



# 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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

	Parameter	Engine Data					QI			
		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	$\lambda$	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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

		Engine Data						QI		
		Units	Target Value	Average	Std Dev	Min	Max	QI	Samples	BQD
<b>Controlled Parameters</b>	<b>Parameter</b>									
	Engine Speed	r/min	3900							
	Torque	Nm	200							
	Humidity Dew Point	°C	7.0							
	Equivalence Ratio	λ	1.00							
<b>Non-Controlled</b>	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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

		Engine Data						QI		
		Units	Target Value	Average	Std Dev	Min	Max	QI	Samples	BQD
<b>Controlled Parameters</b>	<b>Parameter</b>									
	Engine Speed	r/min	2000							
	Torque	Nm	32							
	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 7  
Operational Summary – High Load Stages average of 9 stages**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

		Engine Data						QI		
Parameter		Units	Target Value	Average	Std Dev	Min	Max	OI	Samples	BOD
<b>Controlled Parameters</b>	Engine Speed	r/min	2000							
	Torque	Nm	350							
	Humidity Dew Point	°C	7.0							
	Equivalence Ratio	$\lambda$	1.00							
	Coolant Out Temperature	°C	95							
	Oil Sump Temperature	°C	100							
	Intake Manifold Post-IC Temperature	°C	32							
	Exhaust Back Pressure	kPa	5							
<b>Non-Controlled</b>	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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

<b>Cycle 1-1</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 9  
Combustion Chamber Analysis - Cycle 1-2**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

<b>Cycle 1-2</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 10  
Combustion Chamber Analysis - Cycle 1-3**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

<b>Cycle 1-3</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 11  
Combustion Chamber Analysis - Cycle 2-1**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

<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 13  
Combustion Chamber Analysis - Cycle 2-3**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

<b>Cycle 3-2</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 16  
Combustion Chamber Analysis - Cycle 3-3**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
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**

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

	Parameter	Units	Average	Parameter	Units	Average
<b>Firing Parameters</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				



