

P Loss Measurement Technique Concerns (Technical)

- Oil Level Measurement, only necessary for P Loss is an error source with little possibility for improvement
- First 20 hours “creates” phosphorous 38% of the time.
 - Misestimates volatilized oil in low oil consumption tests
 - Can’t accurately back calculate existing tests with <531g oil consumption in a 20 hour period (discarded oil not recorded)
 - Level measurement error compounds every 20 hours
 - “Long form” - Too complicated
 - It is possible to work in grams P rather than % when calculating the Phosphorous poisoning of the catalyst.

LZ support using a measurement technique based upon the PR% method. and recommends the following improvements which would help all methods...

Improving the system

- There are steps that can be taken to significantly improve the accuracy of the ICP measurement

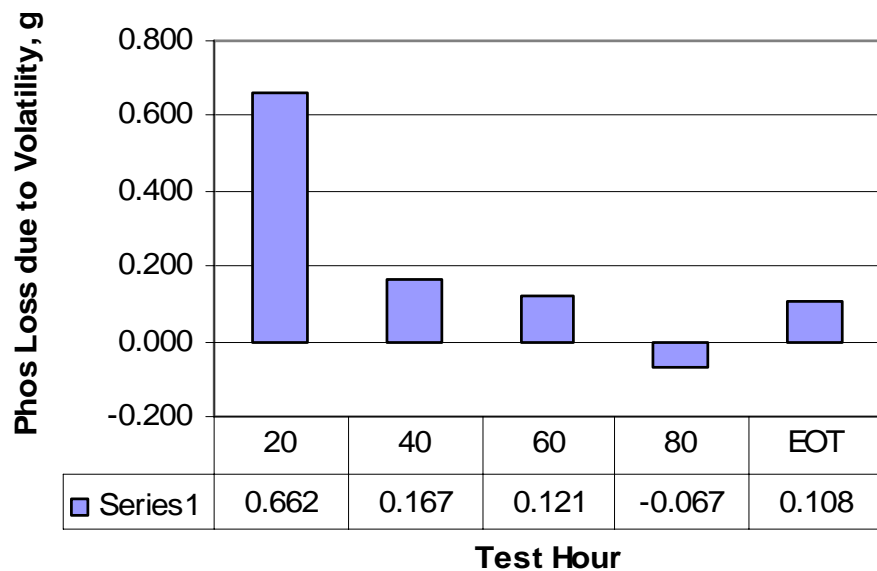
	D5185	D4951	D7040
Operating Parameter			
<i>Background correction</i>	<i>Optional</i>	<i>Optional</i>	<i>Required</i>
<i>Internal Standard</i>	<i>Optional</i>	<i>Required</i>	<i>Required</i>
<i>Peristaltic Pump</i>	<i>Optional</i>	<i>Optional</i>	<i>Required</i>

The D7040 method was designed for low-level phosphorus in GF4 oils, but the mandatory operating parameters included for phosphorus will also improve accuracy and precision for calcium and other desired elements if mandated for the IIIG. To optimize accuracy and precision for Ca and P retention, the ICP method to recommend for new oils and drains for this IIIG engine test procedure should be D5185 with a notation to make the 3 optional parameters mandatory.

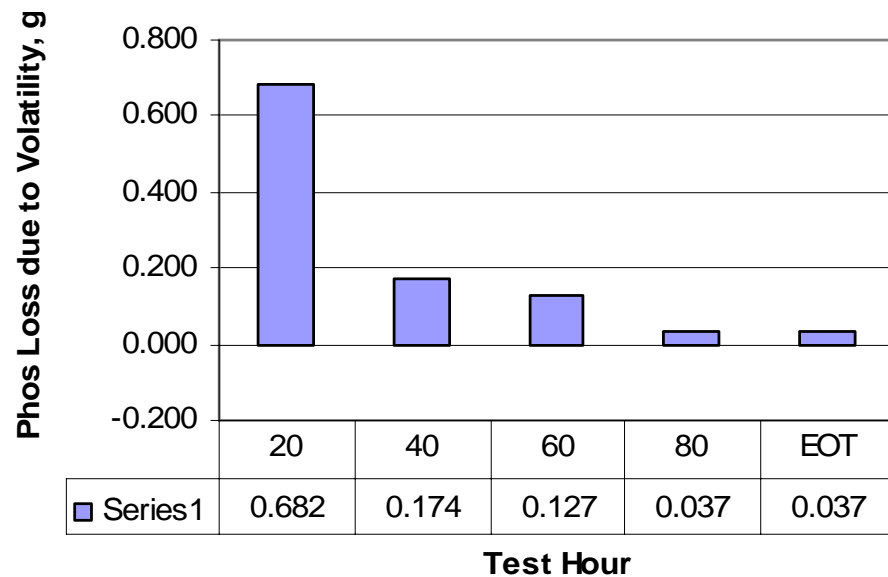
- Results should be done as D445: run 2 “determinations” and average them for the result.
- Based on the ICP methods chosen, precision from that method should dictate an outlier criteria for potentially running a 3rd determination.
- Have TMC monitor test precision
- Remove day-to-day variability in ICP measurement by running all samples together

Effect of ICP Measurement variation on Phos. Retention Calculations

Phos Volatility - P5W-30

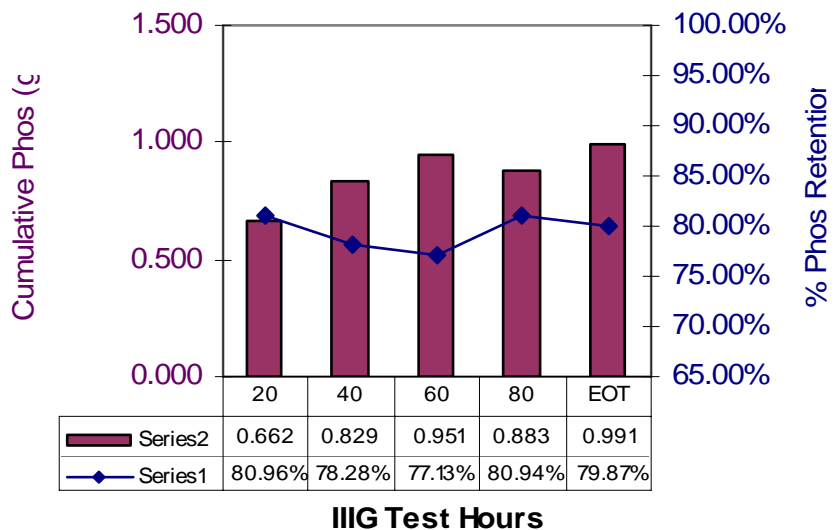


Phos Volatility P5W-30- (All ICP data together)



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Phos Volatility- P5W-30- (all ICP data together)

