2017 Test Data from four (4) DOTs on (4) four PG 76-22 binders provided by (4) different Suppliers, in order to compare the testing accuracy.

Robert (Bob) Humer, P.E.
Sr. Regional Engineer,
(WA, OR, CA, NV, AZ, and HI)
Asphalt Institute
Westlake Village, CA
rhumer@asphaltinstitute.org
805-402-1211
Purpose:

• To determine the accuracy of Laboratory testing by four DOT Labs (Repeatability).

• To compare how the four PG 76-22 test out and are graded in the M320 vs. M332 specifications [comparing for PG 76- and PG 64X-].

Arrangements:

• Four PG 76-22 Binders from four different Suppliers.

• Four DOT Labs doing each a full set of Tests in Duplicate.

• All using the same Data Sheet.
Observations:

Grading in M320 and M332:

• All 4 Labs test all 4 binders as meeting the M320 spec for PG 76-22.

• If the % Jnr Diff. requirement is waived, then all 4 binders meet PG 64E-22.

• In addition 2 of the 4 Labs qualify binder D as PG 64E-22 meeting all of M332.

• Grading the 4 binders with the M332 spec for PG76X-22 (excluding % Jnr Diff);
  a) Binder A would be a PG 76E-22.
  b) Binder B would be a PG 76S-22.
  c) Binder C; 3 Labs test it as PG 76E-22, and one Lab as a PG 76V-22.
  d) Binder D would be a PG 76V-22.
Repeatability:

- Lab #1 is “OUT”; 1x ER and 5x DSR.
- Lab #3 is “OUT”; 2x for DSR Tests.
- Lab #4 is “OUT”; 1x for ER.

Reproducibility:

- The “Reproducibility” is presented based on the MAX and MIN values of:
  1) all 8 test results (chance of 1 in 32).
  2) the 4 averages (chance of 1 in 16).
- Both represent the worst case!
**Elastic Indicators:** Delta, Ductility, % ER, % Rec, % Jnr, % Jnr Diff, and Jnr-line

- Delta is the ratio between Visc. and Elastic of binder behavior.
- Ductility is reduced by ageing, and differs from % Rec, % Jnr, and Jnr-line trend.
- % ER does not discriminate between these 4 binders.
- % Rec, % Jnr, and the Jnr-line do compare well, they are affected by temp change.

- % Rec and Jnr-line identify binder B as Non-Elastic, % ER determines it as Modified.

**Question:** Which parameter(s) to believe as an indicator of Elastic behavior?
Overview of % Jnr Diff variability:

<table>
<thead>
<tr>
<th>Variability of % Jnr Difference</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Jnr diff &lt;75 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binder</td>
</tr>
<tr>
<td>Temp</td>
</tr>
<tr>
<td>Lab #1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Lab #2</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Lab #3</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Lab #4</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

- Only Lab #1 shows % Jnr Diff results lower than 75%.
- All 3 other Labs have wildly varying % Jnr Diff results ranging from 45% to 2,139%.
- **Conclusion:** % Jnr Diff seems not to be a useful specification requirement !!!
Thanks goes to the four Labs which volunteered to perform all the testing !!!

Questions?

Robert (Bob) Humer, P.E.
Sr. Regional Engineer,
(WA, OR, CA, NV, AZ, and HI)
Asphalt Institute
Westlake Village, CA
rhumer@asphaltinstitute.org
805-402-1211