

'TORAY'

Innovation by Chemistry

Functional webs for packaging



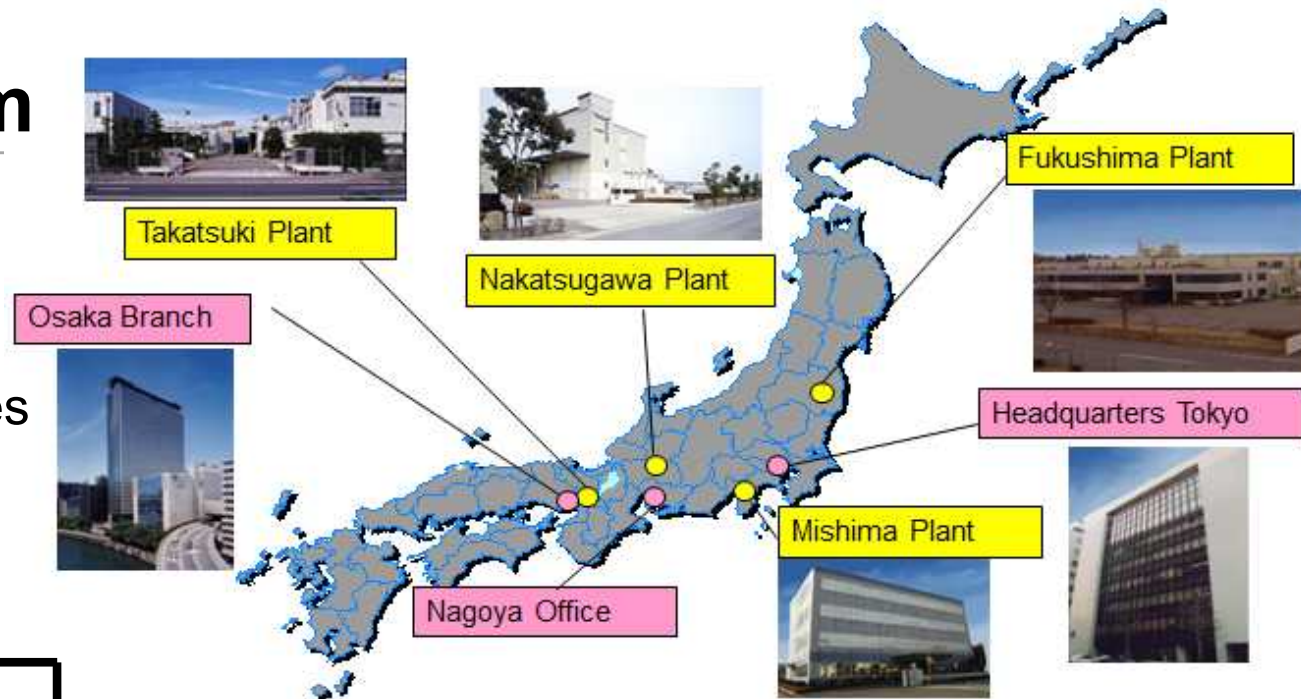
Toray Advanced Film, Co., Ltd.

www.toray-taf.co.jp/



Toray Advanced Film

- Established : July. 2004
- Head office : Tokyo
- Major shareholder : Toray Industries
- Employees : 760



Toyo Metallizing

Advanced processing technology
(Metalizing, Coating)

Toray Plastic Film

Non-oriented polyolefin films (PP, PE)

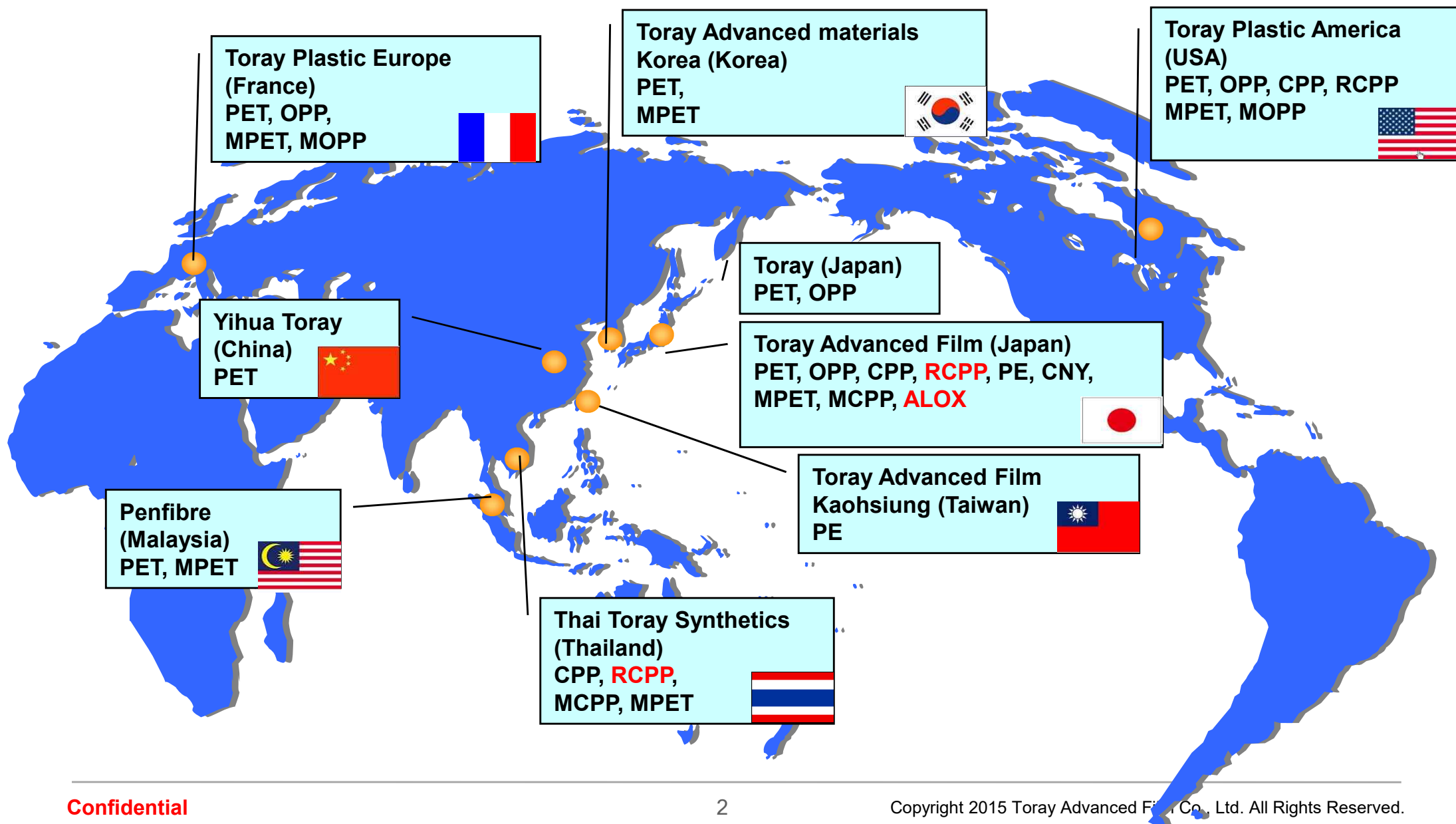
Toray Packaging Sales Dept.

Oriented films (PET, OPP) for packaging.

