Biaxially Oriented PBT Film

BOBLET®

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KOHJIN Film & Chemicals

What is BOBLET?

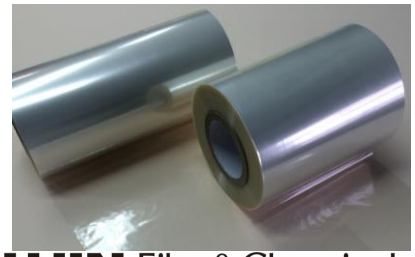
- World's first biaxially oriented with **PBT film.**

- **Strength properties are same level as BOPA.**

- **Heat resistance and acid resistance are same level as OPET.**

- **Excellent in the isotropic property**,
which is feature of our original biaxially oriented Tubular method.

- **No differences of quality depending on mother-roll positioning)**



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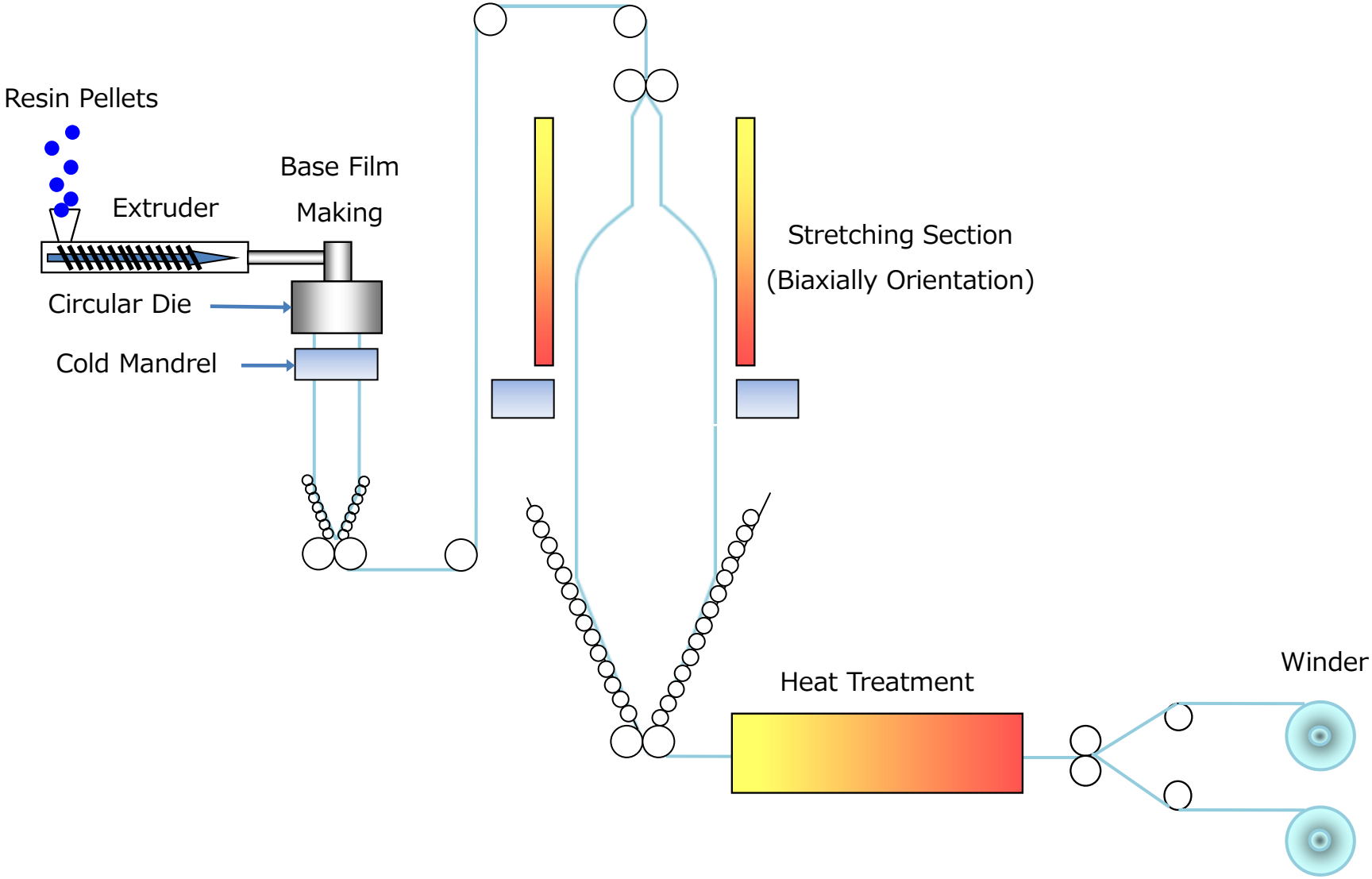
Information about PBT resin

