GLOBAL EXCELLENCE HYOSUNG

2

Characteristic– "High Impact Strength"

- More than 230% higher impact strength compared to Nylon, PBT.
- No deterioration due to good hydrolysis resistance.

Items		Unit	POK	PA6	PA66	PBT	POM
Density		g/cm³	1.24	1.14	1.14	1.30	1.41
Melting Temperature		℃	220	220	260	220	160
Impact Strength		KJ/m²	12	5.2	4.1	5.0	6.5
Tensile Strength	Dry Conditioned Wet	MPa	70 70 60	80 55 35	80 70 50	55 - -	65 - -
Elongation at Break	Dry Conditioned Wet	%	270 270 390	17 40 360	19 60 370	16 – -	35 – –
Flexural Modulus	Dry Conditioned Wet	MPa	1,800 1,800 1,450	2,600 1,200 600	2,900 2,200 1,100	2,400 – -	2,500 – -

* Dry: 23℃, 50% RH, 24hrs Conditioned: 23℃, 50% RH, 60days Wet: 23℃, 90% RH, 60days

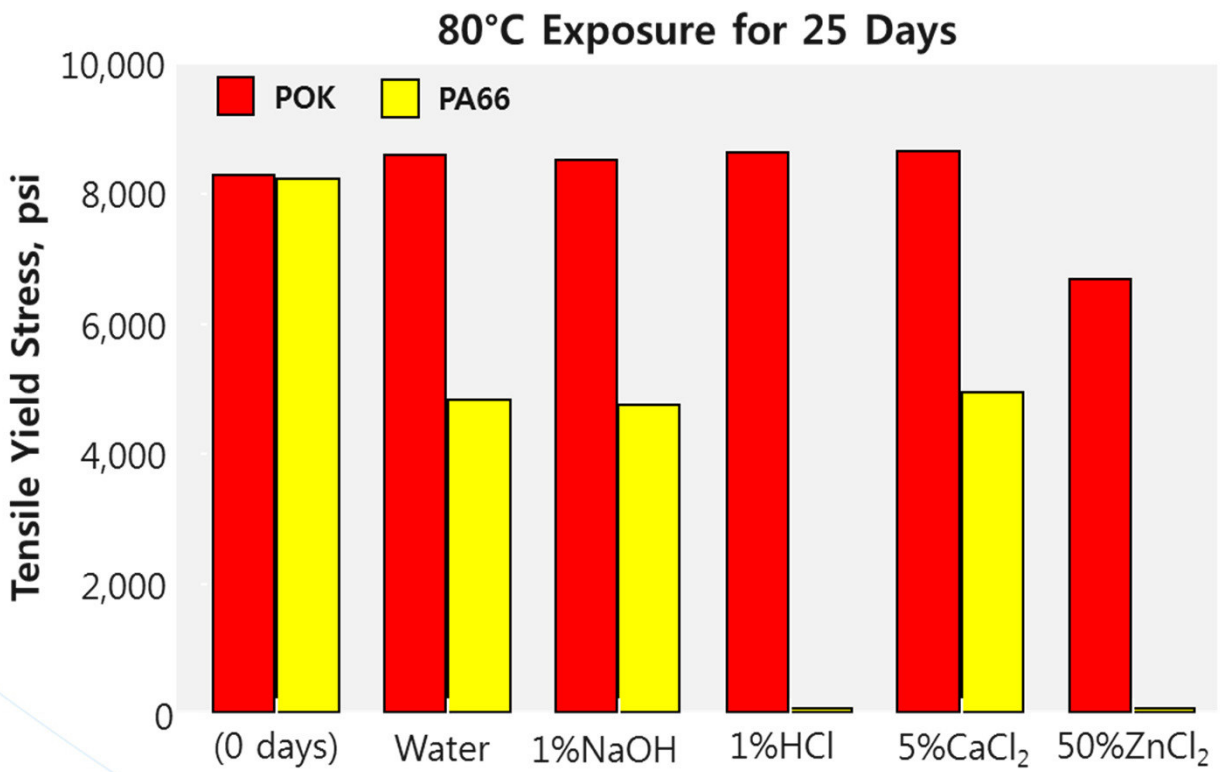
** POK : Hyosung M330A properties.

