**Report On**

**General Motors Stochastic Pre-Ignition Test**

**For dexos ®**

**Form 1**

Version

VERSION

### Conducted For

#### TSTSPON1

TSTSPON2

|  |  |
| --- | --- |
| V | V = Valid |
| I = Invalid |
| N = Results cannot be interpreted as representative of oil performance (Non-reference oil) and shall not be used for multiple test acceptance |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test Number** | | | | | | | | | |
| Stand |  | Stand Run | |  | Engine | |  | Engine Run |  |
| Formulation Stand Code | | |  | | | | | | |
| Date Started | |  | | | | Time Started | |  | |
| Date Completed | |  | | | | Time Completed | |  | |
| Test Length | |  | | | | Total Downtime | |  | |

|  |
| --- |
| In my opinion this test been conducted in a valid manner in accordance with test procedure GMSPI and appropriate amendments. The remarks included in the report describe the anomalies associated with this test. |

|  |  |
| --- | --- |
| Submitted By: | SUBLAB |
|  | Testing Laboratory |
|  |  |
|  | SUBSIGIM |
|  | Signature |
|  |  |
|  | SUBNAME |
|  | Typed Name |
|  |  |
|  | SUBTITLE |
|  | Title |
|  |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 2**

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**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 3**

**Test Results Summary**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Stages\*** | | | | | | | | |
| **Parameters** | **Units** | **0.1** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| Duration | sec | 1800 | 600 | 300 | 900 | 300 | 900 | 300 | 900 | 300 |
| Engine Speed | r/min | 2000 | 3900 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| Torque | Nm | 100 | 200 | 32 | 350 | 32 | 350 | 32 | 350 | 32 |
| Coolant Out Temperature | °C |  |  |  | 95 |  | 95 |  | 95 |  |
| Oil Sump Temperature | °C |  |  |  | 100 |  | 100 |  | 100 |  |
| Intake Manifold Post-Intercooler Temp | °C |  |  |  | 32 |  | 32 |  | 32 |  |
| Exhaust Back Pressure | kPa |  |  |  | 5.0 |  | 5.0 |  | 5.0 |  |
| Humidity Dew Point | °C | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Equivalence Ratio | λ | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

\* Stages 1 - 8 are repeated two times for a total of three cycles

|  |  |
| --- | --- |
| Total (Peak Pressure) PI Events |  |
| Total (MBF02%) PI Events |  |
| Total (Peak Pressure) + (MBF02%) PI Events |  |
|  | |
| Cycle 1 Total PI Events (Peak Pressure) |  |
| Cycle 1 Total PI Events (MBF02%) |  |
| Cycle 1 Total (Peak Pressure) + (MBF02%) PI Events |  |
|  | |
| Cycle 2 Total PI Events (Peak Pressure) |  |
| Cycle 2 Total PI Events (MBF02%) |  |
| Cycle 2 Total (Peak Pressure) + (MBF02%) PI Events |  |
|  | |
| Cycle 3 Total PI Events (Peak Pressure) |  |
| Cycle 3 Total PI Events (MBF02%) |  |
| Cycle 3 Total (Peak Pressure) + (MBF02%) PI Events |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 4**

**Operational Summary – Oil Conditioning Stage**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Engine Data** | | | | | | **QI** | | |
| **Units** | **Target Value** | **Average** | **Std**  **Dev** | **Min** | **Max** | **QI** | **Samples** | **BQD** |
|  | **Parameter** |
| **Controlled Parameters** | Engine Speed | r/min | 2000 |  |  |  |  |  |  |  |
| Torque | Nm | 100  350 |  |  |  |  |  |  |  |
| Humidity Dew Point | °C | 7.0 |  |  |  |  |  |  |  |
| Equivalence Ratio | λ | 1.00 |  |  |  |  |  |  |  |
| **Non-Controlled** | Coolant In Temperature | °C | Report |  |  |  |  |  | | |
| Coolant Out Temperature | °C | Report |  |  |  |  |
| Oil Sump Temperature | °C | Report |  |  |  |  |
| Oil Gallery Temperature | °C | Report |  |  |  |  |
| Intake Manifold Post-IC Temperature | °C | Report |  |  |  |  |
| Fuel Temperature | °C | Report |  |  |  |  |
| Exhaust Back Pressure | kPa | Report |  |  |  |  |
| Coolant Pressure | kPa | Report |  |  |  |  |
| Fuel Pressure | kPa | Report |  |  |  |  |
| Pre-Turbo Inlet Air Temperature | °C | Report |  |  |  |  |
| Exhaust Temperature | °C | Report |  |  |  |  |
| Pre-Turbo Inlet Air Pressure | kPa | Report |  |  |  |  |
| Post-Turbo Air Pressure | kPa | Report |  |  |  |  |
| Intake Manifold Pressure | kPaA | Report |  |  |  |  |
| Barometric Pressure | kPaA | Report |  |  |  |  |
| Crankcase Pressure | kPa | Report |  |  |  |  |
| Coolant Flow | L/min | Report |  |  |  |  |
| Fuel Flow | kg/hr | Report |  |  |  |  |
| Power | kW | Report |  |  |  |  |  | | |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 5**

