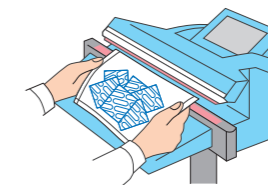
! Do not pile them up. AGELESS™ sachets generate heat and their performance are quickly reduced.



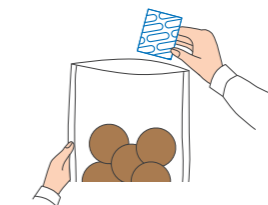
! Do not use AGELESS™ one by one from a master bag. The AGELESS™ sachets in the bag generate heat and their performance are quickly reduced.

4. Degassed-pack the remaining AGELESS™.

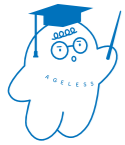
! Before beginning of placement operation, seal the master bag containing the remaining AGELESS™. Remove the air in the master bag as much as possible.



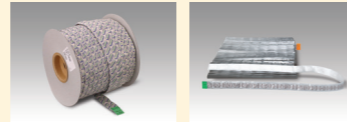
5. Place AGELESS™ within the handling time.



Handling of AGELESS™ continuous roll

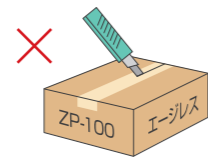


For continuous rolls, an automatic feeder is required. Continuous type consist of roll type (rolled around a paper core) and belt type (zigzag folded).



Handling procedures to place AGELESS™ and precautions

1. Take out the master bag from the carton box.



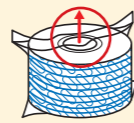
⚠ When opening the carton box, do not use a cutter.

2. Check a vacuumed state.

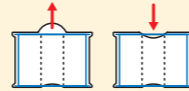
Roll form:

- Check the side paper board of bobbin and the master bag are tightly adhered.
- Pull out the master bag that is pressed inward within the paper core cap hole and check that it returns to the original position when released (even if it returns slowly it is correct).

Roll form



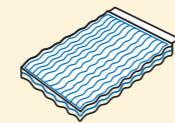
When the part returns to the original position after pulling it by hand, even if slowly, the vacuumed state is normal.



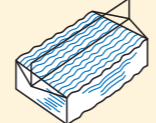
Belt form:

- Check that the master bag is bumpy along the belt upper surface, which is normal.
- Consult us if a degassed state cannot be determined using this method.

Belt form



Cross section



Cross section

3. Open the master bag and take out AGELESS™.

Open one side of the master bag and take out AGELESS™. Discard one each of the first and the last piece of AGELESS™ in continuous rolls without using because tapes are affixed. (The pieces with tapes are not included in the quantity.)

4. Set AGELESS™ in the automatic feeder and place it within the handling time.

Within the preparation time of 30 minutes to set it in the automatic feeder + the handling time, place AGELESS™ in the packaging and seal it. See the next page for the handling time and precautions. When taking a break or stopping the handling after finishing handling, make sure to put the continuous roll back in the master bag, remove the air, and seal it.

Quickly perform the placement of AGELESS™, considering the handling time.



Type		Handling time and precautions
Water-dependent type	Roll and belt forms	Use under the following conditions after opening. Less than 25°C (for 25-35°C, half of the below) Less than 70% RH: within 8 hours 70% RH or more: within 4 hours
Self-reacting type	Roll form	Use these products at a rate of 1,000 sachets per hour after opening. Extra 30 minutes for the time for setting the product in the feeder is added to the above formula. Example: Roll with 3,000 sachets: 3 hours + 0.5 hours or less Note: If you stop the production for longer than 1 hour within the handling time, put the AGELESS™ pack in a master bag and seal it.
	(no open hole product) Roll form	Use these products at a rate of 1,000 sachets per hour after opening. Because of the product properties, be sure to dispose of the first sachet. Also, when resuming the use of the remaining sachets which were stored, dispose of the first one.
	Belt form	Use the products within an hour after opening, regardless of the number of rolled sachets.

* Contact us, for types that are not listed in p.9 and 10.

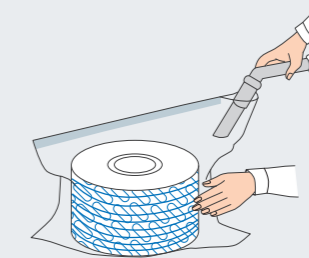
5. How to keep opened rolls.

Put the remaining roll back in the master bag and degassed-pack it with a vacuum cleaner, etc.

* AGELESS™ KEEPING BAG may also be available. (See p.35)

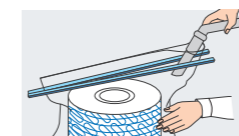
Method of degassed-packing

Seal the bag with a heat sealer, leaving a small opening. Degas the bag by putting the cleaner nozzle into the bag from the open end, and seal the open end after removing the nozzle. If sealing with a heat sealer is difficult, use AGELESS™ Clip.



Be careful not to make wrinkles at the sealed ends of the bag.

Use of AGELESS™ Clip




Sealing will be insufficient if the clip is loose. In such case, use a new clip.