■ PBT : PolyButylene Terephthalate

■ One of the 5 engineering plastics (PBT、PA、PC、POM、m-PPE)

Type of resin	Polyamide	Polyester	
	Nylon6	PET	PBT
Density（g/㎥）	1.14	1.40	1.31
Melting Point（℃） ※DSC method	224～227	254～258	225～227
Glass Transition Temp.（℃）	50～60	70～80	30～50
Water Absorption	Big	Small	Small
Acid Resistance	×	○	○
Alkali Resistance	○	×	×

Our Tubular biaxially oriented method process



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Comparison of properties (OPBT vs ONY, OPET)

◎ : Superior in other　○ : same as other　△ : Inferior in other

	Pinhole Resistance				Dimen-sional Stability		Barrier Resistance			Trans-parency		COF		Processability						Solvent Resistance	
	Impact Strength	Needle Strength	Flexing	Abrasion	After boiling	After Retort	Oxygen	Water Vapor Transmission	Aroma	Haze	Gloss	Normal	Under high humidity	Dimensional change by moisture absorption	Modulus of elasticity	Creep test	Ink adhesion	Food color resistance	Easy cutting	hydrogen peroxide	Other Solvent
OPBT (15μ)	◎	◎	◎	◎	○	○	△	○	○	○	○	○	○	◎	○	○	○	◎	△	◎	◎
ONY (15μ)	◎	◎	○	○	△	△	◎	△	△	◎	○	○	△	△	△	○	○	△	○	△	◎
OPET (16μ)	△	△	△	◎	◎	◎	△	○	◎	○	◎	○	○	◎	◎	◎	○	◎	○	◎	◎
PET/ Ny coex (15μ)	○	○	△	○	○	△	◎	○	○	○	◎	○	-	△	○	○	○	○	○	◎	◎

BOBLET(OPBT) Film Properties

		OPBT (BOBLET-ST)	ONY (BONYL-RX)	OPET	PET/NY coex
Thickness (μm)		15	15	16	15
Haze (%)		5.4	2.6	2.8	4.4
Tensile strength (MPa)	MD	210	280	170	170
	TD	220	300	180	260
Elongation at break (%)	MD	150	120	100	140
	TD	150	120	80	80
Young's modulus (GPa)	MD	3.0	2.2	4.6	2.7
	TD	2.9	1.7	4.5	2.6
Impact strength (J)		1.1	1.5	0.5	1.1
Needle strength (N)		10	11	8	10
Gelboflex Test (5℃*40%RH*500times)		1	12	120	23
Gelboflex Test (5℃*40%RH*1000times)		12	34	210	110
Shrinkage in Hot air 150 ℃ (%)	MD	2.4	0.8	1.4	2.0
	TD	0.3	0.8	0.0	0.3
Shrinkage in Hot water 100 ℃ (%)	MD	1.6	2.4	1.0	2.2
	TD	0.0	2.6	0.0	0.4
Water Vaper transmission rate (g/m^2・24hr)		49	310	42	87
Oxygen transmission rate (cc/m^2・24hr) 23℃*50%RH		110	23	81	21

