Sequence VH Task Force | MINUTES

Revision Date *08-25-2016* | Revision *1.0*

Relevant Test:	Sequence VG and VH
Note Taker:	Chris Mileti
Meeting Date:	08-23-2016
Lubrizol Attendees:	Mileti, Matasic and Brys
Comments:	Sequence VH Task Force conference call to discuss status of prove-out testing at dependent laboratories.

SEQUENCE VH DEVELOPMENTS PRIOR TO CONFERENCE CALL:

1. **Email from Cole Hudson, Southwest [08/11/2016 at 11:19AM EST]:**
   a. Southwest released the modified piston skirt varnish ratings (i.e. APV 50%) for their recent Sequence VH prove-out tests.

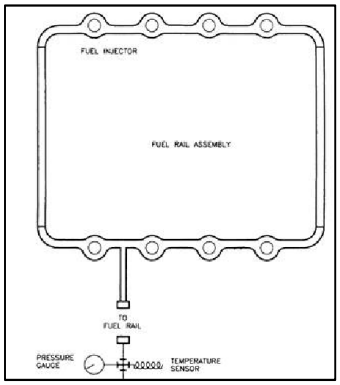
RO 940						
	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	6.8	8.02	8.83	7.17	6.88	70
IAR 98	6.88	8.5	9.09	8.07	7.36	98
avg	6.84	8.26	8.96	7.62	7.12	84

RO 1009						
	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	7.19	8.38	9.16	8.82	7.94	80
IAR 98	7.3	9.08	9.02	7.7	7.62	35
avg	7.25	8.73	9.09	8.26	7.78	58

RO 1006-2						
	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	8.33	8.83	9.16	9.34	8.87	15
IAR 98	-	-	-	-	-	-
avg	8.33	8.83	9.16	9.34	8.87	15

RO 1011						
	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	-	-	-	-	-	-
IAR 98	?	?	?	?	?	?
avg						

2. **Email from Ron Romano, Ford [08/11/2016 at 7:06PM EST]:**
   a. Romano stated that all Sequence VH engines should be equipped with a "return-less" fuel rail (shown below).



3. **Email from Ed Altman, Afton [08/15/2016 at 11:09AM EST]:**
    a. Afton is using a Sequence VG utility engine to shakedown their Sequence VH test stand.
        i. This utility engine is equipped with the new TEI exhaust manifolds and spacer plates.
    b. Afton reported that their exhaust gas temperature is approximately 50°C lower than with the previous manifolds.
        i. There is also a corresponding increase of approximately 15°C in the outlet temperature of their exhaust manifold coolant.

4. **Email from Cole Hudson, Southwest [08/15/2016 at 11:58AM EST]:**
    a. Southwest released the results for Intertek's Sequence VH test with REO1011 (the proposed replacement for REO1006-2).

RO 940						
	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	6.8	8.02	8.83	7.17	6.88	70
IAR 98	6.88	8.5	9.09	8.07	7.36	98
avg	6.84	8.26	8.96	7.62	7.12	84

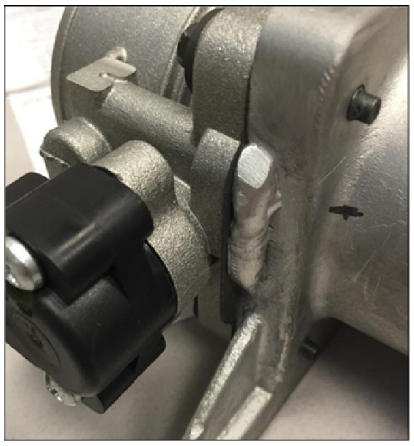
RO 1009						
	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	7.19	8.38	9.16	8.82	7.94	80
IAR 98	7.3	9.08	9.02	7.7	7.62	35
avg	7.25	8.73	9.09	8.26	7.78	58

RO 1006-2						
	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	8.33	8.83	9.16	9.34	8.87	15
IAR 98	-	-	-	-	-	-
avg						

RO 1011						
	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	-	-	-	-	-	-
IAR 98	9.24	9.46	9.46	9.02	8.82	1
avg						

5. **Email from Amol Savant, Ashland [08/16/2016 at 9:07PM EST]:**
    a. Ashland clarified that the following part numbers should be used for the Sequence VH wiring harness:
        i. ***Coolant sensor:*** 3F1Z-12A648-A
        ii. ***Coolant sensor pigtail:*** 3U2Z-14S411-HYB

6. **Email from Chris Mileti, Lubrizol [08/22/2016 at 10:35AM EST]:**
    a. Lubrizol is using the following Sequence VH throttle body hardware:
        i. ***Throttle body:*** 3W7Z-9E926-AA
        ii. ***Elbow:*** 5W7Z-9A589-AA
    b. Lubrizol is modifying the throttle elbow with additional aluminum to prevent a vacuum leak.



