# 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	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							
In my opinion this te		ucted in a valid manner in acc							
		. The remarks included in the	report describe the						
anomalies associated	with this test.								
	Submitted By:								
	·	Testing Labo	oratory						
		_	•						
		Signatur	re						
		Typed Na	ime						
		- :							
		Title							

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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	a				QI	
	Parameter	Units	Target Value	Average	Std Dev	Min	Max	QI	Samples	BQD
ed	Engine Speed	r/min	2000							
Controlled Parameters	Torque	Nm	100							
ntr ran	Humidity Dew Point	°C	7.0							
ညီ  အျ	Equivalence Ratio	λ	1.00							
	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							
lled	Coolant Pressure	kPa	Report							
[ro]	Fuel Pressure	kPa	Report							
  On	Pre-Turbo Inlet Air Temperature	°C	Report							
)-t	Exhaust Temperature	°C	Report							
Non-Controlled	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	
	Parameter	Units	Target Value	Average	Std Dev	Min	Max	QI	Samples	BQD
ed ers	Engine Speed	r/min	3900							
Controlled Parameters	Torque	Nm	200							
ntı ran	Humidity Dew Point	°C	7.0							
C <sub>0</sub>	Equivalence Ratio	λ	1.00							
	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							
Non-Controlled	Coolant Pressure	kPa	Report							
	Fuel Pressure	kPa	Report							
	Pre-Turbo Inlet Air Temperature	°C	Report							
1-C	Exhaust Temperature	°C	Report							
No.	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	
	Parameter	Units	Target Value	Average	Std Dev	Min	Max	QI	Samples	BQD
ed ers	Engine Speed	r/min	2000							
Controlled Parameters	Torque	Nm	32							
ntı ran	Humidity Dew Point	°C	7.0							
C <sub>0</sub>	Equivalence Ratio	λ	1.00							
	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							
l _	Exhaust Back Pressure	kPa	Report							
Non-Controlled	Coolant Pressure	kPa	Report							
tro]	Fuel Pressure	kPa	Report							
on	Pre-Turbo Inlet Air Temperature	°C	Report							
1-C	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	

			E		QI					
	Parameter	Units	TargetValue	Average	Std Dev	Min	Max	OI	Samples	ROD
SI	Engine Speed	r/min	2000	J						
Controlled Parameters	Torque	Nm	350							
l am	Humidity Dew Point	°C	7.0							
Par	Equivalence Ratio	λ	1.00							
ed [	Coolant Out Temperature	°C	95							
lo.	Oil Sump Temperature	°C	100							
   uti	Intake Manifold Post-IC Temperature	°C	32							
స	Exhaust Back Pressure	kPa	5							
	Oil Gallery Temperature	°C	Report							
	Coolant In Temperature	°C	Report							
	Fuel Temperature	°C	Report							
	Coolant Pressure	kPa	Report							
	Fuel Pressure	kPa	Report							
Non-Controlled	Pre-Turbo Inlet Air Temperature	°C	Report							
[ro]	Exhaust Temperature	°C	Report							
On	Pre-Turbo Inlet Air Pressure	kPa	Report							
1-C	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	

					Cycl	e 1-1						
		Cylinder 1			Cylinder 2			Cylinder 3	}		Cylinder 4	1
	Peak	MBF2%		Peak	MBF2%		Peak	MBF2%		Peak	MBF2%	
Average												
PI Threshold												
# of Events												
	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)	•				•					•		

# 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 (Pools Proce)												· · · · · · · · · · · · · · · · · · ·

# 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)								·				

# General Motors dexos® Stochastic Pre-Ignition Test Form 11 Combustion Chamber Analysis - Cycle 2-1

Test Number	Formulation Stand Code	

					Cvcl	e 2-1						
		Cylinder 1			Cylinder 2			Cylinder 3			Cylinder 4	1
	Peak	MBF2%		Peak	MBF2%		Peak	MBF2%		Peak	MBF2%	
Average	1 Cak	WIBI 270		1 Can	WIBI 270		1 can	IVIDI 270		1 Car	IVIDI 2/0	1
PI Threshold		†			†			+				1
# of Events		1			1							1
# 01 EVEIRS	1-Do	doo	Cryola #	1 <sub>r</sub> D <sub>o</sub>	daa	Cryala #	1 <sub>r</sub> D <sub>o</sub>	daa	Crysla #	1 <sub>r</sub> D <sub>o</sub>	doo	Crrolo #
1-4 Frank	kPa	deg	Cycle #	kPa	deg	Cycle #	kPa	deg	Cycle #	kPa	deg	Cycle #
1st Event		<u> </u>			<u> </u>							
2nd Event		1			1							<u> </u>
3rd Event		<u> </u>			<u> </u>			1				
4th Event												
5th Event					1							
6th Event												
7th Event												
8th Event												
9th Event												
10th Event												
11th Event												
12th Event												
13th Event												
14th Event												
15th Event												
Total (Peak Press)		†			1		1	1		<u> </u>	1	-