Thickness Grade： 15μ、20μ、25μ

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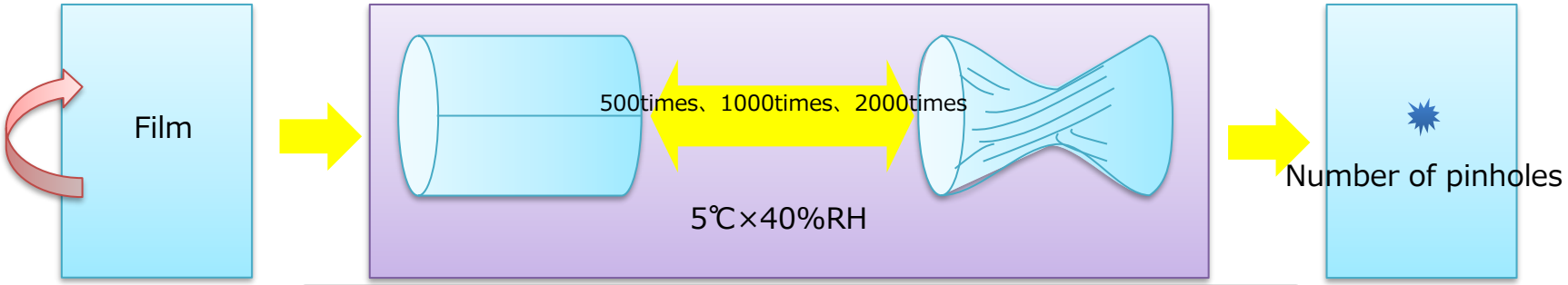
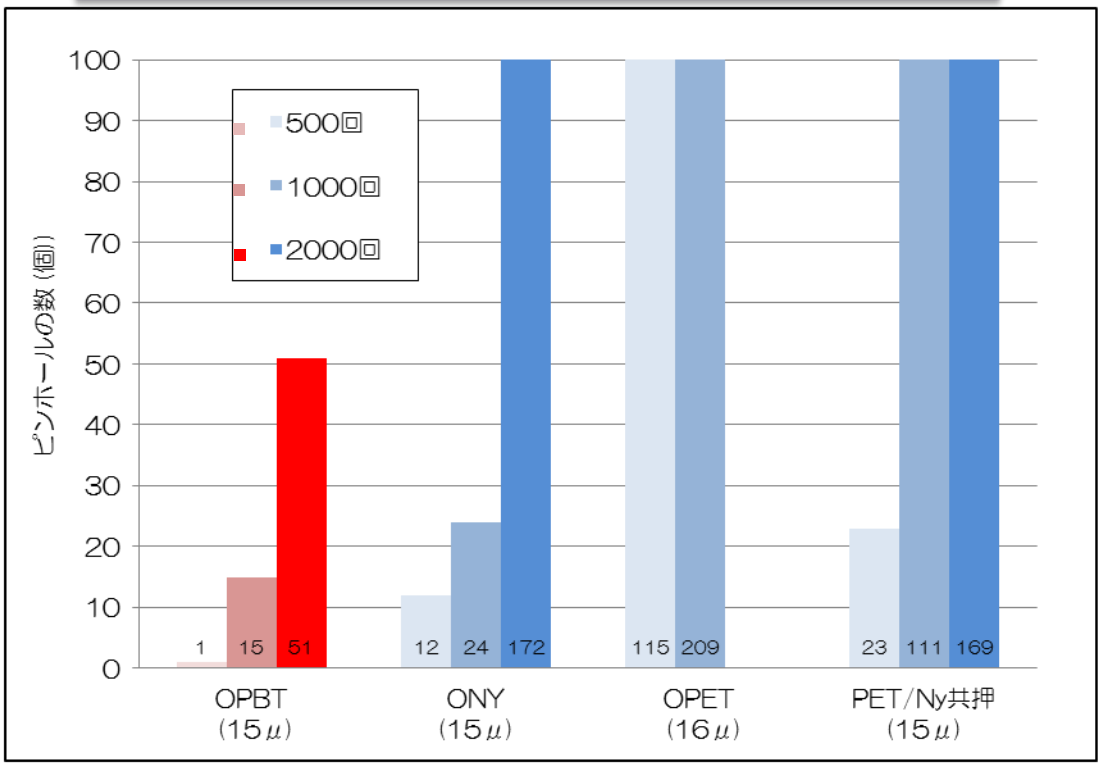
Pinhole Resistance(Flexing)





