

# Samyang Material Introduction ( **TRILOY-PC/PBT Alloy** )

Chemicals R&D  
Tech Center



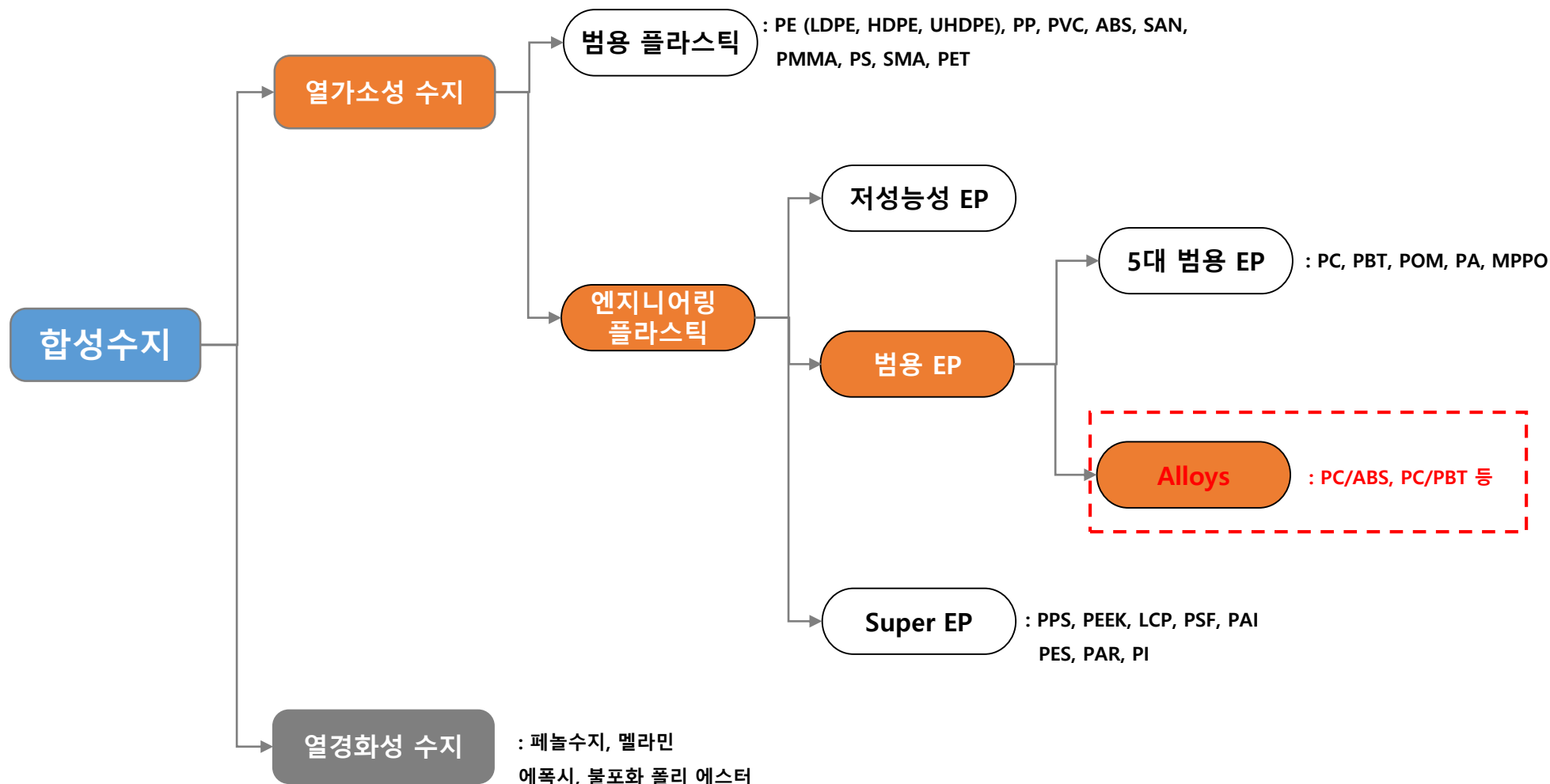
- 1) 플라스틱 분류
- 2) PC/PBT alloy 특성
- 3) PC/PBT Grade Tree
- 4) PC/PBT Properties
- 5) Application.