Toray Advanced Film
“TAF”
(July. 2004)

**TAF was established for the expansion of film processing
& high performance film business of Toray-group.**

The global operation of Toray group about film



Products Line-up of TAF

Oriented Film...for Printing

PET “Lumirror” ...Metalization, Lamination
OPP “TORAYFAN BO”

Non Oriented Film...for Sealant

CPP “TORAYFAN NO” ...Retort, Lamination
CPP/PE “CF FILM” ...Easy Peel for Lid stock
CNY “RAYFAN NO”

Competitive items
for retort

Barrier Film...for Oxygen, Moisture Barrier

Aluminum Metalization ...MPET, MCPP, MOPP, MONY
ALOX Coated “BARRIALOX” ...ALOX-PET

What is TAF doing for export ?

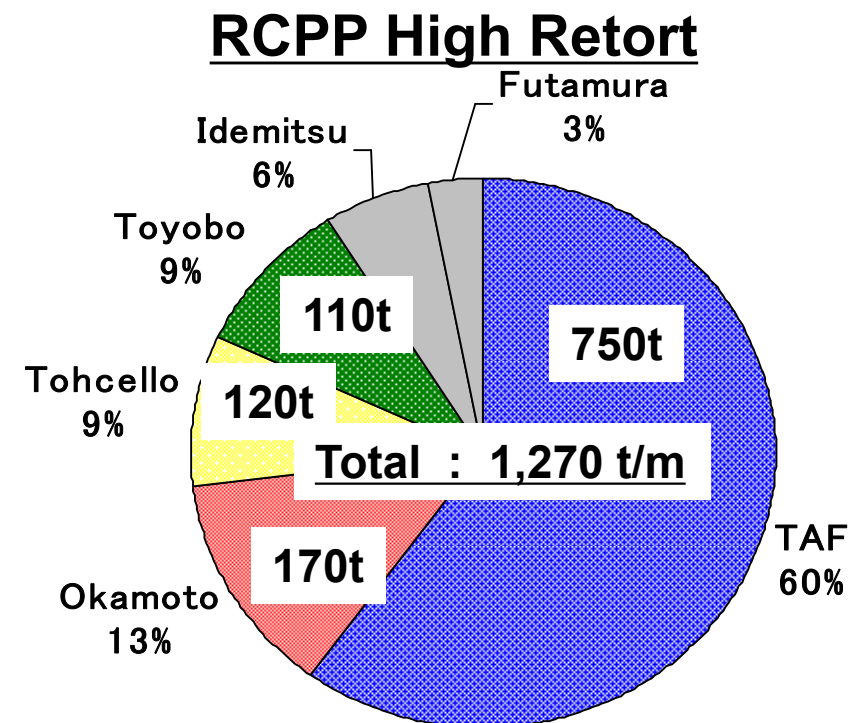
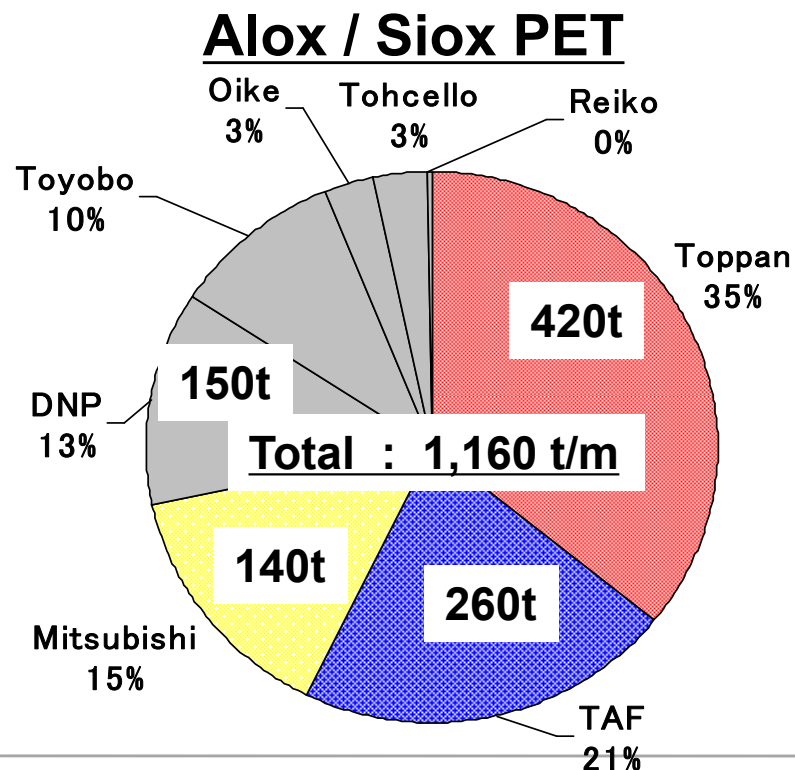
Japan is highly advanced market and technology leader in retort / high barrier.

TAF offers the following products for packaging abroad :

- ALOX coated PET films (“BARRIALOX”)
- Retort CPP films (ZK series)

Market share in Japan

Reference :
Packaging materials share dictionary (JCER)



Functional webs for packaging

POUCHES

Food Applications
Sealant or Clear High-Barrier Webs



ALOX Coated PET films for High Barrier

“BARRIALOX”--- 12mic(48G)

Clear aluminum oxide-coated PET films deliver high barrier performance before and after retort flexing.

O₂TR : 0.1~1.5cc/m²/day

WVTR : 0.3~1.5g/m²/day



Retort CPP films for Pouches

“TORAYFAN NO”--- 50~100mic(200~400G)

High-performance sealant films deliver exceptional quality under aggressive retort sterilization conditions.



Retort foods & pouch

- **Retort foods** : Foods sterilized at more than 100'C(212F) and available to distribute at normal temp.
- **Retort condition** : It's designed by contents, shelf life, package barrier etc.
 - 115~120'C (239~248F) **Semi Retort**
 - 121~135'C (250~275F) **High Retort**

- 1) Heat Seal strength : More than 2.3kg/15mm (JAS standard)
- 2) Heat resist. : 135'C(275F)
- 3) Burst resist. : Less burst pouch in actual use
- 4) Blocking resist. : Opening pouch smoothly
- 5) Smell, Taste : Less plastic smell
- 6) Barrier : AL foil, Clear barrier etc.
- 7) Hygiene : FDA, EU directive etc.



Toray's items

Pouch structure	Outer side	Middle 1	Middle 2	Inner side
AL foil	PET	ONY	AL foil	RCPP
	Printing	Toughness	Barrier	Heat Seal
Clear barrier	ALOX PET	ONY		RCPP
	Barrier, Printing	Toughness		Heat Seal

➡ **“BARRIALOX”**

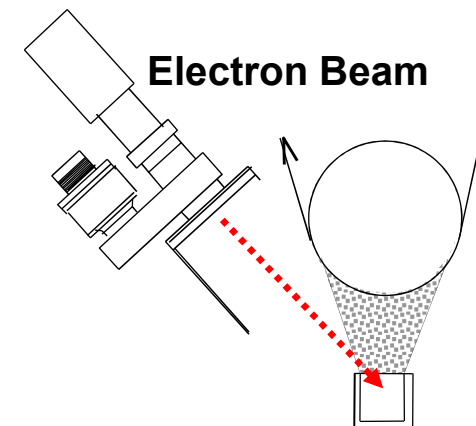
ALOX coated PET films

- ➡ **VM-PET1011HG, 1031HG**
- ➡ **VM-PET1011HG-CA**
- ➡ **VM-PET1011HG-CX, CR**
- ➡ **VM-PET1011EG-C1**
- ➡ **VM-PET1011SB-R2**

Toray Advanced Film, Co., Ltd.

