Elastomer Compatibility Editorial Changes

On March 4, 2020 the Lubricants Standards Group (LSG) reviewed “Elastomer Compatibility Editorial Changes”. The BOI/VGRA Task Force proposal is that E.4.8 and E.4.9 be merged into one table and the language be changed to “The Diesel Elastomer Compatibility Test (ASTM D7216 Annex A1)” and edit Section E.4.13 and Table F-19 with the statement “The PCMO Elastomer Compatibility Test (ASTM D7216 Annex A2)”. Sections E.8 and E.9 are edited into a new Section E.8— The Diesel Elastomer Compatibility Test (ASTM D7216 Annex A1), Section E.4.13 edited to be “E.4.13 The PCMO Elastomer Compatibility Test (ASTM D7216 Annex A2) and Table F-19 edited to include a statement The PCMO Elastomer Compatibility Test (ASTM D7216 Annex A2) are given below and in the Electronic Ballot Attachment.

E.4.8 The Diesel Elastomer Compatibility Test (ASTM D7216 Annex A1) is not required if the saturates and sulfur content (within the precision of the tests) of the interchange base oil fall within the range of the saturates and sulfur content of the base oils in the original candidate oils (minimum two candidate oils) and the DI package is unchanged. An example of this guideline’s application is provided in Table E-34.

<table>
<thead>
<tr>
<th>Table E-34— The Diesel Elastomer Compatibility Test (ASTM D7216 Annex A1) BOI Guideline Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Oil Saturates, mass %</td>
</tr>
<tr>
<td>Base Oil Sulfur, mass %</td>
</tr>
<tr>
<td>CI-4 Elastomer Compatibility Test</td>
</tr>
<tr>
<td>Test Required?</td>
</tr>
<tr>
<td>Reason</td>
</tr>
</tbody>
</table>

E.4.13 A passing PCMO Elastomer Compatibility Test (ASTM D7216 Annex A) in the core data set (as defined in the ACC Code) run in Group II or Group III or a mix of Group II and Group III, can be read across to formulations using other Group II or Group III or a mix of Group II and Group III base stocks.

Additionally, there is no viscosity grade restriction if the read across is limited to 0W-20, 0W-30, 5W-20, 5W-30, 10W-30 and 10W-40 viscosity grades.

When reading to a candidate using Group I base stocks, the PCMO Elastomer Compatibility Test (ASTM D7216 Annex A2) is not required if the base oil saturates and base oil sulfur content (within the precision of the tests) of the interchange base oil fall within the range of the base oil saturates and base oil sulfur content of the base oils in the original candidate oils (minimum two candidate oils) and the DI package is unchanged. An example of this guideline’s application is provided in Table E-36.

<table>
<thead>
<tr>
<th>Table E-36 – Example of PCMO Elastomer Compatibility Test Including API Group I Base Stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Oil Saturates, mass %</td>
</tr>
<tr>
<td>Base Oil Sulfur, mass%</td>
</tr>
</tbody>
</table>
### GF-5 Elastomer Compatibility Test

<table>
<thead>
<tr>
<th>Test Required?</th>
<th>Pass</th>
<th>Pass</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason</td>
<td>Base oil sulfur and Base oil VI falls within the matrix ranges</td>
<td>Base oil sulfur and Base oil VI falls within the matrix ranges</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Table F-14—Groups II and III Viscosity Read-Across: PCMO Elastomer Compatibility Test (ASTM D 7216 Annex 2A)

<table>
<thead>
<tr>
<th>Test Run on</th>
<th>0W-20</th>
<th>0W-30</th>
<th>5W-20</th>
<th>5W-30</th>
<th>10W-30</th>
<th>10W-40</th>
</tr>
</thead>
<tbody>
<tr>
<td>0W-20</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>0W-30</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-20</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-30</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10W-30</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
</tr>
<tr>
<td>10W-40</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
</tr>
</tbody>
</table>

For viscosity grades not listed in the table above, bracketing two passing formulations for a given technology may be used to waive additional testing. VGRA is allowed if the candidate’s base oil viscosity at 100°C falls within the range of the base oil viscosity at 100°C of the 2 passing formulations.

**Example:**

<table>
<thead>
<tr>
<th>Base Oil Viscosity @ 100°C, cSt</th>
<th>Matrix Oil 1</th>
<th>Matrix Oil 2</th>
<th>Candidate Oil A</th>
<th>Candidate Oil B</th>
</tr>
</thead>
<tbody>
<tr>
<td>D7216 A2 Result</td>
<td>Pass</td>
<td>Pass</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The LSG discussed *D7528-ROBO-VGRA*. *(Ballot Attachment 1, pps6-8)*
Subsequently a Motion was made: “**Motion: To ballot proposed changes to Sections E.4.8 and E.4.9.**”

(Attachment 1, Page7)

The Ballot Motion is given below.