# TRILOY-PC/PBT Alloy

## 1) 플라스틱 분류

3/16

samyang

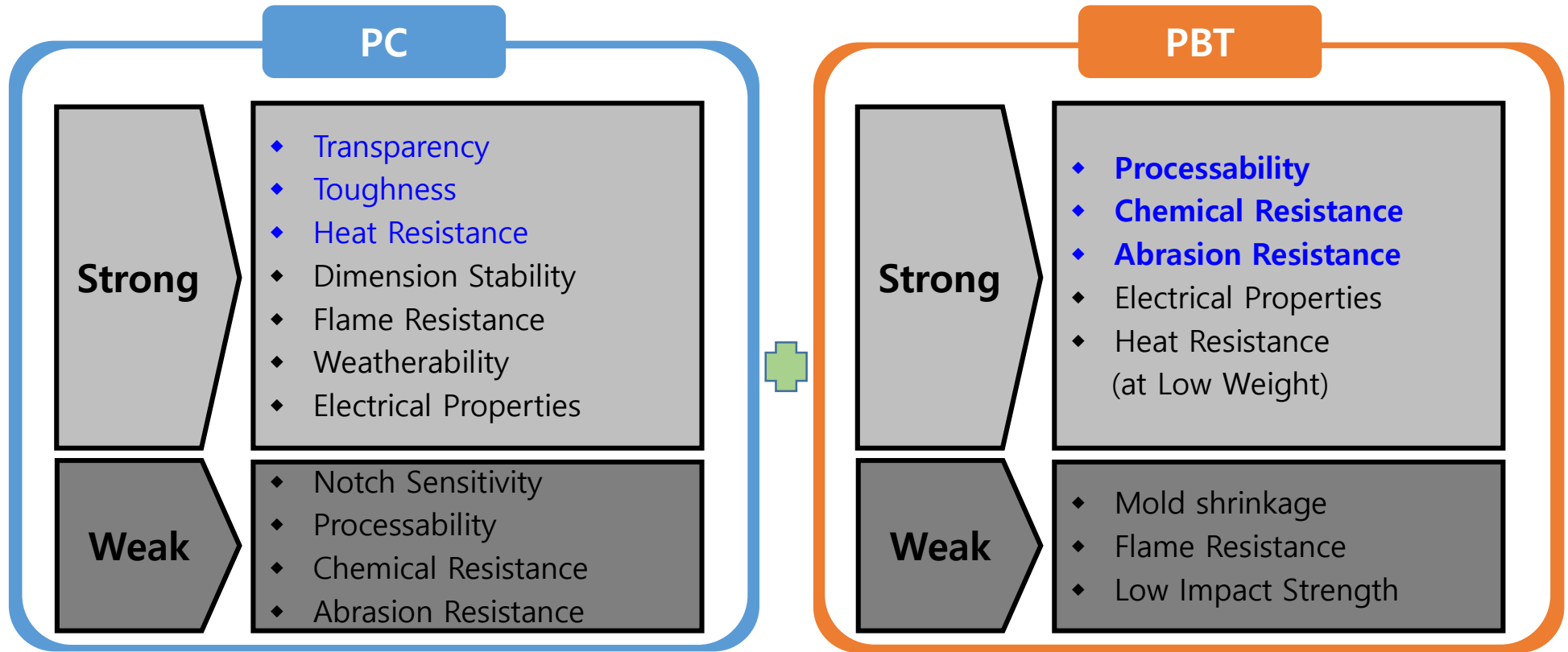


# TRILOY-PC/PBT Alloy

## 2) Characteristic

4/16

samyang



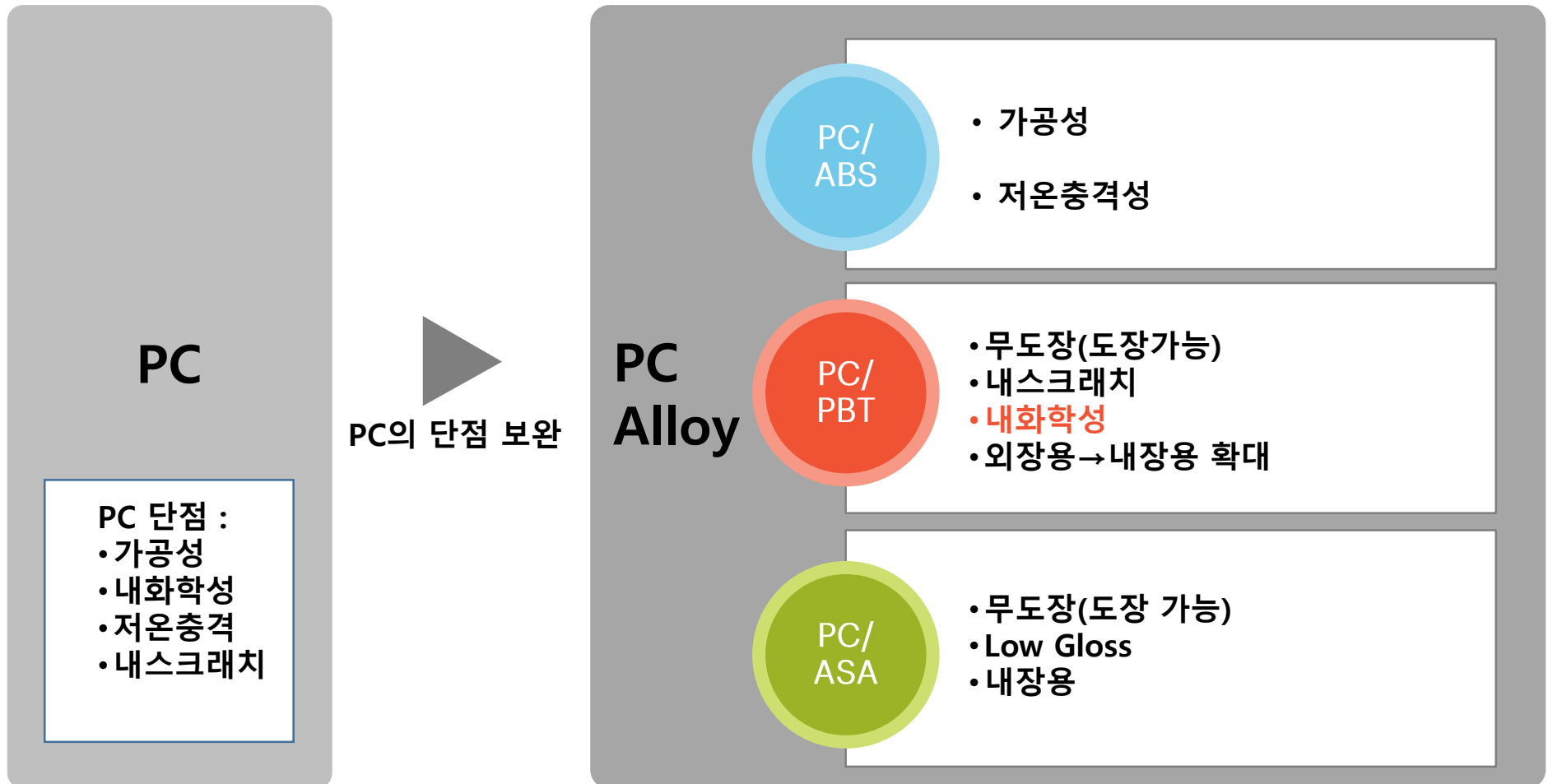
PC의 단점을 보완하는 개념의 Comp'd.  
(충격 물성 필요시, 충격 보강제 첨가)

# TRILOY-PC/PBT Alloy

5/16

## 2) Characteristic – 각 PC alloy 보완 특성

samyang



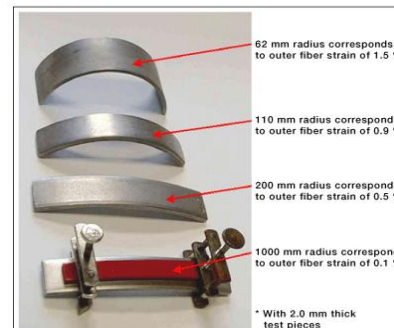
### Chemical resistance compare to PC/ABS