<Flexing>

※ flexing times : 500、1000、2000times

(kohjin original method)

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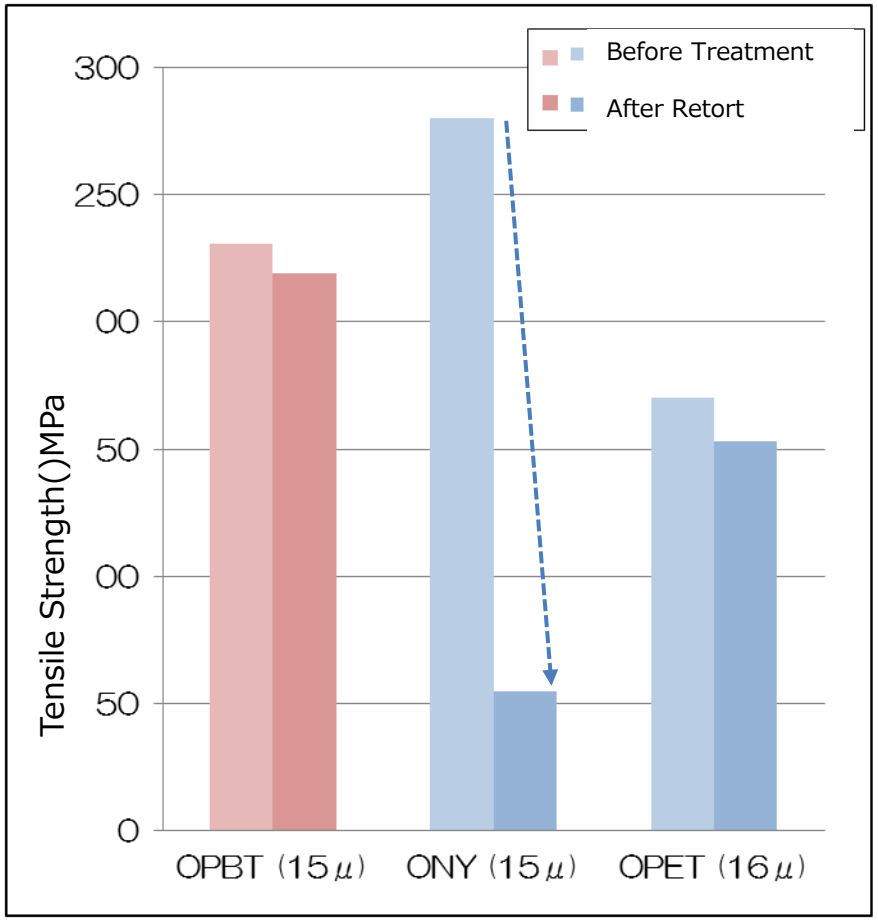
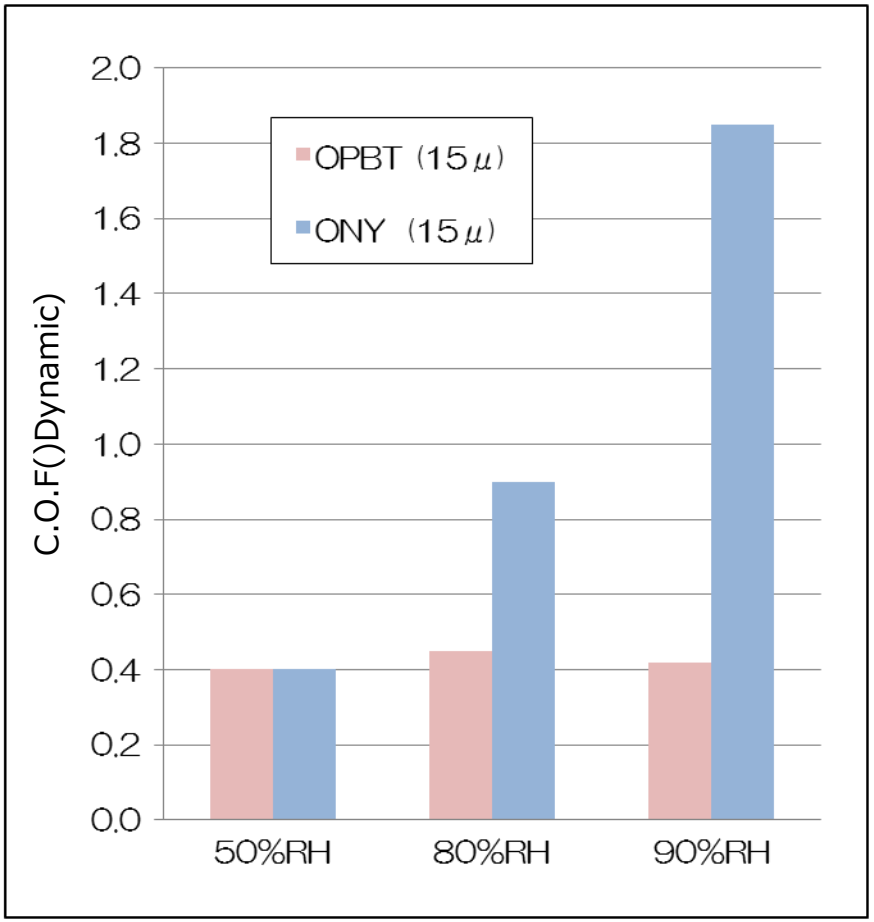
Heat(Retort) Resistance/Humidity Dependence