#### General Motors dexos® Stochastic Pre-Ignition Test Form 12 Combustion Chamber Analysis - Cycle 2-2

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

					Cycl	e 2-2						
		Cylinder 1			Cylinder 2			Cylinder 3	}		Cylinder 4	1
	Peak	MBF2%		Peak	MBF2%		Peak	MBF2%		Peak	MBF2%	
Average												
PI Threshold												
# of Events												
	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												

#### General Motors dexos® Stochastic Pre-Ignition Test Form 13 Combustion Chamber Analysis - Cycle 2-3

Test Number	Formulation Stand Code	

					Cycl	e 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 #									
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	<u> </u>
	Peak	MBF2%		Peak	MBF2%		Peak	MBF2%		Peak	MBF2%	
Average												
PI Threshold												
# of Events												
	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 (Dools Dross)												

#### General Motors dexos® Stochastic Pre-Ignition Test Form 15 Combustion Chamber Analysis - Cycle 3-2

Test Number	Formulation Stand Code	

					Cycl	e 3-2						
		Cylinder 1			Cylinder 2			Cylinder 3	}		Cylinder 4	1
	Peak	MBF2%		Peak	MBF2%		Peak	MBF2%		Peak	MBF2%	
Average												
PI Threshold												
# of Events												
	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 (Dools Dross)												

#### General Motors dexos® Stochastic Pre-Ignition Test Form 16 Combustion Chamber Analysis - Cycle 3-3

Test Number	Formulation Stand Code	

Cylinder 1						Cvcl	e 3-3						
Peak   MBF2%   Peak   Peak			Cylinder 1						Cylinder 3	3		Cylinder 4	
Average		Peak						Peak					
PI Threshold         # of Events           kPa         deg         Cycle #         kP	Average												
Record   R													
1st Event       2nd Event         3rd Event       3rd Event         4th Event       4th Event         5th Event       5th Event         6th Event       5th Event         7th Event       5th Event         8th Event       5th Event         9th Event       5th Event         10th Event       1th Event         12th Event       1th Event         13th Event       1th Event         14th Event       1th Event	# of Events												
2nd Event		kPa	deg	Cycle #	kPa	deg	Cycle #	kPa	deg	Cycle #	kPa	deg	Cycle #
3rd Event	1st Event												
4th Event	2nd Event												
5th Event	3rd Event												
6th Event	4th Event												
7th Event	5th Event												
8th Event       9th Event         10th Event       9th Event         10th Event       9th Event         11th Event       9th Event         12th Event       9th Event         12th Event       10th Event         13th Event       10th Event         14th Event       10th Event	6th Event												
9th Event	7th Event												
10th Event	8th Event												
11th Event	9th Event												
12th Event	10th Event												
13th Event	11th Event												
14th Event	12th Event												
	13th Event												
15th Event	14th Event												
	15th Event												

#### 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 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	Test Number	Formulation Stand Code	
------------------------------------	-------------	------------------------	--

	Parameter	Units	Average	Parameter	Units	Average
	Cell Temperature	°C		Fuel Flow	kg/hr	
	Intake Air Temperature	°C		Humidity Dew Point	°C	
S	Intake Manifold Pressure	kPaA				
ete	Cylinder 1 IMEP	kPa		Cylinder 2 IMEP	kPa	
Parameters	Cylinder 3 IMEP	kPa		Cylinder 4 IMEP	kPa	
ara	Cylinder 1 50% Mass Fraction Burned			Cylinder 2 50% Mass Fraction Burned		
Ig F	Cylinder 3 50% Mass Fraction Burned			Cylinder 4 50% Mass Fraction Burned		
Firing ]	Cylinder 1 Polytropic Compression Constant			Cylinder 2 Polytropic Compression Constant		
Œ	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 Torque	Nm		Fuel Flow	kg/hr	
	Average Cylinder 1 IMEP	kPa		Average Cylinder 2 IMEP	kPa	
Parameters	Average Cylinder 3 IMEP	kPa		Average Cylinder 4 IMEP	kPa	
net	Average Cylinder 1 Peak Pressure	kPa		Average Cylinder 2 Peak Pressure	kPa	
ıraı	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	
Motoring	Crank Angle of Cylinder 3 Peak Pressure	deg		Crank Angle of Cylinder 4 Peak Pressure	deg	
tor	Cylinder 1 Polytropic Compression Constant			Cylinder 2 Polytropic Compression Constant		
Mo	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

	1	
Test Number	Formulation Stand Code	

Number of Downtime Occurrences			
<b>Test Hours</b>	Date	Downtime	Reasons
			Total Downtime (hours)

# $General\ Motors\ dexos \\ \hbox{$\mathbb{R}$ Stochastic Pre-Ignition Test}$

#### Form 20 Comment Record

Test Number		Formulation Stand Code	
	·		
Nu	umber of Comment Lines		
	·		