2011 Police Vehicle Tire Evaluation

MICHIGAN STATE POLICE

NLECTC
National Law Enforcement and Corrections Technology Center

State of Michigan
Department of State Police
and
Department of Technology, Management and Budget

2011 Police Vehicle Tire Evaluation

Published by
Michigan State Police
Precision Driving Unit
July 2011

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The National Law Enforcement and Corrections Technology Center is supported by Cooperative Agreement #2010-MU-MU-K020 awarded by the U.S. Department of Justice, National Institute of Justice. Analyses of test results do not represent product approval or endorsement by the National Institute of Justice, U.S. Department of Justice; the National Institute of Standards and Technology, U.S. Department of Commerce; or Lockheed Martin. Points of view or opinions contained within this document are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.

The National Institute of Justice is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance; the Bureau of Justice Statistics; the Community Capacity Development Office; the Office for Victims of Crime; the Office of Juvenile Justice and Delinquency Prevention; and the Office of Sex Offender Sentencing, Monitoring, Apprehending, Registering, and Tracking (SMART).

Contents

Acknowledgements

We would like to thank the following contributors. We are grateful for their support and encouragement toward our ultimate goal: a safe, successful testing program that benefits the law enforcement community nationwide and beyond.

Col. Kriste Kibbey Etue, Director, Michigan Department of State Police.
Lt. Col. Gary M. Gorski, Deputy Director, Field Services Bureau.
Lt. Col. Daniel B. Atkinson, Science, Technology and Training Bureau.
Mr. Shawn Sible, Deputy Director, Support Services Bureau.
Capt. Kari L. Kusmierz, Commander, Training Division.
Personnel from the Michigan Department of Technology, Management and Budget, Vehicle and Travel Services.

National Institute of Justice.
National Law Enforcement and Corrections Technology Center; Lance Miller, Director; Alex Sundstrom, Testing Coordinator.
Lockheed Martin Corporation.

Matthew Schneider, Schneider Tire Outlet, Marne, Mich.

Special thanks to Brian Tolan and Dana Hammer of General Motors for their support of this program.

Technical Advisors
Thomas Flaim, Ph.D., Complex Systems LLC, Troy, Mich.
Nicholas Flaim, Complex Systems LLC, Troy, Mich.
Michael C. Quinn, Mike Quinn Consulting.
Michael McPike, Kistler-Corrsys Datron.

Finally, thanks to all in the United States and Canada who represent law enforcement and purchasing agencies for your constant encouragement and support. We are proud to make a contribution to the law enforcement community.

Michigan State Police Vehicle Test Team
Lt. Keith Wilson.
Sgt. James Flegel.
Sgt. Ronald Gromak.
Sgt. Matthew Rogers.

Introduction

It is the privilege of the Michigan State Police (MSP) to provide the law enforcement community with results of the 2011 Police Tire Evaluation. The project, conducted in June 2011, provides law enforcement agencies across North America with information to assist them in making informed decisions regarding replacement tires.

Using recommendations from automotive engineers within Chrysler, General Motors and Ford in addition to Internet research, we developed a list of tire manufacturers. We contacted each tire manufacturer and offered the opportunity to participate in the evaluation.

Only Goodyear, Firestone and Pirelli manufacture tires used by auto manufacturers for full service police vehicle applications. The manufacturers of the three additional brands tested during this evaluation state their tires are suitable for police vehicle applications. However, they do not conduct police-specific durability testing.

Tire manufacturers included in this evaluation:
Goodyear.
Firestone.
Cooper.
Nokian.
Nitto.
Pirelli.

All tires used in this evaluation were purchased from a retail tire store to ensure each model was an actual production version. Goodyear, Firestone, Pirelli and Nitto categorized their entries as “High Performance All Season” tires, Nokian labels its model as an “All Weather Plus” tire and the Cooper tire is a “Premium Luxury Touring” tire.

When considering replacements, it is important to purchase tires the same size and speed rating as the original equipment tire. Tire size information can be found on the driver’s door placard. Speed ratings are not part of the door placard information.

Test Overview

To minimize variables in testing, all vehicles began each candidate tire test with new OE brake pads, and rotors and tires were inflated to the manufacturer's recommended pressure (per door placard). Candidate tires were photographed and tread depth was measured.

The tire testing program was a 12-stage process conducted at the MSP Precision Driving Facility in Lansing, Mich. The tire testing program was conducted using a series of whole vehicle tests to assess straight line stopping distance, maximum lateral acceleration in a steady state turn, wet jennite stopping distance and braking in a turn on wet asphalt.

The tires were tested in both a new tire condition and worn tire condition after 100 laps around a one-mile road course simulating pursuit or emergency driving conditions. All vehicle tests were also conducted with the original equipment (OE) tires for comparison purposes. A Ford CVPI with new tires was used as a "control vehicle" for the purpose of monitoring any changes in the test surfaces over the course of the two-week testing program.

The dry asphalt stopping distance testing evaluates the compatibility of various replacement tires offered for police service with each vehicle's brake and chassis control systems**.** Likewise, the wet jennite stopping distance tests simulate the compatibility of the replacement tires in lower coefficient road conditions. The braking-in-a-turn (BIT) testing on wet asphalt provides the basis for evaluating the compatibility of the various replacement tires with the vehicle chassis control systems including anti-lock brake system (ABS) and stability control.

Finally, the steady-state turning testing addresses the lateral adhesion and stability of the vehicles fitted with the various replacement tires being offered for police service. This same set of testing protocols was also conducted on the tires after 100 laps of simulated pursuit or emergency driving to evaluate these same tires in a worn condition.

Thus, this testing protocol permits comparative assessments of various replacement tires offered for police service in each vehicle configuration evaluated, and also permits similar assessments of these same tires in a new vs. worn condition. Therefore, relevant comparisons of performance between tires offered for the same vehicle will be addressed. In addition, comparisons of performance of the same tire in a new vs. worn condition were compiled to assess the significance of this aspect of tire performance.

Measurements of tire wear at each vehicle wheel position were also quantified. Although not specifically relevant to 'normal' tire wear life estimates, a directly comparable measure of tire wear by tire position and vehicle model was compiled from the testing program results.

Test Equipment

The following test equipment was used during Stage 2 of the testing.

KISTLER-CORRSYS DATRON SENSOR SYSTEMS, INC., 40000 Grand River, Ste. 503, Novi, MI 48375

DLS Smart Sensor – Optical noncontact speed and distance sensor.

Correvit S-350 2 Axis Optical Sensor.

Shoei Helmets, 3002 Dow Ave., Ste. 128, Tustin, CA 92780

Law Enforcement Helmet – Model RJ-Air LE.

AMB i.t. US INC., 1631 Phoenix Blvd., Ste. 11, College Park, GA 30349

AMB TranX extended loop decoder.

Mains adapter 230 V AC/12 V DC.

AMB TranX260 transponders.

PYROMETER

Raytek, hand-held optical pyrometer, Model Raymx2U.

Photographs Arranged By Manufacturer

Cooper CS4

Vehicle Platforms Tested

Ford CVPI, Chevrolet Impala, Dodge Charger

Firestone Firehawk GT Pursuit

Vehicle Platforms Tested

Dodge Charger, Ford CVPI, Chevrolet Tahoe

Goodyear Eagle RS-A

Vehicle Platforms Tested

Dodge Charger, Ford CVPI, Chevrolet Tahoe, Chevrolet Caprice, Chevrolet Impala

Nitto NT 850

Vehicle Platforms Tested

Chevrolet Caprice

Nokian WR G2

Vehicle Platforms Tested

Chevrolet Caprice, Chevrolet Impala, Ford CVPI

Pirelli Pzero Nero

Vehicle Platforms Tested

Ford CVPI

Pirelli P6

Vehicle Platforms Tested

Chevrolet Impala

Tire Test Summaries By Vehicle Platform

Tire Summary

Vehicle: 2011 Chevrolet Caprice
Tire Manufacturer: Goodyear
Tire Model / Size: Eagle RSA
P235/50R18

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt		135.94	143.21
SD feet 60-0 mph		1.44	2.23
Standard Deviation			
Wet Jennite		99.16	105.29
SD feet 35-0 mph		3.1	4.52
Standard Deviation			
Wet Asphalt Braking In Turn		72.28	76
SD feet 40-0 mph		3.21	4.76
Standard Deviation			

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	1.05	0.93
with Electronic Stability Control	counter clockwise	0.97	0.99
	Average	1.01	0.96
Maximum Lateral Acceleration (g)	clockwise	0.91	0.93
without Electronic Stability Control	counter clockwise	1.05	1.01
	Average	0.98	0.97

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	62.37
	Standard Deviation	0.34
		2nd 50 Laps
Clockwise	Average, seconds	62.69
	Standard Deviation	0.25

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	27.27%
	RF	32.39%
	LR	31.82%
	RR	30.68%

Goodyear Eagle RSA

Chevrolet Caprice

Tire showing greatest wear-RF

Tire Summary

Vehicle: 2011 Chevrolet Caprice
Tire Manufacturer: Nitto
Tire Model / Size: NT850 Plus 372-120

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		126.33	131.03
Standard Deviation		0.96	1.4
Wet Jennite			
SD feet 35-0 mph		88.68	107.22
Standard Deviation		13.16	3.14
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		74.06	77.10
Standard Deviation		7.92	5.24

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	0.89	1.01
with Electronic Stability Control	counter clockwise	0.85	0.96
	Average	0.87	0.985
Maximum Lateral Acceleration (g)	clockwise	0.88	1.01
without Electronic Stability Control	counter clockwise	0.86	0.91
	Average	0.87	0.96

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	63.38
	Standard Deviation	0.44
		2nd 50 Laps
Clockwise	Average, seconds	62.52
	Standard Deviation	0.67

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	57.66%
	RF	71.49%
	LR	55.57%
	RR	68.02%

Nitto NT850 Plus

Chevrolet Caprice

Tire showing greatest wear-RF

Tire Summary

Vehicle: 2011 Chevrolet Caprice
Tire Manufacturer: Nokian
Tire Model / Size: WRG2 235/50R18

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		148.64	139.65
Standard Deviation		1.92	1.26
Wet Jennite			
SD feet 35-0 mph		96.06	112.79
Standard Deviation		2.14	3.13
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		70.24	74.35
Standard Deviation		4.58	2.27

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	0.97	0.85
with Electronic Stability Control	counter clockwise	1.02	0.091
	Average	1.00	0.88
Maximum Lateral Acceleration (g)	clockwise	1.00	0.96
without Electronic Stability Control	counter clockwise	0.94	0.93
	Average	0.97	0.95

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	61.86
	Standard Deviation	0.37
		2nd 50 Laps
Clockwise	Average, seconds	61.01
	Standard Deviation	0.51

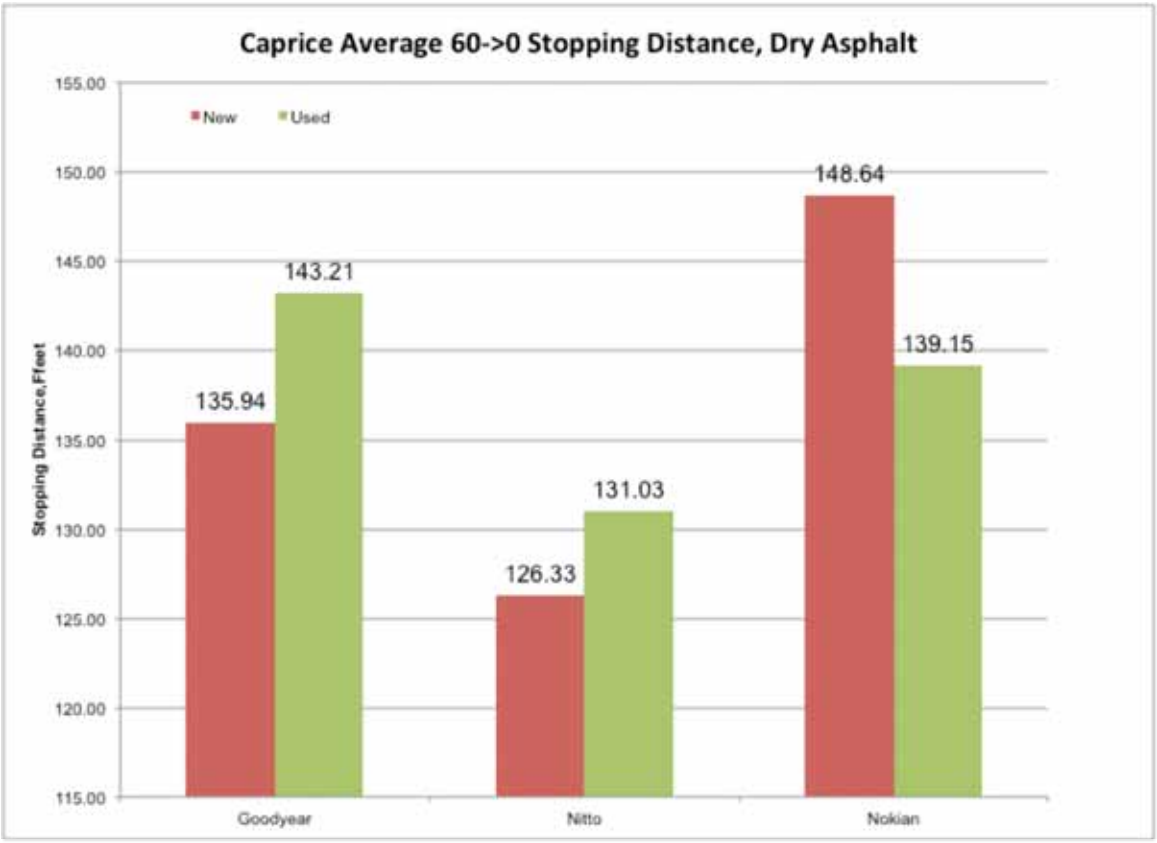
Percentage of Tread Consumed During Testing

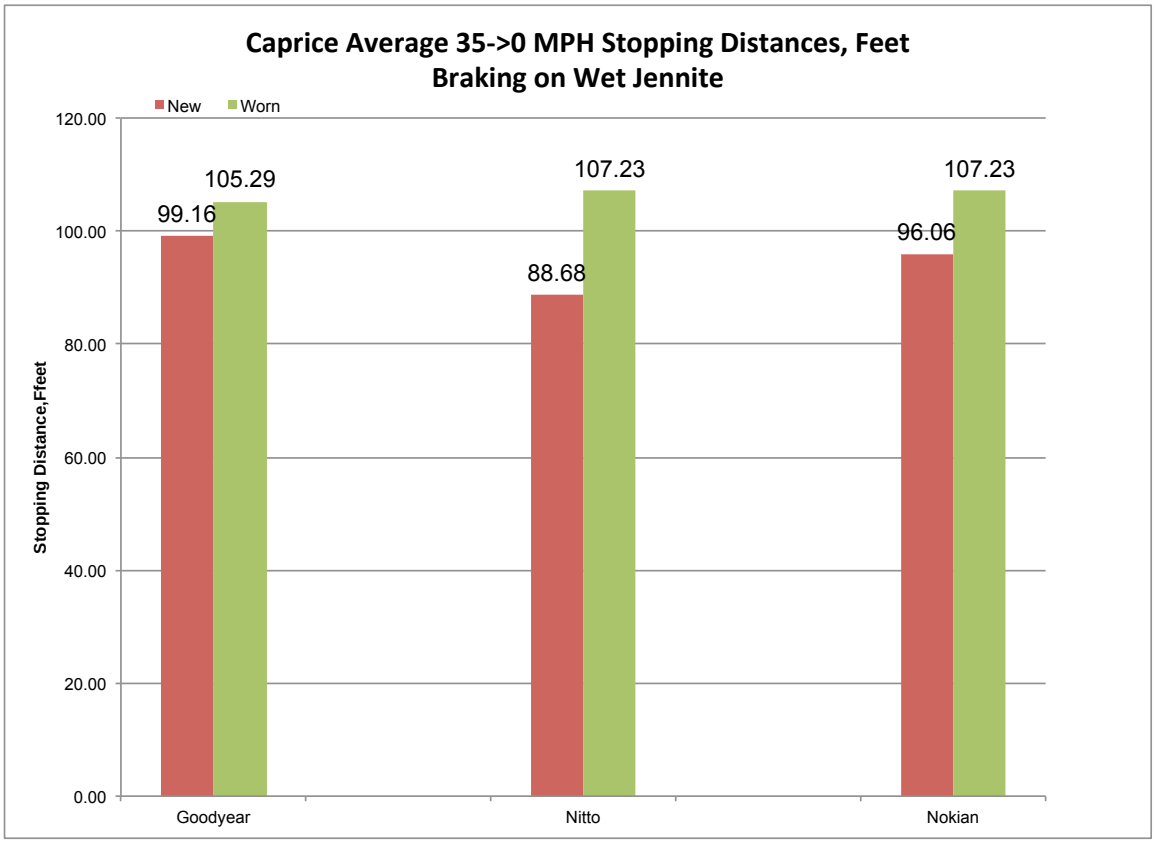
Average wear by tire position	LF	38.07%
	RF	36.08%
	LR	44.60%
	RR	42.90%

