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## Viscosity Index Improvers and Pour Point Depressants for Lubricating Oils

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# ACLUBE Products

### Preface

Since Sanyo Chemical developed ACLUBE, as a viscosity index improver, in 1963, we have been pursuing our studies and bringing various lubricating oil additives to the marketplace.

When automobiles and hydraulic machines are used in a wide range of temperatures, viscosity index improvers and pour point depressants are required. The ACLUBE line includes viscosity index improvers and pour point depressants for lubricating oils which are mainly composed of a methacrylate copolymer and a refined mineral oil. Lubricating oils (engine oil, ATFs, CVTFs, gear oils, hydraulic fluids, etc.) having excellent viscosity characteristics can be prepared by blending ACLUBE products with mineral oils.

We offer a wide range of viscosity index improvers and pour point depressants for lubricating oils under the trade name of ACLUBE as follows:

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Typical Property

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Tables 1 and 2 show the typical properties of ACLUBE products. The values are representatives.

Table 1. Viscosity Index Improver

| Product Name  | Property                            |   |
|---------------|-------------------------------------|---|
|               | Appearance at 40 °C                 | Kinematic Viscosity at 100 °C<br>mm <sup>2</sup> /s |
| ACLUBE V-1001 | Pale yellow to yellow liquid        | 360   |
| ACLUBE V-1010 | Straw colored liquid                | 590   |
| ACLUBE V-1050 | Pale yellow to straw colored liquid | 520   |
| ACLUBE V-1040 | Straw colored liquid                | 510   |
| ACLUBE V-1030 | Pale straw colored liquid           | 260   |
| ACLUBE V-2041 | Yellow to straw colored liquid      | 850   |
| ACLUBE V-2000 | Straw colored liquid                | 640   |
| ACLUBE V-3020 | Straw colored liquid                | 720   |
| ACLUBE V-4020 | Pale straw colored liquid           | 530   |
| ACLUBE V-4000 | Straw colored liquid                | 830   |
| ACLUBE V-5000 | Pale straw colored liquid           | 1,400   |
| ACLUBE V-5040 | Straw colored liquid                | 1,000   |

Table 2. Pour Point Depressant

| Product Name   | Property                            |   |
|----------------|-------------------------------------|---|
|                | Appearance at 40 °C                 | Kinematic Viscosity at 100 °C<br>mm <sup>2</sup> /s |
| ACLUBE P-2320  | Pale yellow to straw colored liquid | 240   |
| ACLUBE P-2100  | Pale straw colored liquid           | 380   |
| ACLUBE P-2090  | Straw colored liquid                | 300   |
| ACLUBE P-D3000 | Straw colored liquid                | 550   |

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Performance

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Lubricating oils obtained by adding ACLUBE products to base oil exhibit low viscosity change with temperature.

Table 3. Viscosity Index Improver

| Product Name  | Performance*                              |       |                    |         | Feature                |
|---------------|---|-------|--------------------|---------|------------------------|
|               | Kinematic Viscosity<br>mm <sup>2</sup> /s |       | Viscosity<br>Index | SSI** % |                        |
|               | 100 °C                                    | 40 °C |                    | 100 °C  |                        |
| ACLUBE V-1001 | 5.35                                      | 23.8  | 170                | 1.5     | Shear stability        |
| ACLUBE V-1010 | 6.01                                      | 27.5  | 174                | 3.4     |                        |
| ACLUBE V-1050 | 6.52                                      | 29.7  | 183                | 4.3     |                        |
| ACLUBE V-1040 | 7.19                                      | 34.0  | 183                | 9.4     |                        |
| ACLUBE V-1030 | 6.79                                      | 31.8  | 180                | 11.8    |                        |
| ACLUBE V-2041 | 7.02                                      | 30.9  | 200                | 14.3    |                        |
| ACLUBE V-2000 | 7.33                                      | 32.8  | 199                | 18.2    |                        |
| ACLUBE V-3020 | 8.49                                      | 37.0  | 218                | 28.7    |                        |
| ACLUBE V-4020 | 8.59                                      | 35.6  | 232                | 48.1    | Thickening<br>property |
| ACLUBE V-4000 | 8.91                                      | 34.9  | 251                | 59.5    |                        |
| ACLUBE V-5000 | 9.79                                      | 37.3  | 264                | 63.0    |                        |
| ACLUBE V-5040 | 10.6                                      | 37.6  | 287                | 79.8    |                        |

\* A mixture of the following base oil and a viscosity index improver (the ratio = 90:10) was evaluated.  
 Base oil properties: kinematic viscosity (100 °C); 4.31 mm<sup>2</sup>/s, kinematic viscosity (40°C); 20.3 mm<sup>2</sup>/s  
 Viscosity index: 121

The viscosity change with temperature is smaller as the viscosity index value heightens.

\*\* Measured according to JASO M347-95 (sonic).  
 The shear stability is better as SSI lowers.

$$SSI = \frac{V_b - V_a}{V_b - V_o} \times 100$$

Vo: Kinematic viscosity of base oil  
 Va: Kinematic viscosity after shear  
 Vb: Kinematic viscosity before shear

Lubricating oils obtained by adding ACLUBE products to base oils have excellent fluidity even at temperatures below freezing point.

Table 4. Pour Point Depressant

| Product Name   | Feature   |
|----------------|---|
| ACLUBE P-2320  | Suitable for base oil containing wax which is separated at high temperatures.                                     |
| ACLUBE P-2100  |   |
| ACLUBE P-2090  | Suitable for the base oil (classified as group III) containing wax which is separated at low – high temperatures. |
| ACLUBE P-D3000 | Dispersion type. Suitable for base oil containing wax which is separated at medium temperatures.                  |

**Important:**

Before handling this product, refer to the Safety Data Sheet for recommended protective equipment, and detailed precautionary and hazards information.

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