Precautions for remaining AGELESS™

- Check the degassed state when resuming the use of the roll in the bag.
- When keeping the self-reacting type roll form, "Z-PKRC (size 30 or below), ZPT-RMBC, ZP-RK, E-R" for 24 hours or more, put in a self-reacting type AGELESS™ comparable to S-500 or above, and then degassed-pack it for keeping.
- When a small amount of sachets of a roll type product remains near the roll core, remove them from the core, and degassed-pack them, and store them, for preventing air from entering.

Precautions for use



Warnings

! AGELESS™ does not have the inhibitory effect on some microorganisms.

Oxygen absorber AGELESS™ effectively inhibits aerobic microorganisms, including molds, however, does not inhibit the growth of obligate anaerobes, microaerophilic bacteria, facultative anaerobes, and yeasts. **Please determine the use of AGELESS™ in food packages that are susceptible to these microorganisms, including combination of AGELESS™ with refrigeration and other food preserving methods, by your company, following properly performing tests under the actual packaging and distribution.**

* Note that the growth of molds cannot be fully prevented by AGELESS™ under certain packaging conditions (see p.29).


Read this instruction manual before using AGELESS™ .
Make sure in advance to perform a test to check the effects.

As the water-, oil-, alcohol-, and acid-resistances of AGELESS™ are limited, **perform a test under the actual usage conditions to verify its effectiveness.**

In the use of iron-based AGELESS™ , rust may be formed.


In the case of acidic products or products with alcohol or a pH adjuster, etc., rust may be formed from AGELESS™. **Before use, please perform a test under the actual usage conditions before use and confirm rust formation.**

Rust may also be formed when AGELESS™ is placed under excess air (capacity shortage, when packaging materials with low gas-barrier properties are used, pinholes, seal defect, etc.).

 **When opening food packaging containing AGELESS™ , heat may be generated by the oxidation reaction of AGELESS™ .**

However, **the amount of heat generated is small, it is insufficient to cause ignition or generally to cause burns.**

The time of heat generation is about few minutes, and temperature depends on the type of AGELESS™ and the conditions of packaging.

 **Remove AGELESS™ when heating any food package containing the microwaveoven non-compliant AGELESS™ .**

If a package with AGELESS™ is microwaved, it may spark, scorch the package, and, on rare occasions, ignite. **If AGELESS™ is likely to be microwaved with food, take necessary measures, including warning labels on AGELESS™ .**

As AGELESS™ for microwave oven is available, please contact us.

Discoloration of food may occur with AGELESS™ .

As raw meat, redfish meat, processed squid, and Chinese noodles **may discolor using AGELESS™ , perform in advance a packaging test.**

Be careful not to rapidly remove air or create a vacuum state.

When a container of food with AGELESS™ is rapidly degassed and vacuumed, **the sachets of AGELESS™ may burst.**

Precautions for use


The safety has been confirmed for each product, AGELESS™ and AGELESS-EYE™.

	AGELESS™	AGELESS-EYE™
Main constituents of products	Iron powder, vitamin C, etc.	Inorganic salts, dyes, etc.
The safety of all of the products has been confirmed in acute toxicity studies by public institutions.		
Packaging materials of products	The packaging materials used in AGELESS™ and AGELESS-EYE™ have passed the standards for food containers, utensils and packaging by the Japanese Ministry of Health and Welfare Public Notice No. 370 in 1959 or Public Notice No. 20 in 1982 as materials that may come in direct contact with foodstuff.	


* If you need specific safety test data, please contact us.

First aid measures


! The contents of AGELESS™ come into contact with the eyes:

 Rubbing the eyes may cause scars. Wash the eyes with plenty of water and get medical advice/attention.


! A sachet of AGELESS™ or AGELESS-EYE™ is swallowed whole.

 It may damage the esophagus and digestive organs, etc. Get medical advice/attention.

! The contents of AGELESS™ come into contact with the skin.

 Wash the skin well with soapy water and water.

! The contents of AGELESS™ accidentally enter the mouth.

 Rinse the mouth with water.

Fire-fighting measures	The contents of the products with some exceptions are non-combustible, and packaging materials are combustible. Fire extinguishing method is not restricted.
Disposal considerations	The packaging materials of AGELESS™ are made from plastic film with paper. Dispose of the products in accordance with the municipal regulations.
Precautions for storage	Take care not to expose the carton box to water and not to break the master bag. See p.23 for the storage method for keeping quality.
Entry data and evaluation results	All the information contained herein is based on the reference materials, data and information available at this time. The precautions stated herein are intended for normal handling, and therefore, if for specific handling, newly perform safety evaluation and measures appropriate for the application and usage.

Please refer to the following examples of caution statements for products adopting AGELESS™, considering the characteristics and distribution conditions of your products.

Items	Examples of caution statements
Statement concerning the purpose of using AGELESS™	<ul style="list-style-type: none"> •Oxygen absorber AGELESS™ absorbs oxygen in packaging and serves to keep the food fresh. •Oxygen absorber AGELESS™ is used to keep the food fresh.
Statement for preventing accidental ingestion of AGELESS™	<ul style="list-style-type: none"> •Oxygen absorber AGELESS™ contained is not edible.
Statement concerning heat generation of AGELESS™	<ul style="list-style-type: none"> •When opening, the oxygen absorber AGELESS™ contained therein may become hot, but there are no concerns about ignition. Please dispose of as it is.
Statement concerning microwave oven	<ul style="list-style-type: none"> •Oxygen absorber AGELESS™ contained in the food container must be removed before warming in a microwave oven.
Statement concerning reuse	<ul style="list-style-type: none"> •Oxygen absorber AGELESS™ cannot be reused.
Statement concerning disposal	<ul style="list-style-type: none"> •The packaging materials of AGELESS™ are made from plastic film with paper. Dispose of the products in accordance with the municipal regulations.