#### 시험 방법

#### ◆ Test Condition

- 테스트 방법 : Bent Strip Method
- Test 시편 : ASTM D638 type I, 3.2mm
- 시험온도 : 상온
- Strain( $\epsilon$ ) : 2%
- 시험시간 : 7 days
- Test Resin :
  - SPL1: PC/PBT , - SPL2: PC/ABS
- Test 용제 : 방향제
  - Aromas Naturals (air freshener)
  - AVATA (aroma)

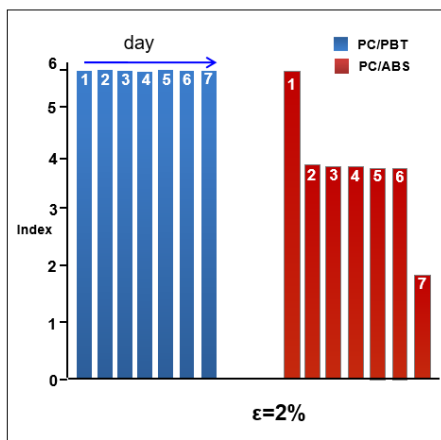
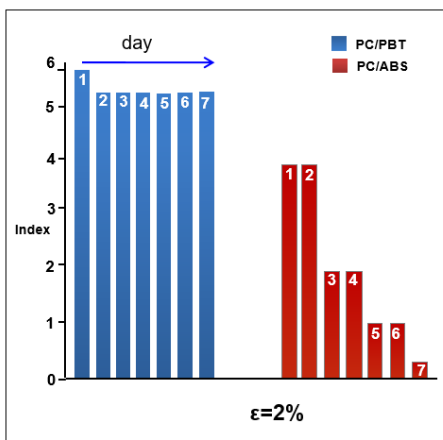
#### ※ Bent Strip Test



- 시편에 일정 strain을 가하고 화학물질에 일정 시간 노출 후, 시편상태를 관찰.

#### 시험 결과

#### ◆ Aromas Naturals (air freshener) ◆ AVATA (aroma)



#### ※ 판정 기준

Index	Shape	Remark
1		Break
2		Edge Break
3		Crack
4		Edge Crack
5		Crazing
6		Edge Crazing

# TRILOY-PC/PBT Alloy

7/16

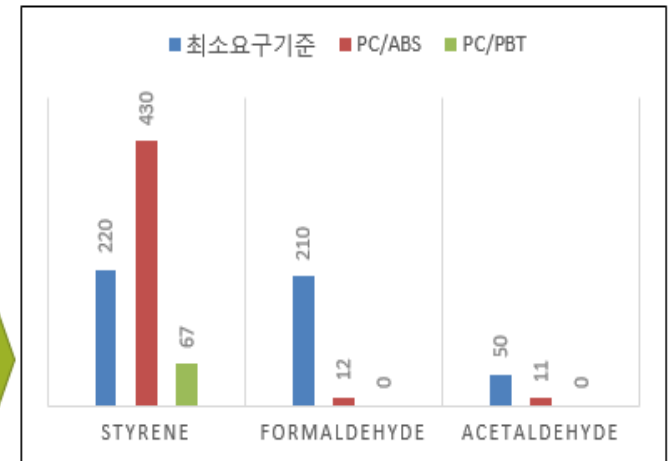
## 2) Characteristic – PC/PBT vs PC/ABS

samyang

### ■ VOCs, Odor compare to PC/ABS

#### (1) MS 300-55 : 내장부품 VOCs(휘발성유기화합물) 표준시험 기준

Test(VOCs)	Unit	Test Method	최소요구기준 (적용)	Result	
				PC/ABS	PC/PBT
Benzene	μg/m <sup>3</sup>	MS 300-55:2016 (정밀분석법)	30	N.A.	N.A.
Toluene	μg/m <sup>3</sup>		1000	14	15
Ethylbenzene	μg/m <sup>3</sup>		1000	74	N.A.
m.p-Xylene	μg/m <sup>3</sup>		870	N.A.	N.A.
o-Xylene	μg/m <sup>3</sup>			N.A.	N.A.
Styrene	μg/m <sup>3</sup>		220	430	67
Formaldehyde	μg/m <sup>3</sup>		210	12	N.A.
Acetaldehyde	μg/m <sup>3</sup>		50	11	N.A.
Acrolein	μg/m <sup>3</sup>		50	N.A.	N.A.



