To: API Lubricants Group
Cc: Lubricants Group Mailing List

**Ballot to Revises Annex E and Annex F**

At the September 12, 2018 Lubricants Standards Group (LSG) Meeting BOI/VGRA Proposal 1 outlined revisions to Annex E and Annex F. BOI/VGRA Proposal 1 lists three revisions:

1. Revision to Section E.2.2.4
2. Revision to Section E.3.2.5
3. Revision to Section F.1.2

After review and discussion, there was a Motion to revise Annex E and Annex F as described in BOI/VGRA Proposal 1.

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Motion:
Motion to Ballot the proposed changes contained in BOI/VGRA Proposal 1
  • Changes are shown in the attached BOI/VGRA Proposal 1.
    ▪ Motion by LSG Chair, Josh Frederick
    ▪ Second by Michael Alessi
      o Approve=16
      o Negative=0
      o Abstain=0
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Attachment 1 is a copy of the BOI VGRA Task Force Proposal 1 with the LSG Meeting Motion attached at the end.

After review and discussion, the LSG agreed by voice vote to Ballot each of the three section revisions separately.

- This Ballot revises Section E.2.2.4

Attachment 2 illustrates the revision to Section E.2.2.4. LSG Members and Interested Parties are asked to review the proposed revision and Vote or Comment on accepting it.

Lubricants Group Members should use the API eBallot System to cast their vote and make comments. The eBallot Link is: [http://Ballots.api.org](http://Ballots.api.org). The Lubricants Group Member votes will be counted, and all received comments reviewed and considered before the ballot results are final.

Non-Lubricants Group Members should comment on the Ballot Motion using the eBallot system. The eBallot Link is: [http://Ballots.api.org](http://Ballots.api.org). All comments on the Ballot Motion will be reviewed before the ballot results are final.

This eBallot will close on November 5, 2018. All Votes and/or Comments must be received by the close date.
Attachment 1
API Lubricants Group
BOI VGRA Task Force Proposal 1

Revisions to Annex E and Annex F

R. C. Dougherty
September 12, 2018
Modification to Section E.2.2.4

**E.2.2.4** Passenger car engine tests required for interchanging the base stock are given in E.2.2.4.1 through E.2.2.4.5. The BOI Guidelines vary according to the API base oil group and amount of the base stocks used in the original test oil and the candidate oil formulations. All percentages are mass percent of the total formulation unless otherwise noted. The data set used to establish the BOI Guidelines involving Group III base oil is based on a base oil VI range up to 126–139 VI, within the precision of the test.
The testing to support BOI and VGRA guideline development for each Sequence test included in the API/ILSAC categories utilizes base stocks, base oils, and finished fluids with a range of physical properties. The significance of the effect of these physical properties on lubricant performance can vary for each test or test type. Data for base stocks, base oils, and/or finished fluids are included in the table (Table E-xx) below; these values are provided for information only. It is important to maintain a record of the properties of the materials employed in developing BOI and VGRA guidelines.

Table E-xx

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Base Stock Groups</th>
<th>BOV&lt;sub&gt;100&lt;/sub&gt; Range, mm&lt;sup&gt;2&lt;/sup&gt;/s</th>
<th>Base Oil VI Range</th>
<th>Base Oil Sats Range (D7419), wt%</th>
<th>Base Oil Sats Range (D2007), wt%</th>
<th>Base Oil Sulfur Range, ppm</th>
<th>Viscosity Grade Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIIH I, II, III&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>4.5 - 10.7</td>
<td>96 - 139</td>
<td>96.0 - &gt;99.8</td>
<td>93.1 - 98.2</td>
<td>&lt; 5 - 371</td>
<td>0W-16 - 20W-50</td>
<td></td>
</tr>
<tr>
<td>IVB II, III</td>
<td>4.2 - 11.2</td>
<td>108 - 140</td>
<td>96.7 - &gt;99.8</td>
<td>93.4 - 99.0</td>
<td>&lt; 5</td>
<td>0W-16 - 20W-50</td>
<td></td>
</tr>
<tr>
<td>VH I, II, III</td>
<td>4.2 - 11.1</td>
<td>95 - 130</td>
<td>86.8 - 87.5&lt;sup&gt;(1)&lt;/sup&gt; II: &gt; 99.8&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>98.0&lt;sup&gt;(2)&lt;/sup&gt; III: &gt; 99.8&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>1301 - 1365&lt;sup&gt;(1)&lt;/sup&gt; II, III: &lt; 5</td>
<td>0W-16 - 20W-50</td>
<td></td>
</tr>
<tr>
<td>VIE II, III</td>
<td>4.2 - 5.9</td>
<td>111 - 135</td>
<td>96.9 - &gt;99.8</td>
<td>93.6 - 99.9</td>
<td>&lt; 5</td>
<td>0W-20 - 10W-30</td>
<td></td>
</tr>
<tr>
<td>VIF III</td>
<td>4.2 - 4.4</td>
<td>122 - 130</td>
<td>&gt; 99.8</td>
<td>98.3 - 99.7</td>
<td>&lt; 5</td>
<td>0W-16, 0W-20</td>
<td></td>
</tr>
<tr>
<td>IX II, III, IV</td>
<td>4.2 - 6.2</td>
<td>109 - 136</td>
<td>96.7 - &gt;99.8</td>
<td>93.4 - 99.9</td>
<td>&lt; 5</td>
<td>0W-16 - 10W-30</td>
<td></td>
</tr>
<tr>
<td>X II, III</td>
<td>4.2 - 6.2</td>
<td>109 - 140</td>
<td>96.7 - &gt;99.8</td>
<td>93.4 - 98.4</td>
<td>&lt; 5</td>
<td>0W-16 - 10W-40</td>
<td></td>
</tr>
</tbody>
</table>