* "AGELESS™" is a registered trademark of an oxygen absorber of Mitsubishi Gas Chemical Company, Inc. Please indicate "Mitsubishi Gas Chemical Company, Inc." and "oxygen absorber" together with AGELESS™, without indicating only AGELESS™.

Prevent deterioration of food quality by understanding kinds and characteristics of microorganisms.



As the functions of microorganisms highly affect the deterioration and alteration of food, measures should be taken to prevent fermentation and putrefaction when using of AGELESS™.

Kinds of microorganisms and the growth preventing effect of AGELESS™

Kinds of microorganism			Characteristics	Water activity suitable for growth (Aw)	Growth preventing effects of AGELESS™	
	Common microorganisms	Food poisoning microorganisms				
Aerobic microorganisms	Mold	•Aspergillus Oryza •Penicillium notatum	•Aflatoxin-producing molds	Unable to grow in anaerobic conditions	0.80 or more	Markedly inhibits growth
	Aerobic bacteria	•Many Bacillus •Pseudomonas	—			
Common yeasts		•Bread yeast •Alcohol yeast	—	Grows well in aerobic conditions, but able to grow in low oxygen concentrations as well	0.88 or more	Cannot sufficiently inhibit growth
Facultative anaerobes		•Escherichia coli	•Staphylococcus aureus •Vibrio parahaemolyticus •Pathogenic Escherichia coli (e.g., O157)	Grows well in aerobic conditions, but able to grow in anaerobic conditions as well	0.90 or more	Cannot inhibit growth
Microaerophilic bacteria		•Most of lactic acid bacteria	•Campylobacter	Grows best in low oxygen concentrations		
Obligate anaerobes		•Bifidobacterium	•Clostridium botulinum •Clostridium perfringens	Grows in anaerobic conditions		



- **Food poisoning microorganisms** which directly cause adverse effects on the human body. Some microorganisms, such as some molds, cause adverse effects on the human body through the production of toxins.
- **Common microorganism**: Microorganisms which do not directly cause adverse effects on the human body but promote food deterioration.

Inhibition of microorganisms, including the growth of common microorganisms, is important to maintain the freshness of food.

Microorganism growth conditions and preventing method of fermentation and putrefaction

General microorganism growth conditions		Procedures for preventing fermentation and putrefaction
Nutrients	Microorganisms are unable to grow unless nutrients exist. Foods are nutrients themselves, and must be kept in the state free of contamination by microorganisms.	Keep the manufacturing environment clean (remove nutrients necessary for microorganism growth). • Disinfect and sterilize materials, equipment, apparatuses, containers, and wastes by the methods suitable for the purpose so that they do not serve as a source of microorganism growth. • Cleaning of manufacturing facility, manufacturing workers, air, etc.
Moisture (water activity)	Microorganisms are unable to grow without moisture. (See the above Table)	Lower the water activity (Reduce the ratio of free water which microorganisms could use). • Increase salt concentration and sugar content. • Lower moisture content.
pH	Growth of microorganisms is usually active where pH is around 7.0 (neutral).	Lower pH (acidic) or increase pH (alkaline).
Temperature	Microorganisms, in general, grow actively at 20 to 30°C. Extremely high temperature or low temperature kills microorganisms and makes it difficult to grow.	Add heat-treatment. Store or distribute products refrigerated or frozen.



In order to prevent fermentation and putrefaction, it is **important to identify whether the fermentation or putrefaction is caused** by primary contamination arising from materials, etc., secondary contamination by settle plate bacteria, adherent bacteria, etc., or by food properties, **and take measures.**

Precautions when using AGELESS™ for food with the water activity of 0.8 or more

The following precautions are necessary considering the growth of microorganisms.

Establishment of the expiration date	The expiration date is determined by performing a packaging test in order to verify the effectiveness of AGELESS™. Please determine an expiration date with an appropriate margin, considering an expiration date obtained without the use of AGELESS™ as a reference.
High moisture food with the water activity of 0.9 or more	It is important to prevent microorganisms themselves from the manufacturing process. Maintain a clean manufacturing environment.
Food that is stored and distributed at low temperatures	Continue to use the conventional storage and distribution conditions even when used with AGELESS™.
If food ingredients are changed	Particularly if the water activity is increased, perform a confirmation test using AGELESS™. Storage and distribution methods should be reevaluated as well.
If mold appears despite the use of AGELESS™	If mold (particularly colored spots of mold) appears despite the absence of pinholes, reevaluate the gas barrier properties of the packaging materials used.

Sanitary control of food production process

The following sanitary control is required during the production process, regardless of the use of AGELESS™.