<table>
<thead>
<tr>
<th>Motion: To ballot proposed changes to Sections E.4.8 and E.4.9.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discussion: None</strong></td>
</tr>
<tr>
<td>• Motion by: Robert Stockwell</td>
</tr>
<tr>
<td>• Second by: David Brass</td>
</tr>
<tr>
<td>▪ For: 19</td>
</tr>
<tr>
<td>▪ Against: 0</td>
</tr>
<tr>
<td>▪ Abstain: 0</td>
</tr>
</tbody>
</table>

Lubricants Group Members should use the API Ballot System to cast their vote and make comments. The Ballot Link is: 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 Ballot system. The Ballot Link is: http://Ballots.api.org. All comments on the Ballot Motion will be reviewed before the ballot results are final.

This Ballot will close on April 27, 2020. All Votes and/or Comments must be received by that date. If approved the balloted change will be effective as of March 4, 2020.
Attachment 1
API BOI-VGRA TF Report
API BOI-VGRA TF Report

March 3, 2020 Lubricants Group Standards Meeting
Overview

- Addition of ASTM D7419 Saturates method ballot proposal
- Editorial change to elastomer compatibility language ballot proposal
- Sequence IIIH VGRA addition ballot proposal
- ROBO VGRA below 5W-20 ballot proposal
- Sequence X VGRA bracketing proposal
Addition of ASTM D7419 Method

• D7419 has been discussed for years as an additional method for saturates determination.
  • Useful for base oils > 75% saturates.
  • Better separation for BO sats above 90%.
  • Smaller sample sizes, more efficient, etc.

• ASTM presented a statistical analysis and bias equation to LSG for D7419 – D2007 methods several years ago.

• A recommendation has been made to incorporate D7419 in to table E.1 as an additional method that can be used.
Addition of ASTM D7419 Method

Note: For Saturates below 75.0% ASTM D2007 must be used.

Note: For saturates ≥ 75.0% ASTM D7419 data must be converted to the ASTM D2007 equivalent using the correlation equation outlined in ASTM D7419 to apply read across.
Motion to Ballot

Motion: Send the proposed change to Table E-1 to ballot with the notes converted to footnotes.

Discussion: None

• Motion by: Chris Castanien
• Second by: Greg Raley

- For: 18
- Against: 0
- Abstain: 0
The only difference between API CI-4 and API CJ-4 is the extra seal that is used in the API CJ-4 limits.

These same seals are used for API CK-4.

BOI-VGRA TF recommends that E.4.8 and E.4.9 be merged into one table and the language be changed to “The Diesel Elastomer Compatibility Test (ASTM D7216 Annex A1)…”
Elastomer Compatibility Editorial Changes

- For GF-6 launch and reference to S-categories this language should be edited.
- BOI-VGRA TF recommends editing the highlighted language to in E.4.13, Table E-40, and Table F-19 to “The PCMO Elastomer Compatibility Test (ASTM D7216 Annex A2)…”
Motion to Ballot

Motion: To ballot proposed changes to Sections E.4.8 and E.4.9.

Discussion: None

- Motion by: Robert Stockwell
- Second: David Brass

- For: 19
- Against: 0
- Abstain: 0
Seq IIIH VGRA

• Data brought forward by 3 ACC members supporting VGRA from 5W-30 to 10W-40 be added to table F.6.
  • This is proposed to LSG for ballot.

• Further discussion on changing the VM tech principle for the IIIH from 1X to something higher was not agreed upon.
  • Conflicting data in BOI/VGRA matrix indicated forward was not in agreement with the original BOI/VGRA matrix conclusion.
  • Based on additional data, the effects of VM concentration may be confounded by changes in BOV and data was requested by the task force to move this any farther forward.
**Sequence IIIH VGRA**

