Petroleum Department

VANLUBE® W-324

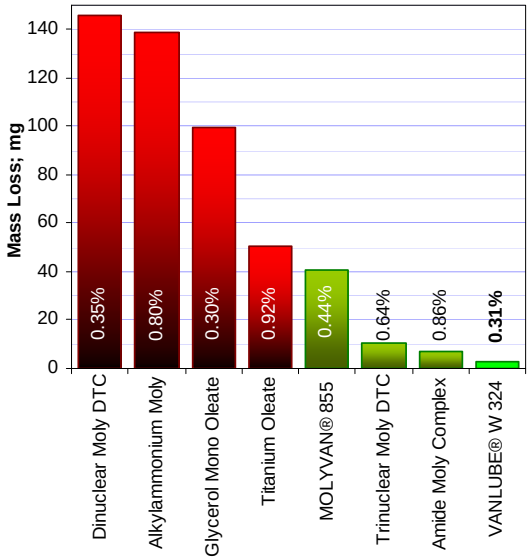
Tungsten Lubricant Additive

Antiwear Agent *Antioxidant*

Typical Properties	
Physical State:	Liquid
Density at 25°C, Mg/m^3:	1.06
Flash Point, PMCC, °C:	175
Nitrogen Content, %:	1.2
Tungsten Content, %	14

VANLUBE® W-324 Lubricant Additive is an organotungstate which is soluble in petroleum fuels and lubricants. It is an effective general-purpose, sulfur and phosphorus-free antioxidant and antiwear agent for a wide range of automotive and industrial lubricants.

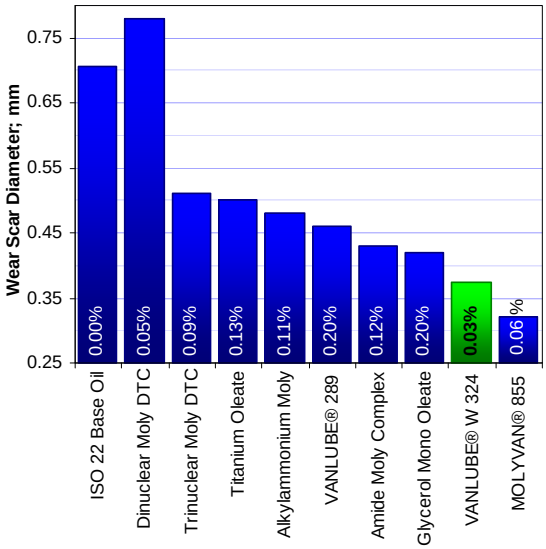
Falex Pin & Vee Block
500 lb. load; 1 hr.
350 ppm metal where applicable



% = Weight Percent of Additive
Red = Failed Test; Pin Broke

FIGURE 1
VANLUBE® W-324 provides superior antiwear protection relative to other lubricant additives in the Falex Pin and Vee Block. Here it provides 58% more protection while using 63% less additive than its nearest competitor.

ASTM 4172[1]: Four Ball Wear
[1]1800 rpm; 54°C; 1 hr. @ 20 kgf
50 ppm metal where applicable



% = Weight Percent of Additive

FIGURE 2
In the Four Ball Wear test, **VANLUBE® W-324** provides excellent antiwear protection with only 50 ppm of tungsten, and at half the charged weight of its nearest competitor.

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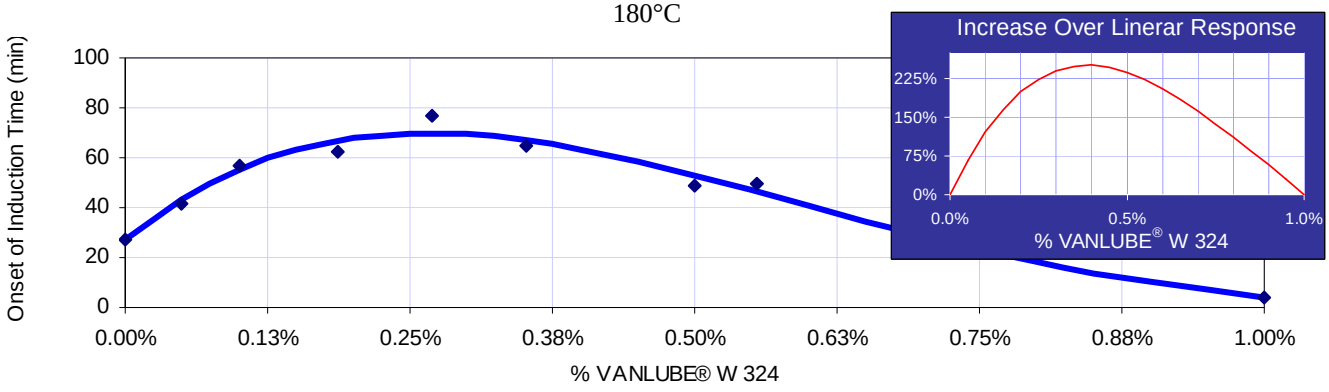
Telephone: (203) 853-1400 - Fax: (203) 853-1452 - Web Site: www.vanderbiltchemicals.com