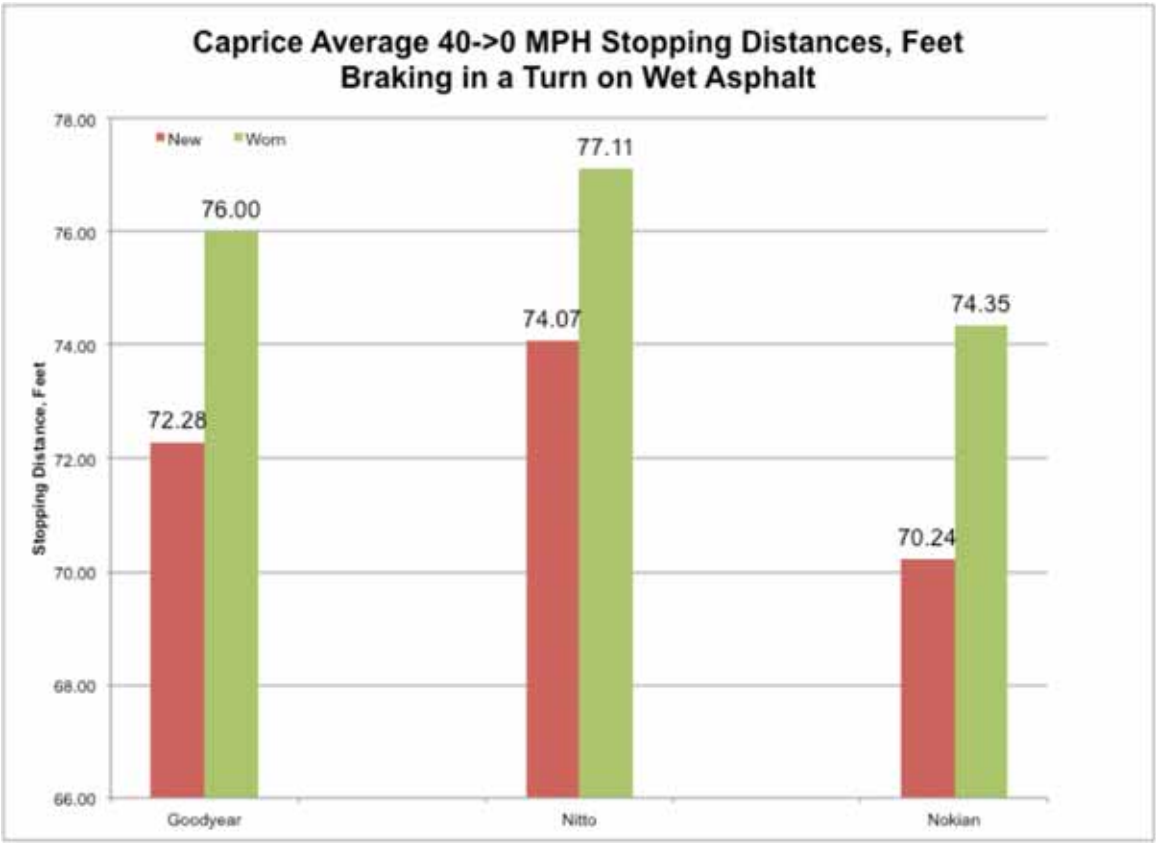
Nokian WRG2

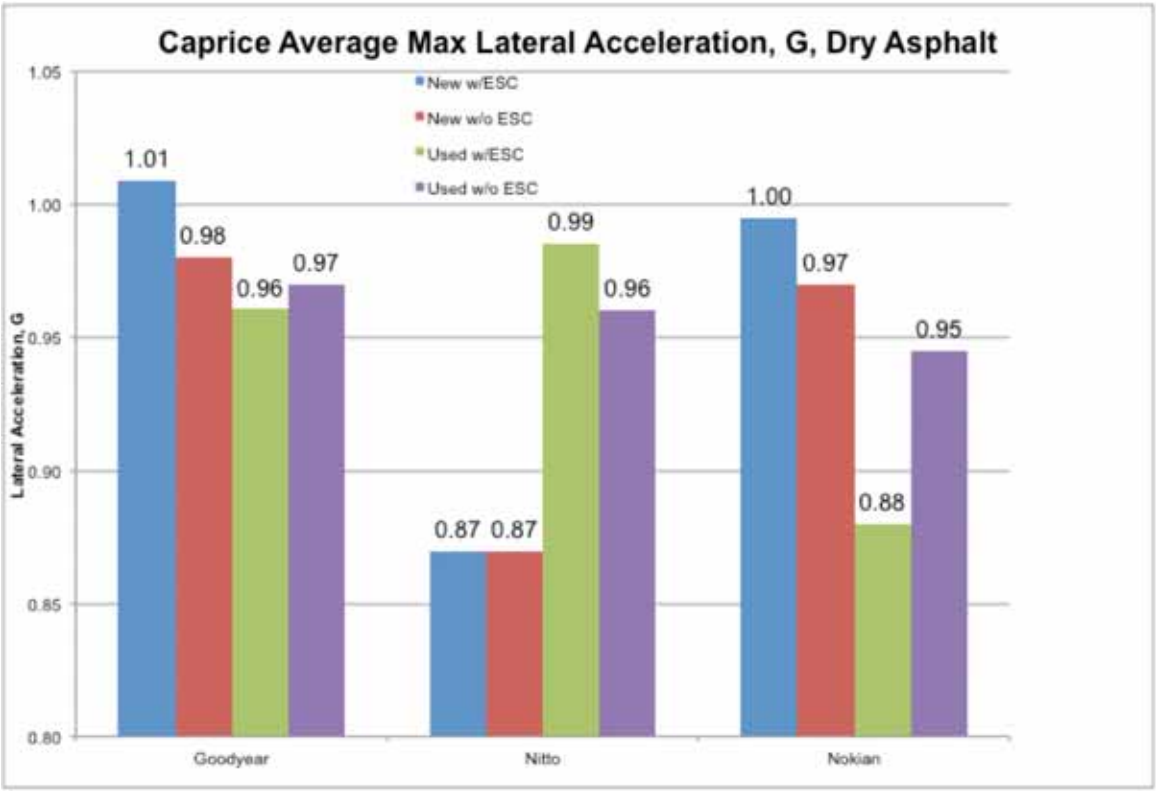
Chevrolet Caprice

Tire showing greatest wear-LR


Caprice Average 60->0 Stopping Distance, Dry Asphalt
New
Used
Stopping Distance,Ffeet
155.00
150.00
145.00
140.00
135.00
130.00
125.00
120.00
115.00
135.94
143.21
126.33
131.03
148.64
139.15
Goodyear
Nitto
Nokian


Caprice Average 35->0 MPH Stopping Distances, Feet
Braking on Wet Jennite
New
Worn
Stopping Distance,Ffeet
120.00
100.00
80.00
60.00
40.00
20.00
0.00
99.16
105.29
88.68
107.23
96.06
107.23
Goodyear
Nitto
Nokian


Caprice Average 40->0 MPH Stopping Distances, Feet
Braking in a Turn on Wet Asphalt
New
Worn
Stopping Distance, Feet
78.00
76.00
74.00
72.00
70.00
68.00
66.00
72.28
76.00
74.07
77.11
70.24
74.35
Goodyear
Nitto
Nokian


Caprice Average Max Lateral Acceleration, G, Dry Asphalt
New w/ESC
New w/o ESC
Used w/ESC
Used w/o ESC
Lateral Acceleration, G
1.05
1.00
0.95
0.90
0.85
0.80
1.01
0.98
0.96
0.97
0.87
0.87
0.99
0.96
1.00
0.97
0.88
0.95
Goodyear
Nitto
Nokian

Tire Summary

Vehicle: 2010 Dodge Charger
Tire Manufacturer: Cooper
Tire Model / Size: CS4 225/60R18 ***Unable to complete test due to excess tire wear***

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		135.78	
Standard Deviation		1.09	
Wet Jennite			
SD feet 35-0 mph		91.21	
Standard Deviation		6.67	
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		79.61	
Standard Deviation		9.27	

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	0.83
with Electronic Stability Control	counter clockwise	0.88
	Average	0.855
Maximum Lateral Acceleration (g)	clockwise	
without Electronic Stability Control	counter clockwise	
	Average	

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	
	Standard Deviation	
		2nd 50 Laps
Clockwise	Average, seconds	
	Standard Deviation	

Percentage of Tread Consumed During Testing

Average wear by tire position	LF
	RF
	LR
	RR

Cooper CS4

Dodge Charger

Tire showing greatest wear-RR

Tire Summary

Vehicle: 2010 Dodge Charger
Tire Manufacturer: Firestone
Tire Model / Size: Firehawk GT Pursuit
226/60R18

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		139.35	150.48
Standard Deviation		0.92	2.14
Wet Jennite			
SD feet 35-0 mph		94.67	118.16
Standard Deviation		5.26	5.21
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		80.37	86.79
Standard Deviation		9.12	8.1

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	1.05	0.97
with Electronic Stability Control	counter clockwise	0.99	0.95
	Average		
Maximum Lateral Acceleration (g)	clockwise	0.94	1.05
without Electronic Stability Control	counter clockwise	0.99	1.03
	Average		

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	63.42
	Standard Deviation	0.53
		2nd 50 Laps
Clockwise	Average, seconds	62.44
	Standard Deviation	0.31

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	63.47%
	RF	56.49%
	LR	53.08%
	RR	72.71%

Firestone Firehawk GT Pursuit

Dodge Charger

Tire showing greatest wear-RR

Tire Summary

Vehicle: 2010 Dodge Charger
Tire Manufacturer: Goodyear
Tire Model / Size: Eagle RSA
226/60R18

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		141.47	151.09
Standard Deviation		1.51	2.35
Wet Jennite			
SD feet 35-0 mph		94.54	105.52
Standard Deviation		2.03	2.43
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		82.93	84.47
Standard Deviation		8.67	4.15

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	0.94	0.99
with Electronic Stability Control	counter clockwise	0.96	0.89
	Average		
Maximum Lateral Acceleration (g)	clockwise	0.89	0.92
without Electronic Stability Control	counter clockwise	0.99	0.93
	Average		

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	62.4
	Standard Deviation	0.44
		2nd 50 Laps
Clockwise	Average, seconds	61.94
	Standard Deviation	0.28

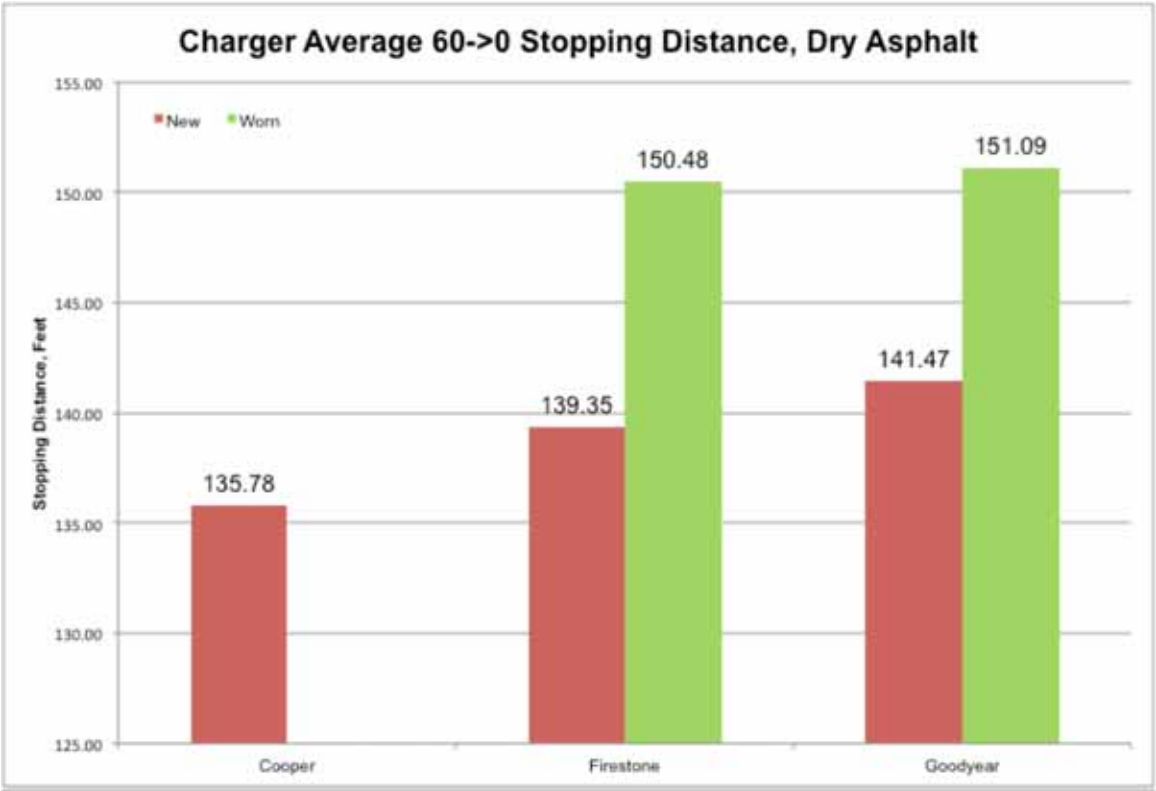
Percentage of Tread Consumed During Testing

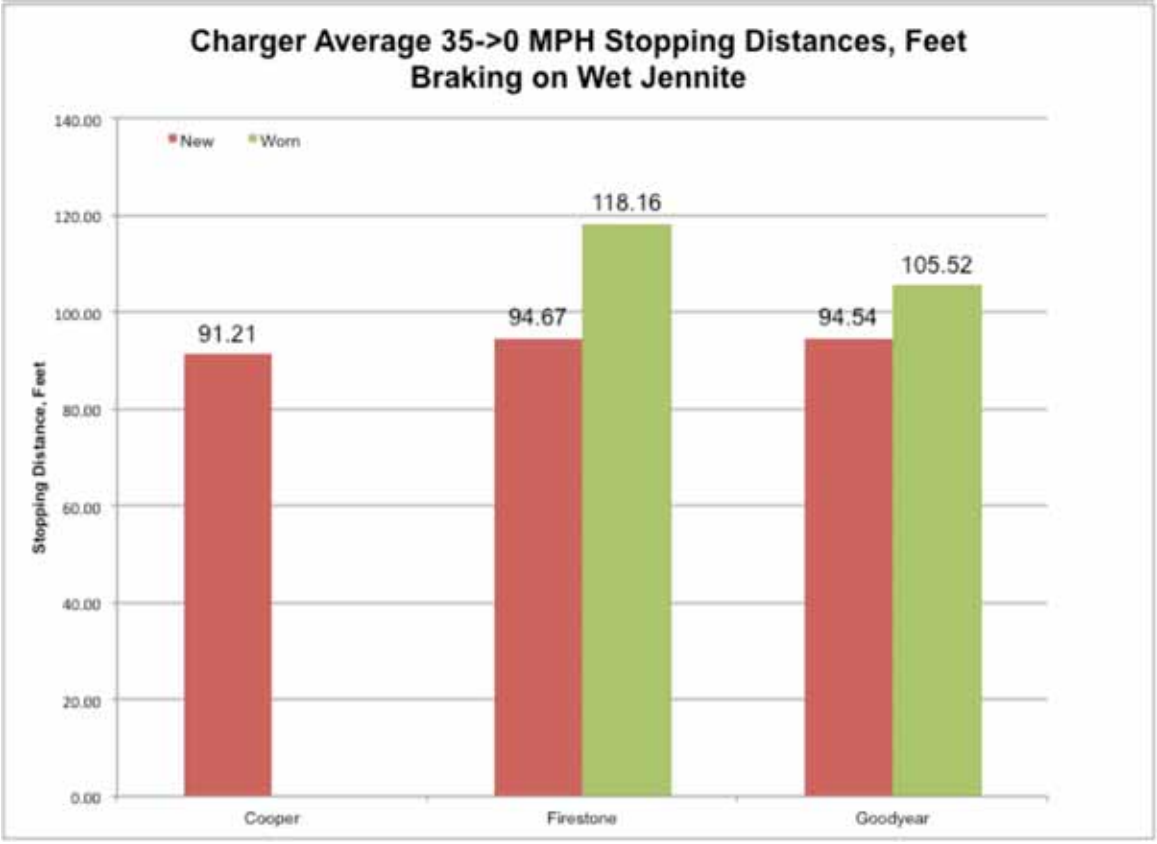
Average wear by tire position	LF	29.03%
	RF	29.96%
	LR	21.36%
	RR	24.38%

