

Test Method D5967

Mack T-8

Version

Method:

Conducted For

| | | |
|--------------|------------------------------|--|
| T-8A: | V = Valid | The Reference Oil/Non-Reference Oil was evaluated in accordance with the test procedure. |
| T-8: | I = Invalid | The Reference Oil/Non-Reference was not evaluated in accordance with the test procedure |
| T-8E: | N = Not Interpretable | The Non-Reference Oil results cannot be interpreted and shall not be used in determining an average test result using multiple test criteria. |

| | | | |
|-------------------------------------|-----------------------|--------------------------|----------------------|
| Stand: | Stand Run No.: | Engine No.: | Engine Hours: |
| End Of Test Date: | | End Of Test Time: | |
| Oil Code/CMIR: ^A | | | |
| T-8 Formulation/Stand Code: | | | |
| T-8E Formulation/Stand Code: | | | |
| Alternate Codes: | | | |

^A CMIR or Non-Reference Oil Code

Submitted By:

Testing Laboratory

Signature

Typed Name

Title

**Test Method D5967 – Mack T-8
Form 1
Test Result Summary**

| | | | | | | | | | | |
|--------------------------------------|---------------------|-------------------------------|-----------------------------------|--|------------------------------------|----------------------------------|-------------------------------|-----------------------------------|--|-----------------------------------|
| T-8 Formulation/Stand Code: | | | | | | Test Length: ^A | | | | |
| T -8E Formulation/Stand Code: | | | | | | | | | | |
| Reference Oil Test | | | | | | Non-Reference Oil Test | | | | |
| CMIR No.: | | | | | | Oil Code: | | | | |
| TMC Oil No. | Test Lab | Test Stand No. | Test Stand Run No. | Engine Block Serial No. | Rebuild Block Hours | Test Lab | Test Stand No. | Test Stand Run No. | Engine Block Serial NO. | Engine Block Hours |
| | | | | | | | | | | |
| Date Test Started: | | Date Test Completed: | | EOT Time: | | Date Test Started: | | Date Test Completed: | | EOT Time: |
| Laboratory Oil Code: | | | | | | Laboratory Oil Code: | | | | |
| SAE Viscosity: | | | | | | SAE Viscosity: | | | | |

| | |
|--|--|
| Viscosity Slope 100 - 150 h, cSt/h | Viscosity Slope 100 - 150 h, cSt/h |
| Viscosity Increase At 3.8% TGA, cSt | Viscosity Increase At 3.8% TGA, cSt |
| Correction Factor, Vis. Inc. at 3.8% TGA | Correction Factor, Vis. Inc. at 3.8% TGA |
| | Severity Adjustment For Viscosity Inc. At 3.8% TGA, cSt |
| Final Viscosity Increase At 3.8% TGA, cSt | Final Viscosity Increase At 3.8% TGA, cSt |
| Relative Viscosity At 4.8%, TGA (50% Loss)^B | Relative Viscosity At 4.8%, TGA (50% Loss)^B |
| Correction Factor, Relative Vis. (50% Loss) | Correction Factor, Relative Vis. (50% Loss) |
| | Severity Adjustment For Relative Viscosity |
| Final Relative Viscosity (50% Loss) | Final Relative Viscosity (50% Loss) |
| Relative Viscosity At 4.8%, TGA (100% Loss)^B | Relative Viscosity At 4.8%, TGA (100% Loss)^B |
| Correction Factor, Relative Vis. (100% Loss) | Correction Factor, Relative Vis. (100% Loss) |
| | Severity Adjustment For Relative Viscosity |
| Final Relative Viscosity (100% Loss) | Final Relative Viscosity (100% Loss) |
| TGA Soot % At 250 h | TGA Soot % At 250 h |
| TGA Soot % At 300 h | TGA Soot % At 300 h |
| Average Oil Consumption At 250 h (g/kW-h) | Average Oil Consumption At 250 h (g/kW-h) |
| Oil Filter Delta At 250 h, kPa | Oil Filter Delta At 250 h, kPa |

