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VANDERBILT Technical Data

VANLUBE® 289 Lubricant Additive

ASHLESS ANTIWEAR ADDITIVE

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VANLUBE® 289 Lubricant Additive

ASHLESS ANTIWEAR ADDITIVE

Typical Properties

Composition:	Borate Ester
Physical State:	Yellow Liquid
Color, ASTM D 1500:	L 1.5
Density at 15.6 °C, Mg/m^3:	0.99
Viscosity at 40 °C, cSt:	458
Viscosity at 100 °C, cSt:	22.3
Flash Point, PMCC, °C:	191
Boron Content, %:	1.0

VANLUBE 289 is an effective antiwear additive, by itself or in combination with other antiwear/EP additives. It contains no phosphorus, sulfur, or metals, and it is useful in eliminating and/or reducing levels of these elements in lubricants.

Falex® Pin and Vee Block Test data (Figures 1, 2 and 3) show that **VANLUBE 289** affords antiwear protection not provided by other additives such as zinc dithiophosphate (ZDDP), ashless dithiophosphate (ADDP), zinc dithiocarbamate (ZnDTC), molybdenum dithiocarbamate (MoDTC), ashless dithiocarbamate (ADTC), and alkyl thiadiazole (ATD). The Falex Pin and Vee Block Test data (Figures 2 and 3) also show that **VANLUBE 289** forms synergistic combinations with these additives.

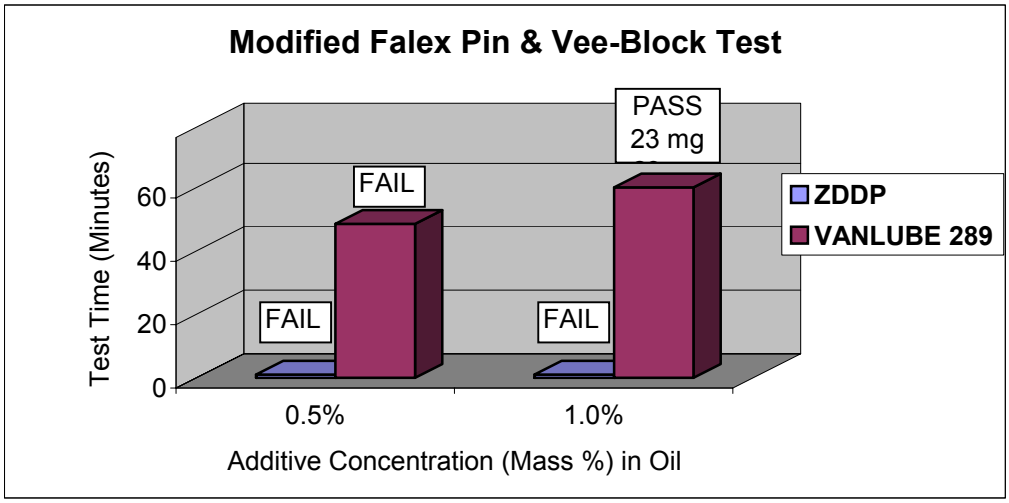

Figure 1. The bar plot compares the antiwear performance of **VANLUBE 289** with that of ZDDP. A 500 pound jaw load was applied to the standard steel vee-blocks and pin. The pin was rotated at 290 rpm for 60 minutes. Under these test conditions, a FAIL rating is considered to be any test which did not run for 60 minutes due to excessive wear or high torque. Mass loss is not relevant to FAIL ratings, and is therefore not provided.