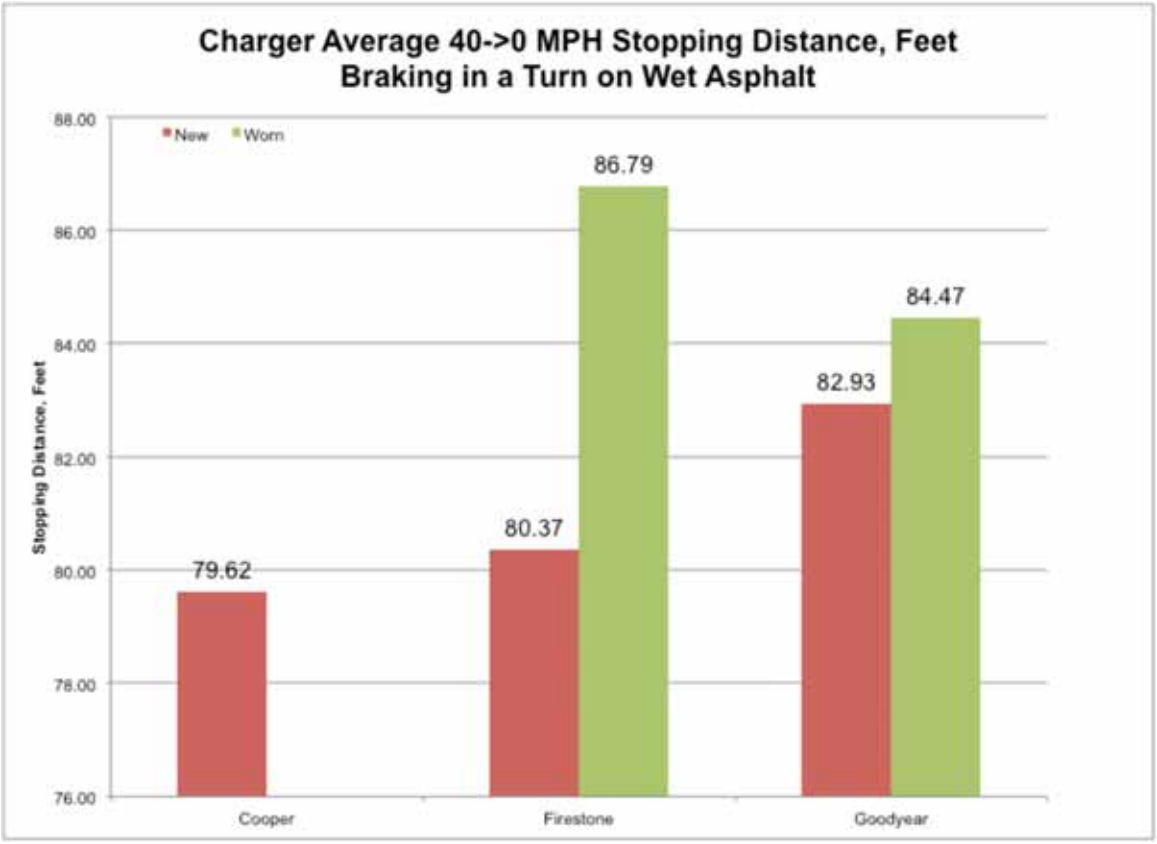
Goodyear Eagle RSA

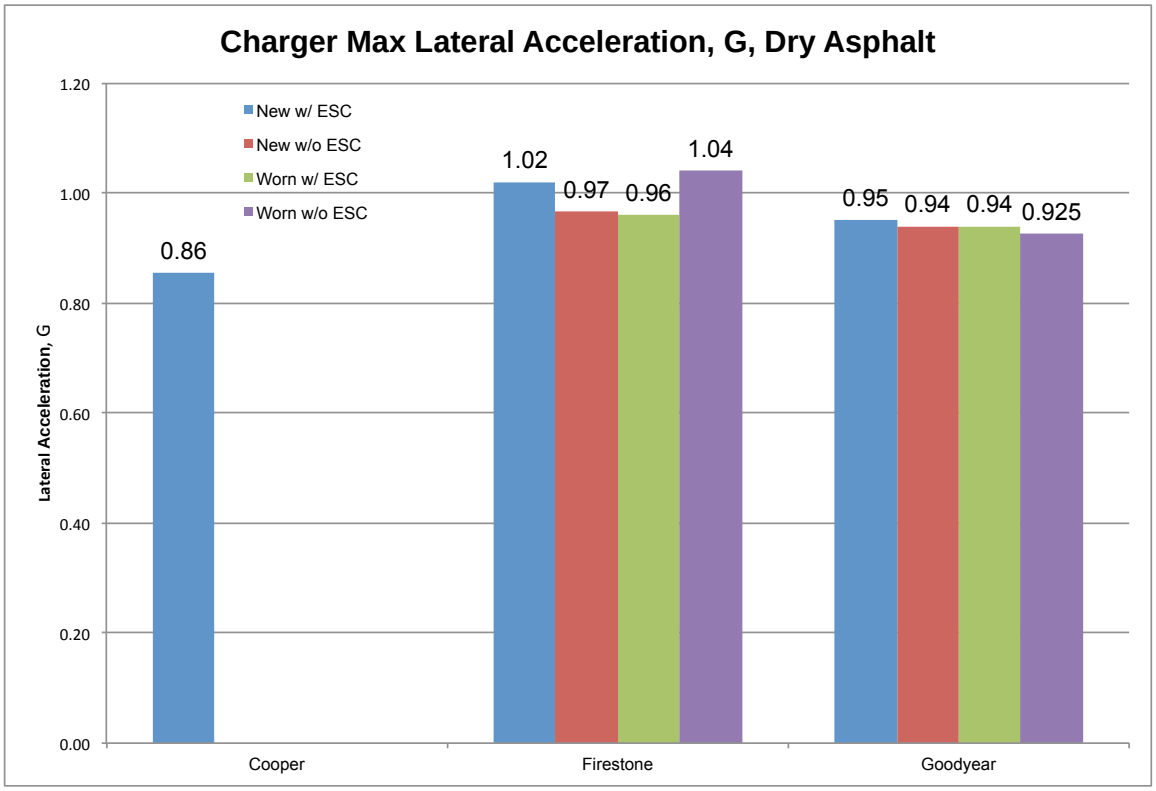
Dodge Charger

Tire showing greatest wear-RF


Charger Average 60->0 Stopping Distance, Dry Asphalt
New
Worn
Stopping Distance, Feet
155.00
150.00
145.00
140.00
135.00
130.00
125.00
135.78
139.35
150.48
141.47
151.09
Cooper
Firestone
Goodyear


Charger Average 35->0 MPH Stopping Distances, Feet
Braking on Wet Jennite
New
Worn
Stopping Distance, Feet
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
91.21
94.67
118.16
94.54
105.52
Cooper
Firestone
Goodyear


Charger Average 40->0 MPH Stopping Distance, Feet
Braking in a Turn on Wet Asphalt
New
Worn
Stopping Distance, Feet
88.00
86.00
84.00
82.00
80.00
78.00
76.00
79.62
80.37
86.79
82.93
84.47
Cooper
Firestone
Goodyear


Charger Max Lateral Acceleration, G, Dry Asphalt
New w/ ESC
New w/o ESC
Worn w/ ESC
Worn w/o ESC
Lateral Acceleration, G
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.86
1.02
0.97
0.96
1.04
0.95
0.94
0.94
0.925
Cooper
Firestone
Goodyear

Tire Summary

Vehicle: 2010 Chevrolet Tahoe
Tire Manufacturer: Firestone
Tire Model / Size: Firehawk GT Pursuit
265/60R17

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		133.84	146.79
Standard Deviation		1.36	3.16
Wet Jennite			
SD feet 35-0 mph		96.84	113.33
Standard Deviation		10.26	7.96
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		73.74	86.73
Standard Deviation		5.51	10.25

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	0.87	0.85
with Electronic Stability Control	counter clockwise	0.85	0.86
	Average	0.86	0.855
Maximum Lateral Acceleration (g)	clockwise	0.92	0.84
without Electronic Stability Control	counter clockwise	1.04	0.89
	Average	0.98	0.865

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	68.35
	Standard Deviation	0.36
		2nd 50 Laps
Clockwise	Average, seconds	68.5
	Standard Deviation	0.88

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	25.65%
	RF	21.48%
	LR	19.79%
	RR	35.90%

Firestone Firehawk GT Pursuit

Chevrolet Tahoe

Tire showing greatest wear-RR

Tire Summary

Vehicle: 2010 Chevrolet Tahoe
Tire Manufacturer: Goodyear
Tire Model / Size: Eagle RSA 265/60/R17

Unable to complete test due to excess tire wear

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		141.65	
Standard Deviation		1.12	
Wet Jennite			
SD feet 35-0 mph		98.81	
Standard Deviation		3.29	
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		82.07	
Standard Deviation		4.13	

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	0.88
with Electronic Stability Control	counter clockwise	0.95
	Average	
Maximum Lateral Acceleration (g)	clockwise	0.90
without Electronic Stability Control	counter clockwise	0.99
	Average	

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	67.04
	Standard Deviation	0.41
		2nd 50 Laps
Clockwise	Average, seconds	66.30
	Standard Deviation	0.38

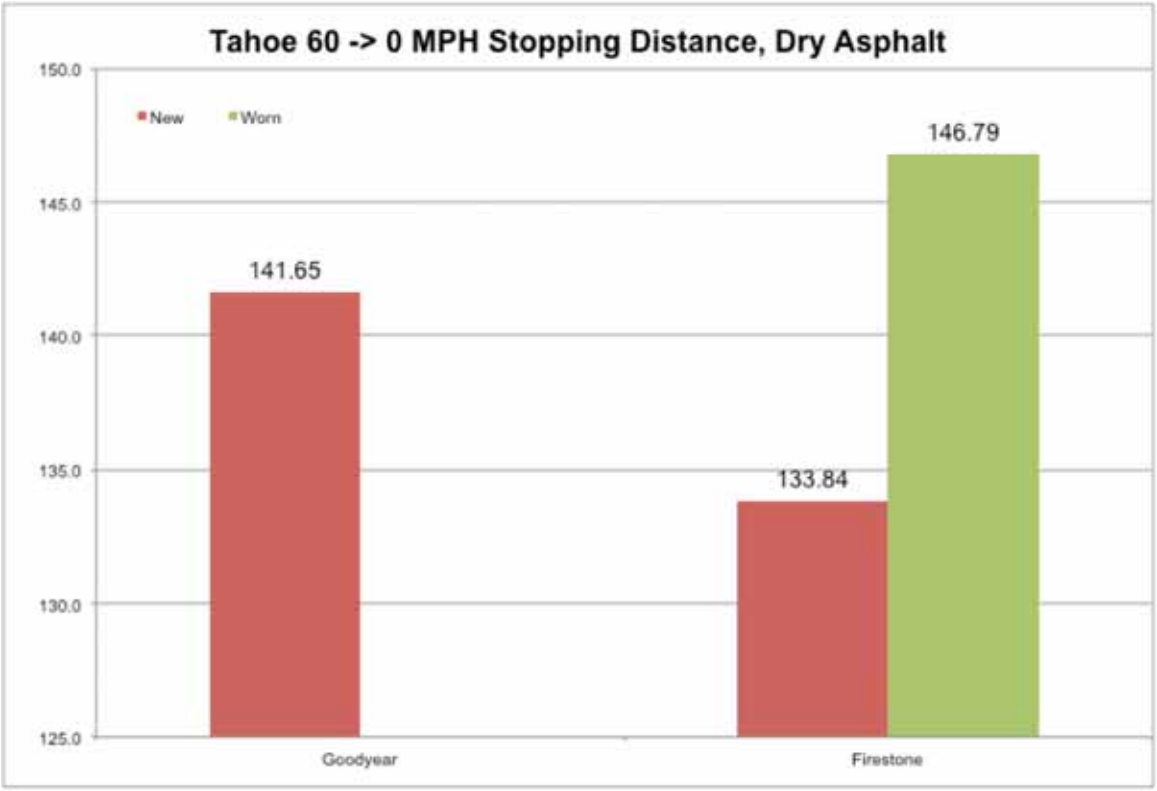
Percentage of Tread Consumed During Testing

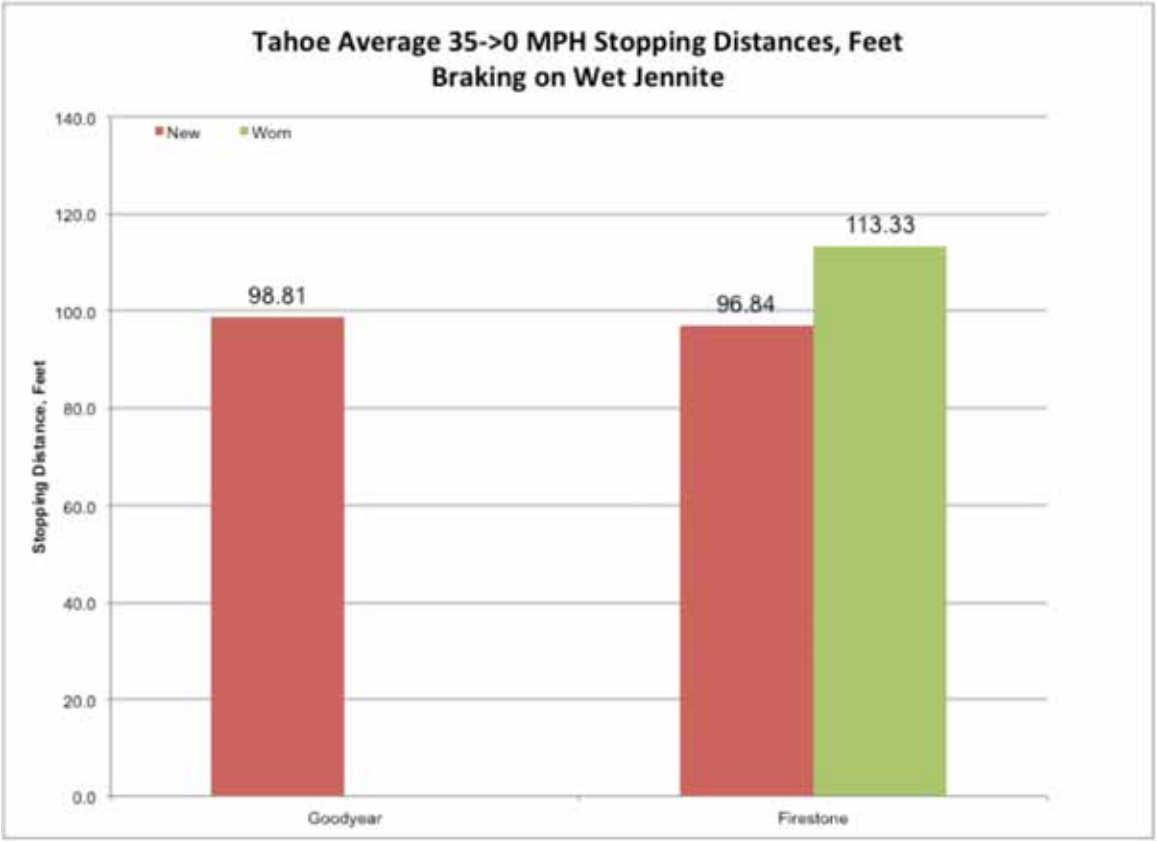
Average wear by tire position	LF	46.11%
	RF	39.41%
	LR	35.65%
	RR	26.68%

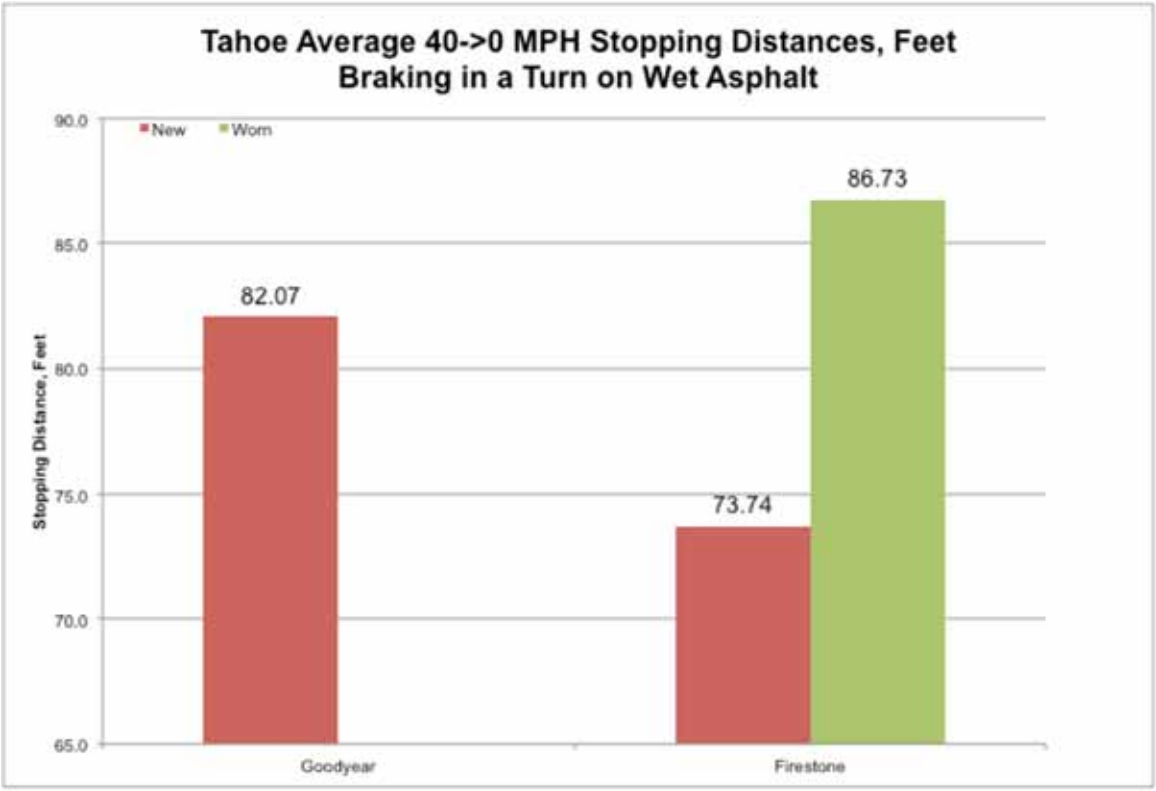
Goodyear Eagle RSA

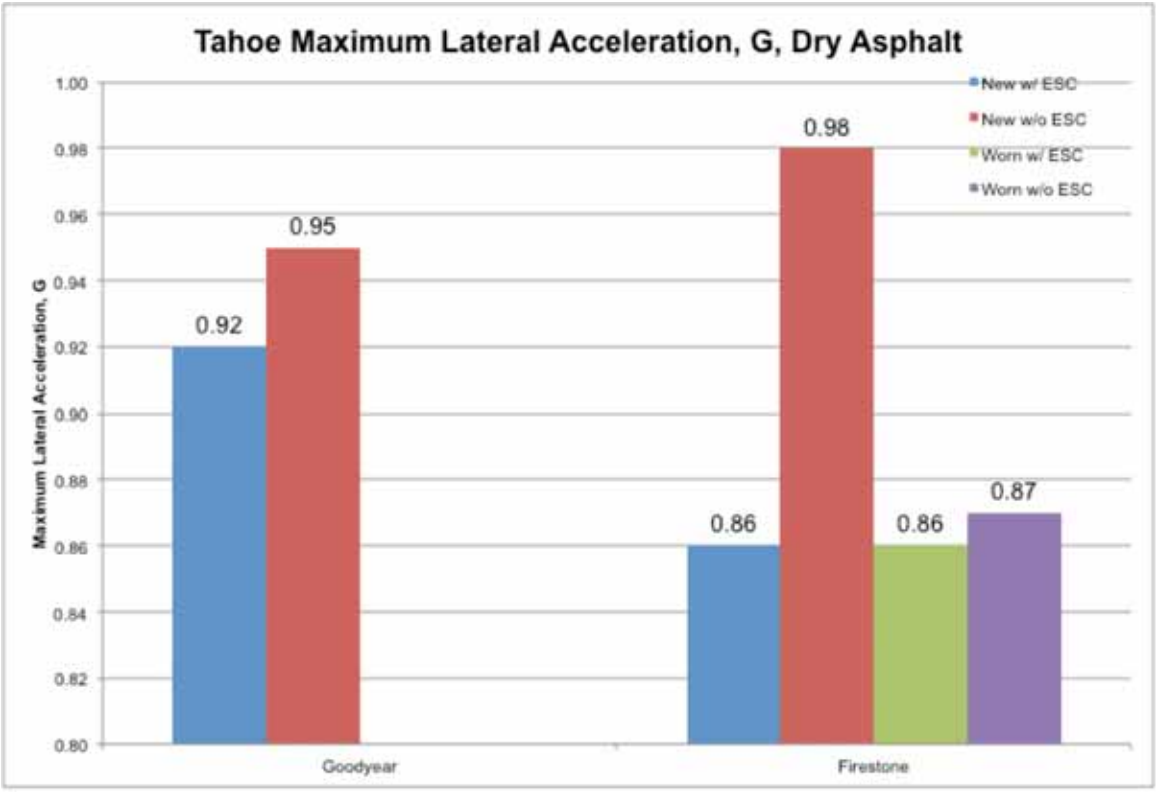
Chevrolet Tahoe

Tire showing greatest wear-LF


Tahoe 60 -> 0 MPH Stopping Distance, Dry Asphalt
New
Worn
150.0
145.0
140.0
135.0
130.0
125.0
141.65
133.84
146.79
Goodyear
Firestone


Tahoe Average 35->0 MPH Stopping Distances, Feet
Braking on Wet Jennite
New
Worn
Stopping Distance, Feet
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
98.81
96.84
113.33
Goodyear
Firestone


Tahoe Average 40->0 MPH Stopping Distances, Feet
Braking in a Turn on Wet Asphalt
New
Worn
Stopping Distance, Feet
90.0
85.0
80.0
75.0
70.0
65.0
82.07
73.74
86.73
Goodyear
Firestone


