

**Report On**  
**General Motors Stochastic Pre-Ignition Test**  
**For dexos®**  
**Form 1**

Version

Conducted For

	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			
Formulation Stand Code			
Test Stand		Test Stand Run #	
Date Started		Time Started	
Date Completed		Time Completed	
Test Length		Total Downtime	

<p>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.</p>
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Submitted By: \_\_\_\_\_  
Testing Laboratory

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Typed Name

\_\_\_\_\_  
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	
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Parameters	Units	Stages*								
		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	
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		Engine Data					QI			
Parameter		Units	Target Value	Average	Std Dev	Min	Max	QI	Samples	BQD
<b>Controlled Parameters</b>	Engine Speed	r/min	2000							
	Torque	Nm	100							
	Humidity Dew Point	°C	7.0							
	Equivalence Ratio	λ	1.00							
<b>Non-Controlled</b>	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	
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		Engine Data					QI			
		Units	Target Value	Average	Std Dev	Min	Max	QI	Samples	BQD
Controlled Parameters	Parameter									
		Engine Speed	r/min	3900						
		Torque	Nm	200						
		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	
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		Engine Data						QI			
		Units	Target Value	Average	Std Dev	Min	Max	QI	Samples	BQD	
Controlled Parameters	Parameter										
		Engine Speed	r/min	2000							
		Torque	Nm	32							
		Humidity Dew Point	°C	7.0							
	Equivalence Ratio	$\lambda$	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	
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		Engine Data						QI		
		Units	Target Value	Average	Std Dev	Min	Max	OI	Samples	BOD
Controlled Parameters	Parameter									
		Engine Speed	r/min	2000						
	Torque	Nm	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 9  
Combustion Chamber Analysis - Cycle 1-2**

Test Number		Formulation Stand Code	
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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	
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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	
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<b>Cycle 2-1</b>												
	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	
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<b>Cycle 2-2</b>												
	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	
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<b>Cycle 3-1</b>												
	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	
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Fuel Batch		Fuel Dilution % at EOT	
Oil Weight at SOT (kg)		Oil Weight at EOT (kg)	
Engine ID		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		
<b>Firing Parameters</b>	<b>Parameter</b>	<b>Units</b>	<b>Average</b>	<b>Parameter</b>	<b>Units</b>	<b>Average</b>	
	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				
<b>Motoring Parameters</b>	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						