1. **When resuming the use of production facilities and equipment idled for an extended period**, perform a thorough cleaning and disinfection.
2. **Do not open the windows of food production and packaging rooms**, even if the room temperature is high.
3. **Vigilance is required in spite of heat-processing**, as some microorganisms are highly resistant to high-temperature conditions. Ensure that heat-treatment has been properly carried out.
If food becomes spoiled or fermented despite having undergone heat-processing, examine the heat resistance of the causative microorganisms.
4. If the causative microorganisms show resistance, examine whether the ingredients are contaminated with those microorganisms and take any necessary measures.
For microorganisms showing no resistance, improve the sanitation control of the cooling and packaging processes performed following the heating process.
5. **High-moisture ingredients should be used within one day** and not saved for the following day. If unavoidable, store them in a refrigerated or frozen state.

Prevention of botulism

Food poisoning caused by Clostridium botulinum bacteria is highly lethal and must be prevented at all costs. With respect to measures against Clostridium botulinum poisoning, in 2003, the Ministry of Health, Labor and Welfare stipulated the following guidelines: "Packaged foods whose pH exceeds 4.6 and at the same time, whose water activity exceeds 0.94 shall be sterilized by heating by performing autoclaved sterilization for 4 minutes at the temperature at cores of 120°C or by a method that has effect equivalent to or higher than this, or shall be stored at temperature not higher than 10°C." When AGELESS™ is applied to foods that fall under this category, adequate attention must be exercised.

Conditions for prevention of botulism

Generally, botulism can be prevented by fulfilling one of the following conditions. However, maintain the strict control of sanitation to guard against unforeseen circumstances.

- No contamination of Clostridium botulinum to ingredients during production and distribution.
- Storage and distribution temperatures of 3°C or lower, at which temperatures Clostridium botulinum cannot grow.
- Heat-disinfection with temperatures of 100°C at the food core for at least 6 hours or at 120°C for at least 4 minutes.
- Food characteristics that do not permit growth of Clostridium botulinum: set a homogeneous state of the water activity of 0.92 or lower (salt concentration ≥ 12%, sugar concentration ≥ 55%) and pH of 4.5 or lower or 9.1 or higher.
- Detoxification of toxins produced by Clostridium botulinum by heating the core of food to 80°C for at least 20 minutes or to 100°C for at least few minutes.

Q1. Can AGELESS™ be used in the frozen condition?

In the case of the freezing temperature of -25°C or lower, any type of AGELESS™ can be used. In this regard, however, the oxygen absorbing speed becomes extremely slow. Use AGELESS™ SS Type to bring the oxygen free condition in a short period (3 to 5 days) under the frozen condition down to -20°C. In the case of other types, there is a method of keeping AGELESS™ at room temperature or refrigerated in half a day after being enclosed, and freezing thereafter. In general, under freezing, the oxygen absorbing speed of AGELESS™ becomes slow but when the temperature returns to room temperature, the oxygen absorbing speed returns to the original speed.

Q2. Can AGELESS™ be used with vacuum packaging?

AGELESS™ be used for low degassed packaging. However, in the case of a strong vacuum ratio, AGELESS™ sticks between the product and packaging film to decrease oxygen absorption, and thus maintain a low degassed state enough to keep the air-flow.

Q3. Can AGELESS™ be used with modified atmosphere packaging?

AGELESS™ can be used along with nitrogen modified atmosphere packaging. However, this combination results in a slow rate of oxygen absorption due to the low initial oxygen concentration. In addition, gas exchange tends to result in an imbalanced exchange rate; therefore, when using AGELESS™ with gas flushing, please use a size of AGELESS™ larger than the calculated size to create the oxygen-free state in the same period as that in using AGELESS™ alone. Carbon dioxide modified atmosphere packaging and mixed carbon dioxide-nitrogen modified atmosphere packaging are not recommended for use with AGELESS™, as carbon dioxide inhibits the oxygen absorption of AGELESS™ (except GT type).

Q4. Can AGELESS™ be used in combination with a desiccant?

Yes, it can. Use AGELESS™ Z-PKC type (ZP type for large-size containers) which is powerful in the dry condition. In this regard, however, contact of AGELESS™ with a desiccant may degrade AGELESS™ performance. Use AGELESS™ with care to avoid contacting. In addition, use packaging materials with high gas barrier capabilities.

Q5. Can AGELESS™ be used with high-temperature sterilization methods?

If AGELESS™ is used with high-moisture products in boiling or retort sterilization, the AGELESS™ may become abnormal (rupture, exudation of the content, stop of oxygen absorption), depending on the food characteristics, packaging form, and heating conditions. Perform a packaging test to judge the adoption of AGELESS™. Oxygen-free film AGELESS OMAC™ is recommended for food with high moisture (see p.15).

Q6. Are the deoxygenation and discoloration rates be affected by the location in which AGELESS™ is placed in the packaging?

Yes. Generally, AGELESS™ eliminates oxygen more quickly when placed directly on the product through which air can flow easily. Even with selfreacting AGELESS™ types, deoxygenation takes longer when placed under the food tray than if placed on the product; therefore, a packaging test should be conducted with AGELESS™ placed at the chosen location under actual conditions.

Q7. When using only a small quantity of AGELESS™ at a time, can the master bag be opened and closed many times?

Repeated opening and closing of the master bag are not desirable, as AGELESS™ results in coming into contact with air repeatedly. In this case, repackage the sachets into smaller sized bags with gas-barrier properties to reduce the frequency of contact with atmosphere.

Q8. We use AGELESS™ for seasonal products. Can we use the remaining AGELESS™ for the next season?