**Operational Summary – Engine Conditioning Stage: average of 3 stages**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Engine Data** | | | | | | **QI** | | |
| **Units** | **Target Value** | **Average** | **Std**  **Dev** | **Min** | **Max** | **QI** | **Samples** | **BQD** |
|  | **Parameter** |
| **Controlled Parameters** | Engine Speed | r/min | 3900 |  |  |  |  |  |  |  |
| Torque | Nm | 200  350 |  |  |  |  |  |  |  |
| Humidity Dew Point | °C | 7.0 |  |  |  |  |  |  |  |
| Equivalence Ratio | λ | 1.00 |  |  |  |  |  |  |  |
| **Non-Controlled** | Coolant Out Temperature | °C | Report |  |  |  |  |  | | |
| Coolant Out Temperature | °C | Report |  |  |  |  |
| Oil Sump Temperature | °C | Report |  |  |  |  |
| Oil Gallery Temperature | °C | Report |  |  |  |  |
| Intake Manifold Post-IC Temperature | °C | Report |  |  |  |  |
| Fuel Temperature | °C | Report |  |  |  |  |
| Exhaust Back Pressure | kPa | Report |  |  |  |  |
| Coolant Pressure | kPa | Report |  |  |  |  |
| Fuel Pressure | kPa | Report |  |  |  |  |
| Pre-Turbo Inlet Air Temperature | °C | Report |  |  |  |  |
| Exhaust Temperature | °C | Report |  |  |  |  |
| Pre-Turbo Inlet Air Pressure | kPa | Report |  |  |  |  |
| Post-Turbo Air Pressure | kPa | Report |  |  |  |  |
| Intake Manifold Pressure | kPaA | Report |  |  |  |  |
| Barometric Pressure | kPaA | Report |  |  |  |  |
| Crankcase Pressure | kPa | Report |  |  |  |  |
| Coolant Flow | L/min | Report |  |  |  |  |
| Fuel Flow | kg/hr | Report |  |  |  |  |
| Power | kW | Report |  |  |  |  |  | | |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 6**

**Operational Summary – Low Load Stages average of 11 stages**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Engine Data** | | | | | | **QI** | | |
| **Units** | **Target Value** | **Average** | **Std**  **Dev** | **Min** | **Max** | **QI** | **Samples** | **BQD** |
|  | **Parameter** |
| **Controlled Parameters** | Engine Speed | r/min | 2000 |  |  |  |  |  |  |  |
| Torque | Nm | 32  350 |  |  |  |  |  |  |  |
| Humidity Dew Point | °C | 7.0 |  |  |  |  |  |  |  |
| Equivalence Ratio | λ | 1.00 |  |  |  |  |  |  |  |
| **Non-Controlled** | Coolant In Temperature | °C | Report |  |  |  |  |  | | |
| Coolant Out Temperature | °C | Report |  |  |  |  |
| Oil Sump Temperature | °C | Report |  |  |  |  |
| Oil Gallery Temperature | °C | Report |  |  |  |  |
| Intake Manifold Post-IC Temperature | °C | Report |  |  |  |  |
| Fuel Temperature | °C | Report |  |  |  |  |
| Exhaust Back Pressure | kPa | Report |  |  |  |  |
| Coolant Pressure | kPa | Report |  |  |  |  |
| Fuel Pressure | kPa | Report |  |  |  |  |
| Pre-Turbo Inlet Air Temperature | °C | Report |  |  |  |  |
| Exhaust Temperature | °C | Report |  |  |  |  |
| Pre-Turbo Inlet Air Pressure | kPa | Report |  |  |  |  |
| Post-Turbo Air Pressure | kPa | Report |  |  |  |  |
| Intake Manifold Pressure | kPaA | Report |  |  |  |  |
| Barometric Pressure | kPaA | Report |  |  |  |  |
| Crankcase Pressure | kPa | Report |  |  |  |  |
| Coolant Flow | L/min | Report |  |  |  |  |
| Fuel Flow | kg/hr | Report |  |  |  |  |
| Power | kW | Report |  |  |  |  |  | | |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 7**

