

MACK-Volvo Surveillance Panel Meeting Notes

03/05/2024 @ 2:00 PM EST

Attendees

SwRI: Isaac Leer, Travis Kostan

Oronite:

Afton: Joseph Hoehn, Bob Campbell

Infineum: David Brass (Chairman), Elisa Santos, Jacob Goodale

Intertek: Garrett White (Secretary), Andrew Smith

Lubrizol: Justin Wolfe

CP Chem: Jonathan VanScoyoc

Haltermann:

Exxon Mobil: Paul Rubas, Steve Jetter

TMC: Sean Moyer

TEI: Derek Grosch

Ford:

Volvo:

John Deere: Ashu Gupta

Agenda

1. Volvo T-13 Reference Oil 823-1 Testing
2. Volvo T-13 Oil Consumption Testing (IAR)
3. Volvo T-13 Ring Analysis
4. New Reference Oil Matrix – PC-12
5. MACK T-11 Procedure Coolant Wording
6. PC9-HS Fuel Update
7. AOB

Action Items and Key Points

- Lab D and Lab A completed references on reference oil 823-1. Both tests utilized recent kit numbers and produced oil consumption within 1 standard deviation of the historic average for the 48-192 hour average oil consumption.
- Intertek completed a 96-hour run on kit 939 which produced an average oil consumption from 24-96 hours of 44.4 g/hr. Run 2 will utilize rings from a used reference kit, number 866, to determine if piston rings are a factor for the recent high oil consumption seen in testing. Run 2 data expected to be available around March 13th.
- Decision to start new reference oil matrix testing for PC-12 postponed until after review of Intertek's run 2 data on the used piston ring sets.

- MACK T-11 procedure updated to reflect the use of either Pencool 3000, mixed with distilled or deionized water per manufacturers instructions, or Chevron Delo Extended Life Coolant 50/50. The use of Chevron Delo Extended Life Coolant Concentrate was removed.
- The most recent PC9-HS fuel batch has been black in color due to a high amount of yellow color in the pre-dyed fuel. CP Chem confirmed that they were able to remove some yellowing from the pre-dyed fuel which then was red in color once the dye was introduced. Labs will begin receiving red colored PC9-HS in approximately 2 months once the current black colored batch is depleted.

Summary of Discussion

Volvo T-13 Reference Oil 823-1 Testing

- Joseph – Afton completed reference with IRPH on severe side at 121.6 and percent viscosity increase at 68.8 %. Average oil consumption was 33.3 g/hr, and reached as high as 45 g/hr in the early parts. Oil Consumption eventually settled into the upper 20's and we did not see empty oil weight bucket. Engine build used kit 929.
- Isaac – SwRI finished today (3/5/2024) however we do not have the 360 hour results yet. At 336 hours IRPH was 115, and percent viscosity increase was around 50% mark. Oil consumption was in the 20-25 g/hr range. Engine build used kit 917. We were expecting high OC since kits 915 and 916 had high oil consumption on candidate tests.

Volvo T-13 Oil Consumption Testing (IAR)

- Intertek performed a 96-hour shakedown run with oil 823-1 on kit 939.
- Average oil consumption from 24 to 96 hours was 44.4 g/hr.
- Piston date codes included were all 0123's.
- All liners were batch D.
- A second run is to be performed using the piston rings from kit 866, a used reference kit to see if the rings in kit 939 are the cause for the elevated oil consumption.
- Average oil consumption on kit 866 reference test with oil 823-1 was 25.3 g/hr.
- David – if we do find that the rings are a problem, what are the next steps?
- Garrett – Ideally it would be to identify the measurement differences and possibly quarantine rings based on serial numbers or date codes.
- Jacob – Liner wearing in from run 1 may create a lower starting oil consumption so the data with the used rings in run 2 might be convoluted because of this.
- David – When will Intertek have the next run completed on kit 866's ring sets?
- Garrett – We should start today or tomorrow (3/6/24) and have data available in the middle of next week (3/13/2024).

Volvo T-13 Ring Analysis

- TEI shared a compiled data set of all ring measurements to identify any possible differences.
- X-axis for the plots signify ring number. At ring number 600 on each plot signifies the point at which kit 854 was assembled.
- Top Rings
 - Slight rise in ring tension around the start of kit 854.
 - Ring face width appeared to shift from an average around 3.000 to 2.9000-2.950.
 - Ring gap, ring peak height, and peak height location from top data showed no significant changes around the time of the oil consumption concerns.
- Second Rings
 - Slight rise in ring tension around the start of kit 854.
 - Witness line width around kit 1200 shows some rings are below 0.2.
 - Ring gap, ring face width, and ring base slope angle data showed no significant changes around the time of the oil consumption concerns.
- Oil Rings
 - Slight increase in ring tension near the end of the population.
 - Slight decrease in rail gap between rails over time of all ring numbers.
 - Oil ring gap, outside to outside of rail distance, top rail width, bottom rail width, and rail height differential plots showed no significant changes around the time of the oil consumption concerns.

New Reference Oil Matrix

- David – Are we ready to begin the new reference oil matrix test for PC-12 given the concerns with oil consumption?
- Isaac – It would be beneficial to see what happens with run 2 at Intertek before proceeding with matrix testing.
- Bob Campbell – If we have the time, we need to make sure things are right before we begin with the matrix testing.
- David – We will revisit the topic of starting the matrix tests following the completion of the next run at Intertek.

MACK T-11 Procedure Coolant Wording

- MACK T-11 procedure was recently updated to allow for the use of Chevron Delo Extended Life Coolant 50/50. Pencool 3000 is no longer in production.
- Comment was submitted stating that “it is not clear that the additives proposed have to be added to the water, whether water was distilled or per the requirements”.
- Initial procedure edit included verbiage allowing for the use of Chevron Delo Extended Life Coolant Concentrate, however, confusion around the wording was found that made it appear that mixing of the 50/50 version was required.
- The option to use Chevron Delo Extended Life Coolant Concentrate was removed, only allowing for the use of Pencool 3000, with the mixing of demineralized water or distilled water, or Chevron Delo Extended Life Coolant 50/50.

- Final procedure wording for section 7.3 Engine Coolant is: “Use either Pencool 3000 coolant additive or Chevron Delo Extended Life Coolant 50/50. Use Pencool 3000 coolant additive at the manufacturer’s recommended rate in demineralized water with less than 0.03 g/L of salts or distilled water. Chevron Delo Extended Life Coolant 50/50 is purchased premixed and should not be diluted. Pencool 3000 may be obtained from the supplier shown in A2.7, Annex A2, and Chevron Delo Extended Life Coolant 50/50 is available from local automotive distributors.”

PC9-HS Fuel Update

- Jonathan V – The most recent batch of PC9-HS, before adding red dye had more yellow than previous batches. When the red dye was introduced the fuel color came out darker than anticipated, black in color. We were able to remove some of the yellow coloring from the pre-dyed fuel. When the red dye was introduced, it did not turn black like the initial batch.
- There is approximately 2 months of the current black colored batch fuel. Thereafter, the color of fuel delivered to the labs will be the normal red color seen before.
- David – Have any labs conducted testing on this fuel?
- Joseph – We have been running with this fuel and have had no issues.

AOB

None

Next Meeting Date/Time

March 19th, 2024 2:00 PM EST

Meeting adjourned on 3/5/2024 at 3:19 EST