

# FUNCTIONAL PRODUCTS INC.

Innovative Chemistry for Lubricants

## Technical Note: V-255 Polymer Clarity

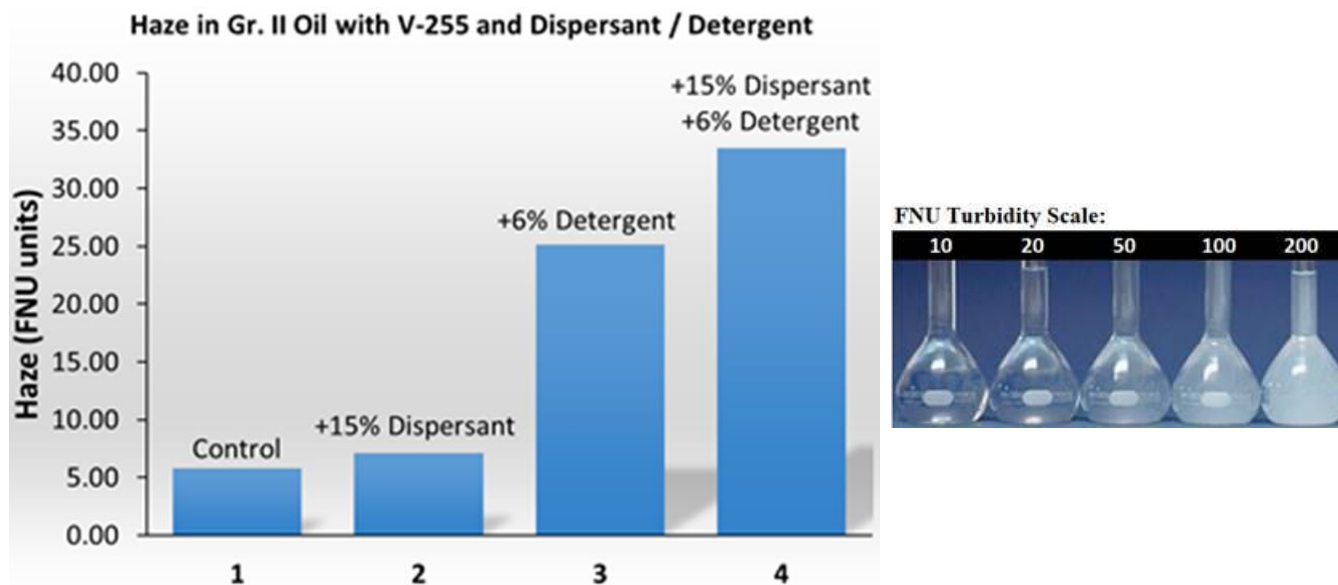
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Functional V-255 is an economical and convenient pellet-form VI improver (viscosity index improver) for lubricant formulators and additive manufacturers. For all polymers, it is known that high treat of additive packages can produce an antagonistic effect on polymer VI improvers. The effect may result in haze if not carefully checked. The V.I. improver treatment level depends on the choice of additive package. This has been communicated for some time now.

Recent work on identifying the source of the effect between polymers and additive packages shows that the detergent, rather than the dispersant, is a prime factor. In the study, 1.5wt% V-255 was prepared in a Gr. II oil blend to prepare a 16.3 cSt high VI blend. This blend (control) was top-treated with 15% dispersant and/or 6% detergent which is representative of final treat rates of such additives in heavy duty applications – especially diesel engine oil where the additive package may comprise up to 30% of the finished formulation and contamination by fuel can pose further stress on the lubricant.

Samples were blended for 1hr at 60°C and frozen overnight (16hrs) at -20C below allowing to thaw at room temperature. Haze was measured using a Milwaukee Mi 415 turbidity meter in FNU units.

Data shown below compares the effect of dispersant and detergent on the observed haze (in FNU units). The FNU turbidity scale with visual references for 10 – 200 units is shown at below. See next page for formulations of samples #1 – 4. It is apparent that highly ionic detergents are a major factor in haze observed with olefin copolymers like V-255 in lube oil.



Functional Products is continuing research to anticipate and address when these issues will occur.

As always, Functional Products recommends formulators to allow finished formulas to stand at room temperature for an extended period of time before assessing clarity. Freezing a lubricant (at -20C for 16hrs or -54C for 72hrs for more aggressive testing) and allowing the oil to thaw to room temperature before assessing is most recommended in order to identify potential issues with an additive package / polymer combination.

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## Sample Lubricant Formulations with OCP VI Improver (Top-Treated with Dispersant/Detergent)

	1	2	3	4
Formulation:	Control	+15% Dispersant	+6% Detergent	+15% Dispersant / +6% Detergent
V-255	1.5%	1.3%	1.4%	1.2%
100N Gr. II	70.4%	59.8%	66.1%	55.6%
300N Gr. II	28.1%	23.9%	26.5%	22.2%
Dispersant (ashless succinimide)		15.0%		15.0%
Detergent (425 BN ionic detergent)			6.0%	6.0%
<b>KV40, cSt</b>	124.8	--	--	--
<b>KV100, cSt</b>	16.26	--	--	--
<b>Viscosity Index</b>	139	--	--	--
<b>Haze (FNU units, Milwaukee Mi 415)</b>	5.80	7.13	25.12	33.52