^A Test length is discussed in sections 1.2, 4.1 A8.3.1 and A9.3.1

^B Relative viscosities are calculated using shear loss determined by D6278

TEST METHOD D5967
FORM 2
OPERATIONAL SUMMARY ^A

| | |
|------------------------------|------------|
| Laboratory | Start Date |
| Test Number ^B | |
| Oil Code | |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code: | |

| TEST PARAMETER | SPECIFICATION | AVERAGE | STD. DEV. | MINIMUM | MAXIMUM |
|---------------------------|---------------|---------|-----------|---------|---------|
| Engine Speed, r/min | 1800 ± 5 | | | | |
| Torque, N-m | 1369 – 1398 | | | | |
| Fuel Flow, kg/h | 63.28 ± 0.63 | | | | |
| Humidity, g/kg | Report | | | | |
| Blowby, L/min | Report | | | | |
| TEMPERATURES | SPECIFICATION | AVERAGE | STD. DEV. | MINIMUM | MAXIMUM |
| Coolant Out, °C | 85 ± 3 | | | | |
| Coolant In, °C | Report Only | | | | |
| Oil, °C | 100 - 107 | | | | |
| Fuel In, °C | 40 ± 1 | | | | |
| Intake Air, °C | 25 ± 3 | | | | |
| Intake Manifold, °C | 43 ± 3 | | | | |
| Pre- Turb. (F), °C | 602 - 632 | | | | |
| Pre-Turbo (R), °C | 602 - 632 | | | | |
| TailPipe, °C | 455 - 474 | | | | |
| PRESSURES | SPECIFICATION | AVERAGE | STD.DEV | MINIMUM | MAXIMUM |
| Oil Gallery, kPa | 372 -441 | | | | |
| Crankcase, kPa | 0.50 ±0.25 | | | | |
| Exhaust, kPa | 3.1 ± 0.4 | | | | |
| Oil Filter Delta, kPa | 138 Max. | | | | |
| Inlet Air Res., kPa | 2.5 ± 0.25 | | | | |
| Intake Manifold, kPa | 186 - 199 | | | | |
| Compressor Discharge, kPa | Report | | | | |
| Intercooler Delta, kPa | 13.6 Maximum | | | | |