The expiry date depends on the product and the exact expiry date can be found on the product information sheet. This principle applies only to AGELESS™ kept in unopened master bags (see p.23).

Q9. Is AGELESS™ safe even if it is accidentally ingested?

AGELESS™ and AGELESS-EYE™ are not foods and are inedible, but their safety is identified by the acute toxicity test conducted by public institutions. When the content of AGELESS™ is accidentally eaten or cooked together with foods and eaten, no particular treatment is required if no particular abnormal symptoms develop. However, if a small sachet of AGELESS™ or AGELESS-EYE™ is swallowed in whole, the sachet may hurt the esophagus or digestive organs. Get medical advice/attention (see p.28).

Q10. Is this normal that AGELESS™ sometimes heats up during packaging operation?

If the master bag containing self-reacting type AGELESS™ is left open, or if the individual sachets are taken one by one from the master bag, heat generated from the reactions of AGELESS™ may accumulate in the bag, which increases the temperature of the master bag. In use, make sure to spread out the sachets on a tray to avoid decreased performance. The roll and belt types may become hot during use, but this will not affect performance as long as they are used within the specified handling time.

Q11. There was no problem in winter, but food spoilage occurred sooner when it became warmer.

In winter, the air temperature is low and the air is dry; consequently, the ability of microorganisms to propagate is reduced and food can be stored efficiently. However, when the weather is warm, microorganisms grow rapidly and may cause early food spoilage. In general, when AGELESS™ is used with food susceptible to the growth of mold and food spoilage, storage testing in winter alone is not sufficient. In seasons with higher temperatures, perform again storage testing with the actual packaging to reselect the type and size of AGELESS™ and set the expiration date accordingly.

Q12. When AGELESS™ is used, products seem to be dried. Is this because AGELESS™ absorbs the moisture in the foods?

AGELESS™ is not a desiccant. Self-reacting AGELESS™ contains the moisture in itself and does not absorb the moisture of the product. Waterdependent AGELESS™ utilizes the moisture in the atmosphere for reactions, which are not enough to affect the food composition.

Q13. As the appropriate size AGELESS™ causes excessive shrinkage of the product, it is possible to reduce the size of AGELESS™?

Using a smaller size of AGELESS™ than the appropriate one may delay the time for reaching the oxygen-free state or cause remaining oxygen in the container, resulting in insufficient performance of AGELESS™. Measures against product shrinkage include use of a little bit larger bag, sealing of the bag to leave a slightly larger amount of air in the bag, and use of combination with nitrogen modified atmosphere packaging.

Q14. The AGELESS™ packed food bag gradually swells within the best-before date.

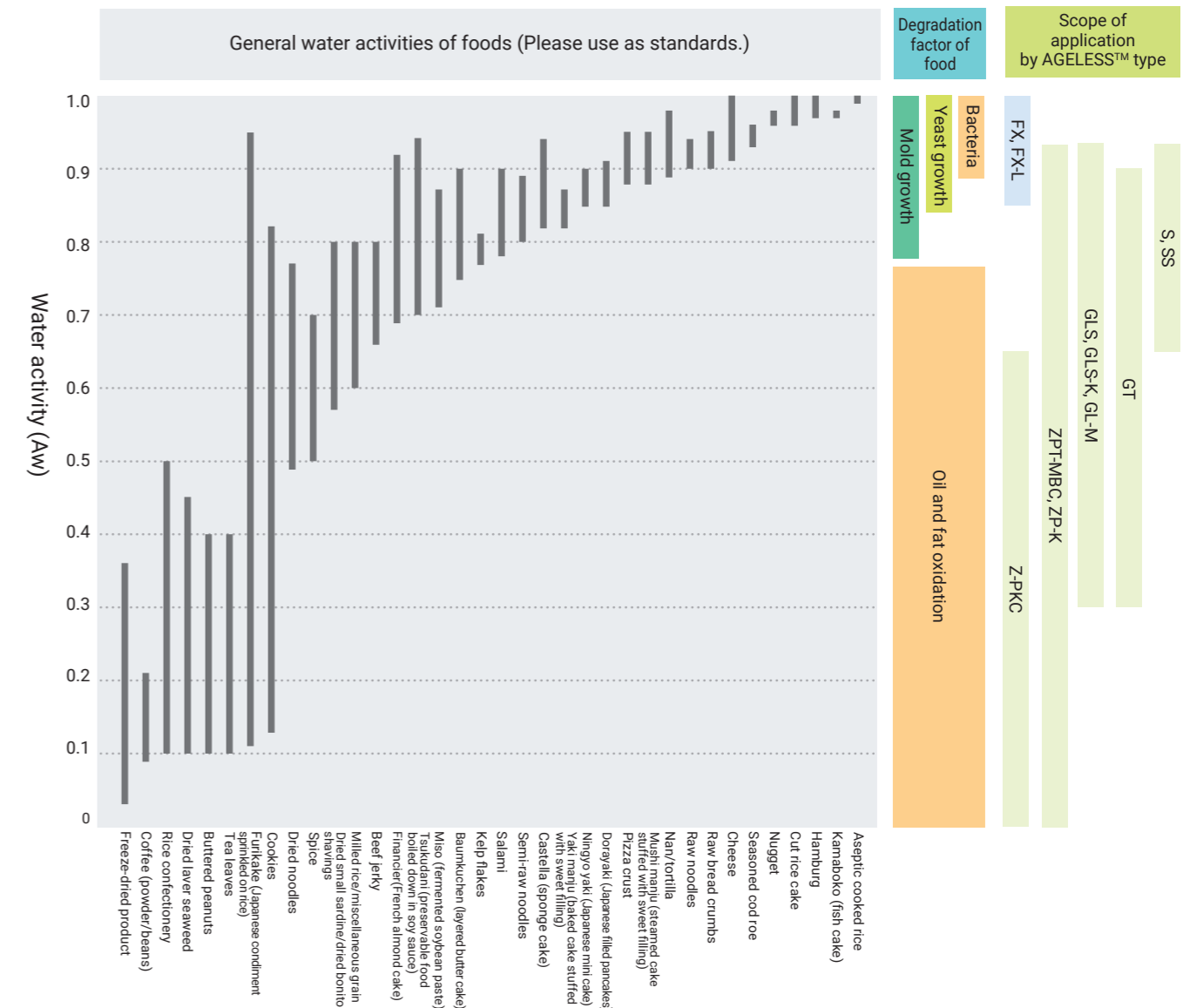
This may be attributed to carbon dioxide generated by food fermentation. Fermentation occurs by yeasts that can proliferate even under an oxygen-free state and cannot be prevented by AGELESS™ (see p.29).

