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## Achieve Higher Performance and Improved Processing with LM Polyol

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VORANOL™ 223-060LM polyol is a newly developed polyether polyol that offers enhanced mechanical performance, abrasion and long-term durability compared to conventional propylene glycol (PPG) systems (PPG+). It enables optimized microphase separation from conventional urethane hard segment chemistries to permit formulation of high-performance polyurethane systems. This innovative upgrade continues to offer the excellent processing performance of standard polyether materials.

The combination of low viscosity at room temperature and high primary hydroxyl content can reduce production costs through fast cure and process cycle times and low processing temperatures.

Its low viscosity also contributes to easier process and storage management across a broad temperature range.

VORANOL™ 223-060LM polyol is the result of development of PPG polyether polyols with low unsaturation for cost-effective use in coatings, adhesives, sealants and elastomers (CASE) and thermoplastic polyurethane (TPU) applications.

The material performance of VORANOL™ 223-060LM has been benchmarked against alternative PPG-based polyether polyols in cast elastomers and TPUs and shown to deliver comparable performance.

### **The VORANOL™ Advantage**

VORANOL™ 223-060LM polyol product advantages include:

- Ease of processing
- Ease of formulation
- High reactivity
- Excellent mechanical properties
- Consistent performance
- Broad processing latitude
- Superior performance compared to polyether polyols for elastomer applications
- Potential for use where higher performance requirements are present
- High pressure and high heat resistance
- High impact absorbance
- Balance of fast reactivity and water uptake

Specification	Target	Range	Method
OH Number	61 mg/g	±2	ASTM D427D
Viscosity (25°C)	300 mPa.s	±15	ASTM D4878

<sup>(a)</sup>AHEW signifies amine hydrogen equivalent weight <sup>(b)</sup>Measured with a 100g sample of D.E.R. 331 at 25 °C

<sup>(c)</sup>Hydroxyl equivalent weight, g/eq <sup>(d)</sup>Measured at 150 °C

### Cast Elastomer Property Comparison

Polyol Type	Shore A (D2240)	% NCO Prepolymer (D2572)	UTS (psi)	TS @100% (psi)	TS @300% (psi)	Elongation (%)	T <sub>g</sub> (°C) (DMA)	Compression Set (% D395 B*)	Resiliency (% Ball Rebound)	Mass Uptake % (7 day, 50°C, Water)	% Retention of TS (7 day, 50°C, Water)
EO-capped polyether polyol (2,000 g/mol)	84	12.3	5900	550	960	1780	-19	43	47	~10	~50
VORANOL™ 223-060LM	85	14.0	5980	610	1030	1860	-23	32	45	~4.5	~70

In all cases, (DXXXX) refers to ASTM utilized

\*70°C, 25%, 24 hours

### Cast Elastomer Application

Hardness (Shore A, D2240)	Tensile Strength, TS (psi, D1708)	% Elongation (D1708)	Tear (Die C, D624) (pli)	Resilience (% Rebound, D3574)	Glass Transition, T <sub>g</sub> (°C)	Mass Uptake % (14 day, 70°C, Water)	% Retention of TS (14 day, 70°C, Water)
91	4290	547	588	29%	-13	3.9	75%
75	3230	655	324	33%	-21	4.9	68%

One-shot process where polyol is mixed with chain extender, catalyst and MDI at room temperature and index of 1.05. Elastomers were cast into heated open mold at 80°C, demolded after 5 minutes and post cured at 100°C for 16 hours. Testing followed ASTM.

% NCO	Prepolymer Viscosity @ 25 °C (Pa.s)	Hardness (Shore A)	Tensile Strength (psi)	Tear Strength (pli)	Modulus @100% (psi)	Modulus @300% (psi)	Elongation (%)	Compression Set (%)
5.5	9.38	90	3770	508	1044	1639	655	50

Full prepolymers synthesized using TDI-100 and cured with dimethylthiotoulenediamine at 1.05 index. Cast into heated open mold at 100°C and post cured at 100°C for 16 hours properties per JIS K3712.

*Innovating For You*

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