“BARRIALOX” Introduction

- ➔ **ALOX coated PET film**
by PVD (Physical Vapor Deposition) metalizer.
- ➔ **Stable quality even under temperature and humidity change.**
- ➔ **Suitable for use in microwave.**
- ➔ **Available for metal detector.**
- ➔ **No chlorine based gas evaporates during incineration.**



“BARRIALOX” Line-Up

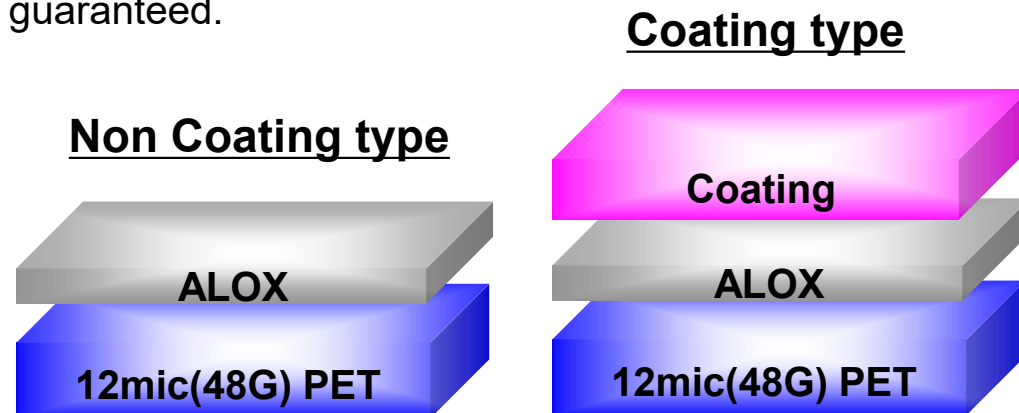
Grade		Application	Printing	O2TR		WVTR		FDA 21CFR § 177.1630	EU Directive 10/2011/EC
				(cc/m ² ·day)	(cc/100in.2 ·day)	(g/m ² ·day)	(g/100in.2 ·day)		
Non Coating	1011HG	Dry / Retort	N/A	1.5	0.10	1.5	0.10	Complies	Complies
	1031HG	Dry / Retort		1.5	0.10	1.5	0.10		
Coating	1011HG-CA	Dry	Best	0.6	0.04	1.0	0.06	Complies	N/A
	1011HG-CX	Retort		1.5	0.10	1.5	0.10	Complies	N/A
	1011HG-CR	Retort		1.5	0.10	1.5	0.10	N/A	Complies
	1011EG-C1	Dry		0.2	0.01	0.3	0.02	Complies	N/A
	1011SB-R2	Retort		0.1	0.01	0.3	0.02	Complies	Complies

* 1031HG···Treated corona on PET side (= non ALOX side)

* The data is actual value in our internal testing, not guaranteed.

* O2TR : 23°C (73F), 90%RH

WVTR : 40°C (104F), 90%RH



Remarks

Standard Width : 500mm ~ 1200mm other width to be discussed
Standard Length : 4000m, 6000m, 8000m other length to be discussed
Standard Core : 3 in, 6 in

Your company shall evaluate the film by means of sufficient running test per set of process conditions (printing, lamination, sealing, filling, sterilization, storage, logistics etc.) in order to make sure that technical property of the film is sufficient for your use. In case such process conditions change, your company shall proceed to new evaluation.

Ink selection : Solvent base
Two components curing
With silane coupling agent
(Please carefully evaluate an affinity with each ink color)

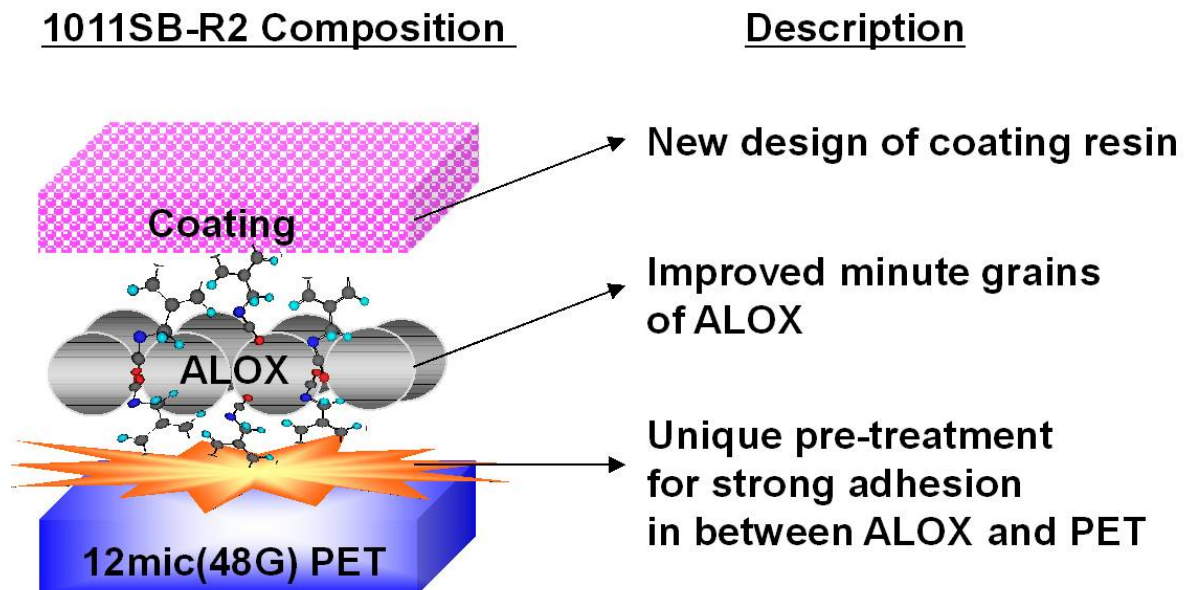
Adhesive selection : Polyester Polyurethane or Polyester, Solvent base
Two components curing
With silane coupling agent
(Please carefully select an appropriate grade and coating weight in the case of retort)

ALOX coated PET film
“BARRIALOX” 1011SB-R2
For High Barrier Retort

Toray Advanced Film, Co., Ltd.

1011SB-R2 Introduction

- **Retortable clear barrier film**
Microwaveable, useable with metal detector
- **Retains excellent barrier after retort treatment**
good for high-acid content
- **Metalized layer is protected with top coat,**
printing process does not cause barrier damage



1011SB-R2 outline of development

Retort high barrier : a leap forward from previous grade to 1011SB-R2

1011SB-R2 was developed to improve the performance in barrier and printability by innovative metalization technique in conjunction with new coating recipe.

1. Barrier Performance

Wide range of applications from dry to boil/retort by improving the initial barrier property

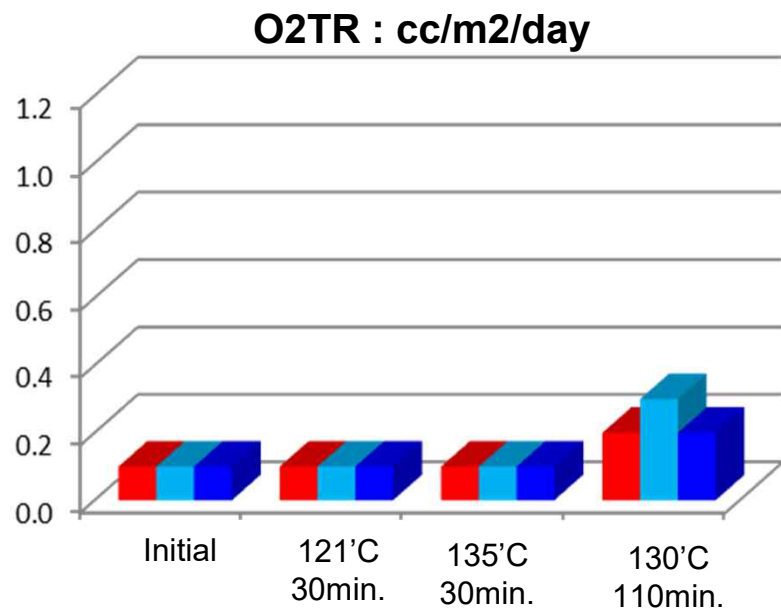
2. Retort durability

Succeeded in preventing degradation of barrier property caused by retort sterilization process. At the same time, barrier property is maintained against high acid contents, thanks to its anti-acid property.