<Tensile Strength Change Before/After Retort in high temp.>

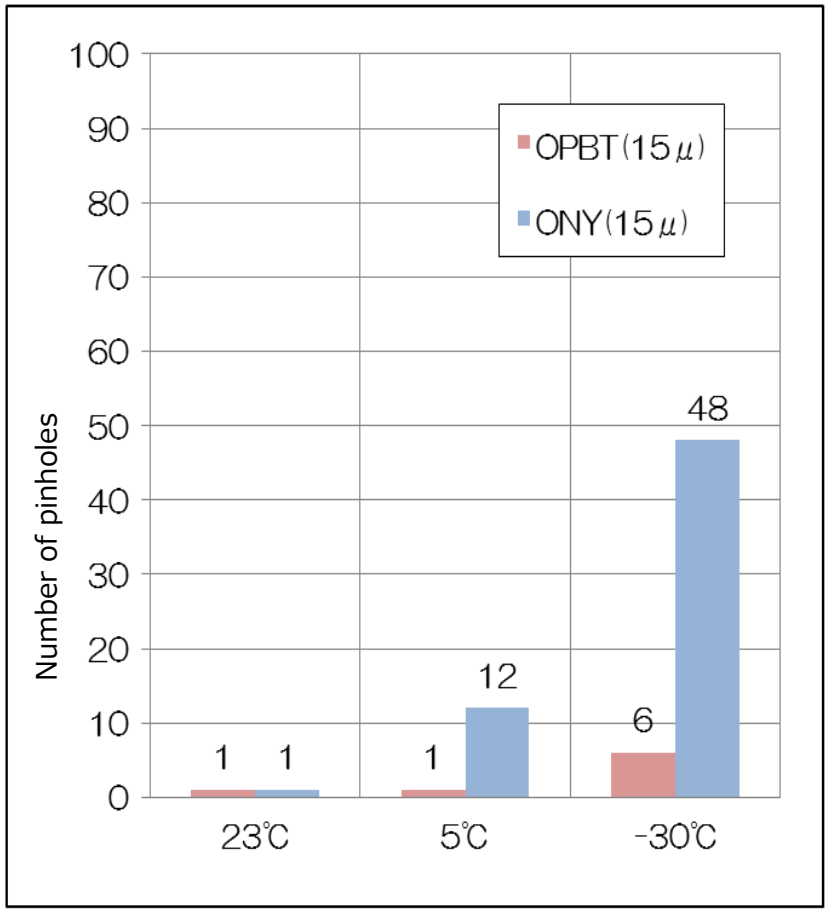
※Retort treatment : 135℃×30minutes

<Slippery Test> (humidity dependance)