GLOBAL EXCELLENCE HYOSUNG

3

Characteristic – "Excellent Chemical Resistance"

- **PK's chemical resistance is the top level among the plastics.**
- **No drops in properties due to the resistance to acidic/basic solutions.**



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Chemical Resistance

	Semi-crystalline							Amorphous		
	PK	PA66	PA12	POM	PBT	PPS	PVDF	PPO	PSU	PC
Hydrocarbons										
aliphatic	+	+	+	+	+	+	+	●	●	●
aromatic	+	+	+	+	+	+	+	●	●	●
halogenated	+	+	●	+	●	+	+	●	●	●
Ketones	+	+	+	+	+	+	●	●	●	●
Esters/ethers	+	+	+	+	+	+	+	●	●	●
Aldehydes	+	●	●	+	+	+	+	●	●	●
Aqueous										
water	+	●	+	+	●	+	+	+	+	+
weak acids	+	●	●	●	●	+	+	+	+	+
weak bases	+	●	●	+	●	+	●	+	●	+
strong acids	●	●	●	●	●	●	+	+	●	+
strong bases	●	●	●	+	●	●	●	●	●	●

+ Resistant ● Not Resistant

Note: Relative ranking including temperature effects

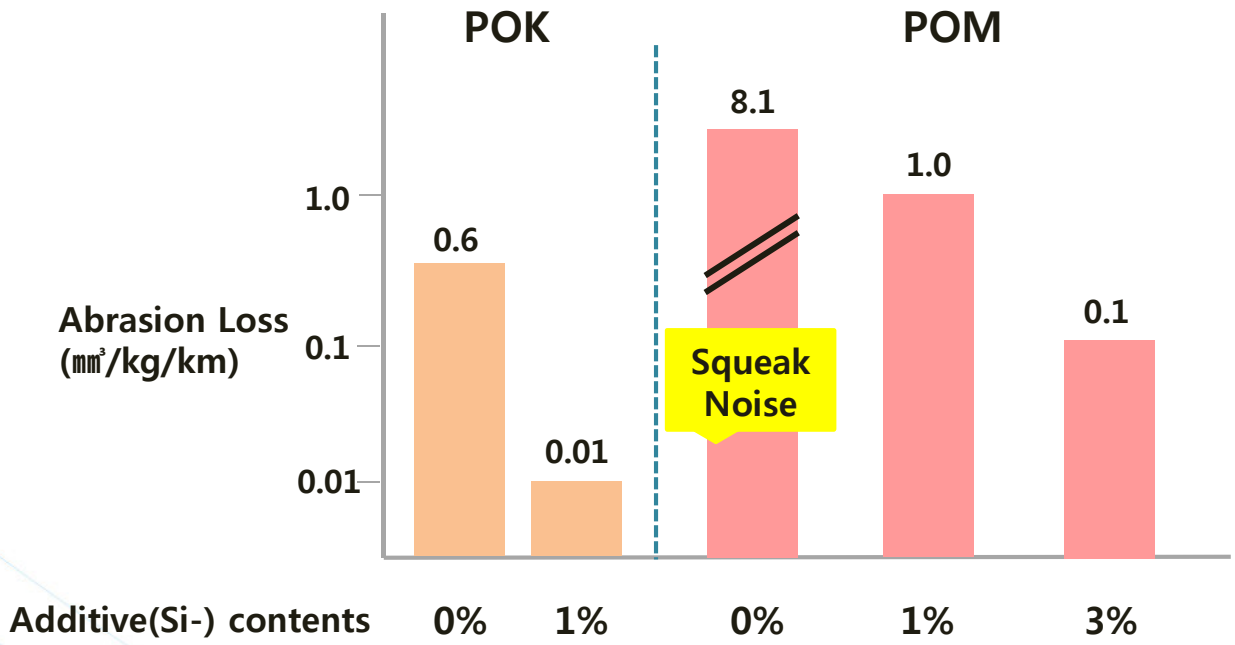
GLOBAL EXCELLENCE HYOSUNG

4

Characteristic– "Excellent Tribological Property"

- **Polyketone has 14 times higher anti-abrasion property than that of POM, currently most stiff material. It helps almost permanent use without change.**

*** POK base resin > POM base resin → 14 times higher.**
*** POK base resin > POM with 1% additive → 1.7 times higher.**
*** POK with 1% additive > POM with 3% additive → 10 times higher.**