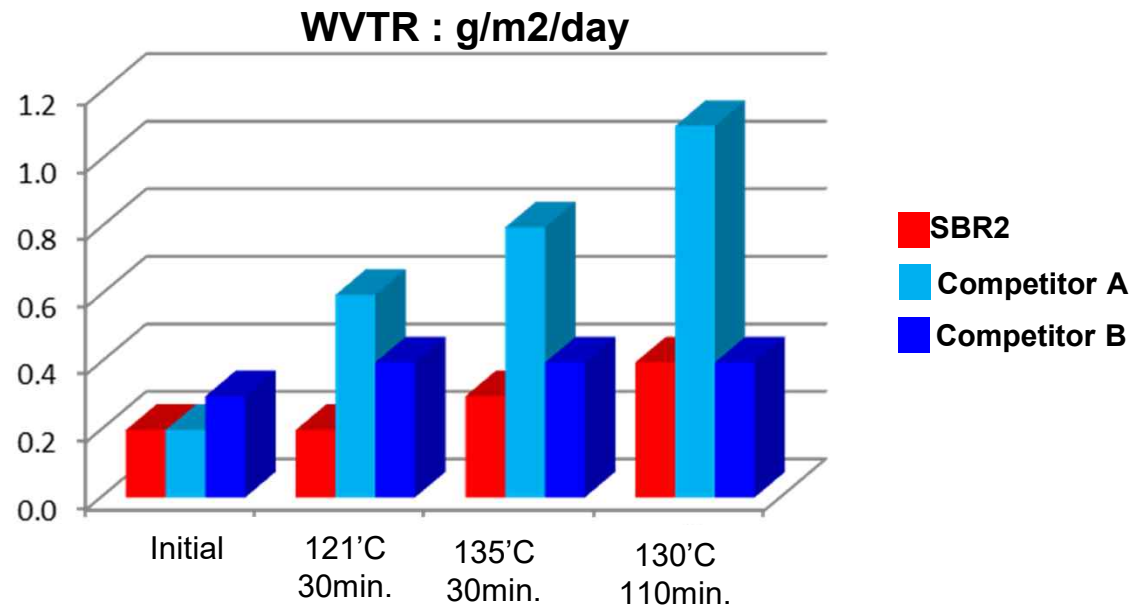
3. Printability

Succeeded in improving wetting tension of top coating surface, leading to excellent appearance in fine-pattern printing.

Barrier performance after retort



	Initial	121'C 30min.	135'C 30min.	130'C 110min.
SBR2	0.1	0.1	0.1	0.2
A	0.1	0.1	0.1	0.3
B	0.1	0.1	0.1	0.2



	Initial	121'C 30min.	135'C 30min.	130'C 110min.
SBR2	0.2	0.2	0.3	0.4
A	0.2	0.6	0.8	1.1
B	0.3	0.4	0.4	0.4

【Physical Conditions】

Structure : Barrier film / ONY(15mic) / RCPP(60mic)

Adhesive : Polyester type

Pouch : 4-side-seal (150mm x 150mm)

Retort sterilization : Hot water retaining,

Content : water

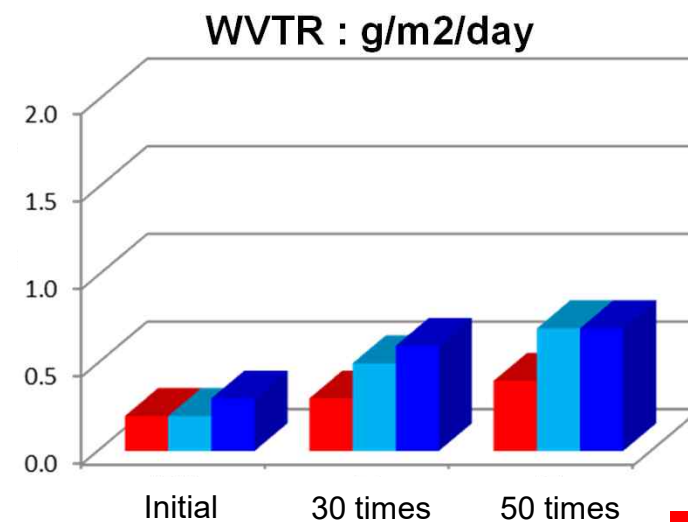
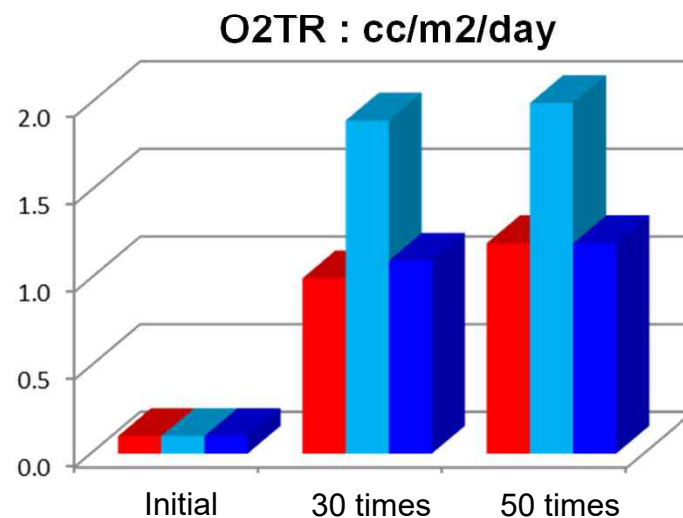
O2TR : 23'C x 90%RH

WVTR : 40'C x 90%RH

Barrier damage by flexing

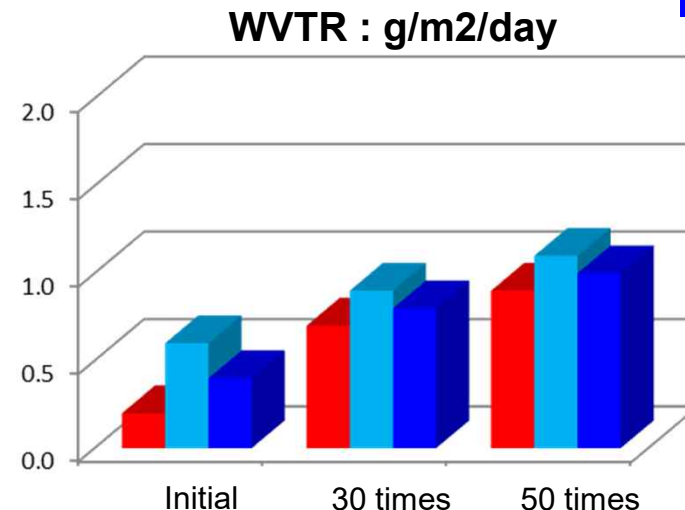
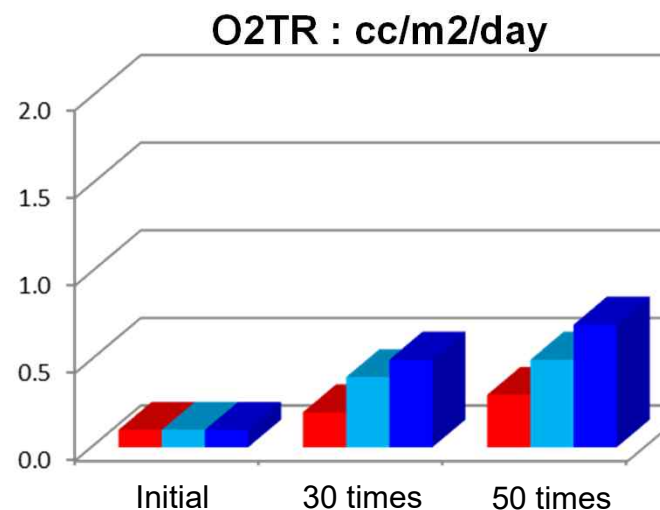
SBR2 is designed to minimize damage by flexing, thus retaining the barrier even after retort process.