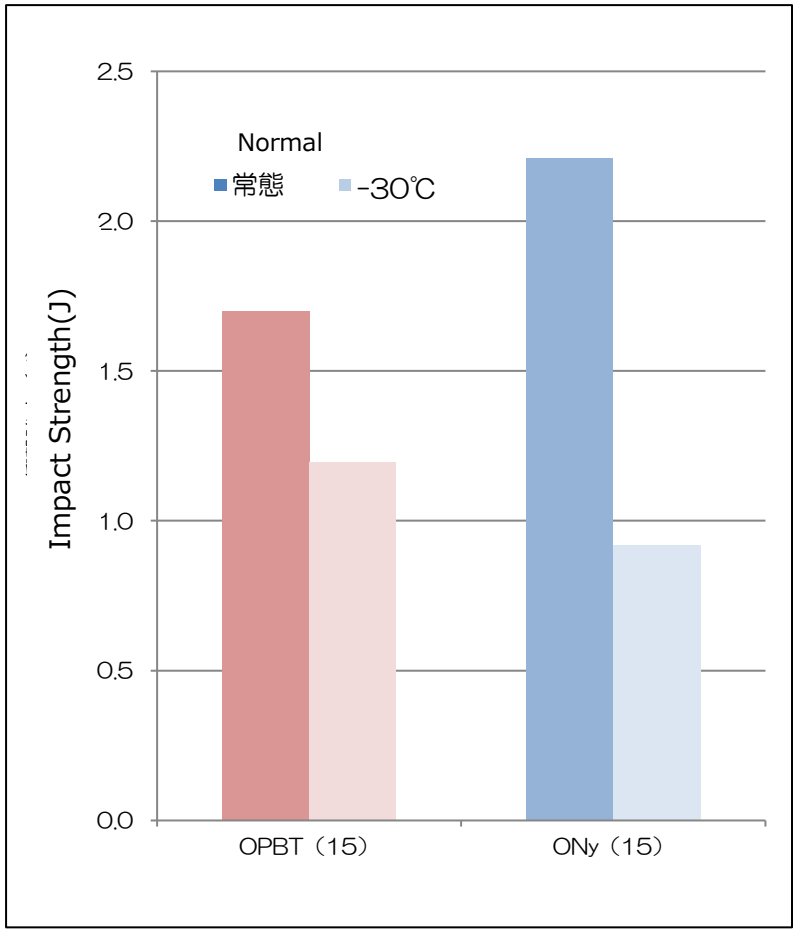
※Condition : 23℃、Film/Film Surface

Cold Resistance

<Flexing under low temp.> 500times

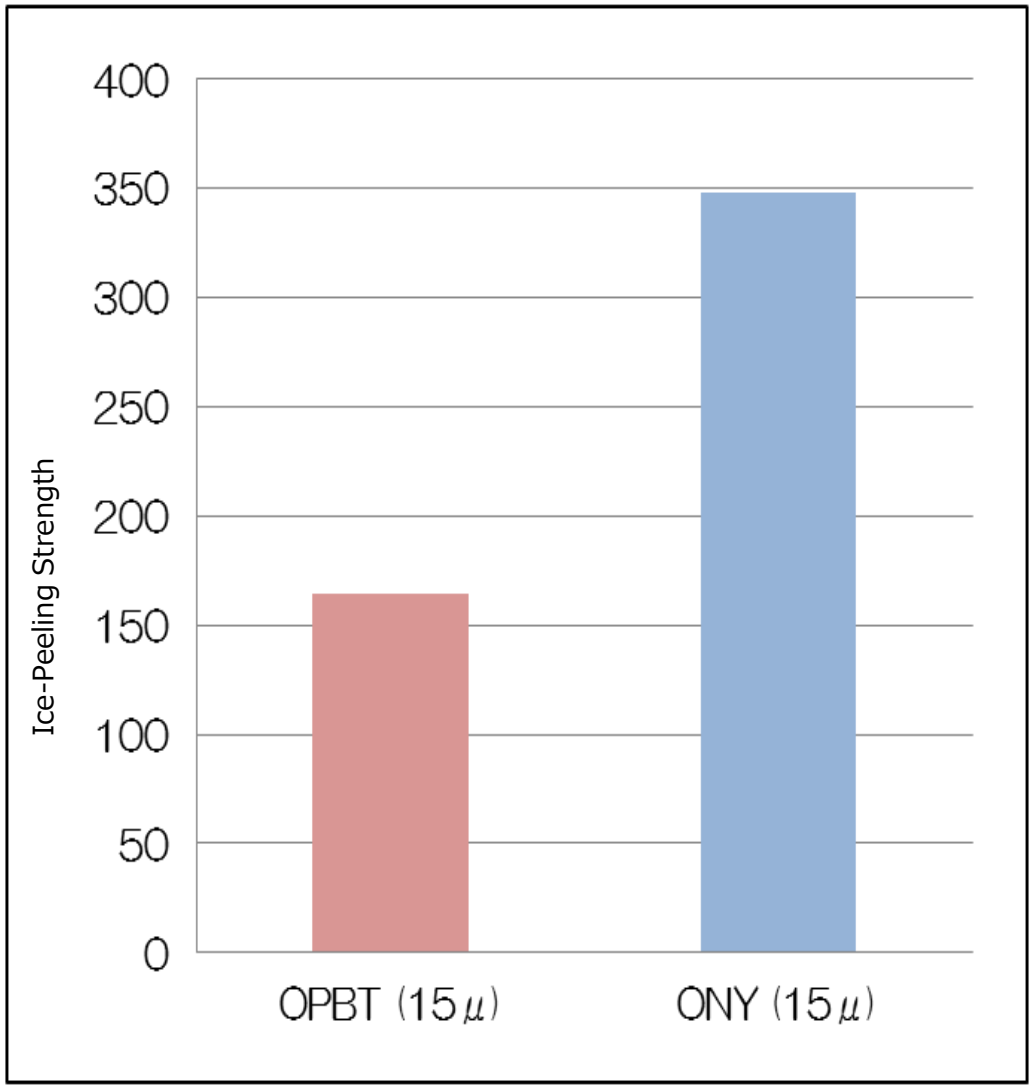


<Impact Strength>



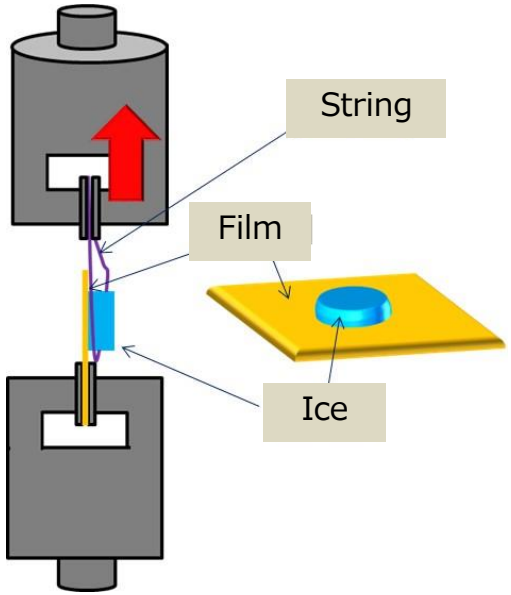
**Main Material//LL structure

Non-sticking-ice Strength



<Ice-peeling strength test)>

Make a film sample with sticking ice at -30℃.
Testing shear peel strength between film/ice



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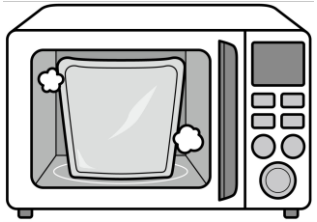
Proposal① : Pouched Package for Microwave food

Applications ▶ Curry, Sauce, Soup, etc

- Chilled or room temp. food by heating with microwave oven.