Tahoe Maximum Lateral Acceleration, G, Dry Asphalt
New w/ ESC
New w/o ESC
Worn w/ ESC
Worn w/o ESC
Maximum Lateral Acceleration, G
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
0.82
0.80
0.92
0.95
0.86
0.98
0.86
0.87
Goodyear
Firestone

Tire Summary

Vehicle: 2010 Chevrolet Impala
Tire Manufacturer: Goodyear
Tire Model / Size: Eagle RSA
225/60R18

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		158.48	155.81
Standard Deviation		3.18	2.04
Wet Jennite			
SD feet 35-0 mph		105.44	109.97
Standard Deviation		7.22	6.03
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		84.97	88.24
Standard Deviation		5.74	11.84

Steady State Turn

Maximum Lateral Acceleration (g) *with* Electronic Stability Control	clockwise	N/A	N/A
	counter clockwise		
	Average		
Maximum Lateral Acceleration (g) *without* Electronic Stability Control	clockwise	0.96	1.02
	counter clockwise	0.98	1.06
	Average	0.97	1.04

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	65.25
	Standard Deviation	0.29
		2nd 50 Laps
Clockwise	Average, seconds	65.19
	Standard Deviation	0.54

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	68.76%
	RF	62.67%
	LR	7.92%
	RR	10.81%

Goodyear Eagle RSA

Chevrolet Impala

Tire showing greatest wear-LF

Tire Summary

Vehicle: 2010 Chevrolet Impala
Tire Manufacturer: Pirelli
Tire Model / Size: P6 4 Season
225/60R16

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		148.88	155.68
Standard Deviation		2.42	2.31
Wet Jennite			
SD feet 35-0 mph		103.44	111.82
Standard Deviation		7.17	3.81
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		82.41	89.23
Standard Deviation		1.44	2.58

Steady State Turn

Maximum Lateral Acceleration (g) *with* Electronic Stability Control	clockwise	N/A	N/A
	counter clockwise		
	Average		
Maximum Lateral Acceleration (g) *without* Electronic Stability Control	clockwise	1.03	0.97
	counter clockwise	1.01	0.99
	Average	1.02	0.98

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	64.18
	Standard Deviation	0.31
		2nd 50 Laps
Clockwise	Average, seconds	64.27
	Standard Deviation	0.32

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	49.88%
	RF	61.18%
	LR	8.73%
	RR	9.81%

Pirelli P6 4 Season

Chevrolet Impala

Tire showing greatest wear-RF

Tire Summary

Vehicle: 2010 Chevrolet Impala
Tire Manufacturer: Nokian
Tire Model / Size: WRG2
225/60R16

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		161.28	156.49
Standard Deviation		1.02	1.3
Wet Jennite			
SD feet 35-0 mph		99.68	110.56
Standard Deviation		2.11	3.59
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		85.36	91.74
Standard Deviation		4.64	5.07

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	N/A	N/A
with Electronic Stability Control	counter clockwise		
	Average		
Maximum Lateral Acceleration (g)	clockwise	1.01	0.97
without Electronic Stability Control	counter clockwise	0.99	0.95
	Average	1.00	0.96

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	64.97
	Standard Deviation	0.32
		2nd 50 Laps
Clockwise	Average, seconds	64.8
	Standard Deviation	0.43

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	56.25%
	RF	61.36%
	LR	9.66%
	RR	8.24%

Nokian WRG2

Chevrolet Impala

Tire showing greatest wear-RF

Tire Summary

Vehicle: 2010 Chevrolet Impala
Tire Manufacturer: Cooper
Tire Model / Size: CS4 265/60/R17 ***Unable to complete test due to excess tire wear***

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		139.82	
Standard Deviation		1.37	
Wet Jennite			
SD feet 35-0 mph		93.32	
Standard Deviation		11.86	
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		80.91	
Standard Deviation		5.09	

Steady State Turn

Maximum Lateral Acceleration (g) *with* Electronic Stability Control	clockwise	N/A	N/A
	counter clockwise		
	Average		
Maximum Lateral Acceleration (g) *without* Electronic Stability Control	clockwise	0.89	
	counter clockwise	0.87	
	Average	0.88	

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	
	Standard Deviation	
		2nd 50 Laps
Clockwise	Average, seconds	
	Standard Deviation	

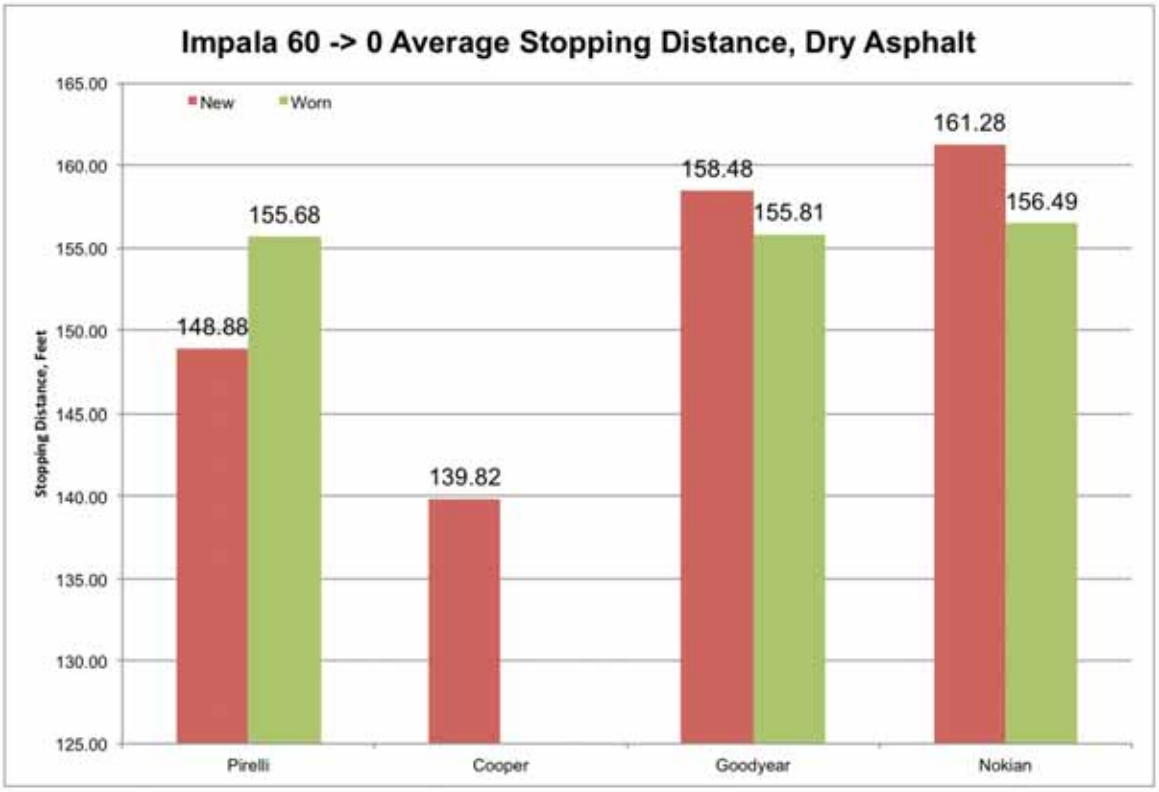
Percentage of Tread Consumed During Testing

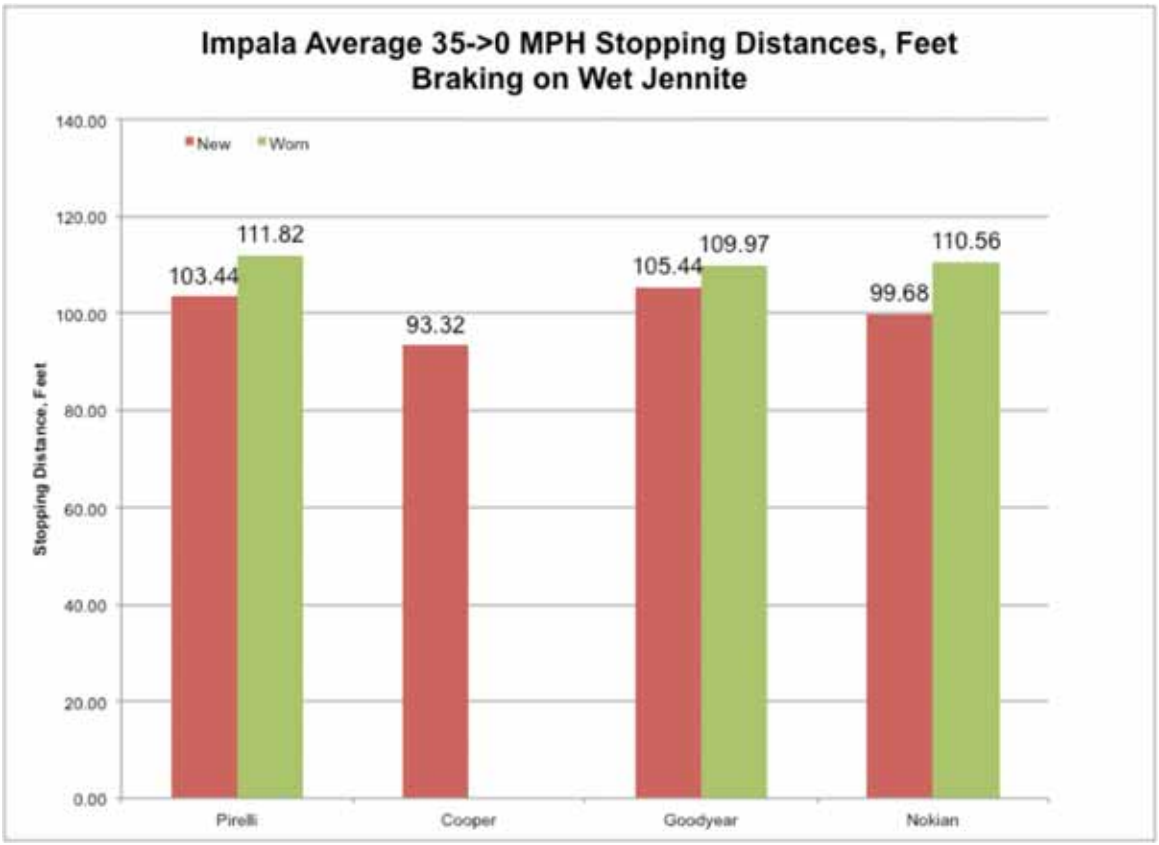
Average wear by tire position	LF
	RF
	LR
	RR

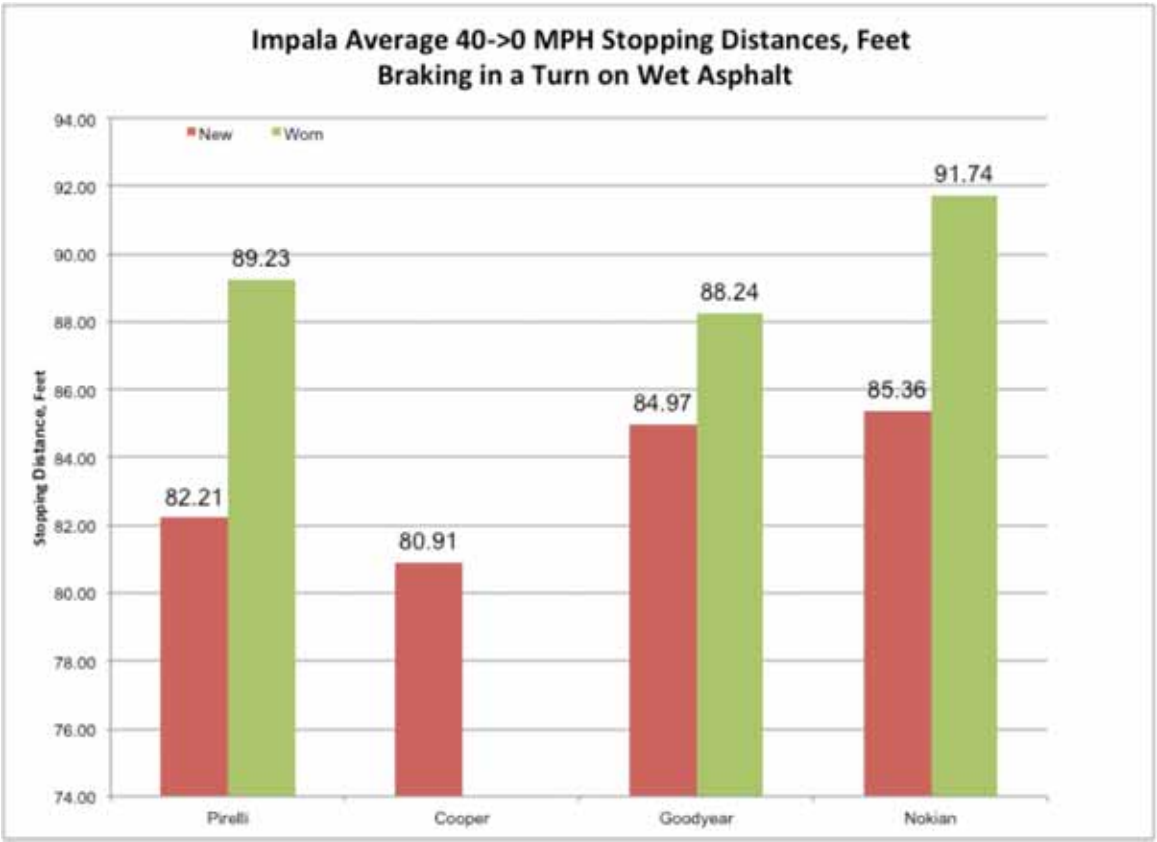
Cooper CS4

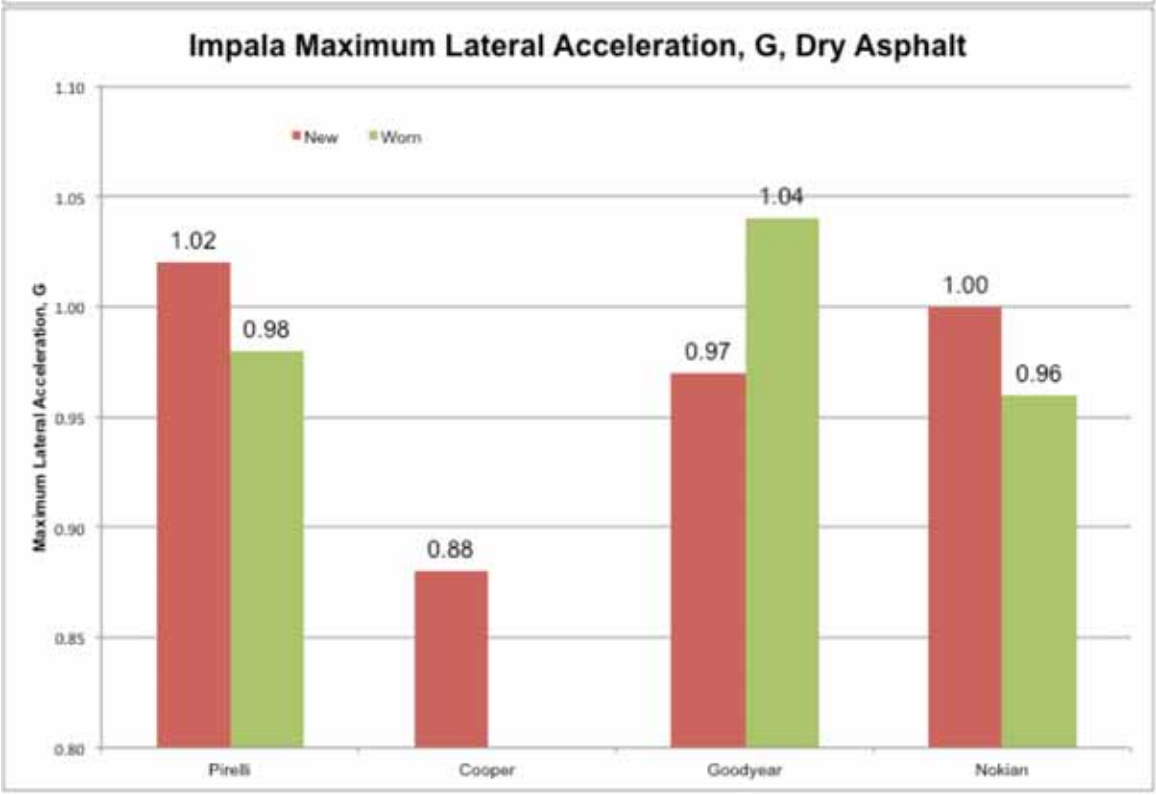
Chevrolet Impala

Tire showing greatest wear-RF


Impala 60 -> 0 Average Stopping Distance, Dry Asphalt
New
Worn
Stopping Distance, Feet
165.00
160.00
155.00
150.00
145.00
140.00
135.00
130.00
125.00
148.88
155.68
139.82
158.48
155.81
161.28
156.49
Pirelli
Cooper
Goodyear
Nokian


Impala Average 35->0 MPH Stopping Distances, Feet
Braking on Wet Jennite
New
Worn
Stopping Distance, Feet
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
103.44
111.82
93.32
105.44
109.97
99.68
110.56
Pirelli
Cooper
Goodyear
Nokian


Impala Average 40->0 MPH Stopping Distances, Feet
Braking in a Turn on Wet Asphalt
New
Worn
Stopping Distance, Feet
94.00
92.00
90.00
88.00
86.00
84.00
82.00
80.00
78.00
76.00
74.00
82.21
89.23
80.91
84.97
88.24
85.36
91.74
Pirelli
Cooper
Goodyear
Nokian


Impala Maximum Lateral Acceleration, G, Dry Asphalt
New
Worn
Maximum Lateral Acceleration, G
1.10
1.05
1.00
0.95
0.90
0.85
0.80
1.02
0.98
0.88
0.97
1.04
1.00
0.96
Pirelli
Cooper
Goodyear
Nokian

Tire Summary

Vehicle: 2010 Ford CVPI
Tire Manufacturer: Firestone
Tire Model / Size: Firehawk GT Pursuit
235/55/R17

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		137.87	141.08
Standard Deviation		0.79	1.42
Wet Jennite			
SD feet 35-0 mph		106.6	122.46
Standard Deviation		4.95	4.54
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		71.12	83.89
Standard Deviation		5.77	5.72

Steady State Turn

Maximum Lateral Acceleration (g) *with* Electronic Stability Control	clockwise	N/A	N/A
	counter clockwise		
	Average		
Maximum Lateral Acceleration (g) *without* Electronic Stability Control	clockwise	0.95	1.08
	counter clockwise	1.08	1.00
	Average		