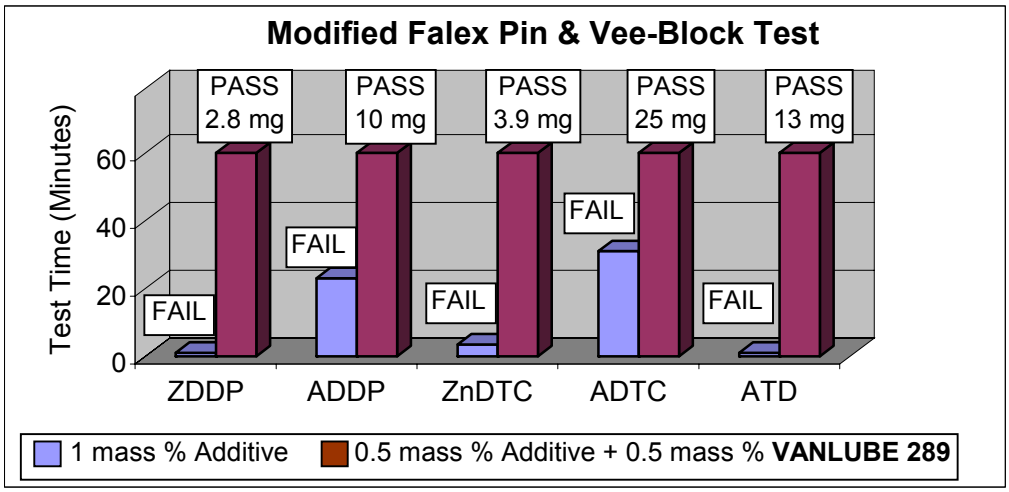

Figure 2. The bar plot compares the antiwear performance of single additives with and without **VANLUBE 289**. A 500 pound jaw load of was applied to the standard steel vee-blocks and pin. The pin was rotated at 290 rpm for 60 minutes. Under these test conditions, a FAIL rating is considered to be any test which did not run for 60 minutes due to excessive wear or high torque. Mass loss is not relevant to FAIL ratings, and is therefore not provided.

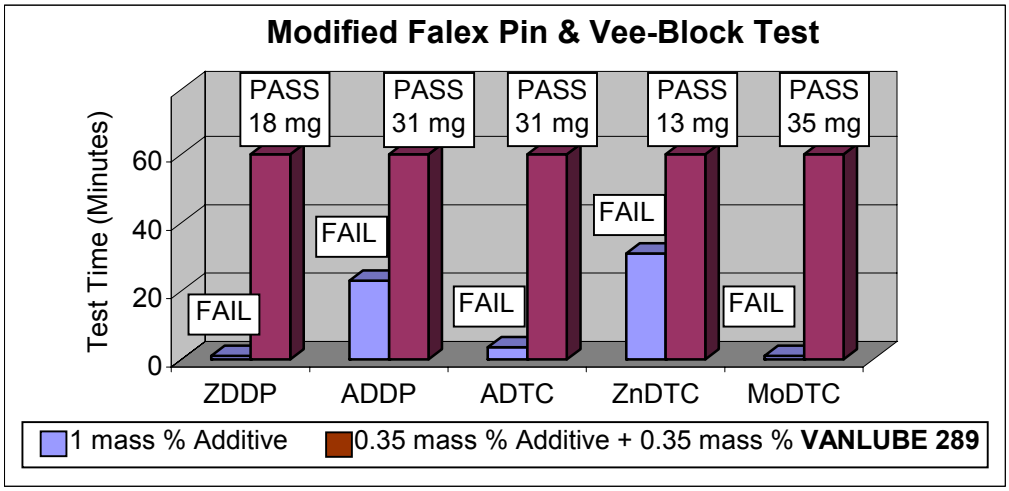

Figure 3. The bar plot compares the antiwear performance of single additives with and without **VANLUBE 289**. The additive combinations at 0.70 mass percent treat level outperformed the single additives at 1.0 mass percent treat level. A 500 pound jaw load was applied to the standard steel vee-blocks and pin. The pin was rotated at 290 rpm for 60 minutes. Under these test conditions, a FAIL rating is considered to be any test which did not run for 60 minutes due to excessive wear or high torque. Mass loss is not relevant to FAIL ratings, and is therefore not provided.

An Optimol® High Frequency, Linear-Oscillation SRV® test machine demonstrates that more durable and lower friction antiwear films are formed when **VANLUBE 289** is combined with other additives. At equivalent treat levels of 1.0 mass percent, lubricating compositions containing the additive combinations maintained lower friction coefficients for longer periods of time than lubricating compositions treated with single additives. The synergy between **VANLUBE 289** and **VANLUBE 871** and that between **VANLUBE 289** and ZDDP, is shown in Figures 4 and 5 respectively.