#### (2) MS 300-34 : 내장부품 냄새 표준시험 기준

Test		Unit	Test Method	Result	
				PC/ABS	PC/PBT
Odor	Dry Condition	등급	MS 300-34:2016	3.0	2
	Wet Condition	등급		2.0	1.5

등급	구분
1등급	None
2등급	Threshold
3등급	Moderate
4등급	Strong
5등급	Very Strong
6등급	Over Strong

- ✓ PC/PBT는 VOCs와 Odor 특성이 뛰어남
- ✓ 자동차 내장 부품의 Low emission 소재 적용 트렌드에 적합함

# TRILOY-PC/PBT Alloy

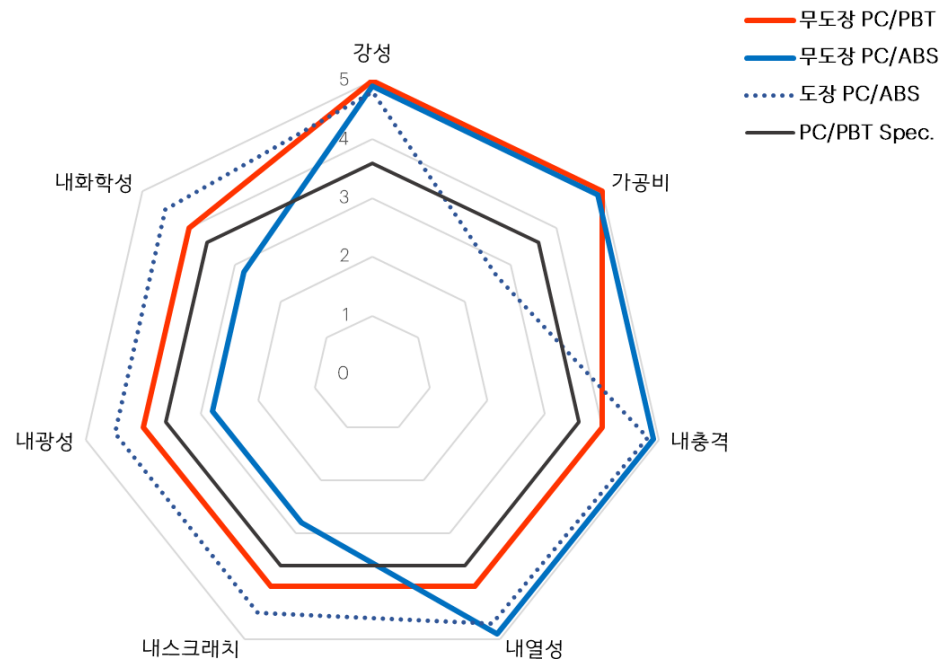
## 2) Characteristic - PC/PBT vs PC/ABS

8/16

samyang

### 결과 종합

	PC/PBT	PC/ABS
내화학성	O PBT특성	X PC특성
내광성	O Non-Butadien	X Butadien 이중결합 깨짐
유동성	O 결정성 (PBT)	Δ Rubber 계
VOCs	O Non-Styrene monomer	Δ Styrene monomer
내열성	Δ PBT 고하중 HDT 특성	O ABS고하중 HDT 특성
내충격성	Δ 상용화제 사용 보완	O Rubber 계



