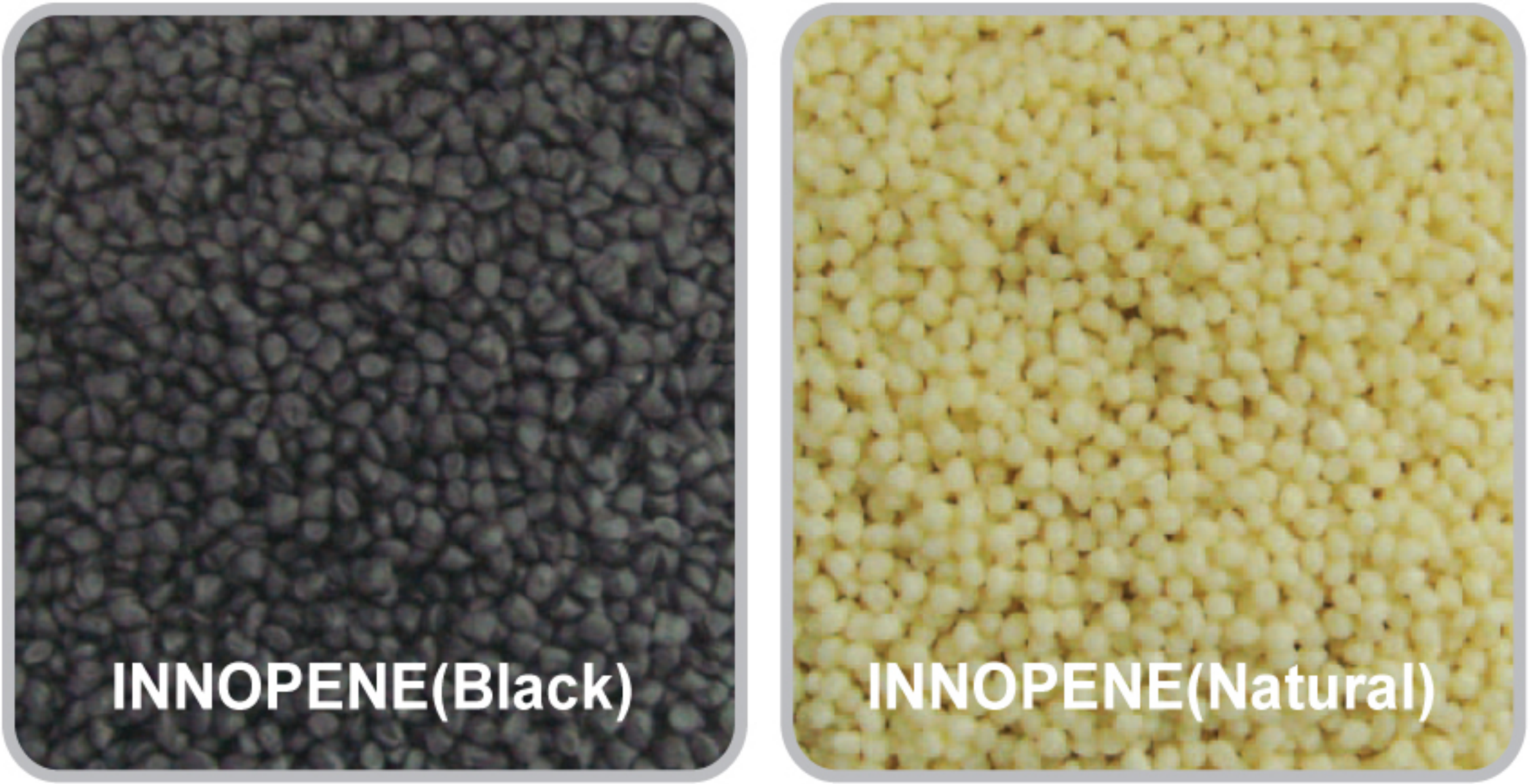


KUMHO POLYCHEM

INNOPRENE / Technical Feature

- _ Low Specific Gravity
- _ Excellent Chemical Resistance & Heat Resistance
- _ Excellent Electrical Insulation
- _ Low Permanent Set & Compression Set
- _ Excellent Flex Fatigue Resistance
- _ Excellent Tear Strength
- _ Excellent Ozone-Resistance & Weather Resistance
- _ Recycling



INNOPRENE / Classification

INNOPRENE can be classified into various product groups from Shore A Hardness 35 to Shore D Hardness 50 and the colors vary from natural tones to dyed black.