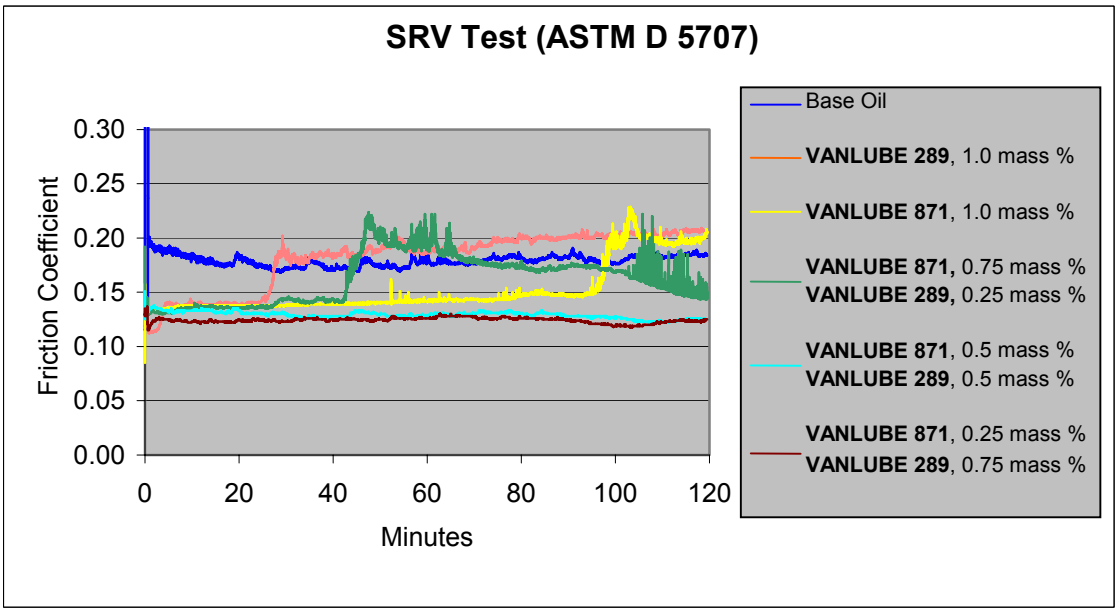

Figure 4. Test Parameters: 80 ºC; 50 N break-in load; 200 N test load; 50 Hz; 1.00 mm stroke; test duration of 120 minutes.

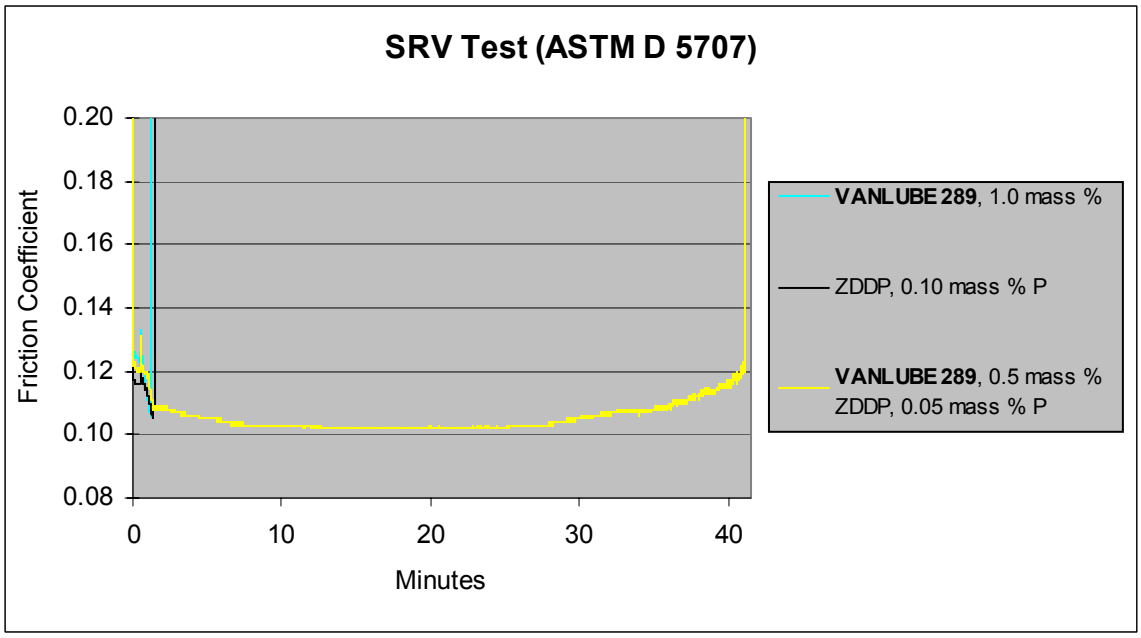

Figure 5. Test Parameters: 25ºC; 50 N break-in load; 1000 N test load; 50 Hz; 1.00 mm stroke. Experiments ran until failure as indicated by a large and sudden increase in the friction coefficients.

Storage and Handling Suggestions

Unloading pumping temperature:	20 °C
Unloading maximum temperature:	60 °C
Storage temperature:	Room temperature

All synergistic combinations containing **VANLUBE 289** are part of Patent Application US 2004/0138073 A1, “SYNERGISTIC ORGANOBORATE COMPOSITIONS AND LUBRICATING COMPOSITIONS CONTAINING THE SAME”.

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