

### FUNCTIONAL V-521

#### Concentrated Low Temperature Thickener for Biobased and Synthetic Ester Lubricants

#### APPLICATION:

**FUNCTIONAL V-521** is a thickener for vegetable oil and synthetic ester lubricants that demonstrates improved low temperature fluidity. **FUNCTIONAL V-521** is best suited to low pour point synthetic esters such as adipates and TMPTO where the thickening from this viscosity modifier has little influence on pour point or cold flow. **FUNCTIONAL V-521** in combination with low viscosity esters can replace the need for high viscosity complex esters and provide greater biodegradability and fluidity.

#### COMPOSITION:

The active component in **FUNCTIONAL V-521** is a polymer selected for its low temperature fluidity. This polymer is not readily biodegradable. The diluent in **FUNCTIONAL V-521** is a biodegradable vegetable oil.

Typical Properties	
Specific Gravity	0.93
Lbs per Gallon	7.75
Flash Point, ASTM D92	150°C (300°F)
Kinematic Viscosity, ASTM D445	5000 cSt at 100°C
Color, ASTM D1500	Light yellow (< 2.0)
Biodegradable Content, wt%, Approximate	83%
Shear Stability Index (PSSI), ASTM D6278 (10wt% in Canola)	30 SSI
20hr KRL Shear Stability, CEC L-45-A-99 (10wt% in Canola)	80%

#### TREATMENT LEVEL:

3 – 15% **FUNCTIONAL V-521** is typical in preparing ISO 46 – 100 hydraulic fluids in vegetable oils. **FUNCTIONAL V-521** has little effect on pour point as it thickens and is ideal for synthetic esters like TMPTO or adipate to prepare low temperature fluids and even heavy duty synthetic lubricants. See next page for treat rates.

#### HANDLING:

**FUNCTIONAL V-521** can be warmed to about 50°C (120°F) to facilitate pumping and handling. Extended storage of this or any other vegetable oil derived product at elevated temperatures or below freezing is not recommended.

# FUNCTIONAL PRODUCTS INC.

Innovative Chemistry for Lubricants

## Technical Data Sheet

### FORMULATION GUIDE:

**FUNCTIONAL V-521** is ideal for low temperature formulations when compared with **FUNCTIONAL V-508F**. **FUNCTIONAL V-521** may be used from a light ISO 46 fluid with very low pour points up to heavy open gear mining fluids and greases which still require some degree of mobility at low temperature.

**FUNCTIONAL V-521 Treat Rates in Canola Oil (Starting From ISO 32-36)**

ISO VG	46	68	100	150	220	320	460	680	1000	1500	2200	3200	4600
wt%	4	8	14	20	24	27	33	38	43	48	52.4	57	62

When **FUNCTIONAL V-521** and/or vegetable oil are blended at  $\geq 25\text{wt}\%$  in synthetic esters, a vegetable oil pour point depressant like **FUNCTIONAL PD-585** at 0.5 – 1.0wt% will reduce the effect of the vegetable oil diluent and further improve cold flow and pour point.

Example soybean oil / adipate hydraulic fluids from 'full vegetable oil' to 'full synthetic':

Formula (wt%):	ISO 32 FULL VEG	ISO 32 SEMISYNTHETIC	ISO 32 FULL SYNTHETIC	ISO 46 FULL VEG	ISO 46 SEMISYNTHETIC
High Oleic Soy Oil	89.7	39.25	0	95.5	47.75
Diisodecyl Adipate	0	54	89.5	0	43
Methyl Ester	7.7	0	0	0	0
<b>Functional V-521</b>	0	4	8	1.5	6.5
<b>Functional PD-585</b>	0.5	0.25	0	0.5	0.25
<b>Functional HF-580</b>	2.5	2.5	2.5	2.5	2.5
<b>KV40 (D445)</b>	32.57	34.41	33.66	47.55	47.33
<b>KV100 (D445)</b>	7.59	7.68	8	9.86	10.44
<b>VI (D2270)</b>	214	202	223	200	218
<b>Pour Point (D97)</b>	-27C	-42C	-54C	-27C	-33C
<b>% Biobased</b>	97.4%	91.2%	87.3%	96.8%	91.9%

### FUNCTIONAL '521' VARIANTS:

- **FUNCTIONAL V-521L** – Dilute, in canola oil, 300 cSt @ 100°C

This Technical Data Sheet and the Safety Data Sheet contain information believed to be accurate and reliable. No warranty is made, however, to information beyond the control of FUNCTIONAL PRODUCTS INC. The engineering and management personnel of the user are responsible for determining the suitability of this or any product for any specific application, and this information is offered to them for that purpose.

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Functional Products, Inc. 8282 Bavaria Rd. Macedonia, Ohio 44056

Ph: 330.963.3060 Fax: 330.963.3322