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	63.05
	Standard Deviation	0.34
		2nd 50 Laps
Clockwise	Average, seconds	63.00
	Standard Deviation	0.37

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	57.66%
	RF	57.86%
	LR	55.57%
	RR	68.02%

Firestone Firehawk GT Pursuit

Ford CVPI

Tire showing greatest wear-RR

Tire Summary

Vehicle: 2010 Ford CVPI
Tire Manufacturer: Goodyear
Tire Model / Size: Eagle RSA
235/55/R17

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		140.44	144.16
Standard Deviation		2.92	1.69
Wet Jennite			
SD feet 35-0 mph		112.57	119.58
Standard Deviation		2.72	6.97
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		83.69	88.15
Standard Deviation		4.51	7.16

Steady State Turn

Maximum Lateral Acceleration (g) *with* Electronic Stability Control	clockwise	N/A	N/A
	counter clockwise		
	Average		
Maximum Lateral Acceleration (g) *without* Electronic Stability Control	clockwise	0.89	0.99
	counter clockwise	0.95	0.99
	Average	0.92	0.99

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	62.37
	Standard Deviation	0.34
		2nd 50 Laps
Clockwise	Average, seconds	62.69
	Standard Deviation	0.25

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	34.57%
	RF	37.18%
	LR	37.90%
	RR	43.40%

Goodyear Eagle RSA

Ford CVPI

Tire showing greatest wear-RR

Tire Summary

Vehicle: 2010 Ford CVPI
Tire Manufacturer: Pirelli
Tire Model / Size: Pzero Nero
235/55/R17

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		135.72	139.63
Standard Deviation		0.85	3.07
Wet Jennite			
SD feet 35-0 mph		107.81	119.54
Standard Deviation		4.72	2.48
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		74.31	78.8
Standard Deviation		6.2	2.7

Steady State Turn

Maximum Lateral Acceleration (g)	clockwise	N/A	N/A
with Electronic Stability Control	counter clockwise		
	Average		
Maximum Lateral Acceleration (g)	clockwise	0.87	0.90
without Electronic Stability Control	counter clockwise	0.97	0.98
	Average	0.92	0.94

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	62.53
	Standard Deviation	0.25
		2nd 50 Laps
Clockwise	Average, seconds	62.39
	Standard Deviation	0.28

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	53.11%
	RF	51.79%
	LR	49.35%
	RR	48.60%

Pirelli Pzero Nero

Ford CVPI

Tire showing greatest wear-LF

Tire Summary

Vehicle: 2010 Ford CVPI
Tire Manufacturer: Nokian
Tire Model / Size: WRG2
235/55/R17

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		148.27	144.67
Standard Deviation		1.24	1.23
Wet Jennite			
SD feet 35-0 mph		103.53	115.72
Standard Deviation		2.87	4.03
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		77.6	80.11
Standard Deviation		2.94	6.73

Steady State Turn

Maximum Lateral Acceleration (g) *with* Electronic Stability Control	clockwise	N/A	N/A
	counter clockwise		
	Average		
Maximum Lateral Acceleration (g) *without* Electronic Stability Control	clockwise	0.96	1.01
	counter clockwise	0.98	1.02
	Average	0.97	1.02

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	62.56
	Standard Deviation	0.23
		2nd 50 Laps
Clockwise	Average, seconds	62.87
	Standard Deviation	0.44

Percentage of Tread Consumed During Testing

Average wear by tire position	LF	39.49%
	RF	42.05%
	LR	45.74%
	RR	51.14%

Nokian WRG2

Ford CVPI

Tire showing greatest wear-RR

Tire Summary

Vehicle: 2010 Ford CVPI
Tire Manufacturer: Cooper
Tire Model / Size: CS4 235/55/R17 ***Unable to complete test due to excess tire wear***

Average Stopping Distances (SD)

		New Tires	Worn Tires
Dry Asphalt			
SD feet 60-0 mph		134.09	
Standard Deviation		1.12	
Wet Jennite			
SD feet 35-0 mph		101.11	
Standard Deviation		14.23	
Wet Asphalt Braking In Turn			
SD feet 40-0 mph		82.93	
Standard Deviation		9.66	

Steady State Turn

Maximum Lateral Acceleration (g) *with* Electronic Stability Control	clockwise	N/A	N/A
	counter clockwise		
	Average		
Maximum Lateral Acceleration (g) *without* Electronic Stability Control	clockwise	0.97	
	counter clockwise	0.90	
	Average		

Wear Sequence Lap Times

		1st 50 Laps
Counter Clockwise	Average, seconds	
	Standard Deviation	
		2nd 50 Laps
Clockwise	Average, seconds	
	Standard Deviation	

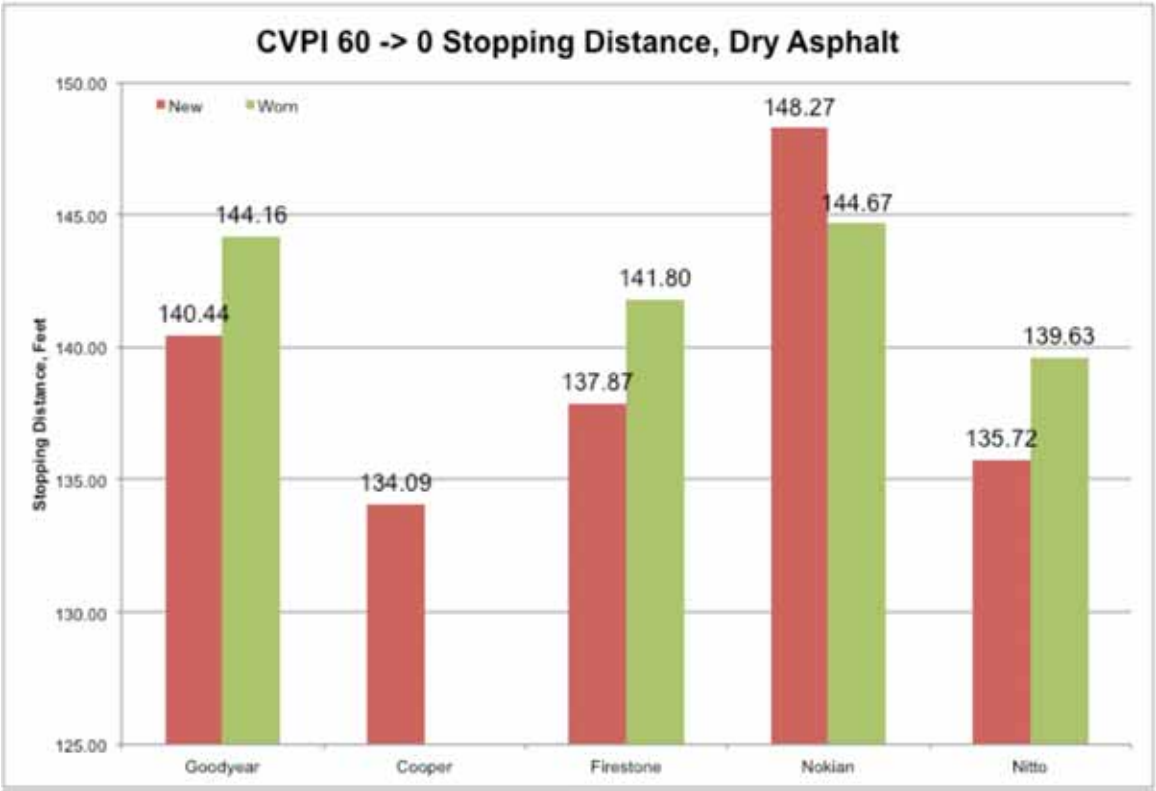
Percentage of Tread Consumed During Testing

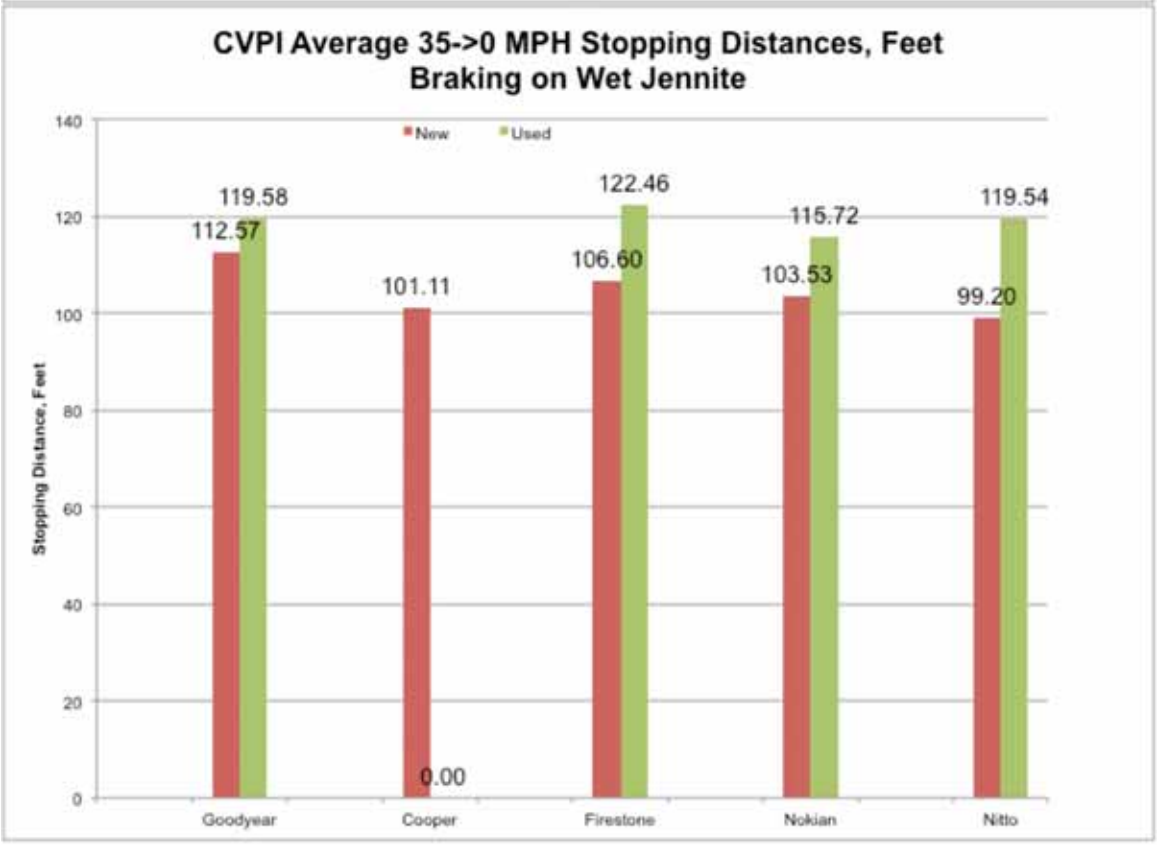
Average wear by tire position	LF
	RF
	LR
	RR

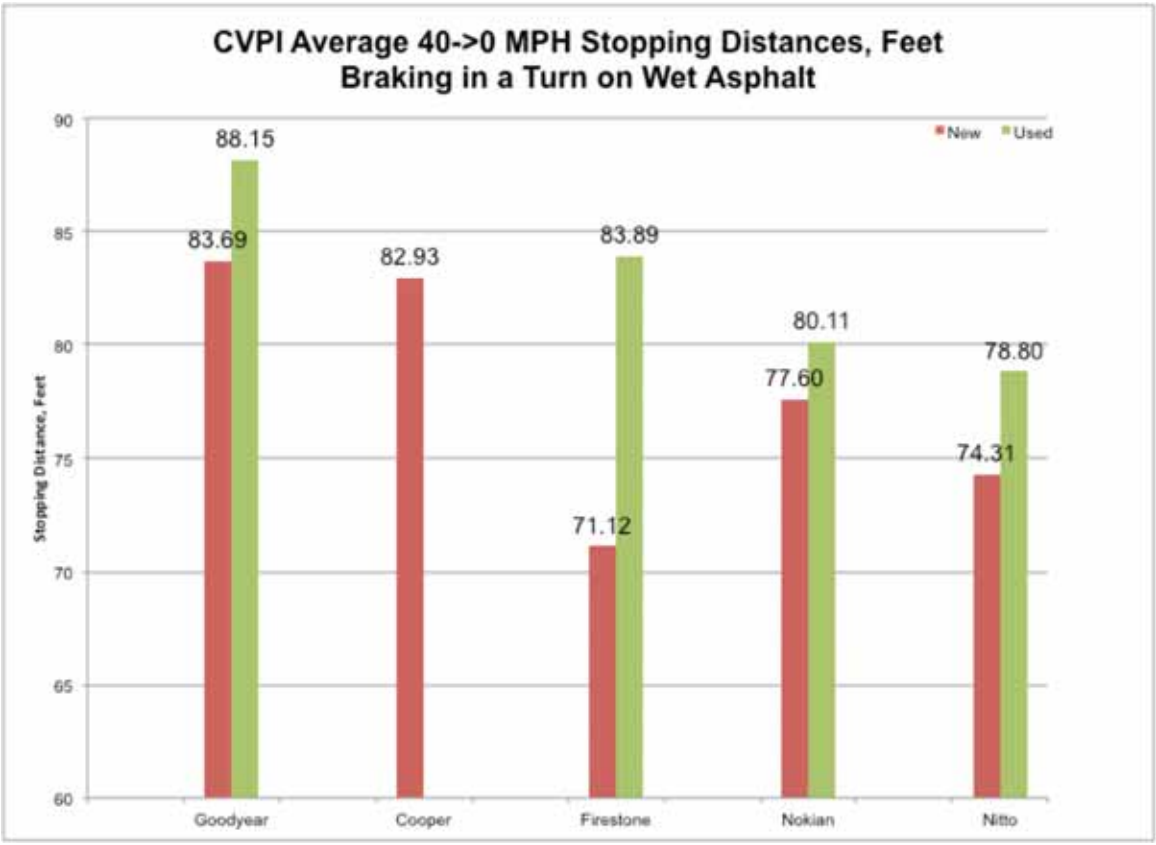
Cooper CS4

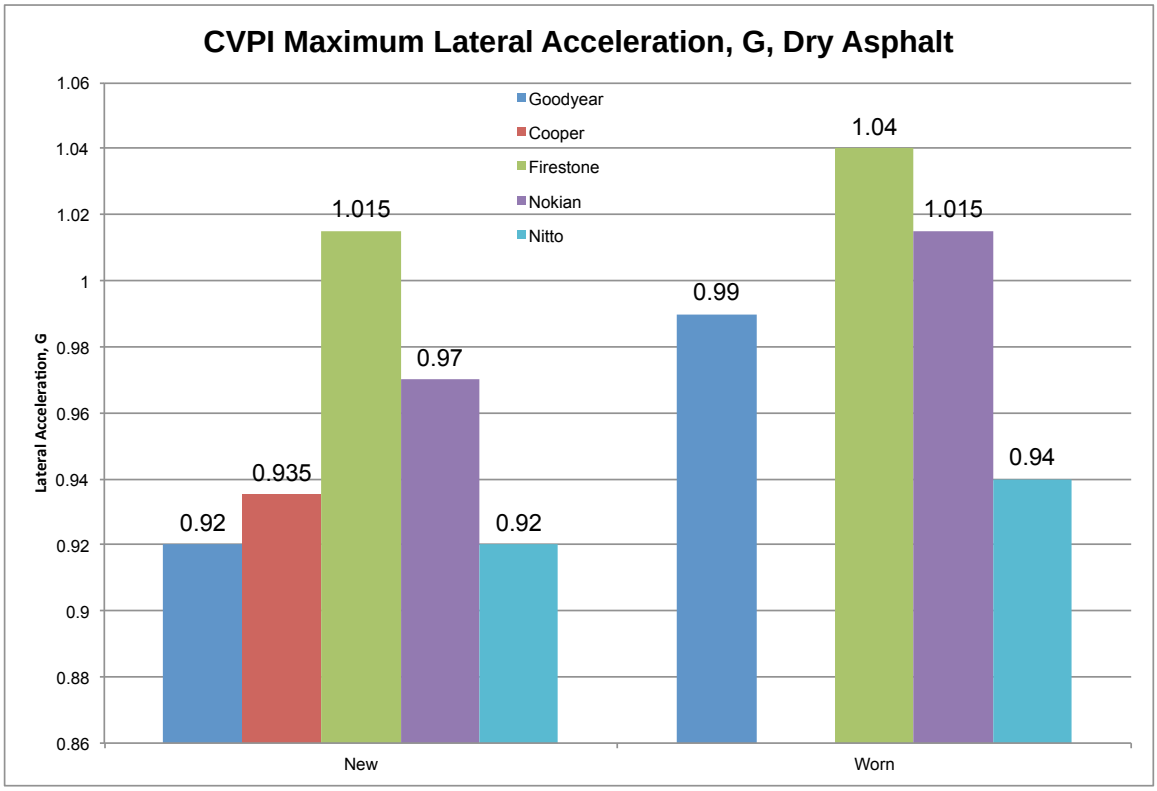
Ford CVPI

Tire showing greatest wear-RF


CVPI 60 -> 0 Stopping Distance, Dry Asphalt
New
Worn
Stopping Distance, Feet
150.00
145.00
140.00
135.00
130.00
125.00
140.44
144.16
134.09
137.87
141.80
148.27
144.67
135.72
139.63
Goodyear
Cooper
Firestone
Nokian
Nitto


CVPI Average 35->0 MPH Stopping Distances, Feet
Braking on Wet Jennite
New
Used
Stopping Distance, Feet
140
120
100
80
60
40
20
0
112.57
119.58
101.11
0.00
106.60
122.46
103.53
115.72
99.20
119.54
Goodyear
Cooper
Firestone
Nokian
Nitto


CVPI Average 40->0 MPH Stopping Distances, Feet
Braking in a Turn on Wet Asphalt
New
Used
Stopping Distance, Feet
90
85
80
75
70
65
60
88.15
83.69
82.93
83.89
71.12
80.11
77.60
78.80
74.31
Goodyear
Cooper
Firestone
Nokian
Nitto


CVPI Maximum Lateral Acceleration, G, Dry Asphalt
Goodyear
Cooper
Firestone
Nokian
Nitto
Lateral Acceleration, G
1.06
1.04
1.02
1
0.98
0.96
0.94
0.92
0.9
0.88
0.86
0.92
0.935
1.015
0.97
0.92
0.99
1.04
1.015
0.94
New
Worn

Test Methodology

Stage 1

All recording of pertinent sidewall information and the measurement of new tire tread depth was done before testing began.