A. Gelbo Flex



■ SBR2
■ Competitor A
■ Competitor B

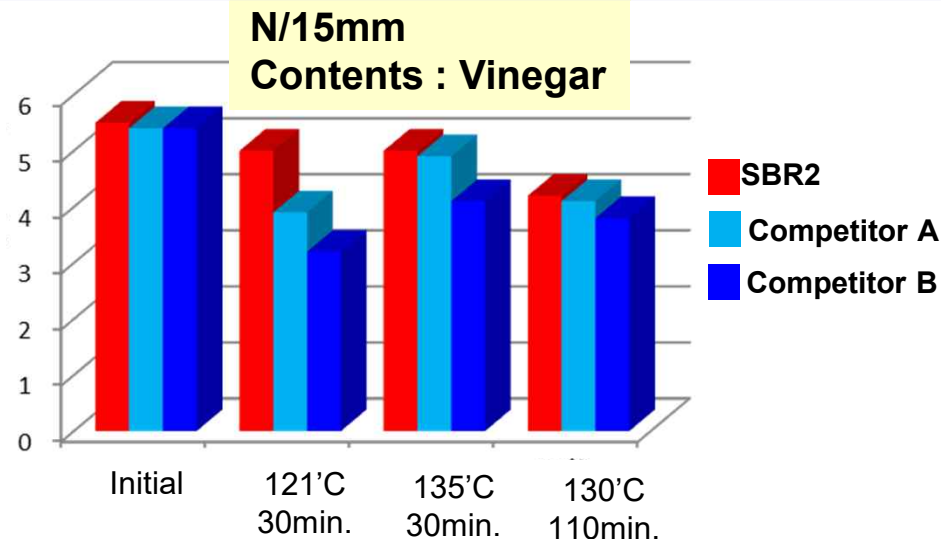
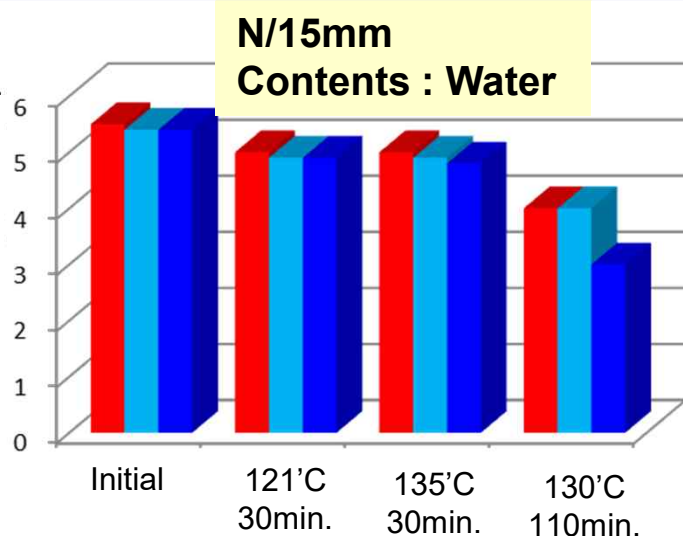
B. Retort (121'C x 30min.) => Gelbo Flex



Bonding strength (laminates structures, high-acid)

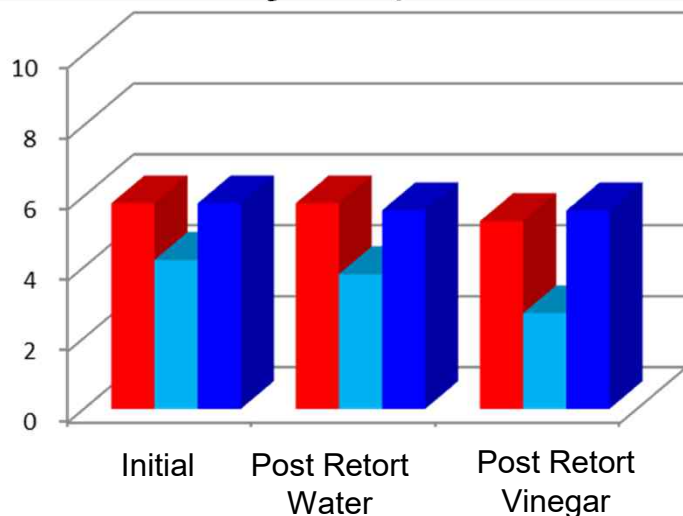
Our proprietary technology offer s stable bonding against high –acid content in various laminate structures.

A. CPP 3 layers

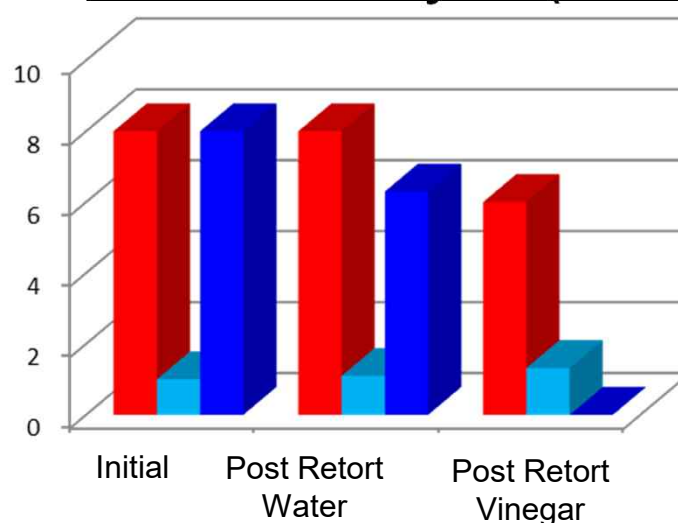


【Test condition】
Condition : WET
Angle : 180° peeling
Speed : 50mm/m

B. CPP 2 layers (121°C x 30min)



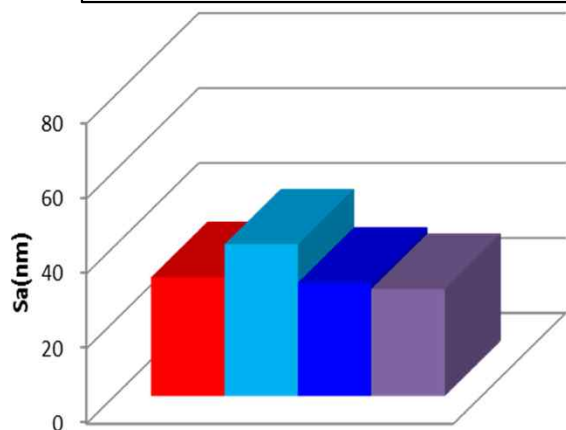
C. LLDPE 2 layers (95°C x 60min)



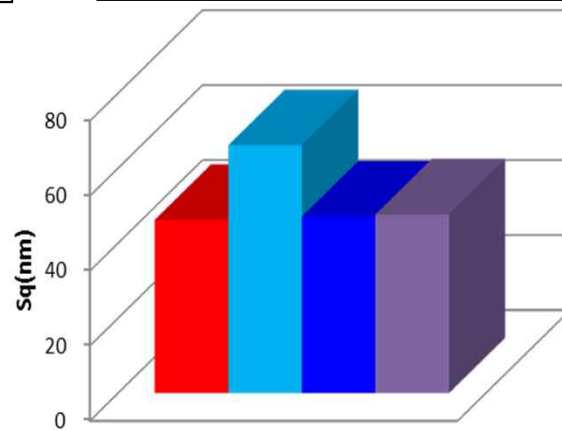
Printability

SBR2 top coat has a similar level of flatness and wetting property as a corona-treated side of a PET film. It is designed to prevent printing troubles like shedding, smudging, dot-skipping.