CONFERENCE CALL:

1. **Update from Lubrizol Regarding Sequence VH Stand Conversion:**
    a. Lubrizol has completed most of the work necessary to convert one of its Sequence VG stands.
    b. The stand is now undergoing full reference calibrations.
    c. Lubrizol is having difficulty allocating maintenance and instrument shop resources to this conversion because its Wickliffe facility is undergoing an extensive renovation.
    d. The major hold-up for Lubrizol at this point is the wiring harness.
        i. The original plan was to install a Ron Francis wiring harness.
        ii. However, the shipment that Lubrizol received from this vendor was just a box of wires and a breakout box.
        iii. As a result, Lubrizol has ordered pigtails from its local Ford dealer and will modify its existing VG harnesses.
    e. Lubrizol should be ready to start its first Sequence VH prove-out test within the next week.

2. **Update from Ashland Regarding Sequence VH Stand Conversion:**
    a. They started their first Sequence VH prove-out test (with REO940) on Friday, August 19th.
        i. The test is currently at 24HRS.
    b. The initial blowby numbers were low, so they pulled the engine and performed a piston ring re-gap.
        i. This increased the Stage 2 blowby level to around 70LPM.
    c. The engine is generating an unusual ticking noise.
        i. This noise may be coming from one of the timing chain tensioners.
    d. Ashland had to drill the boss on their coolant cross-over to accommodate the VH coolant sensor.
        i. Lubrizol will need to do the same thing.

3. **Update from Afton Regarding Sequence VH Stand Conversion:**
    a. Afton is performing stand calibrations now.
    b. Their work was delayed due to a damaged water pump on their utility engine that made it difficult to control to the Stage 2 coolant flow set point.
    c. The installation of their first VH engine should be complete within the next 24-48HRS.
    d. They are modifying their existing VG wiring harnesses [with pigtails] for use on their VH engines.
    e. They have not had to modify their throttle bodies or throttle body elbows.
    f. ***New TEI Exhaust Manifolds and Adaptor Plates:***
        i. Afton is concerned that the recently identified temperature shift with the new hardware is an indication of significantly different heat transfer between the manifold and cylinder head (at least on a VG utility engine).
            1. The coolant porting on the new manifolds appears to be different.
        ii. Southwest and Ashland are not using the new exhaust hardware.
        iii. Lubrizol has purchased several sets of this hardware but needs to confirm that the shipment has arrived.
        iv. *Intertek has used this hardware for several recent VG and VH tests.*
            1. Unfortunately, Intertek did not have any "new" versions of the previous manifolds available to perform a direct operating temperature comparison.

2. They do not measure exhaust temperatures, but they have identified a shift in their exhaust manifold coolant outlet temperature.

v. *Monitoring Temperature at Interface Between TEI Spacer Plate and Cylinder Head:*
   1. Romano noted that there was a previous discussion between the development laboratories about adding a thermocouple between the spacer plate and the cylinder head of the VH engine.
      a. Southwest will follow-up with TEI about this idea.
   2. Lubrizol is willing to run a FLIR camera trial with the original and new exhaust manifold hardware.
      a. However, Lubrizol noted that the old hardware is no longer available.
      b. So all of the labs should probably switch to the new hardware for all VH testing.

vi. TEI needs to confirm how much of the new hardware is available.

4. Update from Southwest Regarding Sequence VH Testing:

a. Southwest has a single dedicated Sequence VH stand.
b. They are currently waiting on the VH prove-out results from the three dependent laboratories.

5. Update from Intertek Regarding Sequence VH Testing:

a. Intertek has two dedicated Sequence VH stands.
   i. One of these stands has been equipped with a new engine coolant flow meter.
   ii. They are planning a proof-of-performance test with REO940 to confirm that this new flow meter is working correctly.
b. They have three calibrated Sequence VG stands.

6. REO1011 Performance:

a. It appears that REO1011 will be an adequate replacement for REO1006-2 as the "passing" Sequence V reference oil.

7. Upcoming AOAP Meetings:

a. Romano would like to have at least one Sequence VH data point from each laboratory before a "Ready for Matrix" vote is brought to the AOAP.
b. Afton and Romano both stated that stand inspections will need to be conducted at each of the five Sequence V labs.
   i. The TMC reinforced that these inspections are needed to satisfy the M.O.A. requirements.
c. As a result of the required stand inspections, Romano and Ritchie agreed to present the "Ready for Matrix" vote at the October AOAP meeting.

8. Miscellaneous Sequence VH Items:

a. Romano distributed the most recent draft of the Sequence VH procedure on August 11th.
   i. Ashland requested that the group confirm that the piston and piston ring part numbers in the procedure are correct.
b. Romano confirmed that the purple and brown fuel injectors are interchangeable.

9. New Discussion Items:

a. Intertek asked if they can run Sequence VH tests on their Sequence VG test stands without impacting their calibration periods.
b. Intertek and TMC will draft a motion to address this concern that will be presented to the full Sequence V Surveillance Panel.

Action Items	Person responsible	Completion Date

Follow-up Notes/Updates:	Initials	Date Added