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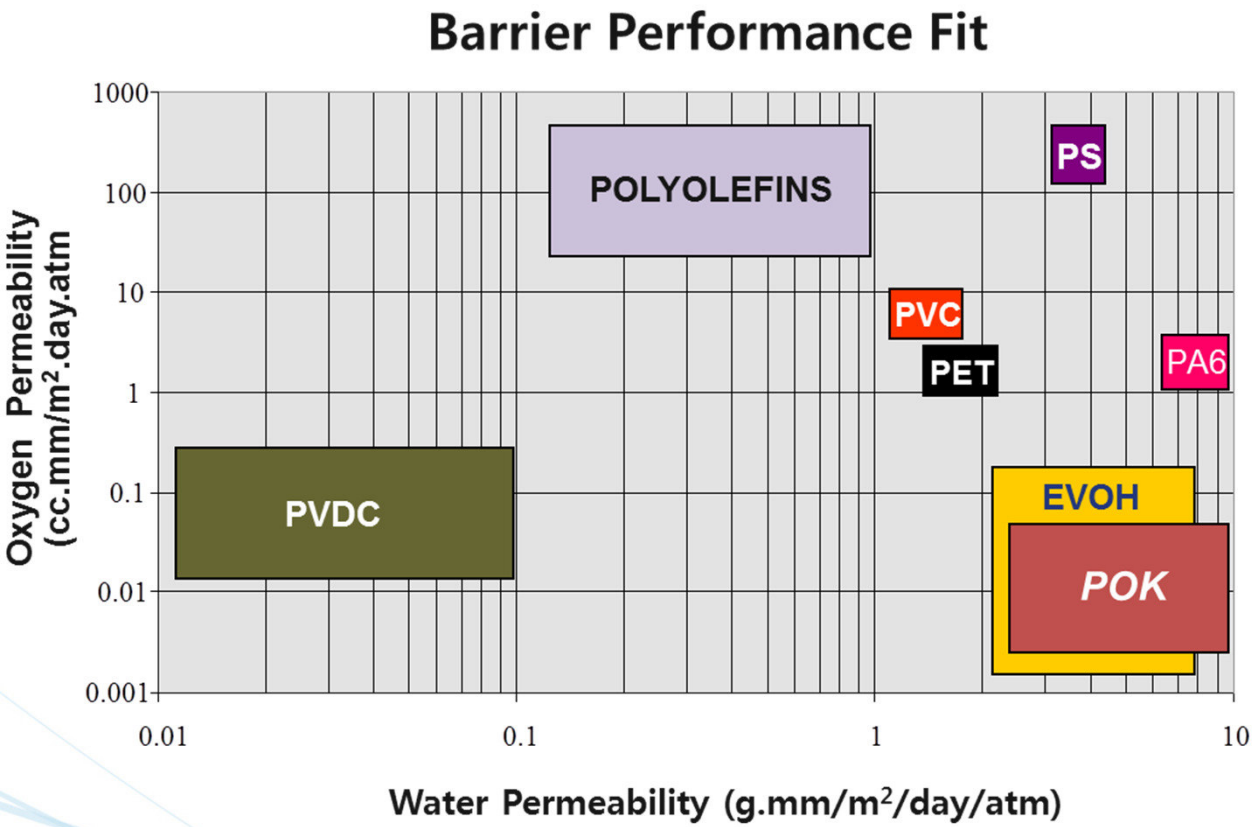
5

Characteristic– "High Barrier Property" : Gas Barrier

- **Same level of EVOH, top class of food packaging material due to the gas barrier property.**
  (EVOH : multi-layer, Polyketone : mono-layer)



