

Cummins Surveillance Panel
ISB (ASTM D7484)
ISM (ASTM D7468)
11/15/2024

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Agenda

- ISB Turbo Status
- New ISB Reference Oil Matrix Updates
- New ISB hardware status
- ISM new reference oil status
- ISM hardware status
- AOB

ISB New Hardware Introduction

- New hardware has arrived at TEI
- 790 Camshafts were produced
 - TEI is seeing around 60% rejection rate
- Kit Status?
- Turbos now available from dealer network

ISB Reference Oil Update

- Estimated timeline from labs to begin new reference oil testing

Run	Cam Wear (Raw)	Cam Wear (CF)	Tappet Wear (Raw)	Tappet Wear (CF)	Crosshead
1 st industry run	105.3	81.1	113.5	104.4	5.5
2 nd Industry Run	77.5	59.6	111.3	102.4	10.0

ISM

- 12 kits currently available at TEI for new RO matrix
- New ISM hardware is pending intake and exhaust valves
 - 290 kits of push rods (current batch)
 - 89 kits of adjusting screws (current batch)
 - 533 kits test filters (current batch)
 - 300 kits of crossheads (new batch)
 - 2500 valves on order (new batch)
- ETA on Exhaust and Intake Valves?

Cummins ISB and ISM Reference Oil Offering - ISB

Supplier	Test	Oil	%P	%S	%SASH	Viscosity Grade	HTHS	Base Stock Group	Cam Wear	Tappet Weight Loss
PC-12 Limits									55/59/61	100/108/112
E	ISB	A	0.077	0.26	0.7	10W-30	3.1	II	58	93
	ISB	A*	0.077	0.26	0.7	10W-30	3.2	II	51	86

Oils A and A* are both FA-4 type oils where both runs are on the exact same additive package chemistry with only very small tweak in VM & base oil mix.

Oil A was chosen as the ISB reference fluid (in green) now known as Reference Oil 835.

Cummins ISB and ISM Reference Oil Offering - ISM

	Sludge	Crosshead	Injector Screw	Filter Plugging	Top Ring Mass Loss
Result:	9.2	2.0	39	12	36
Merits:	250	700	154	175	N/A
P/F Limit	Merit 1000 (Total Merits: 1279)				100 max

SAE Vis: 10W-30
 TGA Soot % At 50 h: 4.1;
 TGA Soot % At 150 h: 7.7
Avg TGA Soot % 0-200 h: 5.0
 Total Oil Consumption, kg: 6.6

Above ISM result was run on a **similar formulation** to the **green** ISB reference fluid. This run was in the same base stocks but a slightly different BOV, VM treat, and a minor modification from the ISB additive package. We would anticipate the ISB formulation to perform similarly.

Prior feedback from Cummins SP was that the Average TGA Soot was high and wanted to see a run closer to reference soot window and had been awaiting a volunteer to run the ISM Reference Oil 835.

ISM Result on ISB RO 835

	Sludge	Crosshead	Injector Screw	Filter Plugging	Top Ring Mass Loss
Result:	9.2	4.4	84.1	12	27.9
Merits:	250	675	-558.4	175	N/A
P/F Limit	Merit 1000 (Total Merits: 541.6)				100 max

SAE Vis: 10W-30
 TGA Soot % At 50 h: 3.3;
 TGA Soot % At 150 h: 6.8
Avg TGA Soot % 0-200 h: 4.2
 Total Oil Consumption, kg: 10.01

- This run aligns with previous similar formulation run
- Depending on average TGA soot window, total merits changes considerably
 - Similar total merits performance to current reference fluid
 - Recognize Injector Screw is higher (39 & 84) than current RO (last 4 years range: 26.5 to 55.3)
- Believe this is a good borderline oil with modern chemistry and low HTHS

	Injector Adj. Screw Adjusted at 3.9%							
	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
Average Soot	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
Original Result	65.45	55.22	46.59	39.30	33.16	27.98	23.60	19.91
Transformed Result	4.18	4.01	3.84	3.67	3.50	3.33	3.16	2.99
Correction Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Corrected Transformed Result	4.43	4.26	4.09	3.92	3.75	3.58	3.41	3.24
Final Result	84.04	70.91	59.82	50.47	42.58	35.92	30.31	25.57
IAS Merits	-558	-349	-172	-23	102	208	297	396
CWL Merit	675	675	675	675	675	675	675	675
OilFDelta Merit	175	175	175	175	175	175	175	175
Sludge Merits	250	250	250	250	250	250	250	250
Total Merits	542	751	928	1077	1202	1308	1397	1496

Concluding Remarks