The meanings of the terms used in this instruction manual are as follows.

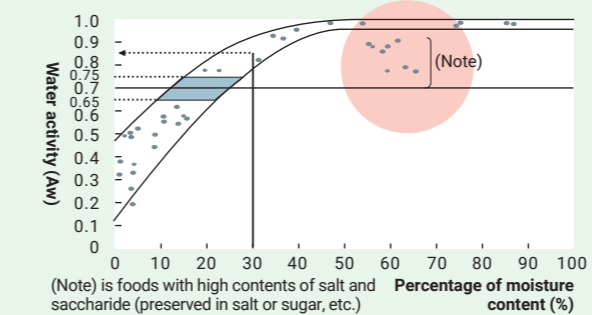
Oxygen-free state	A condition of maintaining an oxygen concentration of 0.1% or less due to the absorption of oxygen in the package by oxygen absorber AGELESS™. This is realized through continuous absorption by AGELESS™ of even a small amount of oxygen penetrating through packaging material.
Size of AGELESS™	A number indicating a nominal oxygen absorption capacity under specified conditions expressed with unit of mL, which serves a standard for selecting the AGELESS™ with appropriate nominal oxygen absorption capacity based on the amount of oxygen in the packaging. For example, if 500 mL of air is contained in packaging, the amount of oxygen included therein is approximately 100 mL, and thus AGELESS™ size 100 is selected. In the case of nitrogen modified atmosphere packaging, the exchange rate should be taken into consideration. Note that the size of E-type AGELESS™ represents the carbon dioxide absorption capacity.
Nominal oxygen absorption capacity	An amount of oxygen expressed as a size of AGELESS™. AGELESS™ can absorb this amount of oxygen in the specified number of days.
Deoxygenation time (days)	Standard number of days needed to attain an oxygen-free state. Standard number of days needed to absorb the amount of oxygen absorption indicated in a size under the specified conditions. For example, the size 100 is the number of days necessary to absorb 100 mL of oxygen. In actual packaging, the number of days depends on the conditions when actual packaging, including the position of placing AGELESS™ and the products contained in packaging.
Water Activity (Aw)	Moisture in food consists of “bound water,” which is combined with food constituents and “free water,” which is not bounded and available for microorganisms. Water activity is a standard indicating the content of free water. The higher water activity, the more likely microorganisms are to grow, therefore the preservability of the food with high water activity is decreased. Water activity is indicated in a figure between 0 and 1, e.g., water activity of food not containing moisture is 0 and pure water is 1. Correlation between water activity and moisture content is strong, but the water activities of foods with the same moisture content vary according to the contents of salt and saccharide. Especially, addition of salt is effective in lowering water activity. When the water activity of a certain food is Aw, and the (equilibrium) relative humidity in the space where the food is sealed is RH (%), $Aw = RH \div 100$. Water activity also serves an important value in selecting a type of AGELESS™.
Water activity to be applied (Aw)	The scope of the water activities that serve a standard in selecting a type of AGELESS™.
AGELESS™ Pack	Packaging whose inside is kept in an oxygen-free state using AGELESS™.
Material with high gas barrier properties	Materials that hardly allow oxygen or steam to pass through, including film. Polyethylene and polypropylene films are not available for oxygen-free packaging since they easily allow oxygen to pass through.
Master bag	A bag containing AGELESS™ sachets in shipment. Materials with high gas-barrier properties or unlikely to cause pinholes are selected in order to keep the quality. A master bag can also be used when keeping partially used AGELESS™.
Handling time	Standard time for which AGELESS™ can be left exposed to the air after a master bag of AGELESS™ is opened. The handling time depends on loose and roll forms and types of AGELESS™. See p.9 for details.
Water resistance/oil resistance	The sachets of AGELESS™ with this indication are made from materials with water resistance and oil resistance. When using AGELESS™ in direct contact with products with high moisture or oil content, select a type with water or oil resistance. Be sure to conduct a packaging test since water/oil resistance is limited.
Acid resistance	AGELESS™ with this indication can be used for acid products. Be sure to conduct a packaging test since acid resistance is limited.
Continuous rolls	AGELESS™ for automatic feeders. The roll type “R” is sachets which are rolled around a paper core, and the belt type “B” is sachets which are zigzag folded.
Loose form	AGELESS™ separated into individual sachets, which can be used manually as they are.
Packaging test	A test of the applications packaged with AGELESS™ Pack in the condition of actual distribution.