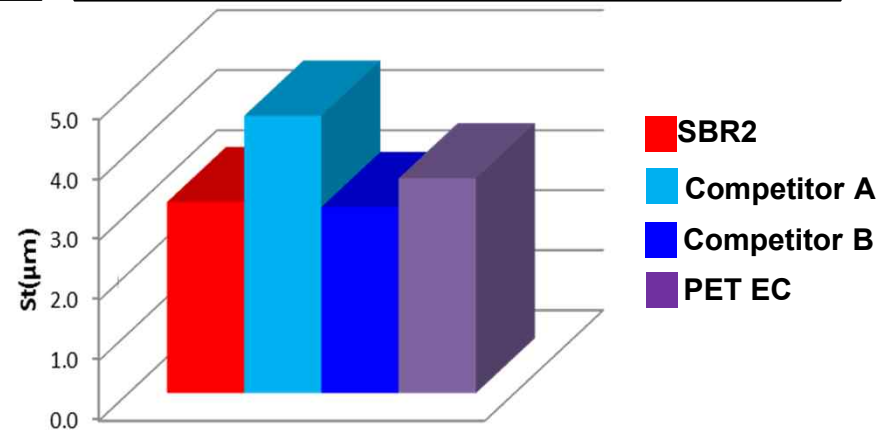
Sa : Arithmetic mean height



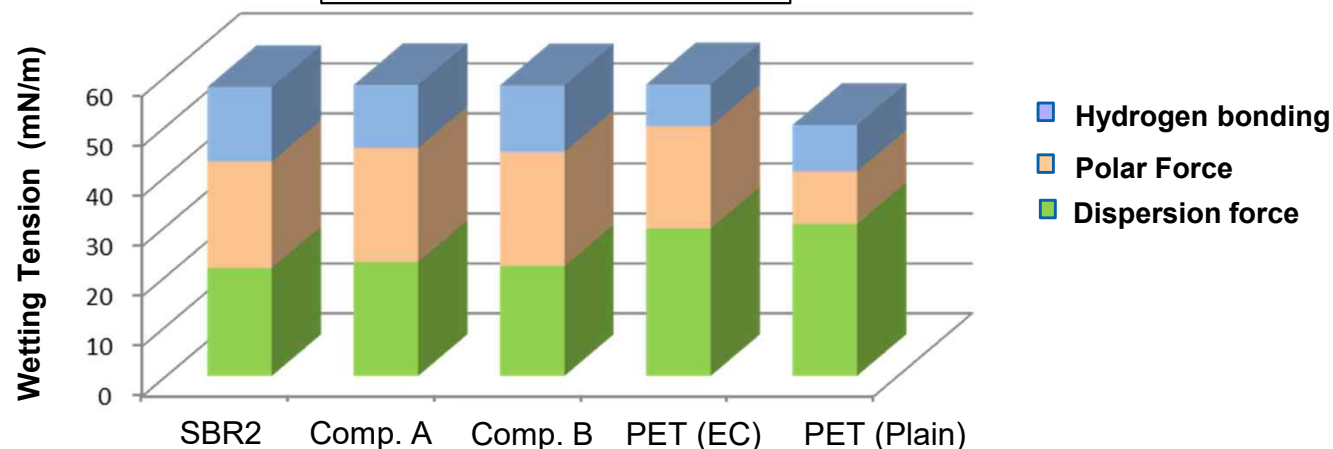
Sq : Root mean squared height



St : Maximum height of the roughness profile



Wetting tension mN/m



Typical Applications

- curry sauce
- pasta sauce
- wet pet food
- beans / bean paste
- bamboo chutes
- pickles
- cup desert lidding
- microwaveable tray rice

Three-side-seal or stand-up pouch

Lidding applications

SBR2 – Alox – Coat // **ink** // **adhesive** // ONY // **adhesive** // RCPP

Ink

- solvent-base
- two-component curing
- silan coupling agent

Adhesive

- solvent-base
- polyester-urethane or polyester type
- two-component curing
- silan coupling agent
- aromatic or aliphatic type depending on applications and regulations
- curing : 35 to 45 deg. C for 5 to 7 days

* Please consult manufacturers of ink and adhesives for specific grade and its use etc.

➡ Retort CPP Film “ZK”

“Torayfan NO” for High Retort

- ➡ ZK207
- ➡ ZK500
- ➡ ZK99S
- ➡ ZK100

Toray Advanced Film, Co., Ltd.

“ZK” Line-Up

Well Balance with Burst Resist.

ZK207

(50-100mic) (200-400G)



High Heat Seal Strength

ZK99S

(50-100mic) (200-400G)



Clear

ZK100

(50-100mic) (200-400G)



High Burst Resist.

ZK500

(50-100mic) (200~400G)



*Depending on various requirements,
you can select a suitable RCPP film for your application.*

“ZK” Line-Up

(Good)1~5(Poor)	HS strength	Burst resist.	Clarity			Creasing	Orange peel	
1	ZK99S	ZK500	ZK100			ZK100	ZK500	ZK100
2	ZK207	ZK207				ZK500		
3	ZK100	ZK100	ZK207	ZK500	ZK99S	ZK207	ZK207	
4	ZK500	ZK99S				ZK99S	ZK99S	
5								