Current Structure	VMOPET(12)//ONY(15)//retort CPP(60)
Proposed Structure with BOBLET	VMOPET(12)//**OPBT(15)**//EasyCutting retort CPP(60)

■ Improve Microwave-Heating Suitability

- Reduce the scattering of the contents due to breaking a pouch during microwave heating.

■ Maintain quality

- Excellent functional properties of BOBLET provides sufficient impact resistance and pressure resistance strength for practical use.

Now is used for a microwave cooking pouch of seasoned raw meat.

Reason: Improve heat resistance of the package in a longtime microwave heating.

Proposal② : Lid Material for thermoforming package with barrier type

Applications ▶ Steamed chicken breast or sausage

Current Structure	homoCPP40//**Barrier ONY15**//LL40
Structure being used with BOBLET	**OPBT15**//Barrier ONY15//LL40
Plastic Reduction（weight）	**17%**

▶ **Improve troubles of CPP(Printability, Ink adhesive suitability, heat resistance)**

※same appearance as a current structure.

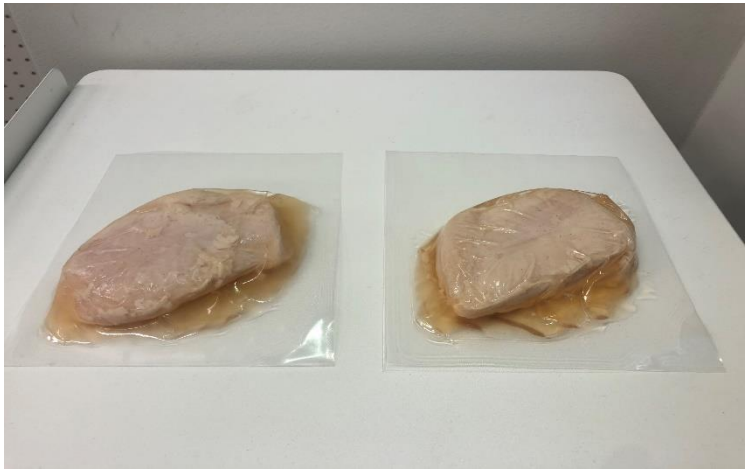
Appendix : Appearance

Current Structure

CPP30//barrierONY15//LL40

Structure with BOBLET

OPBT15//barrier ONY15//LL40



※ Appearance could be improved with appropriate conditions of thermoforming packaging machine.

Proposal② : Lid Material for thermoforming package with non Barrier type

*under evaluation

Current Structure	CPP40//ONY15//LL40	CPP50//OPET12//LL40	CPP50//ONY15//LL40
Total Thickness	101μ	108μ	111μ
Proposing Structure with BOBLET	**OPBT20**//LL40	**OPBT20**//LL40	**OPBT20**//LL40
Total Thickness	63μ	63μ	63μ
Plastic Reduction (weight)	**31%**	**37%**	**37%**

▶ **Improve troubles of CPP(Printability, Ink adhesive suitability, heat resistance)**

NOTE: Appearance could be improved with appropriate conditions of thermoforming packaging machine.

Proposal③ : Lid Material for trayed frozen meals

Applications ▶ Pasta, Sauteed meat/fish etc

**trayed frozen meals by heating with microwave oven.

Product		Pasta		Grilled marinated beef		Seasoned pork	
Current Structure		ONY(25)// ONY(15)//EP(30)	Total 80μ	OPET(12)// ONY(15)//EP(30)	Total 65μ	OPET(12)// ONY(15)//EP(30)	Total 65μ
Proposing Structure		**OPBT(25)**// EP(30)	Total 60μ	**OPBT(20)**// EP(30)	Total 55μ	**OPBT(20)**// EP(30)	Total 55μ
Volume Reduction ※1	**Plastic reduction rate**	**18%**		**13%**		**13%**	
	CO2 reduction rate	**26%**		**8%**		**8%**	

- ▶ **Volume Reduction ※1**
- ▶ **Improve design (surface tension, non sticking ice)**
- ▶ **Maintain quality (cold resistance, wear pinholes, printability)**

※1 The above data are the results of our calculations under specific conditions and do not guarantee each reduction rate.

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