It is important to select AGELESS™ according to the water activities in order to prevent the deterioration and alteration of food.

Water activities of foods and scope of application by AGELESS™ type

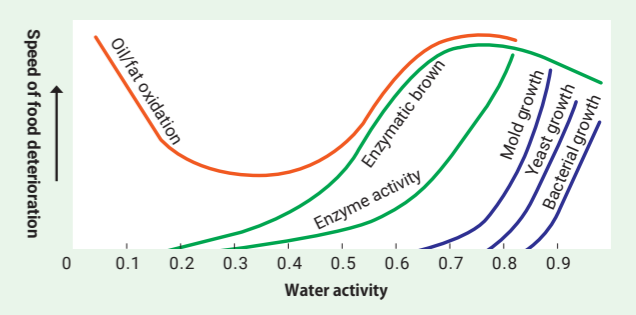


Relationship between water activity and moisture content



Water Activity has strong correlation with the percentage of moisture content and varies depending on the contents of salt and saccharide even for the same food. Especially, **addition of salt is effective in lowering water activity.**

Water activity and food stability



It is shown that food tends to become unstable in the range with high water activity. Excessively low water activity tends to accelerate oil/fat oxidation.

The following related instruments and products are for conveniently using AGELESS™.

* These instruments and products are out of the range of our ISO9001 Quality Management Systems.

Storage of the remaining rolls

AGELESS™ KEEPING BAG

With triple zipper, a vacuum cleaner can be used to remove air easily.



Quantity:
10 bags, 2 clips, and 1 slider.

See p. 26 for how to use.

Check seal failure easily

AGELESS™ SEAL CHECK

Completely sealed clean stainless drum with Allows for transportation of oxygen-free storage and transportation of raw materials and intermediates.



Check seal failure easily

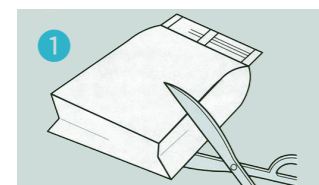
AGELESS™ SEAL CHECK

Check sealing of film and bag-making failure. One-touch spray type; instantly obtain the results.

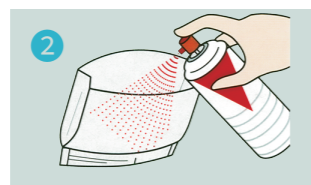


Size:
φ52 mm × H 174 mm
NET: 170 g (154 mL)
Component:
Class III Petroleum
Danger Class III Use of
LPG
Combustible
Minimum lot:
1 box (6 cans)

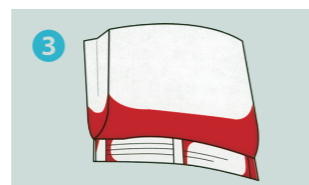
How to check the sealing portion.



1 Cut near center of the master bag.

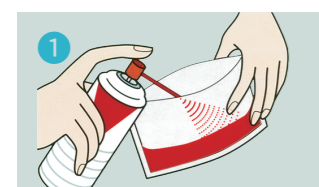


2 Spray the sealing portion (bagmaking portion) from inside.

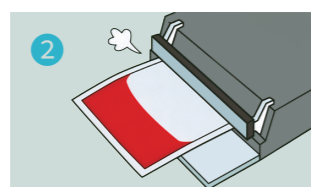


3 Check leakage of liquid from the sealing portion.

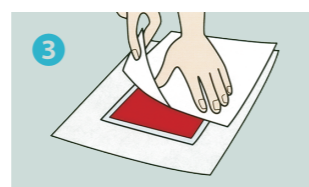
How to check pinholes



1 Spray the more liquid.



2 Seal it.



3 Press the top and bottom of the film with a piece of tissue to check whether the paper gets color or not.

Use of a longer nozzle allows for easy spraying easily without dirtying hands.



Note Be careful not to spray it to human body or clothing, because the spray contains dye. Do not put it close to fire. Do not place it in a place at 40°C or higher, avoiding direct sunlight. AGELESS™ Seal check is required to issue the SDS. Please submit the SDS through the commercial distribution before use.

Insertion of AGELESS™ to an automatic packaging machine

AGELESS™ AUTOMATIC FEEDER

Separates the sachets of AGELESS™ roll form from the roll one by one (or by the specified number) and feeds them. The AGELESS™ automatic feeder can be used in combination with various automatic packaging machines according to its specification. It allows for labor and manpower saving.



