

FUNCTIONAL PRODUCTS INC.

Innovative Chemistry for Lubricants

Key points on Functional V-235 polymer:

- Product is easy to handle. The solid pellet polymer eliminates the need for a guillotine and grinder, which saves the customer money. Also, if a viscosity boost is needed the polymer may be easily blended.
- Rapid solubilization. The pellets have high amount of surface area reducing blending time. Blending is recommended at < 120°C. The time depends on the customer's current blending set up.
- The product has a PSSI (shear stability) of 39%, which allows for formulation in oil blends.
Shear stability is a calculated number which compares the change in viscosity of fresh oil against mechanically worked oil. The lower the number, the better. A PSSI of 39% means that 61% of the polymers thickening power have been retained. ASTM-D6278 and ASTM-D 6022.
- Polymer is readily available from our manufacturing plant in Ohio, or our distribution points throughout the world.

THE CUSTOMER IS RESPONSIBLE FOR CHECKING THE PRODUCT IN ITS APPLICATION. THE EVALUATION SHOULD INCLUDE ALL TESTS APPROPRIATE FOR A GASOLINE OR DIESEL ENGINE OIL. THE RESPONSIBILITY OF END APPLICATION PERFORMANCE IS THE CUSTOMERS.

Background on Functional Products:

- Founded in 1985. ISO 9001:2008 certified. REACH Compliant
- Functional received the "**Best Paper Award**" at the 2011 ELGI (European Lubricants and Grease Institute) Annual Meeting in Paris in May. The topic was polymer compatibility in mineral and vegetable oils. There were 400 delegates from 27 countries.
- Dan Vargo Senior Research Scientist at Functional Products was recently named a Technical Editor to TLT (Tribology Lubrication Transactions, the STLE technical journal).
- Functional Products contributed to the TLT's article on Viscosity Modifiers in the September 2011 and the December 2012 on polymers used in grease.
- Functional Products will provides instruction on polymers to the Advanced Grease Course at NLGI conference.
- Authored technical papers, written chapters in books- Leslie Rudnick's Lubricant Additives chapter on tackifiers, and actively participate in a numerous technical associations throughout the world.
- In October 2011, Functional Products received an award for its paper at the National Lubricating Grease Symposium in Wuyishan China

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PRODUCT PERFORMANCE:

	V-235	Lubrizol 7065C
Shear Stability		
PSSI (ASTM D6278)	39%	35%
Thickening Efficiency		
1% polymer+ ISO 32, cSt	13.9 cSt	13.0 cSt
% Polymer = 1000 cSt	9.0%	9.5%
CCS		
1.5% polymer in ISO 22, -25°C	6943	--

APPROXIMATE POLYMER TREAT RATES FOR MOTOR OIL:

	SAE 30	SAE 40	SAE 50
Base Oil SN 150 ISO 32			
Viscosity Modifier:			
V-235 (pellet)	0.80-1.00 wt%	1.00-1.25 wt%	1.25-1.50 wt%
Low Temperature Grade (with 0.3 wt% PD-610 in SN 100 base oil)	10W	5W	5W

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