



| Handling Precautions |

Storage	Polyol should be sealed and stored in a dark and cold place. Avoid contact with water. After opening, it should be resealed and stored in an environment of nitrogen or dry air.
Handling	Polyol is a hazardous material. Handle polyol with care; always wear goggles and protective gloves. Anyone who handles polyol should learn and follow the required safety procedures. For detailed instructions, please refer to the material safety data sheet (MSDS).
Fire and Explosion	In case of fire, use dry-chemical carbon dioxide or chemical foam extinguisher.
Waste material treatment	If leaked, ventilate and leave the site. Only those with appropriate training and protective gear should remove leaked material and treat the waste material. Cover the leaked material with industrial absorbent or sand, and place it in an empty container bearing a warning label before disposal.
Toxicity and First aid treatment	<p>(1) If polyol comes into contact with skin or eye : Wash with plenty of water for at least 15 minutes and consult a physician.</p> <p>(2) If swallowed : Dilute it with a large quantity of drinking water and induce vomiting. Consult a physician.</p> <p>(3) If vapor is inhaled : Leave the site immediately and seek fresh air. Consult a physician.</p>

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KUMHO PETROCHEMICAL

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KUMHO PPG

Polyether Polyol

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KUMHO PETROCHEMICAL

| Product Introduction |

Kumho Petrochemical Co., LTD produces excellent products by automatic processing, using on-line computer systems and quality control. We are doing our best to satisfy our customers through technologies based on our research and development. Kumho PPG is used in the production of a wide range of products such as shoes, furniture, beds, automobile parts, laminated panels, refrigerated containers, artificial woods, adhesives, coating materials, elastomers and sealants.

| Typical Properties & Characteristics |

*** Polyether Polyol for flexible polyurethane foam**

Flexible PUR foam has an opened cell structure, which provides for good airflow and provides outstanding cushioning. Superb characteristics for a wide range of density and mechanical properties, such as elongation, tensile strength, and resilience, can be achieved through chemical formulation. Semi-flexible polyurethane foams, which show partially rigid PUR foam characteristics, are generally used for applications that require shock-absorbance.

Application	Grade	OH No (mg KOH/g)	Viscosity (cps at 25°C)	Water (%)	Characteristics
Base Polyols for Slabstock & Mold	PPG-2070	220~250	350~450	0.1↓	General-purpose base polyol for slow recovery foam
	PPG-3010	55~58	400~500	0.1↓	General-purpose base polyol for slabstock
	PPG-3022	54~58	400~500	0.1↓	General-purpose base polyol for slabstock
	PPG-3322	46~49	500~600	0.1↓	General-purpose reactive polyol for slabstock
	PPG-4701	32~36	700~800	0.1↓	Reactive base polyol for cold cure system
	PPG-5021	29~35	1,650~2,150	0.1↓	Specialty polyol for cold cure, Cell opener
	PPG-5815	26~30	1,000~1,300	0.1↓	Reactive base polyol for high resilience cold cure
	PPG-5815 N	22~26	1,500~2,000	0.1↓	Reactive base polyol for extra high resilience cold cure
	PPG-6000	26~30	1,000~1,300	0.1↓	Reactive base polyol for high resilience cold cure
CPP(POP)	PPG CS-743	28~32	4,000~6,000	0.1↓	High hardness for slab, Slabstock foam
	PPG CS-540	18~24	5,000~8,000	0.1↓	Flexible mold foam
	PPG-3600		675~925		Slabstock foam(Solid content 10%)
	PPG-3601		850~1,100	0.1↓	Slabstock foam(Solid content 15%)
Slab Blend	PPG-3602		1,200~2,000	0.1↓	Slabstock foam(Solid content 25%)
	PPG-3526	47~50	700~800	0.1↓	Flame lamination (LF) foam system with low fogging
	PPG-9400		430~480		Reactive polyol for amine cata.free(Low Density)
Seat	PPG-9450		430~550		Reactive polyol for amine cata.free(High Density)
	PPG-4600		1,500~1,800		Table cushion system (MT cold cure)
	PPG 4605		1,100~1,200		Cushion system for car and furniture(MDI cold cure)
NVH	PPG-4607		1,600~2,200		High density cushion system (TM cold cure)
	PPG-7421 series		1,100~1,300		Viscoelastic foam system for carpet backing
	PPG-7450		1,000~1,500		Viscoelastic foam system for dashboard
	PPG-7470		1,000~1,200		Low viscoelastic system
Head rest	PPG-7601		700~1,200		Slow recovery system for mold
	PPG-4750		1,500~1,800		Head rest system for one piece mold
Sunvisor	PPG-7605		1,900~2,300		Low density sunvisor system
	PPG-7606		1,900~2,300		High density sunvisor system
Packaging	PPG-7707		200~400		Flexible type packaging cushion system (all water)
	PPG-7708		300~500		Rigid type packaging cushion system (all water)
Semi-Rigid, ISF & RIM	PPG-7709		1,500~2,000		Arm Rest, Console box
	PPG-7810		2,400~3,000		Table edge system
	PPG-7815		1,500~2,500		General side impact pad system
	PPG-7820		1,500~2,500		Non-Foam for wheel flare and bumper guard
Appliance	PPG-781	380~420	1,600~3,200		Blended polyol, for R-11
	PPG-782	400~490	4,000~7,000		Blended polyol, for R-141b
	PPG-784	370~430	3,000~6,000		Blended polyol, for C-pentane
	PPG-771	400~430	400~700		System polyol, C-pentane

*** Polyether Polyol for non-cellular polyurethane applications**

Polyether Polyol used for non-foam application are typically diols and triols, and their major applications are for adhesives, floor coatings, elastomers and sealants. Their chemical structures, and, thus, their physical properties, vary with the application.