First digit	Second & Third digit	Fourth digit	Letter	Examples
Hardness Type	Actual Hardness Value	Grade Type	Hardness Type	INNOPRENE 1550 N - INNOPRENE, Shore A 55 General Purpose, Natural Color ----- INNOPRENE 2400 B - INNOPRENE, Shore D 40 General Purpose, Black Color
1 → Shore A	Test Method →	0 → General Purpose	N → Natural Color	
2 → Shore D	ASTM D 2240 (5 sec)	1~9 → Special Purpose	B → Black Color	

INNOPRENE / Application

- _ **Automotive** : Tubing, Gaskets, Door seals, Dust covers, Impact plates, Interiors, Tubes, Front glass seals, Door belt, Glassrun channel, Bellows, Air intake hose, Wiper & Spoiler, Bumper mud guard, Inpanel skin, Airbag cover/blanket & Holders, Etc.
- _ **Construction** : Glass seals, Expansion joints, Light bulb gaskets, Window seals, Waterproof roofing sheet, Flooring sheet, Track sheet, Etc.
- _ **Office Equipment** : Anti-vibration, Feed rollers, Guards, Anti slipping pad, Etc.
- _ **Appliances** : Hose connectors, Door seals, Interior/Exterior materials, Hoses, Gaskets, Motor mounts, Lever peaks, Electric cleaner wheels, Insulator seals, Light insulator rings, Etc.
- _ **Electrical Equipment** : Syringe tips, Medical device wheels, Power transmitters/receivers, Connectors, Mine cables, Control cables, Coil cords, Power circuit cables, Etc.
- _ **Sports Equipment** : Underwater devices for divers, Fishing pole grips, Ski pole grips, Out door stuff, Etc.

INNOPRENE / Technical Feature

- _ INNOPRENE is manufactured and supplied in pellet form for easy handling and storage.
- _ INNOPRENE may absorb a significant amount of moisture from the atmosphere. INNOPRENE, when exposed to humidity, develops an uneven surface and degraded physical properties. Therefore, be sure to dry INNOPRENE for 2-3 hours at 80~90℃, before processing.
- _ Refer to MSDS for processing INNOPRENE.



For Tomorrow harmonized with Nature,
Humanity and Technology
Kumho Polychem

KUMHO POLYCHEM

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The Best Value **INNOPRENE**

Eco-friendly Thermoplastic Elastomer created by R&D of Kumho Polychem

KUMHO POLYCHEM





INNOPRENE / Physical Properties of INNOPRENE GRADES

Properties		ASTM(ISO) Test Method	TEST Condition	Units	GRADE								
					1350N/B	1450N/B	1550N/B	1640N/B	1730N/B	1800N/B	1870N/B	2400N/B	2500N/B
Hardness		ISO868	25℃	Shore	38A	46A	55A	65A	74A	80A	89A	40D	45D
Specific Gravity		D 297 (ISO1183)	25℃	-	0.95 (0.95)	0.95 (0.95)	0.95 (0.95)	0.95 (0.95)	0.96 (0.96)	0.96 (0.96)	0.95 (0.95)	0.94 (0.94)	0.94 (0.94)
Tensile Strength		D 412 (ISO37)	25℃	kg/cm²	45 (45)	50 (50)	60 (60)	70 (70)	90 (90)	100 (100)	150 (150)	200 (200)	210 (210)
Elongation		D 412 (ISO37)	25℃	%	670 (670)	650 (650)	620 (620)	600 (600)	590 (590)	580 (580)	570 (570)	560 (560)	550 (550)
100% Modulus		D 412 (ISO37)	25℃	kg/cm²	10 (10)	15 (15)	20 (20)	25 (25)	30 (30)	35 (35)	60 (60)	80 (80)	100 (100)
Tear Strength		D 624 (ISO34-1)	25℃	kg/cm	20 (20)	25 (25)	30 (30)	35 (35)	40 (40)	50 (50)	80 (80)	85 (85)	110 (110)
Heat aging	Hardness	ISO188	150℃ x 168 hrs	Shore	+1	+1	+1	+1	+1	+2	+2	+3	+3
	Tensile Strength	D 412 (ISO188)		Change	-6 (-6)	-6 (-6)	-7 (-7)	-8 (-8)	-12 (-12)	-17 (-17)	-17 (-17)	-20 (-20)	-23 (-23)
	Elongation	D 412 (ISO188)		in Property	-10 (-10)	-10 (-10)	-10 (-10)	-12(-12)	-15 (-15)	-16 (-16)	-17 (-17)	-17 (-17)	-25 (-25)
Low Temperature Brittleness		ISO812, Type B		℃	-62	-63	-66	-64	-64	-61	-61	-58	-56
C-set		D395-03 (ISO815 Type A)	120℃ X 70hr	%	38 (38)	40 (40)	43 (43)	45 (45)	50 (50)	60 (60)	70 (70)	75 (75)	75 (75)
			70℃ X 22hr		30	31	23	35	39	45	55	65	70
Fluid resistance (% weight change)	50% NaOH 10% HCl	D 471	25℃ X 168hr	%	+1	+1	+1	0	0	0	0	0	0
			25℃ X 168hr		+4	+3	+3	+2	+3	+2	+2	+1	+1
UV resistance		SAE J1960	1000hr	ΔE*	<1.0	<1.0	< 1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0

※ Above data is representative data of Innoprene, which does not mean the standard specification.