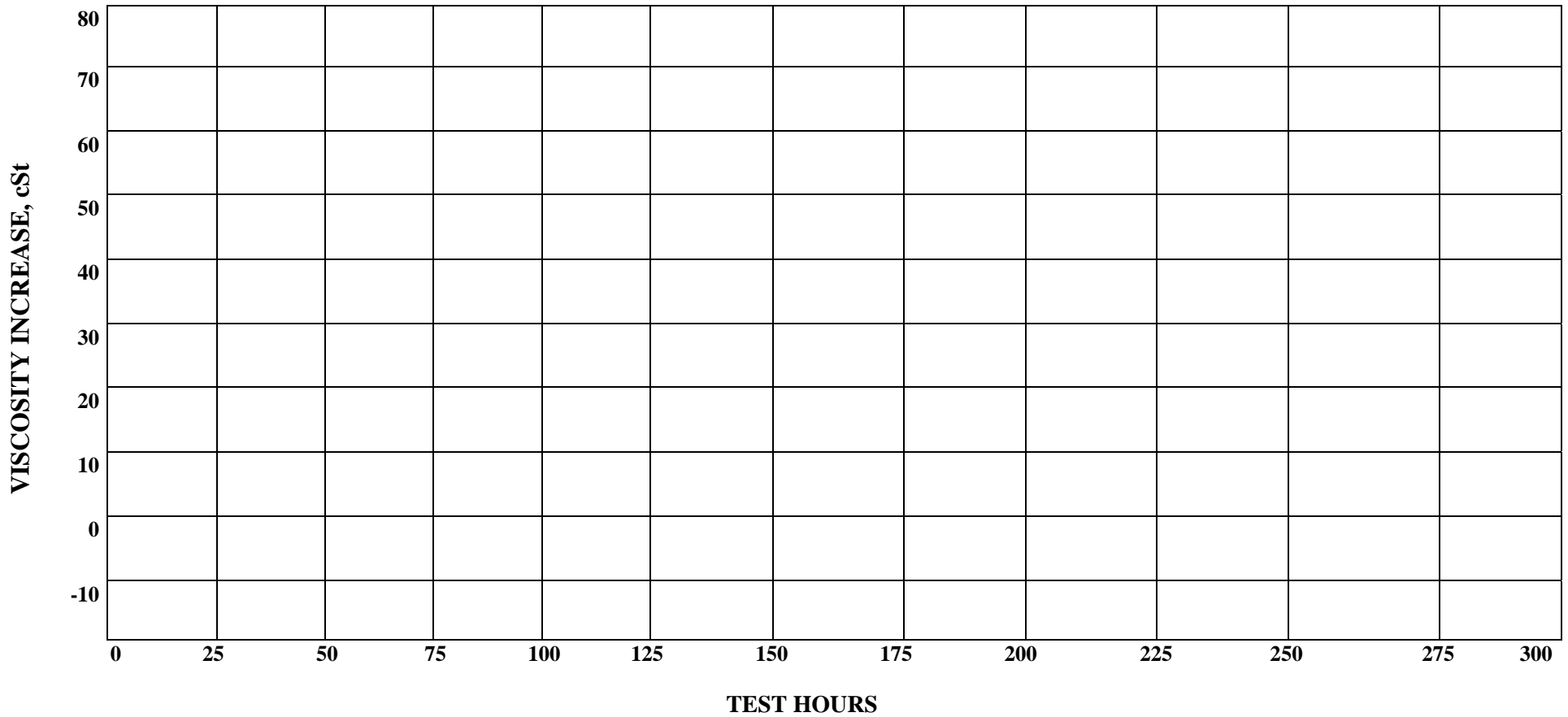
^A ALL DATA VALUES SHOWN ARE BASED ON TEST LENGTH REPORTED ON FORM1

^B TEST NUMBER IS: STAND – STAND RUN NO. – ENGINE SERIAL NO. – ENGINE HOURS

**TEST METHOD D5967
FORM 3**

VISCOSITY INCREASE VERSUS TIME

| | |
|-----------------------------|------------|
| Laboratory | Start Date |
| Test Number ^B | Oil Code |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code | |



**TEST METHOD D5967
FORM 5
TEST FUEL ANALYSIS (LAST BATCH)**

| | |
|------------------------------|--------------------|
| Laboratory | Start Date |
| Test Number ^B | |
| Oil Code | |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code: | |
| Supplier: | Batch Identifiers: |

| Measurement | Specs. | Analysis | | Test Method |
|-----------------------------------|-------------|----------|-----|-------------------------|
| | | NEW | EOT | |
| Total Sulfur, % wt | 0.03 - 0.05 | | | D 129 |
| Gravity, °API | 32-36 | | | D 287 or D 4052 |
| Hydrocarbon Composition | | | | |
| Aromatics % vol | 28 - 35 | | | D 1319 |
| Olefin | Report | | | D 1319 |
| Saturates | Report | | | D 1319 |
| Cetane Index | Report | | | D 4737 |
| Cetane No. | 42 - 48 | | | D 613 |
| Copper Strip Corrosion | 3 max | | | D 130 |
| Flash Point, °C | 54 min | | | D 93 |
| Cloud Point °C | -12 max | | | D 2500 |
| Pour Point °C | -18 max | | | D97 |
| Carbon Residue on 10% Residium, % | 0.35 max | | | D 524 (10 % Bottoms) |
| Water & Sediment, % Vol | 0.05 max | | | D 2709 |
| Ash, % wt | 0.01 max | | | D482 |
| Viscosity, cSt @ 40 °C | 2.0 - 3.2 | | | D445 |
| Distillation °C | | | | |
| IBP | 177 - 199 | | | D 86 |
| 10% | 210 - 232 | | | D 86 |
| 50% | 249 - 277 | | | D 86 |
| 90% | 299 - 327 | | | D 86 |
| EP | 327 - 360 | | | D 86 |

**TEST METHOD D5967
FORM 7
CHARACTERISTICS OF THE DATA ACQUISITION SYSTEM**

| | |
|------------------------------|------------|
| Laboratory | Start Date |
| Test Number ^B | |
| Oil Code | |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code: | |

| PARAMETER (1) | SENSING DEVICE (2) | CALIBRATION FREQUENCY (3) | RECORD DEVICE (4) | OBSERVATION FREQUENCY (5) | RECORD FREQUENCY (6) | LOG FREQUENCY (7) | SYSTEM RESPONSE (8) |
|---------------------|--------------------------|---------------------------------|-------------------------|---------------------------------|----------------------------|-------------------------|---------------------------|
| Temperatures | | | | | | | |
| OIL@ FILT. | | | | | | | |
| FUEL IN. | | | | | | | |
| INTAKE AIR | | | | | | | |
| INTAKE MAN | | | | | | | |
| PRE- TURB. | | | | | | | |
| COOL. OUT | | | | | | | |
| Other | | | | | | | |
| FUEL FLOW | | | | | | | |
| ENGINE RPM | | | | | | | |
| LOAD | | | | | | | |
| INLET RESTR | | | | | | | |
| EXH. PRESS. | | | | | | | |
| OIL GAL PRES | | | | | | | |