ASTM D6186: Pressurized Differential Scanning Calorimetry

180°C



% VANLUBE® W 324

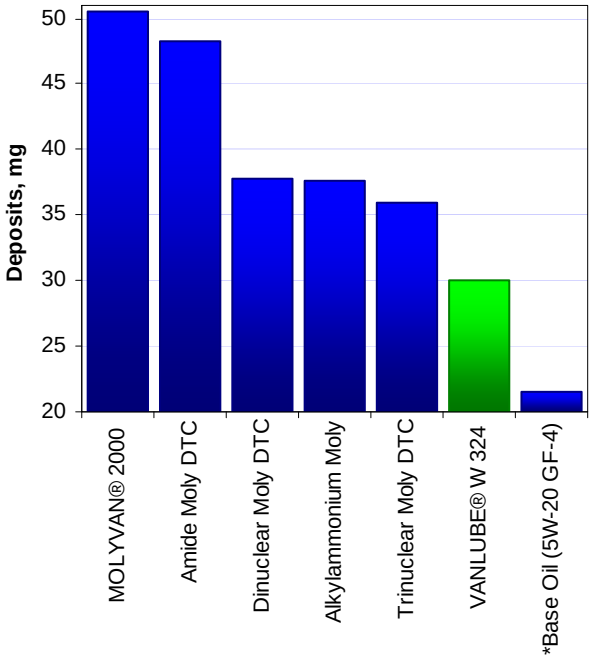
Base Oil (naphthenic) = 99%wt; VANLUBE® W 324 + VANLUBE® 961= 1%wt

FIGURE 3

VANLUBE® W-324 works as an antioxidant synergist with alkylated diphenylamines. In the graph above it is shown to increase the effectiveness of VANLUBE® 961 by 250%.

ASTM D6335: TEOST 33C

700 ppm W or Mo



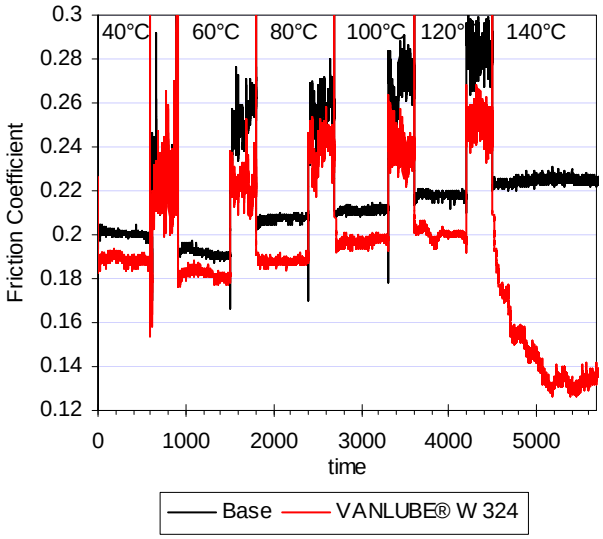
* Base Oil has no Significant Molybdenum Content

FIGURE 4

VANLUBE® W-324 resists deposit formation more effectively than molybdenum when exposed to high temperatures.

SRV Friction Test

700 ppm W



Base= ISO 32 Group II + 3.9% dispersant + ZDDP (600ppm P) + 1% VANLUBE® SL

Ball on Disk; 4N; 20 Hz; 10 min @ *x* °C followed by 5 min hold

FIGURE 5

VANLUBE® W-324 activates at elevated temperatures to provide friction modification.

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