Stage 2

To condition the tires and brakes prior to the start of testing, each candidate tire, and vehicle brakes were burnished during ten 60-0 mph full ABS stops. Each stopping distance is mathematically corrected to reflect 60 mph as the initial speed, thus providing a more accurate comparison of each stop. The control tire (Ford CVPI-Goodyear Eagle RSA) ran this stage only one time. The dry asphalt coefficient of friction 0.85 was used.

Stage 3

Each vehicle and candidate tire conducted five 60-0 mph full ABS stops. In an attempt to eliminate brake temperature as a performance factor, a one-mile cool down was conducted between stops. Speeds at trigger of the measurement were mathematically adjusted to 60 mph. Stopping distances were adjusted to reflect changes in track conditions using the track index established by the control tire.

Stage 4

Each vehicle performed ten 35-0 mph full ABS stops on a wet jennite (non-abrasive asphalt sealant) having a coefficient of friction of 0.35. Water is applied to the jennite surface using large commercial irrigation sprinklers. In an attempt to eliminate brake temperature as a performance factor, a one-mile cool down was conducted between stops. Speeds at trigger of the measurement were mathematically adjusted to 35 mph.

Stage 5

Each vehicle and candidate tire performed ten 40-0 mph stops in a turn on wet asphalt. Water was applied to the road surface by a large irrigation sprinkler. Five stops were conducted traveling clockwise and five stops were conducted traveling counter clockwise.

In an attempt to eliminate brake temperature as a performance factor, a one-mile cool down was conducted between stops. Speeds at trigger of the measurement were mathematically adjusted to 40 mph.

Stage 6

Each vehicle and candidate tire performed a steady state turn around a 300-foot diameter circle both clockwise and counter clockwise. The vehicle was driven to the point where it was unable to maintain its turn radius. The dual axis optical sensor measured speed and lateral acceleration in relation to the force of gravity noted as “G” at point of departure. Vehicles having Electronic Stability Control (ESC) were run with ESC on, ESC partial off or ESC off depending on system functionality. Lateral acceleration figures adjusted to reflect track changes using the track index.

Stage 7

To complete the tire endurance and wear test, each vehicle and candidate tire was driven 100 laps on a one-mile road course: 50 laps clockwise and 50 laps counter clockwise. Each lap was driven in a manner to simulate emergency or pursuit driving. Every 10 laps the vehicle stopped in order to obtain temperatures of rotor and tires.

Stage 8

Repeat Stage 3 with worn tires.

Stage 9

Repeat Stage 4 with worn tires.

Stage 10

Repeat Stage 5 with worn tires.

Stage 11

Repeat Stage 6 with worn tires.

Stage 12

Each candidate tire tread depth was measured at the conclusion of Stage 11. Measurements were initiated at the valve stem (considered TDC) moving clockwise to the 90,180 and 270 degree locations. Using the beginning and ending measurements, average percentage of tread consumed during the test was calculated.

Standard Deviation (St Dev)

Standard deviation is a statistic that indicates how tightly various points of data are clustered around the average. For purposes of this test, standard deviation indicates the consistency by which each tire and vehicle brakes and/or stability system performed in combination with each other. Smaller standard deviation numbers indicate better performance.

Detailed Test Data By Vehicle Platform

Chevrolet Caprice/ Goodyear Eagle RSA

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Caprice
Vehicle VIN	BL532613
Initial Odometer	578
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA

General Track and Weather Info

Date of Test	6/10/11 & 6/13/11
Driver	Ron Gromak

		6/10/11	6/13/11
Track Temperature	Initial	66° F	63° F
Deg F	Midpoint		79° F
	Final		101° F
Weather Info			
Temperature	Initial	56° F	57° F
Deg F	Midpoint		64° F
	Final		78° F

Conditions 6/10 Cloudy & Cool

6/13 Sunny & Cool

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1511
DOT Code	M6GM JAIR 1511
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	99

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.266	0.234	0.234	0.266		
TDC + 90°	0.297	0.234	0.250	0.250		
TDC + 180°	0.266	0.234	0.234	0.250		
TDC + 270°	0.266	0.234	0.234	0.250		
Average	0.273	0.234	0.238	0.254		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1511
DOT Code	M6GM JAIR 1511
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	99

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.219	0.234	0.250		
TDC + 90°	0.219	0.219	0.234	0.250		
TDC + 180°	0.219	0.172	0.250	0.250		
TDC + 270°	0.234	0.219	0.250	0.250		
Average	0.230	0.207	0.242	0.250		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1511
DOT Code	M6GM JAIR 1511
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	99

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.203	0.219	0.234		
TDC + 90°	0.250	0.219	0.234	0.234		
TDC + 180°	0.250	0.219	0.234	0.250		
TDC + 270°	0.250	0.219	0.234	0.250		
Average	0.250	0.215	0.230	0.242		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1511
DOT Code	M6GM JAIR 1511
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	99

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.234	0.219	0.250		
TDC + 90°	0.250	0.219	0.234	0.250		
TDC + 180°	0.250	0.234	0.234	0.250		
TDC + 270°	0.250	0.219	0.219	0.250		
Average	0.250	0.227	0.227	0.250		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, PMH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Track Index	SD, Indexed
1	60.24	134.49	133.43	1.0082	134.52895
2	59.21	131.96	135.51	1.0082	136.62103
3	60.21	135.21	134.25	1.0082	135.34749
4	59.98	135.71	135.81	1.0082	136.9212
5	61.18	144.34	138.84	1.0082	139.98083
6	59.25	133.16	136.54	1.0082	137.66342
7	59.24	134.33	137.81	1.0082	138.9444
8	60.57	143.19	140.50	1.0082	141.65318
9	59.18	132.42	136.13	1.0082	137.24561
10	61.81	148.63	140.04	1.0082	141.19123
= Average 60 mph SD feet			136.89		138.01
= Standard Deviation, 60 mph SD feet			2.37		2.38

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Track Index	Adjusted w/ Index
1	60.97	136.74	132.41	1.0082	133.50
2	60.29	136.12	134.81	1.0082	135.92
3	58.35	128.17	135.53	1.0082	136.64
4	60.25	136.52	135.38	1.0082	136.49
5	60.32	137.53	136.06	1.0082	137.18
= Average 60 mph SD feet			134.84		135.94
= Standard Deviation, 60 mph SD feet			1.43		1.44

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.58	94.90	91.85
2	34.65	99.05	101.03
3	34.56	99.35	101.91
4	35.04	97.82	97.60
5	35.28	102.63	101.03
6	34.42	95.43	98.67
7	35.21	102.77	101.57
8	35.31	98.93	97.21
9	34.74	100.17	101.68
10	34.90	98.48	99.02

= Average 35 mph SD feet	99.16
= Standard Deviation, 35 mph SD feet	3.10

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.92	78.99	71.92	CW
2	41.74	86.12	79.08	CW
3	41.77	75.18	68.95	CW
4	41.40	74.69	69.73	CW
5	41.18	78.57	74.15	CW
6	38.21	61.85	67.77	CCW
7	40.00	73.67	73.67	CCW
8	40.51	72.97	71.16	CCW
9	40.68	76.12	73.60	CCW
10	40.20	73.46	72.74	CCW

= Average 40 mph SD feet	72.28
= Standard Deviation, 40 mph SD feet	3.21

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Track Index	Adjusted w/ Index
1	CW	48	1.03	1.02	1.05
		Max Lat	1.03		
1	CCW	46.20	0.95	1.02	0.97
		Max Lat	0.95		

ADDITIONAL RUNS MADE WITH STABILITY CONTROL TURNED OFF

Run #	Direction	Velocity	Lateral Accel,G	Track Index	Adjusted w/ Index
1	CW	44.768	0.89	1.02	0.91
1	CCW	48.05	1.03	1.02	1.05

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	63.093	62.931
2	62.182	62.158
3	62.616	61.843
4	62.451	62.009
5	62.973	61.774
6	63.033	61.94
7	62.68	62.121
8	62.273	62.155
9	62.614	62.335
10	63.054	61.906
11	62.787	62.083
12	62.541	61.804
13	62.69	62.217
14	62.445	62.273
15	62.394	62.874
16	62.913	62.569
17	62.779	62.327
18	62.944	62.204
19	62.541	62.257
20	62.855	63.154
21	63.103	62.305
22	62.696	62.592
23	62.52	62.401
24	62.879	62.421
25	62.749	62.362
26	62.733	62.536
27	63.281	62.258
28	62.955	62.647
29	62.847	62.383
30	62.634	62.605
31	62.472	62.612
32	62.338	62.29
33	62.293	62.389
34	62.557	62.293
35	62.492	62.164
36	63.177	62.087
37	62.422	62.193
38	62.662	62.751
39	62.801	63.535
40	62.733	61.934
41	62.9	62.697
42	62.766	62.261
43	62.463	62.342
44	62.804	62.322
45	62.37	62.571
46	62.629	62.235
47	62.414	62.271
48	62.582	62.667
49	62.429	62.626
50	62.836	62.786
Avg =	62.701789	62.321658
Std Dev =	0.2712426	0.308851
Min =	62.182	61.774
Max =	63.281	63.154
Range =	1.099	1.761

Temperatures of rotor and tire during endurance test

Vehicle Caprice Goodyear Eagle RSA

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	840	130	372	125	500	145	805	160
After 20 Laps	845	145	430	137	745	160	845	159
After 30 Laps	832	134	495	143	715	162	808	162
After 40 Laps	830	142	655	130	700	162	794	162
After 50 Laps	835	130	656	138	713	158	782	159
After 60 Laps	895	160	780	168	675	119	825	125
After 70 Laps	960	172	840	187	730	126	795	137
After 80 Laps	940	172	860	180	740	136	842	135
After 90 Laps	949	165	800	173	730	125	850	132
After 100 Laps	930	168	805	179	780	136	890	131

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Track Index	Adjusted w/ Index
1	59.79	140.26	141.23	0.9991	141.107418
2	59.54	143.58	145.82	0.9991	145.689579
3	60.22	145.69	144.62	0.9991	144.487532
4	59.80	143.34	144.28	0.9991	144.152042
5	60.20	141.68	140.74	0.9991	140.610816
= Average 60 mph SD feet			143.34		143.209477
= Standard Deviation, 60 mph SD feet			2.23		2.22735574

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.09	95.13	94.67
2	34.49	105.55	108.69
3	35.76	112.07	107.36
4	35.05	108.07	107.77
5	35.85	105.06	100.16
6	34.23	100.90	105.49
7	35.01	107.64	107.58
8	35.44	108.72	106.02
9	34.43	102.30	105.69
10	36.07	116.23	109.44

= Average 35 mph SD feet	105.29
= Standard Deviation, 35 mph SD feet	4.52

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.21	73.19	72.44	CW
2	40.84	78.92	75.69	CW
3	40.16	75.27	74.66	CW
4	39.49	73.51	75.41	CW
5	40.53	78.56	76.53	CW
6	40.57	82.57	80.26	CCW
7	41.43	92.65	86.36	CCW
8	38.86	65.04	68.93	CCW
9	40.68	75.01	72.53	CCW
10	41.06	81.37	77.22	CCW

= Average 40 mph SD feet	76.00
= Standard Deviation, 40 mph SD feet	4.76

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Track Index	Adjusted w/ Index
1	CW	45.705	0.93	1.0031	0.93
		Max Lat.	0.93		
1	CCW	46.96	0.98	1.0031	0.99
		Max Lat.	0.98		
ADDITIONAL RUNS MADE WITH STABILITY CONTROL TURNED OFF					
1	CW	45.695	0.93	1.0031	0.93
1	CCW	47.50	1.01	1.0031	1.01

Stage 12- End of Test Tire Wear Check

Measured tire tread depth in each groove at four locations

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.078125	-0.109375	-0.109375	-0.078125	0	0
TDC + 90°	-0.046875	-0.109375	-0.09375	-0.09375	0	0
TDC + 180°	-0.078125	-0.109375	-0.109375	-0.09375	0	0
TDC + 270°	-0.078125	-0.109375	-0.109375	-0.09375	0	0
Average	-0.070313	-0.109375	-0.1054688	-0.0898438	0	0

% Wear	20.45%	31.82%	30.68%	26.14%	LF AVG	27.27%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.09375	-0.125	-0.109375	-0.09375	0	0
TDC + 90°	-0.125	-0.125	-0.109375	-0.09375	0	0
TDC + 180°	-0.125	-0.171875	-0.09375	-0.09375	0	0
TDC + 270°	-0.109375	-0.125	-0.09375	-0.09375	0	0
Average	-0.113281	-0.136719	-0.1015625	-0.09375	0	0

% Wear	32.95%	39.77%	29.55%	27.27%	RF AVG	32.39%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.09375	-0.140625	-0.125	-0.109375	0	0
TDC + 90°	-0.09375	-0.125	-0.109375	-0.109375	0	0
TDC + 180°	-0.09375	-0.125	-0.109375	-0.09375	0	0
TDC + 270°	-0.09375	-0.125	-0.109375	-0.09375	0	0
Average	-0.09375	-0.128906	-0.1132813	-0.1015625	0	0

% Wear	27.27%	37.50%	32.95%	29.55%	LR AVG	31.82%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.09375	-0.109375	-0.125	-0.09375	0	0
TDC + 90°	-0.09375	-0.125	-0.109375	-0.09375	0	0
TDC + 180°	-0.09375	-0.109375	-0.109375	-0.09375	0	0
TDC + 270°	-0.09375	-0.125	-0.125	-0.09375	0	0
Average	-0.09375	-0.117188	-0.1171875	-0.09375	0	0

% Wear	27.27%	34.09%	34.09%	27.27%	RR AVG	30.68%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	27.27%
RF AVG	32.39%
LR AVG	31.82%
RR AVG	30.68%

Chevrolet Caprice/Nitto NT850 Plus

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Caprice
Vehicle VIN	BL532613
Initial Odometer	429
Tire Manufacturer	Nitto
Tire Brand Name	NT 850 Premium

General Track and Weather Info

Date of Test	8-Jun-11
Driver	Ron Gromak

Track Temperature	Initial	87° F
Deg F	Midpoint	108° F
	Final	116° F

Weather Info

Temperature	Initial	80° F
Deg F	Midpoint	87° F
	Final	98° F

Conditions Hot, Hazy, Humid

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Nitto
Tire Brand Name	NT 850 Premium
Tire Build Date	4810
DOT Code	735V HHF 4810
UTQG Treadwear Rating	500
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	101

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.313	0.328	0.297	0.281	
TDC + 90°	0.281	0.313	0.328	0.297	0.281	
TDC + 180°	0.281	0.313	0.328	0.297	0.281	
TDC + 270°	0.281	0.313	0.328	0.297	0.281	
Average	0.28125	0.3125	0.328125	0.296875	0.28125	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.109	0.063	0.156	0.156	0.156	
TDC + 90°	0.141	0.063	0.156	0.156	0.156	
TDC + 180°	0.109	0.063	0.172	0.156	0.172	
TDC + 270°	0.094	0.063	0.156	0.156	0.078	
Average	0.1132813	0.0625	0.1601563	0.15625	0.140625	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Nitto
Tire Brand Name	NT 850 Premium
Tire Build Date	4810
DOT Code	735V HHF 4810
UTQG Treadwear Rating	500
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	101

Tire Position Right Front Initial Cold Inflation Pressure (psi) 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.313	0.344	0.328	0.297	
TDC + 90°	0.297	0.313	0.344	0.328	0.297	
TDC + 180°	0.297	0.313	0.344	0.328	0.297	
TDC + 270°	0.297	0.313	0.344	0.328	0.297	
Average	0.296875	0.3125	0.34375	0.328125	0.296875	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.094	0.063	0.156	0.156	0.156	
TDC + 90°	0.109	0.078	0.156	0.156	0.141	
TDC + 180°	0.109	0.094	0.188	0.172	0.156	
TDC + 270°	0.109	0.078	0.172	0.172	0.156	
Average	0.1054688	0.078125	0.1679688	0.1640625	0.1523438	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Nitto
Tire Brand Name	NT 850 Premium
Tire Build Date	4810
DOT Code	735V HHF 4810
UTQG Treadwear Rating	500
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	101

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.313	0.344	0.313	0.281	
TDC + 90°	0.297	0.313	0.344	0.313	0.281	
TDC + 180°	0.297	0.313	0.344	0.313	0.281	
TDC + 270°	0.297	0.313	0.344	0.313	0.281	
Average	0.296875	0.3125	0.34375	0.3125	0.28125	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.141	0.109	0.172	0.156	0.141	
TDC + 90°	0.125	0.094	0.156	0.156	0.141	
TDC + 180°	0.109	0.078	0.172	0.156	0.125	
TDC + 270°	0.141	0.094	0.172	0.172	0.141	
Average	0.1289063	0.09375	0.1679688	0.1601563	0.1367188	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Nitto
Tire Brand Name	NT 850 Premium
Tire Build Date	4810
DOT Code	735V HHF 4810
UTQG Treadwear Rating	500
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	101

Tire Position Right Rear Initial Cold Inflation Pressure (psi) 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.313	0.344	0.313	0.297	
TDC + 90°	0.297	0.313	0.344	0.313	0.297	
TDC + 180°	0.297	0.313	0.344	0.313	0.297	
TDC + 270°	0.297	0.313	0.344	0.313	0.297	
Average	0.296875	0.3125	0.34375	0.3125	0.296875	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.078	0.031	0.125	0.141	0.125	
TDC + 90°	0.063	0.031	0.109	0.125	0.109	
TDC + 180°	0.078	0.047	0.125	0.141	0.141	
TDC + 270°	0.094	0.047	0.125	0.141	0.125	
Average	0.078125	0.0390625	0.1210938	0.1367188	0.125	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/8/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	58.32	125.43	132.79
2	57.17	121.03	133.31
3	59.38	128.51	131.19
4	59.48	129.18	131.46
5	57.63	127.79	138.53
6	60.03	129.63	129.51
7	64.67	141.17	121.51
8	61.30	135.17	129.51
9	61.48	137.91	131.36
10	60.85	140.11	136.23

= Average 60 mph SD feet	131.54
= Standard Deviation, 60 mph SD feet	4.53

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/8/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Track Index	Adjusted w/ Index
1	60.35	131.66	130.13	0.9777	127.23
2	61.24	135.19	129.76	0.9777	126.86
3	60.52	130.68	128.46	0.9777	125.60
4	60.43	131.73	129.85	0.9777	126.95
5	60.71	130.91	127.87	0.9777	125.02
= Average 60 mph SD feet			129.21		126.33
= Standard Deviation, 60 mph SD feet			0.99		0.97

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/8/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	34.63	70.88	72.40
2	35.45	90.40	88.13
3	34.04	90.45	95.64
4	35.01	112.55	112.49
5	34.63	95.85	97.92
6	35.15	88.96	88.19
7	35.75	79.35	76.04
8	34.56	74.97	76.89
9	34.43	98.39	101.65
10	33.87	72.57	77.49