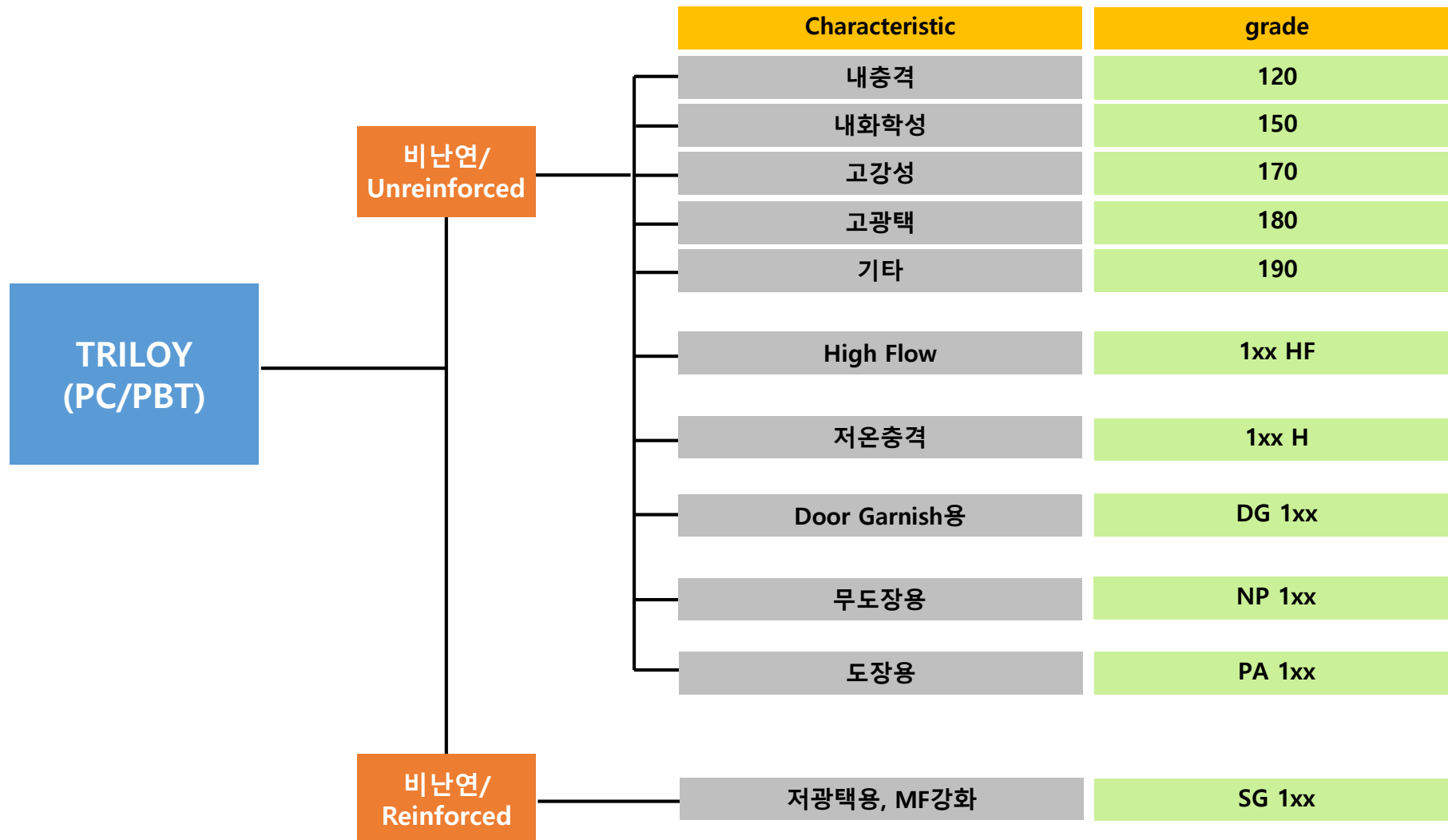


# TRILOY-PC/PBT Alloy

## 4) PC/PBT Grade Tree

9/16

samyang



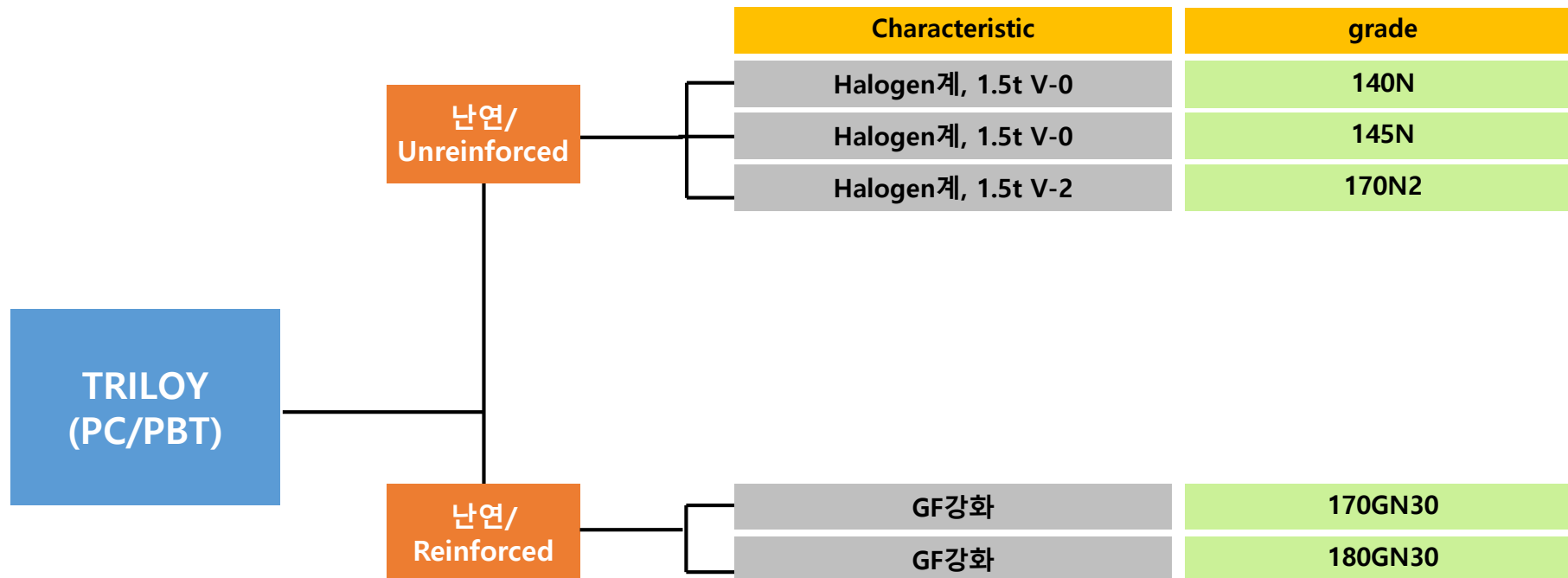
※ xx: Represent any number 00~99 incl.

# TRILOY-PC/PBT Alloy

## 4) PC/PBT Grade Tree

10/16

samyang



# TRILOY-PC/PBT Alloy

## 7) Properties of PC/PBT

11/16



PROPERTY	UNIT	ASTM METHOD	120H	150	170	170HF	DG170	NP170
PHYSICAL								
Specific Gravity		D792	1.20	1.20	1.21	1.21	1.20	1.21
Water Absorption (24 hours at 23°C)	%	D570	0.15	0.15	0.20	0.15	0.15	0.20
Melt Flow Rate (250°C, 3.8kg)	g/10min	D1238	22					
Melt Flow Rate (250°C, 5kg)	g/10min	D1238		20	14	23	12	12
MECHANICAL								
Tensile Strength at yield	kgf /cm <sup>2</sup>	D638	500	500	600	600	600	580
Tensile Elongation at break	%	D638	160	180	180	180	160	120
Flexural Strength at yield	kgf /cm <sup>2</sup>	D790	700	750	900	880	850	780
Flexural Modulus	kgf /cm <sup>2</sup>	D790	19,500	20,000	22,000	21,500	22,000	22,000
Izod Impact Strength, notched, 23°C (1/8")	kgf · cm/cm	D256	70	70	80	80	80	75
Rockwell Hardness	R scale	D785	110		118	118	110	118
THERMAL								
HDT, 18.6 kgf/cm <sup>2</sup>	°C	D648	90	92	105	100	100	105
OTHERS								
UL-94 Flammability	-	(UL 94)	HB	HB	HB	HB	HB	HB
Mold shrinkage(3mm)	%	D955	0.7~1.2		0.7~1.2	0.7~1.2	0.7~1.2	0.7~1.2