LEUEND:

- (1) OPERATING PARAMETER
- (2) THE TYPE OF DEVICE USED TO MEASURE TEMPERATURE, PRESSURE OR FLOW
- (3) FREQUENCY AT WHICH THE MEASUREMENT SYSTEM IS CALIBRATED
- (4) THE TYPE OF DEVICE WHERE DATA IS RECORDED
 LG-HANDLOGSHEET
 DL -AUTOMATIC DATA LOGGER
 SC-STRIPCHARTRECORDER
 C/M -COMPUTER, USING MANUAL DATA ENTRY
 C/D -COMPUTER, USING DIRECT VO ENTRY
- (5) DATA ARE OBSERVED BUT ONLY IF RECORDED OFF SPEC.
- (6) DATA ARE RECORDED BUT ARE NOT RETAINED AT EOT
- (7) DATA ARE LOGGED AS PERMANENT RECORD, NOTE SPECIFY IF:
 SS -SNAPSHOT TAKEN AT SPECIFIED FREQUENCY
 AG/X AVERAGE OF X DATA POINTS AT SPECIFIED FREQUENCY
- (8) TIME FOR THE OUTPUT TO REACH 63.2% OF FINAL VALUE FOR STEP CHANGE AT INPUT

**TEST METHOD D5967
FORM 8
BUILD-UP AND HARDWARE INFORMATION**

| | |
|------------------------------|------------|
| Laboratory | Start Date |
| Test Number ^B | |
| Oil Code | |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code: | |