---

Table F-6—Groups I, II, III and IV Viscosity Read-Across: Sequence IIIH Test

<table>
<thead>
<tr>
<th>Test Run on</th>
<th>0W-15</th>
<th>0W-20</th>
<th>0W-30</th>
<th>5W-20</th>
<th>5W-30</th>
<th>10W</th>
<th>10W-30</th>
<th>10W-40</th>
<th>15W-40</th>
<th>15W-50</th>
<th>20W-40</th>
<th>20W-50</th>
<th>30</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>0W-15</td>
<td>NA</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0W-20</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0W-30</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5W-20</td>
<td>—</td>
<td>X</td>
<td>NA</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5W-30</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10W-30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10W-40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15W-40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15W-50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20W-40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20W-50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. X = read-across is permitted for the viscosity grades identified based on data and some applications of the technical principles approved by API/BCE/VGRA Task Force and API Lubricants Standards Group. Viscosity modifier content should not be higher than that in the oil tested.
2. A dash (—) means that read-across is not permitted. NA = not applicable.
3. New viscosity grades and associated read-across are allowed if the requirements described in F.1.3 are met.
4. Tested formulations containing Group V stocks must contain an equal amount of the same Group V base stock (e.g., ester) in the finished oil blend for application of viscosity grade read-across.
<table>
<thead>
<tr>
<th>Test Run on</th>
<th>0W-16</th>
<th>0W-20</th>
<th>0W-30</th>
<th>5W-20</th>
<th>5W-30</th>
<th>10W</th>
<th>10W-30</th>
<th>10W-40</th>
<th>15W-40</th>
<th>15W-50</th>
<th>20W</th>
<th>20W-40</th>
<th>20W-50</th>
<th>30</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>0W-16</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0W-20</td>
<td>X</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0W-30</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5W-20</td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5W-30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10W-30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10W-40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15W-40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15W-50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20W-40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20W-50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. X = read-across is permitted for the viscosity grades identified based on data and some applications of the technical principles approved by API BOW/VGRA Task Force and API Lubricants Standards Group. Viscosity modifier content should not be higher than that in the oil tested.
2. A dash (—) means that read-across is not permitted; NA = not applicable.
3. New viscosity grades and associated read-across are allowed if the requirements described in F.1.3 are met.
4. Tested formulations containing Group V stocks must contain an equal amount of the same Group V base stock (e.g., ester) in the finished oil blend for application of viscosity grade read-across.
Ballot Motion

Motion: Motion to ballot proposed change to Table F.6.

Discussion: None

• Motion by: Brent Calcut
• Second: Bill O’Ryan

  ▪ For: 19
  ▪ Against: 0
  ▪ Abstain: 0
D7528 ROBO VGRA

• Current VGRA table does not include viscosity grades below 5W-20

• ACC PAPTG pooled data for 0W-XX and 5W-XX and brought it forward for review by the BOI-VGRA TF.

• A proposal for ballot has been made to expand the current VGRA and add it as a new table to include 0W-XX viscosity grades for ROBO only.
  • Existing table also includes Seq. IIIGa and will remain.
Table F-X—Groups I, II, III and IV Viscosity Read-Across: ROBO Test

Can Be “Read-Across” to:

<table>
<thead>
<tr>
<th></th>
<th>0W-16</th>
<th>0W-20</th>
<th>0W-30</th>
<th>5W-20</th>
<th>5W-30</th>
<th>5W-40</th>
<th>10W</th>
<th>10W-30</th>
<th>10W-40</th>
</tr>
</thead>
<tbody>
<tr>
<td>0W-16</td>
<td>NA</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0W-20</td>
<td>X</td>
<td>NA</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0W-30</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5W-20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>NA</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>5W-30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>NA</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10W-30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>NA</td>
<td>X</td>
</tr>
<tr>
<td>10W-40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>NA</td>
</tr>
</tbody>
</table>

1. X = read-across is permitted for the viscosity grades identified based on data approved by API BOI/VGRA Task Force and API Lubricants Group. Viscosity modifier content must be no more than 1.5 times higher than the viscosity modifier content in the oil on which the test was run.
2. A dash (—) means that read-across is not permitted; NA = not applicable.
3. Tested formulations containing Group V stocks must contain an equal amount of the same Group V base stock (e.g., ester) in the finished oil blend for application of viscosity grade read-across.
### Table F-7—Groups I, II, III and IV Viscosity Read-Across: Sequence IIIGA and ROBO Test

Can Be “Read-Across” to:

<table>
<thead>
<tr>
<th>Test Run on</th>
<th>5W-20</th>
<th>5W-30</th>
<th>10W</th>
<th>10W-30</th>
<th>10W-40</th>
</tr>
</thead>
<tbody>
<tr>
<td>5W-20</td>
<td>NA</td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>—</td>
</tr>
<tr>
<td>5W-30</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10W-30</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>NA</td>
<td>X</td>
</tr>
<tr>
<td>10W-40</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>X</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Notes:**

1. X = read-across is permitted for the viscosity grades identified based on data and some applications of the technical principles approved by API BOI/VGRA Task Force and API Lubricants Standards Group. Viscosity modifier content must be no more than 1.5 times higher than the viscosity modifier content in the oil on which the test was run.
2. A dash (—) means that read-across is not permitted; NA = not applicable.
3. Tested formulations containing Group V stocks must contain an equal amount of the same Group V base stock (e.g., ester) in the finished oil blend for application of viscosity grade read-across.
Motion to Ballot

Motion: Ballot proposed ROBO VGRA Table and remove “And ROBO” From table F-7
Discussion: Need to strike words “and ROBO” from existing table F-7

• Motion by: Eric Kalberer
• Second by: Angela Willis

- For: 19
- Against: 0
- Abstain: 0
Sequence X Gr I Bracketing

- Current VGRA in table F.16 note 5 requires Gr I base stock content to be held constant at the same amount used for tested oil.