<sup>(1)</sup> Grp I blended with Grp III at 36%/64% Grp I/III ratio

<sup>(2)</sup> Data not supplied on all Group II base stocks to enable calculation of all base oil saturates levels
Modification to Section E.3.2.5

E.3.2.5  Heavy duty engine tests required for interchanging the base stock are given in E.3.2.5.1 through E.3.2.5.16. The BOI Guidelines vary according to the API base oil-stock group and amount of the base stocks used in the original test oil and the candidate oil formulations. All percentages are mass percent of the total formulation unless otherwise noted. The data set used to establish the BOI Guidelines involving Group III base oil stocks is based on a base oil VI range up to 126 VI, within the precision of the test.
The testing to support BOI and VGRA guideline development for each heavy duty engine test included in the API categories utilizes base stocks, base oils, and finished fluids with a range of physical properties. The significance of the effect of these physical properties on lubricant performance can vary for each test or test type. Data for base stocks, base oils, and/or finished fluids are included in the table (Table E-yy) below; these values are provided for information only. It is important to maintain a record of the properties of the materials employed in developing BOI and VGRA guidelines.

**Table E-yy**

<table>
<thead>
<tr>
<th>Engine Test</th>
<th>Base Stock Groups</th>
<th>$\text{BOV}_{100}$ Range, mm$^2$/s</th>
<th>Base Oil VI Range</th>
<th>Base Oil Sats Range (D7419), wt%</th>
<th>Base Oil Sats Range (D2007), wt%</th>
<th>Viscosity Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volvo T-13</td>
<td>II</td>
<td>5.6 - 7.1</td>
<td>108 - 118</td>
<td>97.4 - &gt;99.8</td>
<td>94.7 - 98.3</td>
<td>10W-30, 10W-40, 15W-40</td>
</tr>
<tr>
<td>Caterpillar Aeration</td>
<td>II</td>
<td>5.5 - 7.3</td>
<td>108 - 115</td>
<td>97.4 - &gt;99.8</td>
<td>94.7 - 98.0</td>
<td>10W-30, 10W-40, 15W-40</td>
</tr>
</tbody>
</table>

(1) Viscosity grade used for BOI guideline development
Addition to Section F.1.2

F.1.2 VISCOSITY-GRADE READ ACROSS GUIDELINES

In certain situations, data generated from one viscosity grade of a given engine oil formulation may be extrapolated to another viscosity grade that uses the same additive technology by means of a practice commonly referred to as “read-across” (See Tables F-1 through F-13).

These Viscosity-Grade Engine Testing Guidelines can be used to complete a testing program using the most severe viscosity grade for each individual test for the grades being licensed. Engine tests shall be registered using the ACC Code. No read-across or substitute data are permitted for physical and chemical analyses or for bench tests (except as allowed in F.1.3 and F.4); that is, all specified physical and chemical analyses must be run on the final formulation. Proposed changes to the read-across tables or F.1.3 should be sent to the Chair of API’s Base Oil Interchange (BOI)/Viscosity Grade Read-Across (VGRA) Task Force or API. The proposal must include a justification and supporting data for such change.

Properties of base oils used in the development of BOI and VGRA guidelines for certain PCMO and HDEO tests are given in Tables E-xx and E-yy, respectively. These properties are provided for information only.
Motion

• Motion to Ballot the proposed changes contained in BOI/VGRA Proposal 1

• Motion by Chair, Josh Frederick
• Second Mike Alessi
Attachment 2
Revision to Section E.2.2.4

BOI/VGRA Proposal 1

Revision to E.2.2.4
Modification to Section E.2.2.4

E.2.2.4 Passenger car engine tests required for interchanging the base stock are given in E.2.2.4.1 through E.2.2.4.x. The BOI Guidelines vary according to the API base stock group and amount of the base stocks used in the original test oil and the candidate oil formulations. All percentages are mass percent of the total formulation unless otherwise noted.
The testing to support BOI and VGRA guideline development for each Sequence test included in the API/ILSAC categories utilizes base stocks, base oils, and finished fluids with a range of physical properties. The significance of the effect of these physical properties on lubricant performance can vary for each test or test type. Data for base stocks, base oils, and/or finished fluids are included in the table (Table E-xx) below; these values are provided for information only. It is important to maintain a record of the properties of the materials employed in developing BOI and VGRA guidelines.

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<th>Base Stock Groups</th>
<th>BOV_{100} Range, mm²/s</th>
<th>Base Oil VI Range</th>
<th>Base Oil Sats Range (D7419), wt%</th>
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<td>I, II, III</td>
<td>4.5 - 10.7</td>
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