TIMING

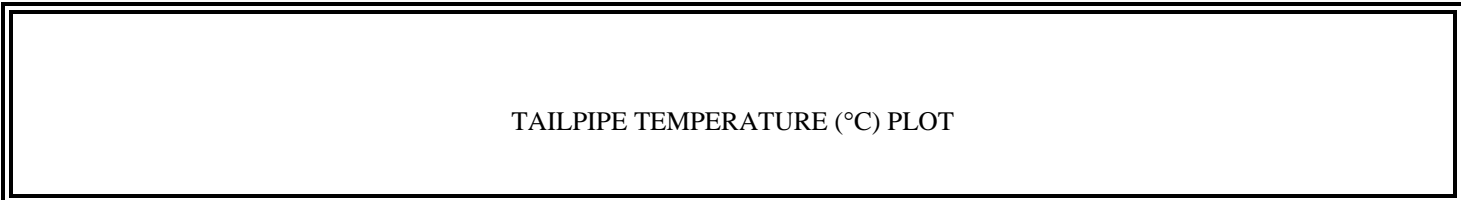
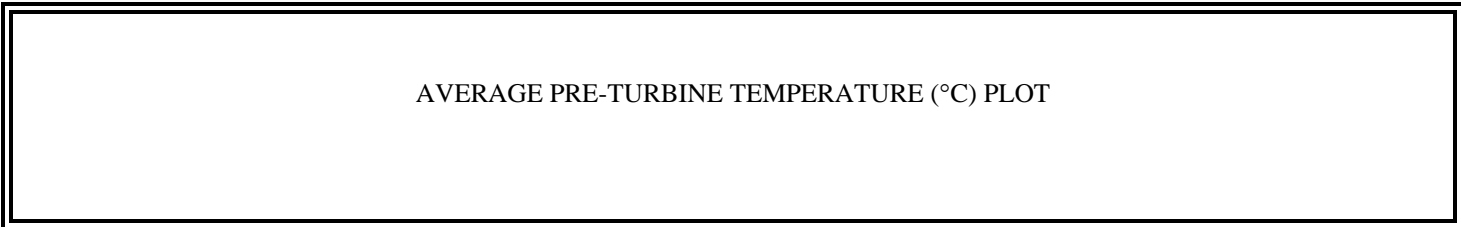
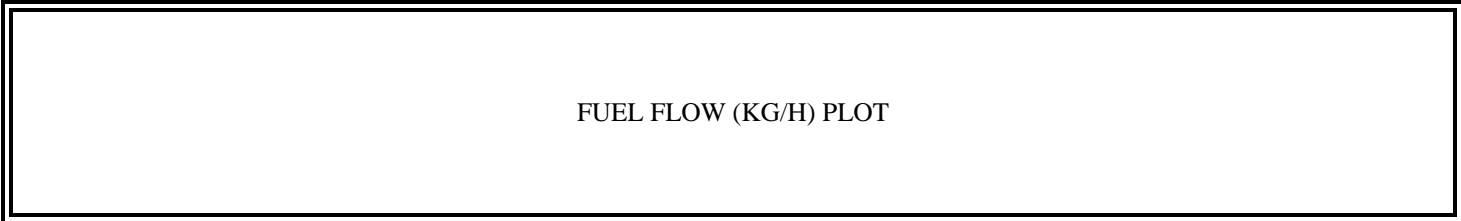
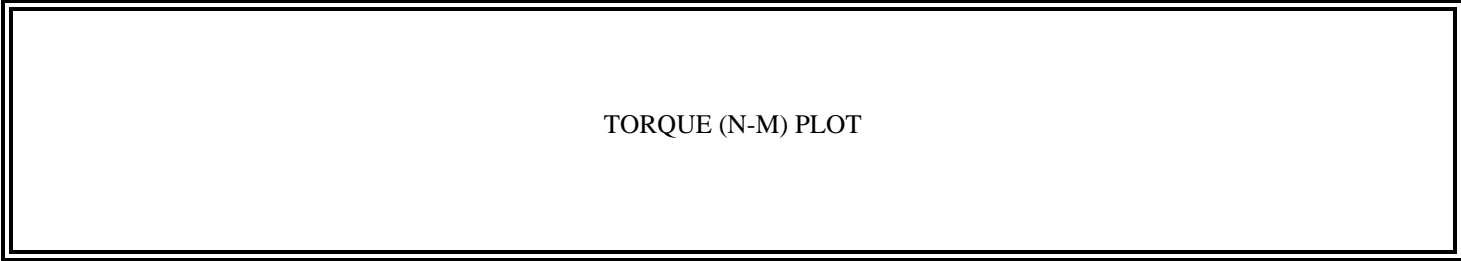
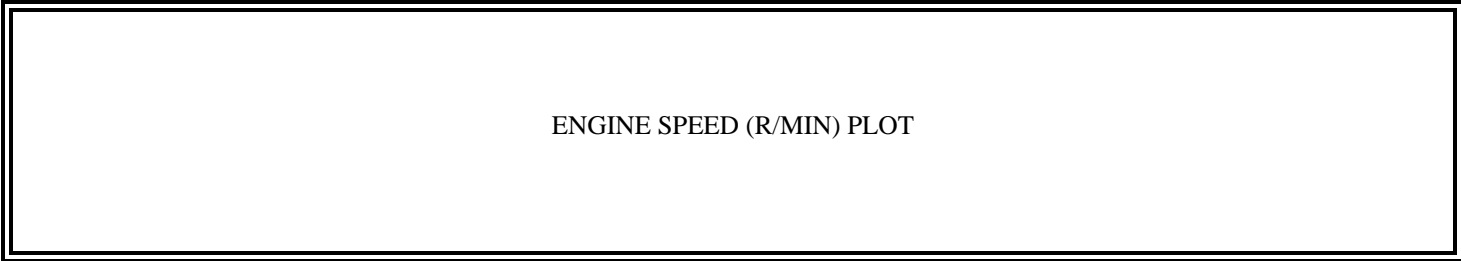
| | |
|---------------------------------|--|
| Lite/HPC Offset (deg) | |
| Piston Travel to TDC (deg) | |
| Initial Timing (deg) | |
| First Timing Change (deg) | |
| First Timing Change Hour (Hrs) | |
| Second Timing Change (deg) | |
| Second Timing Change Hour (Hrs) | |

PARTS

| Part | Part Number | Serial Number |
|-----------------------|-------------|---------------|
| Injection Pump | | |
| Turbo Charger | | |
| Cylinder Head (front) | | |
| Cylinder Head (rear) | | |
| Pistons | | |
| Injection Nozzles | | |

**TEST METHOD D5967
FORM 9
OPERATIONAL DATA**

| | |
|------------------------------|------------|
| Laboratory | Start Date |
| Test Number ^B | |
| Oil Code | |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code: | |



**TEST METHOD D5967
FORM 10
OPERATIONAL DATA**

| | |
|------------------------------|------------|
| Laboratory | Start Date |
| Test Number ^B | |
| Oil Code | |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code: | |

COOLANT IN TEMPERATURE (°C) PLOT

COOLANT OUT TEMPERATURE (°C) PLOT

OIL TEMPERATURE (°C) PLOT

FUEL IN TEMPERATURE (°C) PLOT

**TEST METHOD D5967
FORM 11
OPERATIONAL DATA**

| | |
|------------------------------|------------|
| Laboratory | Start Date |
| Test Number ^B | |
| Oil Code | |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code: | |