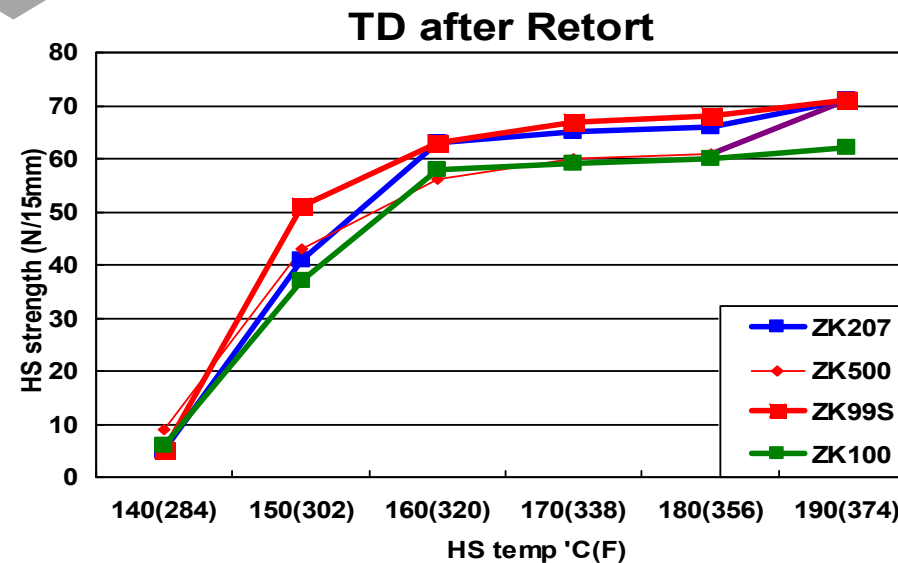
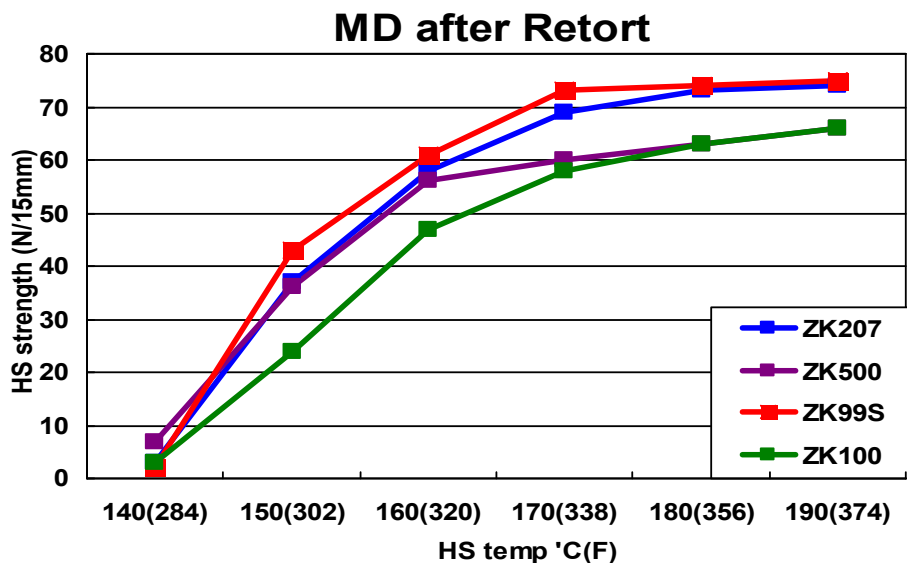
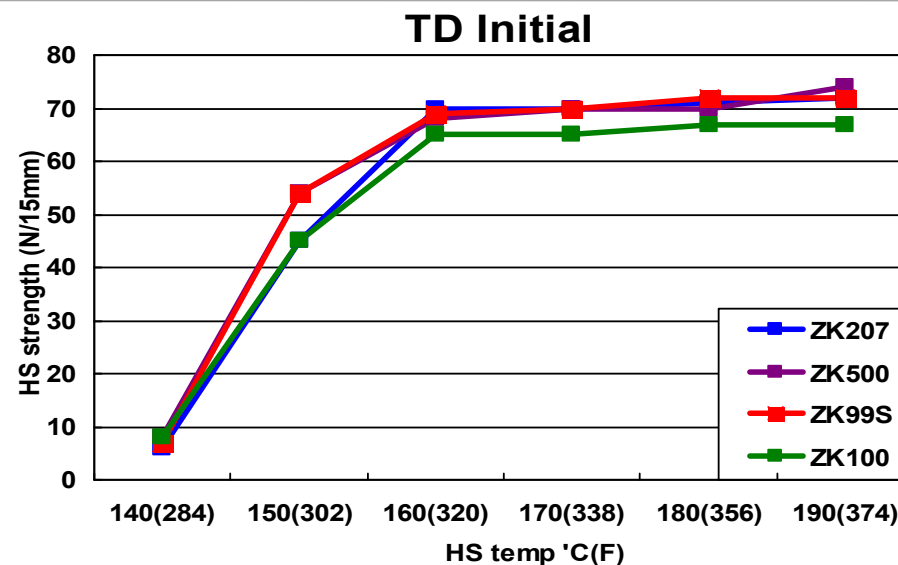
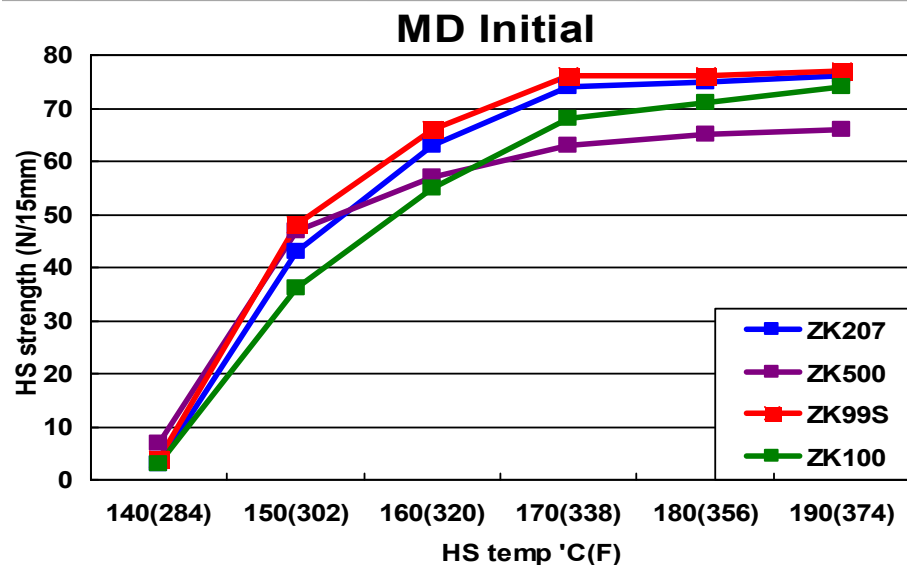
	HS strength	Burst resist.	Clarity	Creasing	Orange peel	FDA 21CFR § 177.1520	EU Directive 10/2011/EC
ZK207	Best		Good			Complies	
ZK500	Good	Excellent	Good	Best			
ZK99S	Best	Good					
ZK100	Good		Best				