Stick AGELESS™ within the packaging

AGELESS™ AUTOMATIC ADHESIVE MACHINE

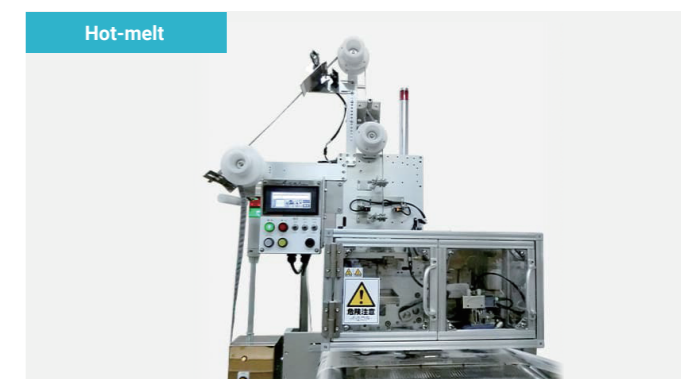
Double-sided tape

Sticks the double-sided tape on AGELESS™ roll form, separates the sachets one by one, and Sticks it on a tray.



Hot-melt adhesive

Puts hot-melt on the packaging film, places the cut AGELESS™ sachet, and fix it.



Allows for preventing AGELESS™ from entering into food or accidentally eating AGELESS™.



Merit 1 Perfect support system through the network all over the world



Because there are many types, I do not know which oxygen absorber should be use.....



I need AGELESS™ by next week..., what should I do?



The feeder of AGELESS™ is in a bad condition, but where should I contact...?

We support our customers through the worldwide distribution network.



We respond to our customers' requests with the safe distribution and stock system.



AGELESS™ can solve all problems and worries about oxygen absorbers.

We also provide a sufficient line-up of related instruments. Please consult us about the use of oxygen absorbers.



Merit 2 Compliant with overseas regulations

We have AGELESS™ which compliant with following customs and regulations.

1. FDA 21CFR*1, Registered for DMF
2. EU Directive*2
3. HALAL (Central Islamic Committee of Thailand, CICOT)

*1. The U.S. Food and Drug Administration (FDA) regulates packaging materials that come in contact with food and drugs under Title 21 of the Code of Federal Regulations (CFR). Exporters of food and pharmaceutical products to the U.S. must use packaging materials that conform to these regulations. AGELESS™ complies with this regulation.

*2. In the EU, materials and products that come into contact with food products are required to meet various regulations, including manufacturing regulations and quality control regulations, and a declaration stating compliance with the applicable regulations must accompany the materials and products.

Please kindly contact with us which AGELESS™ is following these customs and regulations.



Merit3 Two large production bases



MGC AGELESS Shirakawa Plant

- Established April 2017
- Address 1-8 Toyochi Yanaigoya, Shirakawa City, Fukushima, 961-0005, Japan
- Obtained ISO9001 and FSSC22000



AGELESS (THAILAND) CO., LTD.

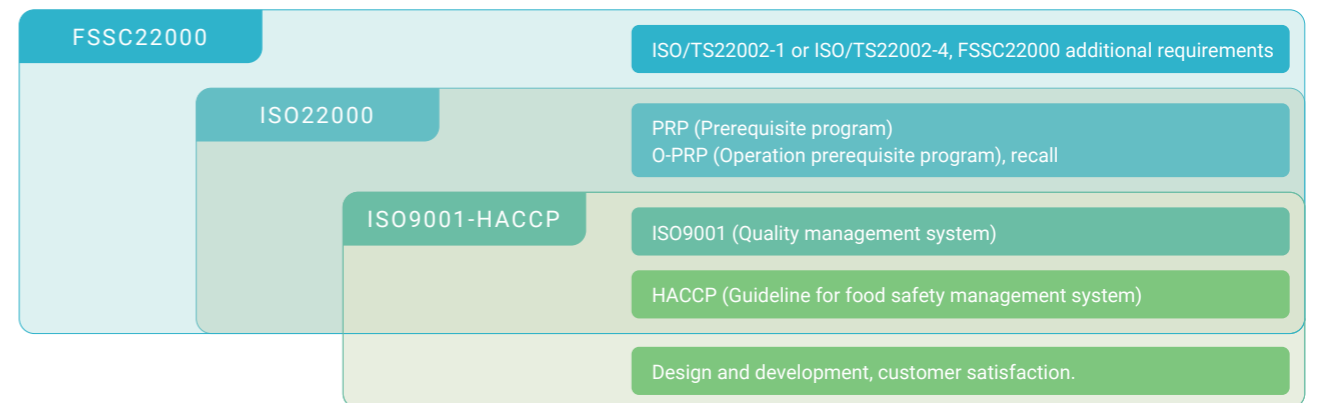
- Established March 2002
- Address Amata City Chonburi Industrial Estate, 700/323 Moo 6, Tumbol Don Hua Lor, Muang Chonburi District, Chonburi 20000, THAILAND
- Obtained ISO9001 and FSSC22000



Introduction of business operations of the AGELESS Service Center

- Selection of AGELESS™
- Property analysis of products of customers (water activity, N2 exchange rate, etc.)
- Storage tests of products
- Analysis of troubles of products and proposal of measures
- Study meetings about AGELESS™ and measures for microorganisms.

Merit4 We have obtained the international certifications



FSSC22000 is based on HACCP. As a manufacturer of oxygen absorbers for food packaging materials and a company participating in the food industry, we have realized that it is extremely important to ensure quality and safety, and have obtained the certifications in order to earn the trust of our customers. We are willing to provide our customers with safety and security by the thorough quality control in the future.