= Average 35 mph SD feet	88.68
= Standard Deviation, 35 mph SD feet	13.16

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/8/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.22	70.14	69.38	CW
2	41.62	74.25	68.59	CW
3	40.34	68.16	67.02	CW
4	40.47	96.33	94.10	CW
5	42.18	85.29	76.71	CW
6	39.95	70.40	70.57	CCW
7	38.18	66.54	73.04	CCW
8	39.26	66.07	68.58	CCW
9	39.01	71.95	75.65	CCW
10	39.90	76.65	77.03	CCW

= Average 40 mph SD feet	74.07
= Standard Deviation, 40 mph SD feet	7.92

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Track Index	Adjusted w/ Index
1	CW	45.74	0.93	0.9545	0.89
		Max Lat	0.93		
1	CCW	44.81	0.89	0.9545	0.85
		Max Lat	0.89		
ADDITIONAL RUNS MADE WITHOUT STABILITY CONTROL OFF					
1	CW	45.37	0.92	0.9545	0.88
1	CCW	45.02	0.90	0.9545	0.86

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	63.2	63.2
2	63.2	63.5
3	62.4	63.2
4	63	63.9
5	62.6	63.5
6	63.1	63.3
7	63	63.3
8	63.1	63.5
9	62.6	63.5
10	66.5	63.1
11	61.8	63.4
12	62.2	63
13	61.9	62.4
14	62.2	62.5
15	62.3	63
16	62.8	63
17	62.3	63
18	62.9	63.6
19	62.2	63.2
20	62.4	62.8
21	62.8	63
22	61.9	62.8
23	62.3	63
24	62.4	63.2
25	62.6	63.2
26	62.2	64
27	62.4	63.6
28	62.2	62.9
29	62.3	63.3
30	62.9	63.5
31	62	63.1
32	62.5	63.3
33	62.6	63.3
34	62.5	63.8
35	62.7	63.7
36	62.1	63.9
37	62.4	62.7
38	62.6	63.1
39	62.2	63.1
40	62.1	63.6
41	62.2	63.7
42	62.4	63.8
43	62.9	63.6
44	62.2	64
45	62.4	63.8
46	62.3	64.2
47	62.1	64.4
48	62	64
49	62.2	64.2
50	62	63.4
Avg =	62.613889	63.263889
Std Dev =	0.7668685	0.3681248
Min =	61.8	62.4
Max =	66.5	64
Range =	4.7	1.6

Temperatures of rotor and tire during endurance test

Vehicle Caprice Nitto NT

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	625	160	400	165	450	173	630	181
After 20 Laps	700	180	434	175	600	198	740	198
After 30 Laps	785	178	460	181	697	194	735	198
After 40 Laps	830	170	590	178	700	195	775	198
After 50 Laps	760	170	600	175	640	190	690	196
After 60 Laps	829	182	697	178	659	164	717	162
After 70 Laps	941	178	805	184	737	177	806	174
After 80 Laps	862	177	793	182	736	176	791	171
After 90 Laps	925	185	840	192	620	172	805	172
After 100 Laps	925	185	855	189	753	175	793	173

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/8/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Track Index	Adjusted w/ Index
1	60.29	138.02	136.68	0.9734	133.05
2	61.12	137.91	132.88	0.9734	129.35
3	60.18	136.00	135.20	0.9734	131.61
4	58.77	128.36	133.78	0.9734	130.22
5	59.41	131.87	134.50	0.9734	130.92
= Average 60 mph SD feet			134.61		131.03
= Standard Deviation, 60 mph SD feet			1.44		1.40

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/8/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	34.95	105.86	106.18
2	35.19	104.39	103.29
3	36.32	113.22	105.11
4	36.19	111.89	104.64
5	35.82	114.96	109.78
6	34.86	106.50	107.38
7	35.07	105.50	105.08
8	35.07	109.05	108.61
9	35.80	113.08	108.08
10	34.66	111.90	114.11

= Average 35 mph SD feet	107.23
= Standard Deviation, 35 mph SD feet	3.14

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/8/11
Driver	Ron Gromak
Target Velocity, mph	40

Stop #	Initial Velocity, mph	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.75	95.02	87.24	CW
2	41.00	81.26	77.35	CW
3	39.83	79.97	80.65	CW
4	38.73	71.59	76.35	CW
5	40.31	80.17	78.94	CW
6	39.25	72.30	75.11	CCW
7	39.75	73.08	73.99	CCW
8	38.54	61.67	66.45	CCW
9	39.56	76.36	78.07	CCW
10	38.15	69.96	76.91	CCW

= Average 40 mph SD feet	77.11
= Standard Deviation, 40 mph SD feet	5.24

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Track Index	Adjusted w/ Index
1	CW	48.23	1.04	0.9709	1.01
		Max Lat.	1.04		
1	CCW	47.02	0.99	0.9709	0.96
		Max Lat.	0.99		
ADDITIONAL RUNS MADE WITH STABILITY CONTROL TURNED OFF					
1	CW	48.33	1.04	0.9709	1.01
1	CCW	45.854	0.937	0.9709	0.91

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.171875	-0.25	-0.171875	-0.140625	-0.125	0
TDC + 90°	-0.140625	-0.25	-0.171875	-0.140625	-0.125	0
TDC + 180°	-0.171875	-0.25	-0.15625	-0.140625	-0.109375	0
TDC + 270°	-0.1875	-0.25	-0.171875	-0.140625	-0.203125	0
Average	-0.167969	-0.25	-0.167969	-0.140625	-0.140625	0

% Wear	59.72%	80.00%	51.19%	47.37%	50.00%	LF AVG	57.66%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.203125	-0.25	-0.1875	-0.171875	-0.140625	0
TDC + 90°	-0.1875	-0.234375	-0.1875	-0.171875	-0.15625	0
TDC + 180°	-0.1875	-0.21875	-0.15625	-0.15625	-0.140625	0
TDC + 270°	-0.1875	-0.234375	-0.171875	-0.15625	-0.140625	0
Average	-0.191406	-0.234375	-0.175781	-0.1640625	-0.144531	0

% Wear	78.95%	90.00%	68.18%	57.14%	63.16%	RF AVG	71.49%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.15625	-0.203125	-0.171875	-0.15625	-0.140625	0
TDC + 90°	-0.171875	-0.21875	-0.1875	-0.15625	-0.140625	0
TDC + 180°	-0.1875	-0.234375	-0.171875	-0.15625	-0.15625	0
TDC + 270°	-0.15625	-0.21875	-0.171875	-0.140625	-0.140625	0
Average	-0.167969	-0.21875	-0.175781	-0.1523438	-0.144531	0

% Wear	56.58%	70.00%	51.14%	48.75%	51.39%	LR AVG	55.57%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.21875	-0.28125	-0.21875	-0.171875	-0.171875	0
TDC + 90°	-0.234375	-0.28125	-0.234375	-0.1875	-0.1875	0
TDC + 180°	-0.21875	-0.265625	-0.21875	-0.171875	-0.15625	0
TDC + 270°	-0.203125	-0.265625	-0.21875	-0.171875	-0.171875	0
Average	-0.21875	-0.273438	-0.222656	-0.1757813	-0.171875	0

% Wear	73.68%	87.50%	64.77%	56.25%	57.89%	RR AVG	68.02%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	57.66%
RF AVG	71.49%
LR AVG	55.57%
RR AVG	68.02%

Chevrolet Caprice/Nokian WRG2

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Caprice
Vehicle VIN	BL532613
Initial Odometer	734
Tire Manufacturer	Nokian
Tire Brand Name	WRG 2

Track and Weather Info

Date of Test	15-Jun-11
Driver	Ron Gromak

Track Temperature	Initial	62° F
Deg F	Midpoint	77° F
	Final	85° F

Weather Info Temperature	Initial	57° F
Deg F	Midpoint	63° F
	Final	67° F

Conditions Light Clouds, Cool, Winds 10 - 12 MPH

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Nokian
Tire Brand Name	WRG 2
Tire Build Date	1610
DOT Code	60BV1610
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	101

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.234	0.203	0.219	0.219		
TDC + 90°	0.234	0.219	0.203	0.141		
TDC + 180°	0.234	0.203	0.203	0.219		
TDC + 270°	0.234	0.203	0.219	0.219		
Average	0.234	0.207	0.211	0.199		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form

Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Nokian
Tire Brand Name	WRG 2
Tire Build Date	1510
DOT Code	60BV1610
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	101

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90˚	0.344	0.344	0.344	0.344		
TDC + 180˚	0.344	0.344	0.344	0.344		
TDC + 270˚	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.234	0.234	0.219	0.219		
TDC + 90˚	0.219	0.219	0.234	0.219		
TDC + 180˚	0.219	0.219	0.219	0.203		
TDC + 270˚	0.234	0.219	0.219	0.188		
Average	0.227	0.223	0.223	0.207		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Nokian
Tire Brand Name	WRG 2
Tire Build Date	1610
DOT Code	60BV1610
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	101

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.172	0.203	0.219		
TDC + 90°	0.188	0.172	0.172	0.188		
TDC + 180°	0.203	0.188	0.188	0.203		
TDC + 270°	0.203	0.172	0.188	0.203		
Average	0.195	0.176	0.188	0.203		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Caprice
Tire Manufacturer	Nokian
Tire Brand Name	WRG 2
Tire Build Date	1610
DOT Code	60BV1610
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	101

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 36

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.203	0.188	0.188		
TDC + 90°	0.203	0.188	0.203	0.188		
TDC + 180°	0.203	0.188	0.203	0.203		
TDC + 270°	0.203	0.188	0.203	0.188		
Average	0.203	0.191	0.199	0.191		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/15/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	60.13	145.44	144.84
2	58.56	137.13	143.98
3	60.37	145.24	143.47
4	59.50	146.11	148.56
5	60.57	151.38	148.54
6	60.13	148.90	148.25
7	60.34	152.08	150.38
8	59.51	146.18	148.59
9	60.36	162.70	160.78
10	60.29	155.95	154.45

= Average 60 mph SD feet	149.19
= Standard Deviation, 60 mph SD feet	5.21

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/15/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Track Index	Adjusted w/ Index
1	61.28	153.21	146.90	1.0099	148.35
2	60.39	149.46	147.54	1.0099	149.00
3	59.61	146.09	148.02	1.0099	149.49
4	60.19	145.06	144.16	1.0099	145.59
5	60.14	149.97	149.29	1.0099	150.76
= Average 60 mph SD feet			147.18		148.64
= Standard Deviation, 60 mph SD feet			1.90		1.92

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/15/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.32	100.13	98.34
2	35.45	98.20	95.71
3	35.54	97.97	94.99
4	35.51	94.67	91.95
5	34.42	95.42	98.66
6	36.31	101.18	93.99
7	35.86	99.69	94.99
8	34.55	95.07	97.59
9	36.28	103.71	96.54
10	35.19	98.94	97.88

= Average 35 mph SD feet 96.06
= Standard Deviation, 35 mph SD feet 2.14

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/15/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.11	67.24	66.88	CW
2	38.09	53.44	58.94	CW
3	41.43	74.48	69.43	CW
4	41.15	78.47	74.13	CW
5	40.46	74.85	73.14	CW
6	39.08	66.96	70.17	CCW
7	40.05	70.69	70.51	CCW
8	39.29	71.21	73.82	CCW
9	41.88	80.05	73.03	CCW
10	39.83	71.73	72.35	CCW

= Average 40 mph SD feet	70.24
= Standard Deviation, 40 mph SD feet	4.58

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Track Index	Adjusted w/ Index
1	CW	46.06	0.95	1.03	0.97
		Max Lat	0.95		
1	CCW	47.05	0.99	1.03	1.02
		Max Lat	0.99		
ADDITIONAL TEST CONDUCTED WITH STABILITY CONTROL TURNED OFF					
1	CW	46.59	0.97	1.03	1.00
1	CCW	45.19	0.91	1.03	0.94

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Record lap times

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	61.139	62.651
2	60.769	62.369
3	61.119	61.456
4	60.533	61.83
5	60.223	61.815
6	60.47	61.962
7	60.618	61.774
8	60.634	61.678
9	60.38	61.696
10	60.797	62.116
11	60.929	62.568
12	60.449	61.861
13	60.807	61.731
14	60.433	61.486
15	61.185	61.127
16	60.629	61.81
17	61.087	62.114
18	60.283	61.593
19	60.865	61.868
20	60.994	61.899
21	60.956	61.923
22	61.208	61.826
23	61.519	61.126
24	60.819	61.882
25	60.593	62.401
26	60.774	61.323
27	61.496	61.598
28	60.957	62.052
29	61.45	61.767
30	61.178	62.419
31	61.854	61.901
32	61.396	61.835
33	61.307	62.414
34	61.748	62.198
35	60.921	61.467
36	60.994	62.003
37	61.505	61.287
38	60.733	62.034
39	60.585	61.506
40	61.274	62.019
41	61.38	62.283
42	61.074	61.356
43	60.733	62.424
44	61.35	62.085
45	60.621	61.908
46	61.2	61.356
47	61.24	61.871
48	60.064	62.004
49	62.422	62.146
50	62.692	61.164
Avg =	60.946432	61.860162
Std Dev =	0.4087694	0.3729747
Min =	60.223	61.126
Max =	61.854	62.651
Range =	1.631	1.525

Temperatures of rotor and tire during endurance test

Vehicle Caprice Nokian WRG2

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	777	126	470	135	491	157	726	158
After 20 Laps	781	138	501	146	580	153	747	162
After 30 Laps	797	139	535	151	661	164	730	161
After 40 Laps	817	136	621	151	701	156	754	158
After 50 Laps	840	136	655	150	715	146	780	160
After 60 Laps	960	137	778	162	689	141	820	146
After 70 Laps	993	148	878	162	768	145	863	152
After 80 Laps	987	164	878	165	808	145	865	148
After 90 Laps	930	162	802	159	730	144	815	153
After 100 Laps	935	155	789	162	690	130	757	140

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests)
(driver + full instrumentation + full fuel

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/15/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Track Index	Adjusted w/ Index
1	60.81	142.92	139.14	0.9999	139.12
2	60.28	139.93	138.65	0.9999	138.64
3	60.32	142.65	141.14	0.9999	141.13
4	60.26	138.92	137.71	0.9999	137.69
5	60.01	139.24	139.19	0.9999	139.18
= Average 60 mph SD feet			139.17		139.15
= Standard Deviation, 60 mph SD feet			1.26		1.26

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/15/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	34.78	109.53	110.93
2	36.56	116.90	107.15
3	34.87	113.84	114.67
4	34.64	114.74	117.14
5	36.46	122.98	113.31
6	35.52	118.91	115.43
7	35.31	110.87	108.93
8	35.55	119.02	115.37
9	36.18	119.26	111.64
10	35.54	116.91	113.38

= Average 35 mph SD feet	112.79
= Standard Deviation, 35 mph SD feet	3.13

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/15/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	39.40	66.92	68.97	CW
2	40.85	77.55	74.34	CW
3	39.27	72.14	74.85	CW
4	41.52	81.93	76.03	CW
5	41.84	80.16	73.26	CW
6	40.56	76.87	74.75	CCW
7	40.40	77.69	76.16	CCW
8	39.54	73.66	75.39	CCW
9	38.78	72.26	76.90	CCW
10	39.73	71.91	72.88	CCW

= Average 40 mph SD feet	74.35
= Standard Deviation, 40 mph SD feet	2.27

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	43.46	0.84	1.01	0.85
		Max Lat.	0.84		
1	CCW	44.88	0.90	1.01	0.91
		Max Lat.	0.90		
ADDITIONAL TEST CONDUCTED WITH STABILITY CONTROL OFF					
1	CW	46.07	0.95	1.01	0.96
1	CCW	45.43	0.92	1.01	0.93

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.109375	-0.140625	-0.125	-0.125	0	0
TDC + 90°	-0.109375	-0.125	-0.140625	-0.203125	0	0
TDC + 180°	-0.109375	-0.140625	-0.140625	-0.125	0	0
TDC + 270°	-0.109375	-0.140625	-0.125	-0.125	0	0
Average	-0.109375	-0.136719	-0.132813	-0.144531	0	0

% Wear	31.82%	39.77%	38.64%	42.05%	LF AVG	38.07%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.109375	-0.109375	-0.125	-0.125	0	0
TDC + 90°	-0.125	-0.125	-0.109375	-0.125	0	0
TDC + 180°	-0.125	-0.12475	-0.125	-0.140625	0	0
TDC + 270°	-0.109375	-0.125	-0.125	-0.15625	0	0
Average	-0.117188	-0.121031	-0.121094	-0.136719	0	0

% Wear	34.09%	35.21%	35.23%	39.77%	RF AVG	36.08%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.15625	-0.171875	-0.140625	-0.125	0	0
TDC + 90°	-0.15625	-0.171875	-0.171875	-0.15625	0	0
TDC + 180°	-0.140625	-0.15625	-0.15625	-0.140625	0	0
TDC + 270°	-0.140625	-0.171875	-0.15625	-0.140625	0	0
Average	-0.148438	-0.167969	-0.15625	-0.140625	0	0

% Wear	43.18%	48.86%	45.45%	40.91%	LR AVG	44.60%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.140625	-0.140625	-0.15625	-0.15625	0	0
TDC + 90°	-0.140625	-0.15625	-0.140625	-0.15625	0	0
TDC + 180°	-0.140625	-0.15625	-0.140625	-0.140625	0	0
TDC + 270°	-0.140625	-0.15625	-0.140625	-0.15625	0	0
Average	-0.140625	-0.152344	-0.144531	-0.152344	0	0

% Wear	40.91%	44.32%	42.05%	44.32%	RR AVG	42.90%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	38.07%
RF AVG	36.08%
LR AVG	44.60%
RR AVG	42.90%

Dodge Charger/Cooper CS4

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Dodge Charger
Vehicle VIN	9H604210
Initial Odometer	5145
Tire Manufacturer	Cooper
Tire Brand Name	CS4

Track and Weather Info

Date of Test	6/7/11
Driver	Ron Gromak

Track Temperature	Initial	86° F
Deg F	Midpoint	113°
	Final	

Weather Info

Temperature	Initial	78° F
Deg F	Midpoint	86°F
	Final	

Conditions Sunny, Hazy, Humid

TEST ABORTED -- TIRE FAILURE

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Dodge Charger
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	4210
DOT Code	U9E4 CLT 4210
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	100