INNOPRENE / Recycle

- INNOPRENE is a thermoplastic rubber of which the waste materials generated during the production process can be recycled.
- Recycled waste does not degrade the physical properties significantly.
- Waste material recycling ratio should be 20% or less to minimize problems during the production process.

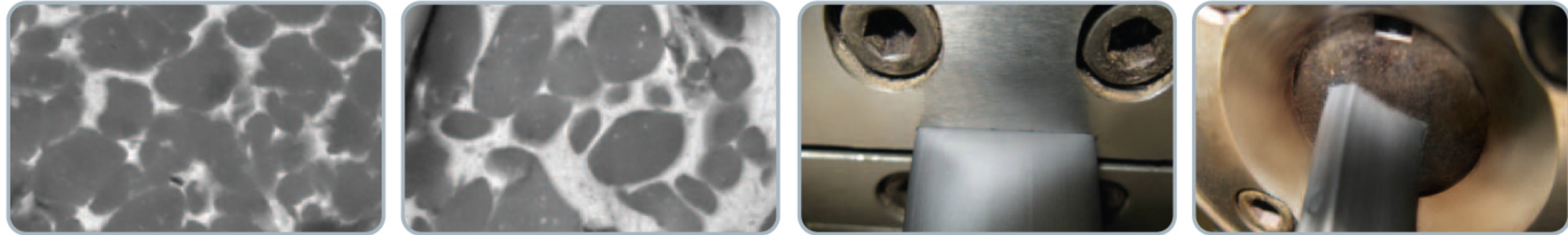
INNOPRENE / Process condition

► INJECTION MOLDING CONDITIONS

- INNOPRENE Series is processed easily in injection molding equipment, producing and releases freely from the mold. Part definition is excellent under normal operating conditions.

ITEMS	CONDITIONS
Drying Temperature	85℃
Drying Time	3.0 hrs
Rear Temperatur	160 ~ 180℃
Middle Temperature	180 ~ 200℃
Front Temperature	200℃
Nozzle Temperature	200 ~ 220℃
Processing (Melt) Temperature	190 ~ 230℃
Mold Temperature	10 ~ 60℃
Cooling Time	20 ~ 30 sec / 100 ~ 175g
Injection Rate	FAST

INNOPRENE / TEM / Extrusion



▲ INNOPRENE TEM Micrographs_56A ▲ INNOPRENE TEM Micrographs_75A ▼ INNOPRENE Extrusion_sheet ▼ INNOPRENE Extrusion_gravey

► EXTRUSION CONDITIONS

- INNOPRENE Series can be extruded to produce profiles, tubing, sheet or insulation and jacketing for wire and cable. Extruders with length to diameter ratios of 24 to 1 greater are recommended for efficient processing of INNOPRENE Series. General purpose, single-stage screws provide the best processing. Compression ratios of 3 to 1 are recommended.

ITEMS	CONDITIONS
Drying Temperature	85℃
Drying Time	3.0 hrs
Feed Temperature	160 ~ 170℃
Zone 1 ~ Zone 3 Temperature	180 ~ 200℃
Head Temperature	200℃
Die Temperature	180 ~ 210℃
Processing (Melt) Temperature	190 ~ 230℃
Screen Pack	20 ~ 60 mesh
Back Pressure	5.0 to 20.0 Mpa

Thermoplastic Elastomer Of Kumho Polychem _
INNOPRENE



As the largest manufacturer of EP rubber in Korea, Kumho Polychem has been contributing greatly to the stable supply of EP rubber to the worldwide market and to the development of the auto industry, competing with the world's top-class companies by producing various products of super quality on the basis of steady R&D. With technology acquired through 20 years of research and production, Kumho Polychem has developed INNOPRENE, a thermoplastic rubber which incorporates the elasticity of thermosetting rubber with the palsticity of thermoplastics. Various INNOPRENE products manufactured by Kumho Polychem are thermoplastic elastomers, which can be used to replace thermosetting products such as EPDM and CR rubbers. They can also replace soft PVC, which has been recognized as a cause of environmental problems. In addition, the weight of final products can be reduced due to those low specific gravities. Since INNOPRENE is a fully cross-linked product, no additional cross-linking process is required before its final use. It is an eco-friendly product of which the scraps generated in the production process can be recycled, thus simplifying the process and saving on costs. As with general plastics, INNOPRENE can be formed by common methods such as extrusion, injection, blow molding, and calendering. Especially, it is one of the new materials used in the extrusion molding (car glass run channels, window gaskets for buildings, etc.).