Heat Seal strength

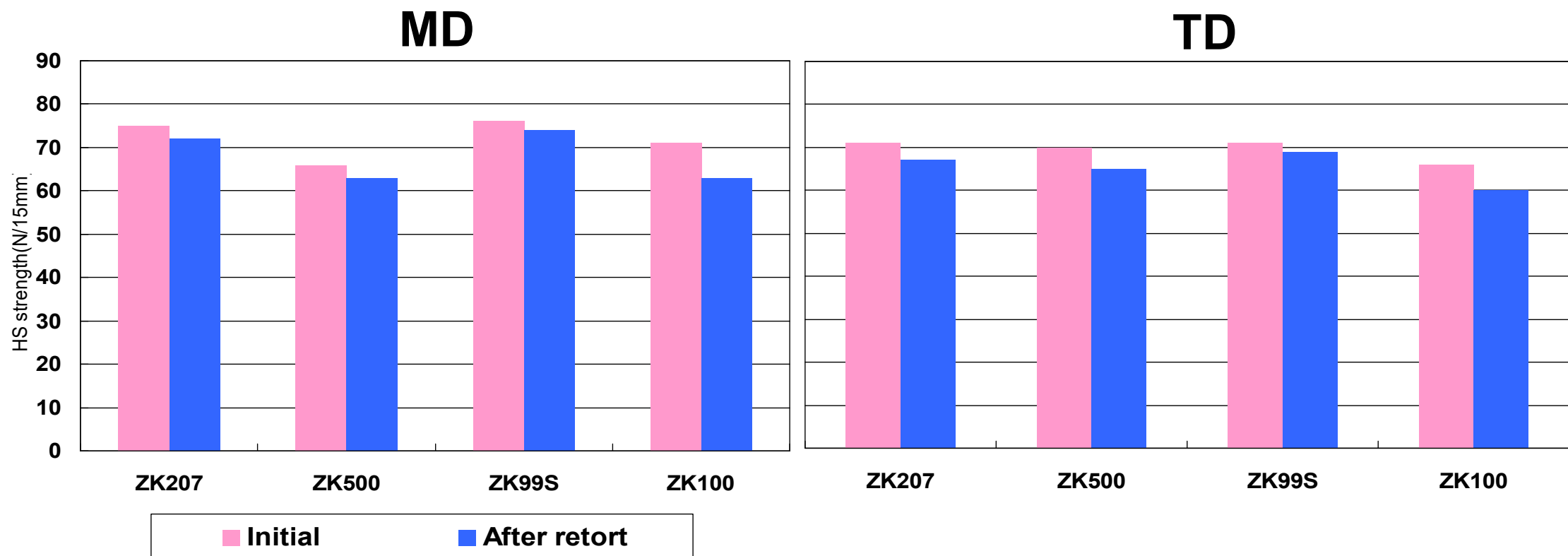
RCP 70mic(280G) base

Both side heating, HS time : 1sec, HS pressure : 2kg/cm², T type peeling

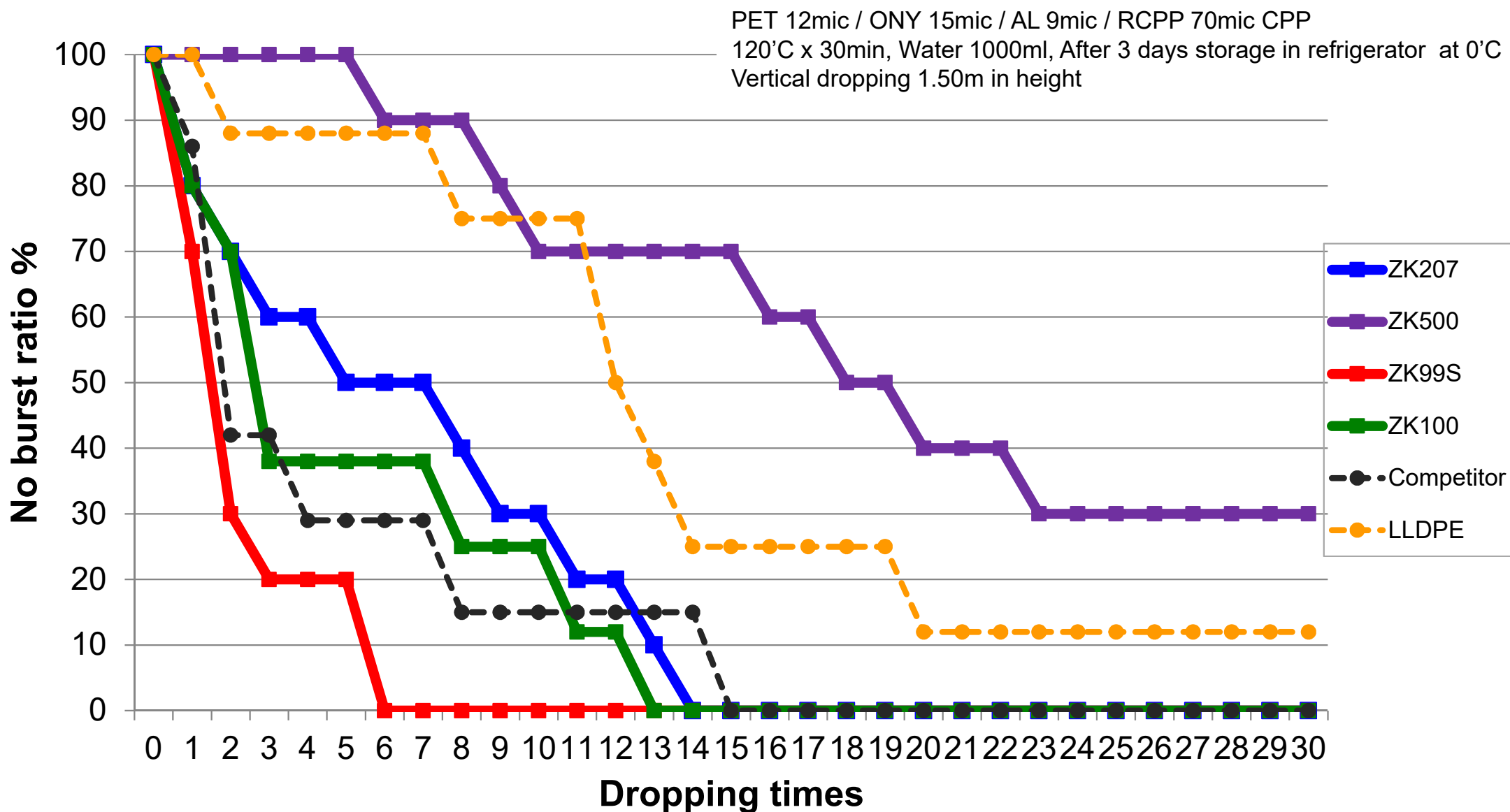
Retort condition : 130'C(266F) × 30min



Heat Seal strength after retort

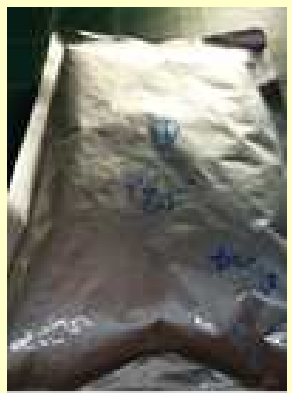
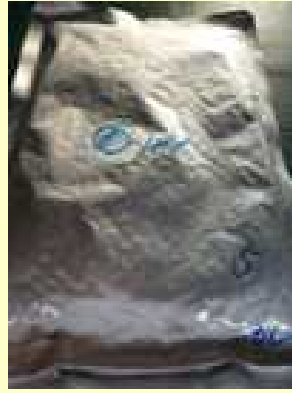
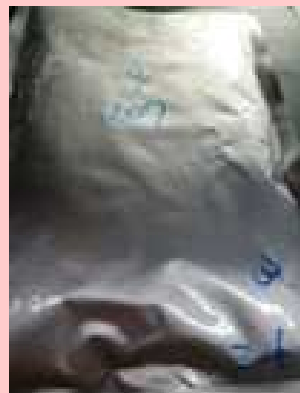


Forced burst test

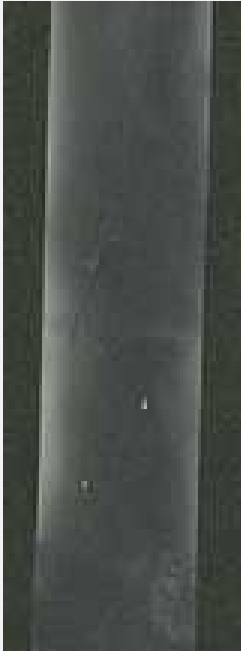


Orange peel

PET 12mic / ONY 15mic / AL 9mic / RCPP70mic
120'C x 30min

	ZK207	ZK500 ZK100	ZK99S	Competitor	LLDPE
Curry					
(Good)1~5(Poor)	3~4	1	4~5	4	5
Pasta sauce					
(Good)1~5(Poor)	3	1	4~5	3	1

Creasing

	ZK207	ZK500	ZK99S	ZK100
Creasing				
(Good)1~5(Poor)	3	2	4	1

RCPP 70mic base
130'C x 30min
MIT bending machine 100 times (500g weight) 90° folding