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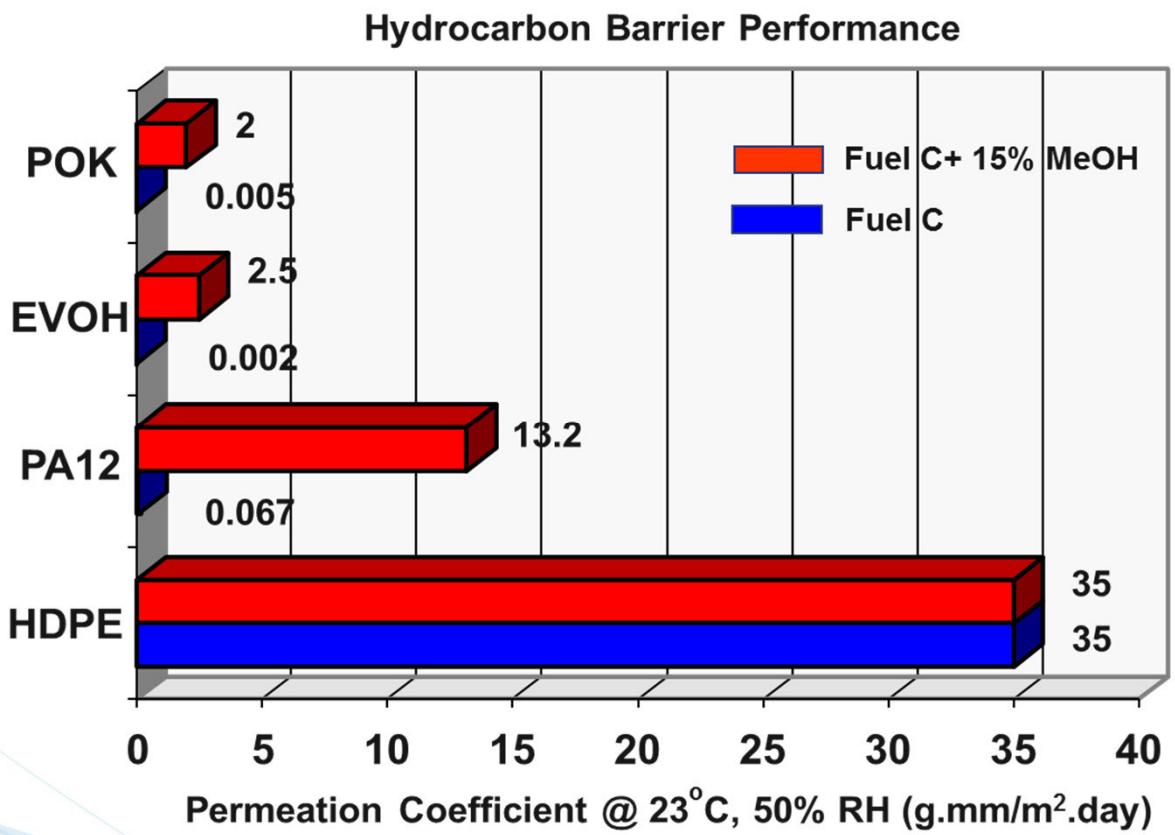
Characteristic – "High Barrier Property" : Hydrocarbon

- **Polyketone has excellent barrier property to the hydrocarbon, with good chemical resistance.**