# TRILOY-PC/PBT Alloy

## 7) Properties of PC/PBT

12/16

samyang

PROPERTY	UNIT	ASTM METHOD	180	PA180	190	140N	145N	170N2
PHYSICAL								
Specific Gravity		D792	1.22	1.21	1.23	1.20	120	1.21
Water Absorption (24 hours at 23°C)	%	D570	0.15	0.20	0.15	0.15		0.15
Melt Flow Rate (250°C, 3.8kg)	g/10min	D1238				32		
Melt Flow Rate (250°C, 5kg)	g/10min	D1238	32	15	40			
Melt Flow Rate (250°C, 10kg)	g/10min	D1238						40
Melt Flow Rate (260°C, 2.16kg)	g/10min	D1238					13	
Melt Flow Rate (300°C, 1.2kg)	g/10min	D1238						
MECHANICAL								
Tensile Strength at yield	kgf /cm <sup>2</sup>	D638	620	500	550	550	500	550
Tensile Elongation at break	%	D638	120	100	120	180	50	120
Flexural Strength at yield	kgf /cm <sup>2</sup>	D790	880	800	850	850	780	800
Flexural Modulus	kgf /cm <sup>2</sup>	D790	22,500	20,000	21,000	21,000	21,000	21,000
Izod Impact Strength, notched, 23°C (1/8")	kgf · cm/cm	D256	60	70	90	75	65	80
Rockwell Hardness	R scale	D785					118	
THERMAL								
HDT, 18.6 kgf/cm <sup>2</sup>	°C	D648	110	106	82	100	85	90
OTHERS								
UL-94 Flammability	-	(UL 94)	HB	HB	HB	1.5t V-0	1.5t V-0	1.5t V-2
Mold shrinkage(3mm)	%	D955	0.7~1.2					

# TRILOY-PC/PBT Alloy

## 7) Properties of PC/PBT

13/16

samyang

PROPERTY	UNIT	ASTM METHOD	SG110	170GN30	180GN30
PHYSICAL					
Specific Gravity		D792	1.20	1.43	1.32
Water Absorption (24 hours at 23°C)	%	D570	0.20	0.20	0.20
Melt Flow Rate (250°C, 3.8kg)	g/10min	D1238			
Melt Flow Rate (250°C, 5kg)	g/10min	D1238	20		
Melt Flow Rate (250°C, 10kg)	g/10min	D1238			
Melt Flow Rate (260°C, 2.16kg)	g/10min	D1238			22
Melt Flow Rate (300°C, 1.2kg)	g/10min	D1238		15	
MECHANICAL					
Tensile Strength at yield	kgf /cm <sup>2</sup>	D638	600	1,000	950
Tensile Elongation at break	%	D638	20	2	1
Flexural Strength at yield	kgf /cm <sup>2</sup>	D790	900	1,400	1,200
Flexural Modulus	kgf /cm <sup>2</sup>	D790	28,000	66,000	77,000
Izod Impact Strength, notched, 23°C (1/8")	kgf · cm/cm	D256	7	12	10
Rockwell Hardness	R scale	D785			
THERMAL					
HDT, 18.6 kgf/cm <sup>2</sup>	°C	D648	98	120	100
OTHERS					
UL-94 Flammability	-	(UL 94)	HB		
Mold shrinkage(3mm)	%	D955	0.7~1.2	0.2~0.5	0.2~0.4

# TRILOY-PC/PBT Alloy

## 8) Application- 자동차

14/16

samyang

용도

Air Vent  
Cover

사진



소재

PC/PBT

GRADE

TRILOY 180

AVN Panel



PC/PBT

TRILOY PA180

Garnish



PC/PBT

TRILOY 180

# TRILOY-PC/PBT Alloy

## 8) Application- 자동차

15/16

samyang

용도

Door  
Handle

사진



소재

PC/PBT

GRADE

TRILOY 170  
TRILOY NP170  
TRILOY SG110

Console  
Upper  
Cover



PC/PBT

TRILOY 180

# TRILOY-PC/PBT Alloy

## 8) Application- 전기전자/잡화

16/16

samyang

용도

모발성장  
헬멧

사진



소재

난연  
PC/PBT

GRADE

TRILOY 170N2

스피커



난연  
PC/PBT

TRILOY 170N2

용도

골프화  
원터치 버튼  
하우징

사진



소재

PC/PBT

GRADE

TRILOY 170