**Operational Summary – High Load Stages average of 9 stages**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Engine Data** | | | | | | **QI** | | |
| **Units** | **TargetValue** | **Average** | **Std**  **Dev** | **Min** | **Max** | **QI** | **Samples** | **BQD** |
|  | **Parameter** |
| **Controlled Parameters** | Engine Speed | r/min | 2000 |  |  |  |  |  |  |  |
| Torque | Nm | 350  350 |  |  |  |  |  |  |  |
| Humidity Dew Point | °C | 7.0 |  |  |  |  |  |  |  |
| Equivalence Ratio | λ | 1.00 |  |  |  |  |  |  |  |
| Coolant Out Temperature | °C | 95 |  |  |  |  |  |  |  |
| Oil Sump Temperature | °C | 100 |  |  |  |  |  |  |  |
| Intake Manifold Post-IC Temperature | °C | 32 |  |  |  |  |  |  |  |
| Exhaust Back Pressure | kPa | 5 |  |  |  |  |  |  |  |
| **Non-Controlled** | Oil Gallery Temperature | °C | Report |  |  |  |  |  | | |
| Coolant In Temperature | °C | Report |  |  |  |  |
| Fuel Temperature | °C | Report |  |  |  |  |
| Coolant Pressure | kPa | Report |  |  |  |  |
| Fuel Pressure | kPa | Report |  |  |  |  |
| Pre-Turbo Inlet Air Temperature | °C | Report |  |  |  |  |
| Exhaust Temperature | °C | Report |  |  |  |  |
| Pre-Turbo Inlet Air Pressure | kPa | Report |  |  |  |  |
| Post-Turbo Air Pressure | kPa | Report |  |  |  |  |
| Intake Manifold Pressure | kPaA | Report |  |  |  |  |
| Barometric Pressure | kPaA | Report |  |  |  |  |
| Crankcase Pressure | kPa | Report |  |  |  |  |
| Coolant Flow | L/min | Report |  |  |  |  |
| Fuel Flow | kg/hr | Report |  |  |  |  |
| Power | kW | Report |  |  |  |  |  | | |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 8**

**Combustion Chamber Analysis - Cycle 1-1**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 1-1** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 9**

**Combustion Chamber Analysis - Cycle 1-2**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 1-2** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 10**

**Combustion Chamber Analysis - Cycle 1-3**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 1-3** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 11**

**Combustion Chamber Analysis - Cycle 2-1**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 2-1** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 12**

**Combustion Chamber Analysis - Cycle 2-2**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 2-2** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 13**

**Combustion Chamber Analysis - Cycle 2-3**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 2-3** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 14**

**Combustion Chamber Analysis - Cycle 3-1**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 3-1** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 15**

**Combustion Chamber Analysis - Cycle 3-2**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 3-2** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 16**

**Combustion Chamber Analysis - Cycle 3-3**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle 3-3** | | | | | | | | | | | | |
|  | Cylinder 1 | | | Cylinder 2 | | | Cylinder 3 | | | Cylinder 4 | | |
| Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  | Peak | MBF2% |  |
| Average |  |  |  |  |  |  |  |  |
| PI Threshold |  |  |  |  |  |  |  |  |
| # of Events |  |  |  |  |  |  |  |  |
|  | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # | kPa | deg | Cycle # |
| 1st Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 2nd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 3rd Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 4th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 5th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 6th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 7th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 8th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 9th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 10th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 11th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 12th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 13th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 14th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| 15th Event |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (Peak Press) |  |  | | | | | | | | | | |
| Total (MBF02%) |  |
| Total (Combined) |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 17**