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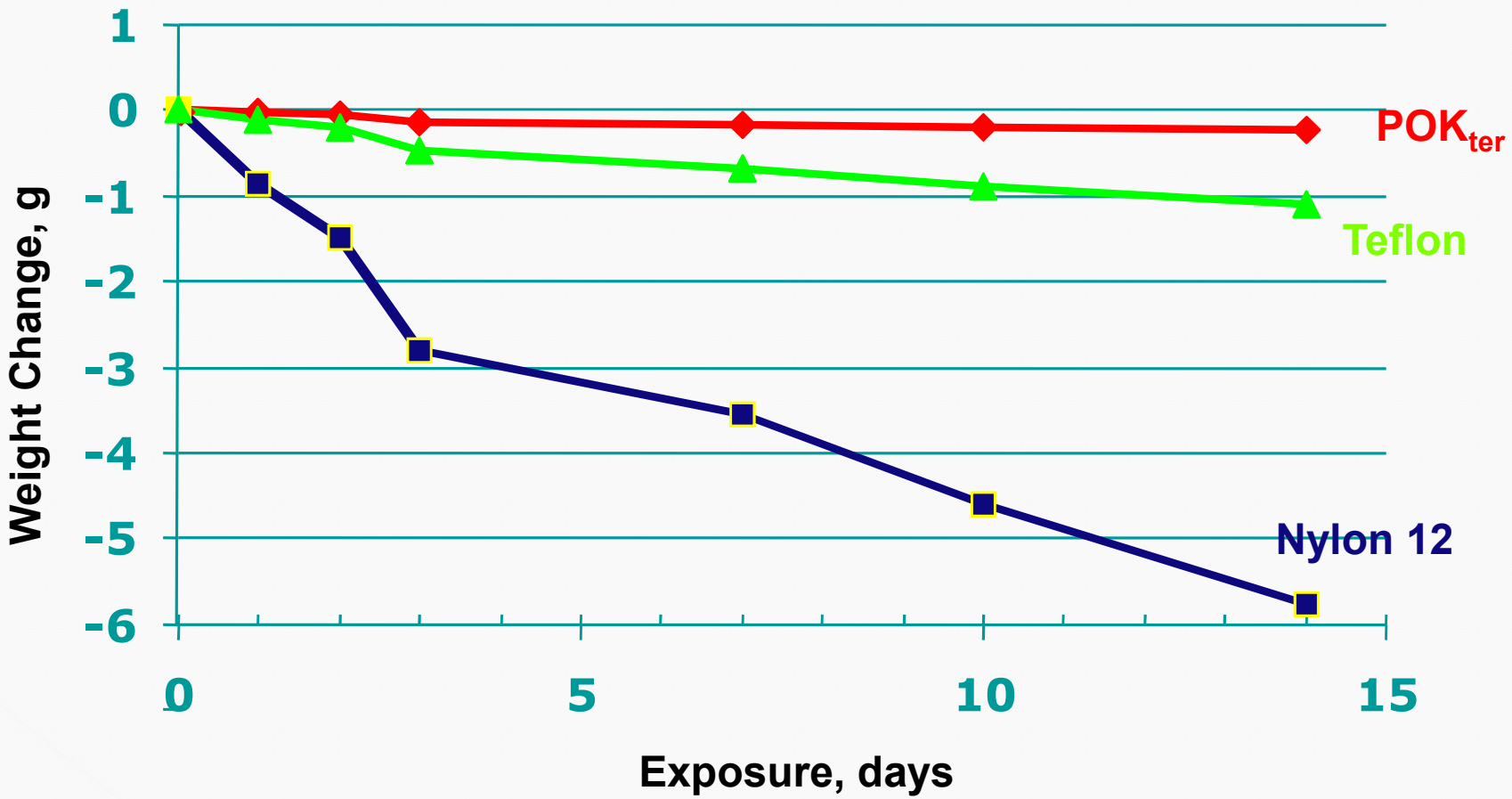
Permeability to unleaded Gasoline at 93℃



* Measured according to GM SPEC 9061-P

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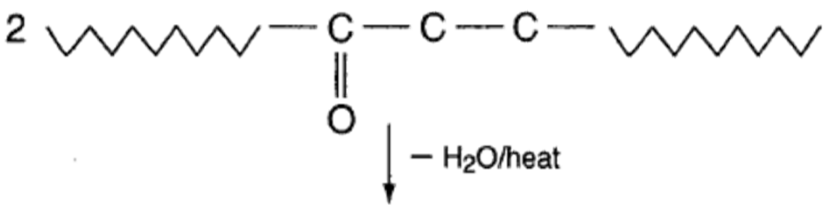
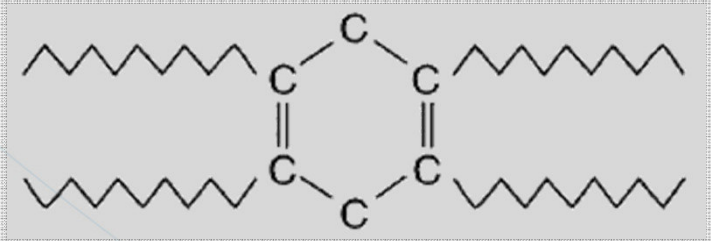
6

Characteristic – "Excellent Flame Retardant"

- **Polyketone makes water, reacted ketone(C=O) group with hydrogen during burning and Char layer covered surface not to contact to oxygen and heat.**
  ⇒ 50% dose of flame retardant additive compared to Nylon (UL-V0 rate).



Char 형성 : *"Carbon Rich Aromatic Polymer"*



*** Phosphorous flame retardant (Metal Phosphinate) test result for UL-V0 rate**

	PK	NY66
Contents(%)	8	17

GLOBAL EXCELLENCE HYOSUNG

Summary

- Polyketone is **new green polymeric material**, made of carbon-monoxide. It has excellent ***"Impact strength", "Chemical Resistance", "Anti-abrasion", "Gas barrier", "Flame retardant"***, superior to current engineering plastic.