Grade	Functionality	MW	OH No (mg KOH/g)	Viscosity (cps at 25°C)	Water (%)	Characteristics
PPG-1000D	2	1,000	105~115	135~165	0.05↓	Good abrasion, Fatigue resistance, Elongation
PPG-2000D	2	2,000	54~58	260~340	0.05↓	Better abrasion, Fatigue resistance, Elongation
PPG-2100	3	3,000	54~58	460~520	0.05↓	Good resilience, Tensile strength, Hardness
PPG-3000D	2	3,000	33~37	540~640	0.05↓	High abrasion, Flex fatigue resistance, Elongation
PPG-3020	3	3,000	52~54	480~540	0.05↓	Highly reactive triol
PPG-4000	3	4,000	40~44	450~750	0.05↓	Good resilience, Tensile strength
PPG-400D	2	400	265~295	50~80	0.05↓	Low viscosity, Good flowability
PPG-4020D	2	4,000	26~30	850~1,150	0.05↓	Highly reactive diol
PPG-4701N	3	4,800	32~36	700~800	0.05↓	Better resilience, Tensile strength, Hardness
PPG-5000	3	5,000	31~35	800~1,000	0.05↓	Good resilience, Tensile strength

*** Polyether polyol for rigid polyurethane foam**

Rigid PUR foam is widely used as a thermal insulator in household appliances and for industrial applications due to their excellent physical properties, such as low thermal conductivity, good adhesion to other substrates, cushioning properties and being lightweight. Other advantages of using Rigid PUR foam are processing convenience, such as in-situ molding, and versatility due to a wide range of properties resulting from the chemical formulation, depending on the desired application.

Application	Grade	OH No (mg KOH/g)	Viscosity (cps at 25°C)	Water (%)	Characteristics
Base polyols for Rigid	PPG-280	270~290	200~300	0.1↓	Low viscous & reactive polyol
	PPG-360	350~370	3,000~4,000	0.1↓	High functional polyol
	PPG-365	355~375	300~400	0.1↓	Low-viscous & reactive polyol
	PPG-366	350~370	1,000~2,000	0.1↓	Low-viscous & reactive polyol, Low K-factor
	PPG-391	385~405	3,500~5,500	0.1↓	Low K-factor
	PPG-440	440~460	5,000~6,000	0.1↓	High functional polyol
	PPG-450	345~385	300~400	0.1↓	Low-viscous polyol
	PPG-455	410~460	12,000~16,000	0.1↓	High functional polyol
	PPG-482	460~500	35,000~55,000	0.1↓	High functional polyol
	PPG-490	480~500	6,500~7,500	0.1↓	Low-viscous polyol
	PPG-500	380~420	1,800~2,000	0.1↓	Low-viscous & reactive polyol
	PPG-510	490~510	4,500~5,500	0.1↓	Low-viscous polyol
	PPG-640	625~655	15,000~17,000	0.1↓	Reactive polyol
	PPG-750	735~765	16,000~19,000	0.1↓	High-viscous & reactive polyol
Refrigerator	PPG-771		350~650		System polyol, C-pentane
Container	PPG-433 series		2,000~2,500		R-141b system for general pour-in-place foam
DBL	PPG-602		2,200~3,200		R-141b blended system for double band lamination(PUR system)
	PPG-604A		300~500		R-141b blended system for double band lamination(PUR system)
	PPG-604B		500~700		R-141b blended system for double band lamination(PUR system)
	PPG-605D		2,400~3,400		R-141b blended system for double band lamination(PUR system)
	PPG-605C		2,300~3,300		R-141b blended system for double band lamination(PUR system)
	PPG-611		350~550		R-141b blended system for double band lamination(PIR system)
DCP	PPG-433.56		200~600		Low density R-11 system and R-141b
	PPG-542		800~1400		High density all water system polyol
Spray	PPG-541 series		200~400		R-11 system for spray
Wood	PPG-401 series		1,000~1,500		All water system for high density imitation wood
Pipe	PPG-306 series		500~700		R-141b system for pipe insulation
Block	PPG-548 series		500~700		R-141b system for block
Adhesive	PPG-310 series		300~600		All water system for EPS panel adhesion
LNG	PPG-410		1,000~1,400		CO ₂ blown system for LNG carrier cargo container ship
Automotive	PPG-7910		1,000~2,000		Side impact bar