**Hardware Info**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Fuel Batch |  | Fuel Dilution % at EOT |  |
| Oil Weight at SOT (kg) |  | Oil Weight at EOT (kg) |  |
| Engine |  | Engine Hours |  |
| Cylinder Head ID |  | Cylinder Head Hours |  |
| Turbocharger ID |  | Turbocharger Hours |  |
| Pressure Transducer 1 ID | |  | |
| Pressure Transducer 2 ID | |  | |
| Pressure Transducer 3 ID | |  | |
| Pressure Transducer 4 ID | |  | |
| Pressure Transducer 1 Cycles | |  | |
| Pressure Transducer 2 Cycles | |  | |
| Pressure Transducer 3 Cycles | |  | |
| Pressure Transducer 4 Cycles | |  | |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 18**

**Engine Health Checks**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Parameter** | **Units** | **Average** | **Parameter** | **Units** | **Average** |
| **Firing Parameters** | Cell Temperature | °C |  | Fuel Flow | kg/hr |  |
| Intake Air Temperature | °C |  | Humidity Dew Point | °C |  |
| Intake Manifold Pressure | kPaA |  |  |  |  |
| Cylinder 1 IMEP | kPa |  | Cylinder 2 IMEP | kPa |  |
| Cylinder 3 IMEP | kPa |  | Cylinder 4 IMEP | kPa |  |
| Cylinder 1 50% Mass Fraction Burned |  |  | Cylinder 2 50% Mass Fraction Burned |  |  |
| Cylinder 3 50% Mass Fraction Burned |  |  | Cylinder 4 50% Mass Fraction Burned |  |  |
| Cylinder 1 Polytropic Compression Constant |  |  | Cylinder 2 Polytropic Compression Constant |  |  |
| Cylinder 3 Polytropic Compression Constant |  |  | Cylinder 4 Polytropic Compression Constant |  |  |
| Cylinder 1 Polytropic Expansion Constant |  |  | Cylinder 2 Polytropic Expansion Constant |  |  |
| Cylinder 3 Polytropic Expansion Constant |  |  | Cylinder 4 Polytropic Expansion Constant |  |  |
| **Motoring Parameters** | Motoring Torque | Nm |  | Fuel Flow | kg/hr |  |
| Average Cylinder 1 IMEP | kPa |  | Average Cylinder 2 IMEP | kPa |  |
| Average Cylinder 3 IMEP | kPa |  | Average Cylinder 4 IMEP | kPa |  |
| Average Cylinder 1 Peak Pressure | kPa |  | Average Cylinder 2 Peak Pressure | kPa |  |
| Average Cylinder 3 Peak Pressure | kPa |  | Average Cylinder 4 Peak Pressure | kPa |  |
| Crank Angle of Cylinder 1 Peak Pressure | deg |  | Crank Angle of Cylinder 2 Peak Pressure | deg |  |
| Crank Angle of Cylinder 3 Peak Pressure | deg |  | Crank Angle of Cylinder 4 Peak Pressure | deg |  |
| Cylinder 1 Polytropic Compression Constant |  |  | Cylinder 2 Polytropic Compression Constant |  |  |
| Cylinder 3 Polytropic Compression Constant |  |  | Cylinder 4 Polytropic Compression Constant |  |  |
| Cylinder 1 Polytropic Expansion Constant |  |  | Cylinder 2 Polytropic Expansion Constant |  |  |
| Cylinder 3 Polytropic Expansion Constant |  |  | Cylinder 4 Polytropic Expansion Constant |  |  |
|  | Engine off torque | Nm |  |  |  |  |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 19**

**Downtime Record**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of Downtime Occurrences** | | |  |  |
| **Test Hours** | **Date** | **Downtime** | **Reasons** | |
|  |  |  |  | |
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| TOTLDOWN |  |  | **Total Downtime (hours)** | |

**General Motors dexos® Stochastic Pre-Ignition Test**

**Form 20**

**Comment Record**

|  |  |  |  |
| --- | --- | --- | --- |
| Test Number |  | Formulation Stand Code |  |

|  |  |
| --- | --- |
| Number of Comment Lines |  |
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