5. Tested formulations containing Group I and/or Group V stocks must contain an equal amount of the same base stock in the finished oil blend for application of viscosity grade read-across

- Utilization of lower amounts of Gr I than the tested oil is possible in some scenarios, but current guideline does not allow.
- 2 data pairs were brought forward for review by BOI-VGRA TF.
- Views were mixed, but a bracketing approach has been recommended by the BOI-VGRA TF that would allow for lesser amounts of Gr I base oil than tested oil.
### Table F-16 Groups I, II, III, and IV Viscosity Grade Read-Across: Sequence X Test

<table>
<thead>
<tr>
<th>Test Run on</th>
<th>0W-16</th>
<th>0W-20</th>
<th>5W-20</th>
<th>5W-30</th>
<th>5W-40</th>
<th>10W-30</th>
<th>10W-40</th>
</tr>
</thead>
<tbody>
<tr>
<td>0W-16</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>0W-20</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-20</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-30</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-40</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10W-30</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
</tr>
<tr>
<td>10W-40</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Notes:**
1. X = read-across is permitted for the viscosity grades identified based on data and some applications of the technical principles approved by API BOIVGRA Task Force and API Lubricants Standards Group.
2. A dash (—) means that read-across is not permitted; NA = not applicable.
3. New viscosity grades and associated read-across are allowed if the requirements described in F.1.3 are met.
4. BOIVGRA matrix testing was conducted with oils containing a wide range of viscosity modifier. Oils with zero viscosity modifier were also tested. Oils tested with 2.5 times the amount of viscosity modifier included in the formulation or no viscosity modifier were shown to be statistically no different from the original oil.
5. Tested formulations containing Group V stocks must contain an equal amount of the same base stock in the finished oil blend for application of viscosity grade read-across.

Bracketing two passing formulations for a given technology where one or both contain Group I base oil may be used to support VGRA for blends that contain the same or lower amount of the tested Group I. VGRA is allowed if the candidate’s Group I content falls within the range of the Group I content of the two passing formulations.

<table>
<thead>
<tr>
<th>Group I Content, % Wt.</th>
<th>Matrix Oil 1</th>
<th>Matrix Oil 2</th>
<th>Candidate Oil A</th>
<th>Candidate Oil B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>40</td>
<td>35</td>
<td>50</td>
</tr>
</tbody>
</table>

**Sequence IX**  
Pass  Pass

**Test Required?**  
No  Yes

**Reason**  
Group I content falls within tested range  
Group I Content Outside of tested range
Some concern this will now require bracketing.
### Table F-16—Groups I, II, III and IV Viscosity Read-Across: Sequence X test

<table>
<thead>
<tr>
<th>Test Run on (0W-16)</th>
<th>0W-16</th>
<th>0W-20</th>
<th>5W-20</th>
<th>5W-30</th>
<th>5W-40</th>
<th>10W-30</th>
<th>10W-40</th>
</tr>
</thead>
<tbody>
<tr>
<td>0W-16</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>0W-20</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-20</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-30</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5W-40</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10W-30</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
</tr>
<tr>
<td>10W-40</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Note:**

1. X = read-across is permitted for the viscosity grades identified based on data and some applications of the technical principles approved by API BOI/VGRA Task Force and API Lubricants Group.
2. A dash (—) means that read-across is not permitted; NA = not applicable.
3. New viscosity grades and associated read-across are allowed if the requirements described in F.1.3 are met.
4. BOI/VGRA Matrix testing was conducted with oils containing a wide range of viscosity modifier. Oils with zero viscosity modifier were also tested. Oils tested with 2.5 times the amount of viscosity modifier included in the formulation or no viscosity modifier were shown to be statistically no different from the original oil.
5. Tested formulations containing Group I and/or Group V stocks must contain an equal amount of the same base stock in the finished oil blend for application of viscosity grade read-across.
6. Bracketing two passing formulations for a given technology may be used to allow Group I content changes. VGRA is allowed if the candidate’s Group I content falls within the range of the 2 passing formulations.

**Example:**

<table>
<thead>
<tr>
<th>Group I Content, % Wt.</th>
<th>Matrix Oil 1</th>
<th>Matrix Oil 2</th>
<th>Candidate Oil A</th>
<th>Candidate Oil B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seq. X</td>
<td>10</td>
<td>40</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>Test Required?</td>
<td>Pass</td>
<td>Pass</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Reason:**

- Group I Content falls within tested range
- Group I Content does not fall within tested range
BSMIC Definitions Review

• BOI-VGRA TF was given a chance to review the proposed BSMIC definitions and additional changes.
• LSG requested this be reviewed by BOI-VGRA TF.
• BSMIC to make recommendation directly to LSG.