Product Characteristics	PA 11&12	PA 6&66	POM	PBT
Stiffness				
Temperature/Modulus				
Toughness				
Dimensional Stability				
Chemical Resistance				
Abrasion/Wear Resistance				

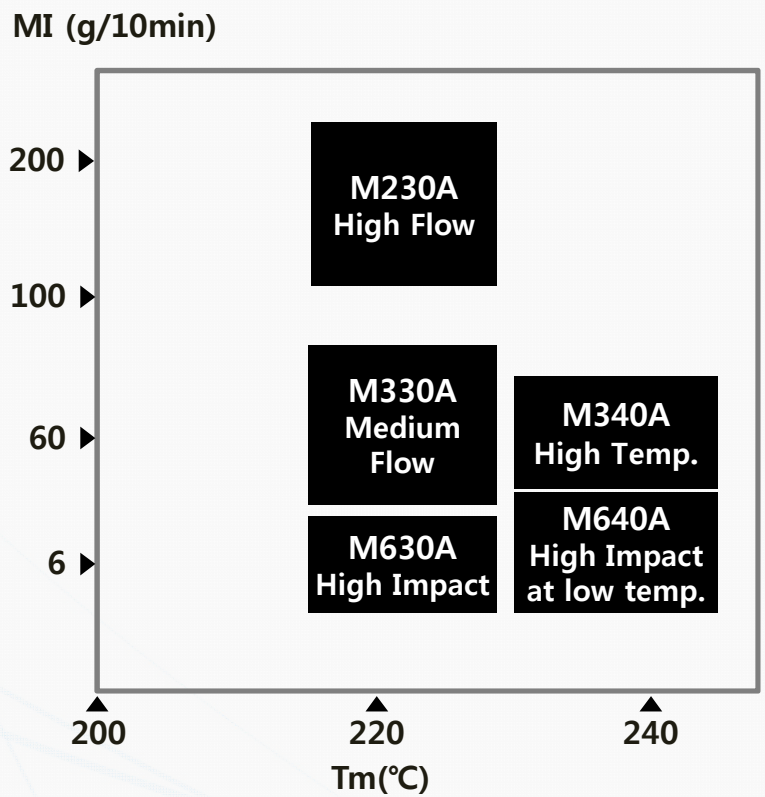
Polyketones:	Outperform	Equivalent	Underperform

IV. Present & Future

GLOBAL EXCELLENCE HYOSUNG

Portfolio

- 5 Base resin (M230A~M640A) and 27 compounding recipes
- Melt Index 6~200, Melting Temp. 220~240℃ for Injection Molding and Extrusion.



POK Grade		Characteristic	
Name			
M230A	High Flow	Injection Molding	For High Filling
M330A	Medium Flow		For general/thin wall injection
M340A	High Temp.		For high temperature use
M630A	High Impact	Extrusion/ Injection	For Pipe Extrusion For high impact injection molding
M640A	High Impact at low temp		For high impact at low temperature

GLOBAL EXCELLENCE HYOSUNG

Base Resin Grade : High Flow M230A, Medium Flow M330A, High Impact M630A.

Item	Method	Unit	M230A	M330A	M630A
Physical					
Density	ASTM D792	g/cm³	1.24	1.24	1.24
Water Content (23°C, 60% RH, Eq.)	ASTM D570	%	0.45	0.5	0.5
Thermal					
Melting Temperature	ASTM D1525	°C	220	220	220
Melt Flow Rate (240°C, 2.16kg)	ASTM D1238	g/10min	150	60	6
Deflection Temperature : HDT 0.45MPa(4.6 kg/cm²)	ASTM D648	°C	205	210	210
Mechanical					
Tensile Strength	ASTM D638	Kg/cm²	500	600	620
Nominal Strain at Break	ASTM D638	%	>25	>250	>300
Flexural Strength	ASTM D790	Kg/cm²	500	600	620
Flexural Modulus	ASTM D790	Kg/cm²	13,000	18,000	18,000
Charpy Notched Impact Strength	ASTM D256	Kg · cm/cm	5	12	18
Electrical					
Volume Resistivity	ASTM D257	Ω·cm	10^{15}	10^{15}	10^{15}
Dielectric Strength	ASTM D149	KV/mm	20	17	17