INTAKE AIR TEMPERATURE (°C) PLOT

INTAKE MANIFOLD TEMPERATURE (°C) PLOT

OIL GALLERY PRESSURE (KPA) PLOT

OIL FILTER PRESSURE (KPA) PLOT

**TEST METHOD D5967
FORM 12
OPERATIONAL DATA**

| | |
|------------------------------|------------|
| Laboratory | Start Date |
| Test Number ^B | |
| Oil Code | |
| T-8 Formulation/Stand Code: | |
| T-8E Formulation/Stand Code: | |

| |
|-------------------------------|
| CRANKCASE PRESSURE (KPA) PLOT |
|-------------------------------|

| |
|-----------------------------|
| EXHAUST PRESSURE (KPA) PLOT |
|-----------------------------|

| |
|----------------------------------|
| INLET AIR RESTRICTION (KPA) PLOT |
|----------------------------------|

| |
|-------------------------------------|
| INTAKE MANIFOLD PRESSURE (KPA) PLOT |
|-------------------------------------|

TEST METHOD D5967
Form 13
American Chemistry Council Code of Practice
Test Laboratory Conformance Statement

| | | | | | |
|------------------------------|--|------------|--|-----------|--|
| Test Laboratory | | | | | |
| Test Sponsor | | | | | |
| T8E Formulation / Stand Code | | | | | |
| Test Number | | | | | |
| Start Date | | Start Time | | Time Zone | |

Declarations

- No. 1 All requirements of the ACC Code of Practice for which the test laboratory is responsible were met in the conduct of this test. Yes _____ No _____*
- No. 2 The laboratory ran this test for the full duration following all procedural requirements; and all operational validity requirements of the latest version of the applicable test procedure (ASTM or other) including all updates issued by the organization responsible for the test, were met.
 Yes _____ No _____*
- If the response to this Declaration is “No”, does the test engineer consider the deviations from operational validity requirements that occurred to be beyond the control of the laboratory?
 Yes _____* No _____
- No. 3 A deviation occurred for one of the test parameters identified by the organization responsible for the test as being a special case. Yes _____* No _____ (*This currently applies only to specific deviations identified in the ASTM Information Letter System*)

Check The Appropriate Conclusion

| | |
|--|---|
| | Operational review of this test indicates that the results should be included in the Multiple Test Acceptance Criteria calculations. |
| | *Operational review of this test indicates that the results should not be included in the Multiple Test Acceptance Criteria calculations. |

Note: *Supporting comments are required for all responses identified with an asterisk.*

| |
|-----------------|
| Comments |
| |
| |
| |
| |

Signature

Date

Typed Name

Title

TEST METHOD D5967
Form 13A
American Chemistry Council Code of Practice
Test Laboratory Conformance Statement

| | | | | | |
|-----------------------------|--|------------|--|-----------|--|
| Test Laboratory | | | | | |
| Test Sponsor | | | | | |
| T8 Formulation / Stand Code | | | | | |
| Test Number | | | | | |
| Start Date | | Start Time | | Time Zone | |

Declarations

- No. 1 All requirements of the ACC Code of Practice for which the test laboratory is responsible were met in the conduct of this test. Yes_____ No_____*
- No. 2 The laboratory ran this test for the full duration following all procedural requirements; and all operational validity requirements of the latest version of the applicable test procedure (ASTM or other) including all updates issued by the organization responsible for the test, were met.
 Yes_____ No_____*
- If the response to this Declaration is “No”, does the test engineer consider the deviations from operational validity requirements that occurred to be beyond the control of the laboratory?
 Yes_____ * No_____
- No. 3 A deviation occurred for one of the test parameters identified by the organization responsible for the test as being a special case. Yes_____ * No_____ (*This currently applies only to specific deviations identified in the ASTM Information Letter System*)

Check The Appropriate Conclusion

| | |
|--|---|
| | Operational review of this test indicates that the results should be included in the Multiple Test Acceptance Criteria calculations. |
| | *Operational review of this test indicates that the results should not be included in the Multiple Test Acceptance Criteria calculations. |

Note: *Supporting comments are required for all responses identified with an asterisk.*

| |
|-----------------|
| Comments |
| |
| |
| |
| |

Signature

Date

Typed Name

Title