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.328	0.297		
TDC + 90°	0.297	0.328	0.328	0.297		
TDC + 180°	0.297	0.328	0.328	0.297		
TDC + 270°	0.297	0.328	0.328	0.297		
Average	0.296875	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.234	0.219	0.250		
TDC + 90°	0.250	0.219	0.234	0.219		
TDC + 180°	0.250	0.219	0.219	0.234		
TDC + 270°	0.250	0.219	0.234	0.234		
Average	0.25	0.22265625	0.2265625	0.234375		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Dodge Charger
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	4210
DOT Code	U9E4 CLT 4210
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	100

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.266	0.328	0.328	0.297		
TDC + 90°	0.266	0.328	0.328	0.297		
TDC + 180°	0.266	0.328	0.328	0.297		
TDC + 270°	0.266	0.328	0.328	0.297		
Average	0.265625	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.234	0.234	0.250		
TDC + 90°	0.250	0.219	0.234	0.250		
TDC + 180°	0.266	0.234	0.250	0.250		
TDC + 270°	0.266	0.234	0.250	0.234		
Average	0.2578125	0.23046875	0.2421875	0.2460938		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Dodge Charger
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	4210
DOT Code	U9E4 CLT 4210
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	100

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.328	0.297		
TDC + 90°	0.297	0.328	0.328	0.297		
TDC + 180°	0.297	0.328	0.328	0.297		
TDC + 270°	0.297	0.328	0.328	0.297		
Average	0.296875	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.219	0.219	0.188		
TDC + 90°	0.234	0.219	0.219	0.203		
TDC + 180°	0.234	0.219	0.219	0.203		
TDC + 270°	0.250	0.219	0.219	0.219		
Average	0.2421875	0.21875	0.21875	0.203125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Dodge Charger
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	4210
DOT Code	U9E4 CLT 4210
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	100

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.328	0.297		
TDC + 90°	0.297	0.328	0.328	0.297		
TDC + 180°	0.297	0.328	0.328	0.297		
TDC + 270°	0.297	0.328	0.328	0.297		
Average	0.296875	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.172	0.203	0.219		
TDC + 90°	0.219	0.188	0.203	0.219		
TDC + 180°	0.219	0.172	0.203	0.219		
TDC + 270°	0.219	0.172	0.203	0.219		
Average	0.2148438	0.17578125	0.203125	0.21875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/7/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	62.40	147.15	136.04
2	63.09	149.10	134.86
3	62.87	145.56	132.57
4	62.43	149.09	137.70
5	60.42	137.49	135.59
6	61.76	146.61	138.39
7	60.94	139.98	135.69
8	61.46	149.13	142.15
9	60.01	139.44	139.39
10	61.12	142.52	137.33

= Average 60 mph SD feet	136.97
= Standard Deviation, 60 mph SD feet	2.66

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/2/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	59.47	137.57	140.04	0.9826	137.60
2	61.32	144.31	138.18	0.9826	135.78
3	61.97	147.04	137.84	0.9826	135.45
4	61.84	146.44	137.85	0.9826	135.45
5	59.96	136.83	137.03	0.9826	134.64
= Average 60 mph SD feet			138.19		135.78
= Standard Deviation, 60 mph SD feet			1.12		1.10

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/2/11
Driver	Ron Gromak
Target Velocity, mph	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	34.69	85.38	86.91
2	35.02	106.26	106.14
3	34.46	88.89	91.69
4	35.73	99.84	95.81
5	35.48	97.81	95.17
6	35.17	90.30	89.43
7	35.05	86.74	86.51
8	34.94	86.97	87.28
9	35.35	83.86	82.19
10	34.91	90.53	91.02

= Average 30 mph SD feet	91.21
= Standard Deviation, 30 mph SD feet	6.67

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/2/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.67	96.37	93.20	CW
2	39.72	95.35	96.72	CW
3	41.04	85.60	81.33	CW
4	39.75	78.18	79.16	CW
5	42.48	87.88	77.94	CW
6	40.05	70.80	70.63	CCW
7	40.10	66.90	66.57	CCW
8	40.49	78.83	76.93	CCW
9	40.27	80.83	79.77	CCW
10	39.97	73.80	73.93	CCW

= Average 30 mph SD feet	79.62
= Standard Deviation, 60 mph SD feet	9.27

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	44.21	0.87	0.95	0.83
		Max Lat	0.87		
1	CCW	45.52	0.92	0.95	0.88
		Max Lat	0.92		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Tested aborted due to excess tire wear

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec			
1			38		
2			39		
3			40		
4			41		
5			42		
6			43		
7			44		
8			45		
9			46		
10			47		
11			48		
12			49		
13			50		
14					
15			Avg =		
16			Std Dev =		
17			Min =	0	0
18			Max =	0	0
19			Range =	0	0
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					

Temperature of rotor and tire during endurance test

Vehicle Charger Cooper Tire

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	665	165	270	167	277	188	717	201
After 20 Laps	770	175	247	173	323	214	777	210
After 30 Laps		171	276	164	303	192	741	198
After 40 Laps	666	179	266	177	318	193	772	208
After 50 Laps	640	180	277	174	335	198	804	203
After 60 Laps								
After 70 Laps								
After 80 Laps								
After 90 Laps								
Post Test								

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage
Test aborted due to excess tire wear

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/2/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1			
2			
3			
4			
5			

= Average 60 mph SD feet

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Tested aborted due to excess tire wear

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/2/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

= Average 30 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Test aborted due to excess tire wear

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/2/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1				CW
2				CW
3				CW
4				CW
5				CW
6				CCW
7				CCW
8				CCW
9				CCW
10				CCW

= Average 30 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Test aborted due to excess tire wear

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G
1	CW		0
		Max Lat.	0
1	CCW		0
		Max Lat.	0

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.09375	-0.109375	-0.046875	0	0
TDC + 90°	-0.046875	-0.109375	-0.09375	-0.078125	0	0
TDC + 180°	-0.046875	-0.109375	-0.109375	-0.0625	0	0
TDC + 270°	-0.046875	-0.109375	-0.09375	-0.0625	0	0
Average	-0.046875	-0.105469	-0.101563	-0.0625	0	0

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.015625	-0.09375	-0.09375	-0.046875	0	0
TDC + 90°	-0.015625	-0.109375	-0.09375	-0.046875	0	0
TDC + 180°	0	-0.09375	-0.078125	-0.046875	0	0
TDC + 270°	0	-0.09375	-0.078125	-0.0625	0	0
Average	-0.007813	-0.097656	-0.085938	-0.050781	0	0

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.109375	-0.109375	-0.109375	0	0
TDC + 90°	-0.0625	-0.109375	-0.109375	-0.09375	0	0
TDC + 180°	-0.0625	-0.109375	-0.109375	-0.09375	0	0
TDC + 270°	-0.046875	-0.109375	-0.109375	-0.078125	0	0
Average	-0.054688	-0.109375	-0.109375	-0.09375	0	0

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.09375	-0.15625	-0.125	-0.078125	0	0
TDC + 90°	-0.078125	-0.140625	-0.125	-0.078125	0	0
TDC + 180°	-0.078125	-0.15625	-0.125	-0.078125	0	0
TDC + 270°	-0.078125	-0.15625	-0.125	-0.078125	0	0
Average	-0.082031	-0.152344	-0.125	-0.078125	0	0

Dodge Charger/Firestone Firehawk GT Pursuit

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Charger
Vehicle VIN	9H604201
Initial Odometer	5225
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT

General Track and Weather Info

Date of Test	6/9/11
Driver	Ron Gromak

Track Temperature	Initial	74° F
Deg F	Midpoint	81° F
	Final	83° F

Weather Info Temperature	Initial	68° F
Deg F	Midpoint	71° F
	Final	71° F

Conditions Cloudy, Some Wind 10-12 MPH

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Charger
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	0511
DOT Code	W27DFHY
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	99

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.188	0.344	0.188	0.328	
TDC + 90°	0.328	0.188	0.344	0.188	0.328	
TDC + 180°	0.328	0.188	0.344	0.188	0.328	
TDC + 270°	0.328	0.188	0.344	0.188	0.328	
Average	0.328	0.188	0.344	0.188	0.328	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.047	0.188	0.031	0.219	
TDC + 90°	0.156	0.031	0.188	0.016	0.219	
TDC + 180°	0.172	0.031	0.203	0.031	0.203	
TDC + 270°	0.219	0.031	0.203	0.031	0.219	
Average	0.184	0.035	0.195	0.027	0.215	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Charger
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	0511
DOT Code	W27DFHY
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	99

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.188	0.344	0.188	0.328	
TDC + 90°	0.344	0.188	0.344	0.188	0.328	
TDC + 180°	0.344	0.188	0.344	0.188	0.328	
TDC + 270°	0.344	0.188	0.344	0.188	0.328	
Average	0.344	0.188	0.344	0.188	0.328	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.234	0.047	0.219	0.031	0.203	
TDC + 90°	0.234	0.063	0.203	0.031	0.203	
TDC + 180°	0.219	0.063	0.203	0.031	0.203	
TDC + 270°	0.219	0.063	0.203	0.031	0.203	
Average	0.227	0.059	0.207	0.031	0.203	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Charger
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	0511
DOT Code	W27DFHY
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	99

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.359	0.359	0.297	0.328	
TDC + 90°	0.297	0.359	0.359	0.297	0.328	
TDC + 180°	0.297	0.359	0.359	0.297	0.328	
TDC + 270°	0.297	0.359	0.359	0.297	0.328	
Average	0.297	0.359	0.359	0.297	0.328	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.234	0.078	0.234	0.063	0.219	
TDC + 90°	0.234	0.078	0.219	0.047	0.234	
TDC + 180°	0.234	0.078	0.219	0.047	0.234	
TDC + 270°	0.266	0.078	0.234	0.063	0.219	
Average	0.242	0.078	0.227	0.055	0.227	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Charger
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	0511
DOT Code	W27DFHY
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	99

Tire Position Right Rear Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.188	0.359	0.188	0.344	
TDC + 90°	0.344	0.188	0.359	0.188	0.344	
TDC + 180°	0.344	0.188	0.359	0.188	0.344	
TDC + 270°	0.344	0.188	0.359	0.188	0.344	
Average	0.344	0.188	0.359	0.188	0.344	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.031	0.203	0.031	0.234	
TDC + 90°	0.156	0.016	0.188	0.031	0.219	
TDC + 180°	0.063	0.031	0.156	0.016	0.203	
TDC + 270°	0.078	0.016	0.156	0.016	0.203	
Average	0.121	0.023	0.176	0.023	0.215	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/9/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	60.73	138.78	135.45
2	61.96	144.41	135.41
3	58.54	124.15	130.42
4	60.86	138.33	134.44
5	61.38	140.58	134.33
6	59.85	140.14	140.82
7	61.13	140.89	135.73
8	61.21	139.19	133.73
9	60.76	137.24	133.82
10	61.07	140.25	135.38

= Average 60 mph SD feet	134.95
= Standard Deviation, 60 mph SD feet	2.57

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/9/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.15	138.73	133.58	1.0333	138.03
2	59.63	133.02	134.69	1.0333	139.17
3	61.08	140.97	136.02	1.0333	140.55
4	60.90	139.35	135.28	1.0333	139.78
5	61.35	140.82	134.71	1.0333	139.20
= Average 60 mph SD feet			134.86		139.35
= Standard Deviation, 60 mph SD feet			0.89		0.92

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/9/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	34.89	92.67	93.23
2	35.56	105.67	102.37
3	35.79	101.63	97.21
4	35.33	98.97	97.13
5	35.21	83.58	82.59
6	34.95	92.31	92.57
7	35.19	92.34	91.33
8	34.85	96.05	96.86
9	34.73	94.60	96.09
10	34.98	97.22	97.36

= Average 35 mph SD feet	94.67
= Standard Deviation, 35 mph SD feet	5.26

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/9/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	39.90	71.41	71.76	CW
2	42.02	92.06	83.44	CW
3	41.92	79.13	72.04	CW
4	40.15	88.65	87.97	CW
5	41.72	78.31	72.01	CW
6	39.63	64.31	65.54	CCW
7	40.96	92.27	87.99	CCW
8	41.36	89.23	83.46	CCW
9	41.46	98.09	91.32	CCW
10	40.86	91.96	88.12	CCW

= Average 40 mph SD feet	80.37
= Standard Deviation, 40 mph SD feet	9.12

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	47.45	1.00	1.04	1.05
		Max Lat	1.00		
1	CCW	46.07	0.95	1.04	0.99
		Max Lat	0.95		
ADDITIONAL RUNS MADE WITH STABILITY CONTROL TURNED OFF					
1	CW	44.99	0.90	1.04	0.94
1	CCW	46.10	0.95	1.04	0.99

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	62.405	62.832
2	62.599	62.515
3	62.241	62.858
4	62.349	62.801
5	62.41	62.775
6	62.828	63.332
7	62.945	63.084
8	62.605	63.054
9	63.378	63.381
10	62.395	63.489
11	62.704	62.938
12	62.925	63.533
13	62.205	62.742
14	62.563	62.335
15	62.875	63.049
16	62.465	62.471
17	62.7	62.653
18	62.26	62.896
19	62.48	62.519
20	62.742	62.809
21	62.479	63.336
22	62.201	63.695
23	62.519	63.903
24	62.604	63.44
25	62.597	63.369
26	62.64	63.739
27	62.389	63.671
28	62.549	63.914
29	62.588	64.052
30	62.236	63.746
31	62.474	63.498
32	62.291	63.293
33	62.297	63.626
34	62.58	63.754
35	62.121	63.735
36	62.126	63.984
37	61.945	63.979
38	62.57	63.706
39	62.167	63.496
40	62.69	63.679
41	61.967	64.112
42	61.581	63.856
43	62.518	63.483
44	61.896	63.678
45	62.134	64.195
46	62.54	63.508
47	62.252	63.909
48	62.463	64.337
49	61.941	64.604
50	62.164	63.773
Avg =	62.505676	63.264865
Std Dev =	0.2754545	0.4932294
Min =	61.945	62.335
Max =	63.378	64.052
Range =	1.433	1.717

Temperature of rotor and tire during endurance test

Vehicle Charger Firestone Firehawk GT

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	733	138	262	125	342	167	737	168
After 20 Laps	788	148	272	138	291	178	815	179
After 30 Laps	714	146	247	130	335	176	740	176
After 40 Laps	760	138	262	131	363	156	720	171
After 50 Laps	684	148	285	133	380	149	676	160
After 60 Laps	883	162	386	151	374	123	757	140
After 70 Laps	870	156	385	157	392	119	763	132
After 80 Laps	855	146	373	145	399	130	739	135
After 90 Laps	847	159	386	150	442	139	710	137
After 100 Laps	860	155	386	145	444	136	696	142

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/9/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.38	158.23	151.19	1.0076	152.34
2	60.96	152.65	147.90	1.0076	149.02
3	60.85	155.49	151.17	1.0076	152.31
4	60.52	148.94	146.41	1.0076	147.52
5	60.97	154.97	150.08	1.0076	151.22
= Average 60 mph SD feet			149.35		150.48
= Standard Deviation, 60 mph SD feet			2.12		2.14

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers ON)
Date	6/9/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, mph	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.93	120.96	114.75
2	35.56	119.04	115.32
3	35.96	135.71	128.56
4	35.57	120.65	116.84
5	35.02	121.41	121.25
6	34.31	107.70	112.10
7	35.89	118.16	112.40
8	34.94	123.39	123.83
9	34.95	119.23	119.60
10	35.26	118.67	116.92

= Average 35 mph SD feet	118.16
= Standard Deviation, 35 mph SD feet	5.21

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/9/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.69	111.15	102.34	CW
2	40.62	84.98	82.40	CW
3	40.74	85.09	82.04	CW
4	39.83	98.79	99.64	CW
5	39.56	88.07	90.04	CW
6	41.58	87.40	80.88	CCW
7	39.69	78.84	80.07	CCW
8	39.34	78.07	80.73	CCW
9	39.59	84.92	86.68	CCW
10	40.09	83.42	83.07	CCW

= Average 40 mph SD feet	86.79
= Standard Deviation, 40 mph SD feet	8.10

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	46.47	0.96	1.01	0.97
		Max Lat.	0.96		
1	CCW	45.82	0.94	1.01	0.95
		Max Lat.	0.94		

ADDITIONAL RUNS MADE WITH STABILITY CONTROL TURNED OFF

1	CW	48.17	1.03	1.01	1.05
1	CCW	47.71	1.01	1.01	1.03

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.140625	-0.140625	-0.15625	-0.15625	-0.109375	0
TDC + 90°	-0.171875	-0.15625	-0.15625	-0.171875	-0.109375	0
TDC + 180°	-0.15625	-0.15625	-0.140625	-0.15625	-0.125	0
TDC + 270°	-0.109375	-0.15625	-0.140625	-0.15625	-0.109375	0
Average	-0.144531	-0.152344	-0.148438	-0.160156	-0.113281	0

% Wear	44.05%	81.25%	43.18%	85.42%	LF AVG	63.47%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.109375	-0.140625	-0.125	-0.15625	-0.125	0
TDC + 90°	-0.109375	-0.125	-0.140625	-0.15625	-0.125	0
TDC + 180°	-0.125	-0.125	-0.140625	-0.15625	-0.125	0
TDC + 270°	-0.125	-0.125	-0.140625	-0.15625	-0.125	0
Average	-0.117188	-0.128906	-0.136719	-0.15625	-0.125	0

% Wear	34.09%	68.75%	39.77%	83.33%	RF AVG	56.49%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.0625	-0.28125	-0.125	-0.234375	-0.109375	0
TDC + 90°	-0.0625	-0.28125	-0.140625	-0.25	-0.09375	0
TDC + 180°	-0.0625	-0.28125	-0.140625	-0.25	-0.09375	0
TDC + 270°	-0.03125	-0.28125	-0.125	-0.234375	-0.109375	0
Average	-0.054688	-0.28125	-0.132813	-0.242188	-0.101563	0

% Wear	18.42%	78.26%	36.96%	81.58%	LR AVG	53.80%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.15625	-0.15625	-0.15625	-0.15625	-0.109375	0
TDC + 90°	-0.1875	-0.171875	-0.171875	-0.15625	-0.125	0
TDC + 180°	-0.28125	-0.15625	-0.203125	-0.171875	-0.140625	0
TDC + 270°	-0.265625	-0.171875	-0.203125	-0.171875	-0.140625	0
Average	-0.222656	-0.164063	-0.183594	-0.164063	-0.128906	0

% Wear	64.77%	87.50%	51.09%	87.50%	RR AVG	72.71%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	63.47%
RF AVG	56.49%
LR AVG	53.80%
RR AVG	72.71%

Dodge Charger/Goodyear Eagle RSA

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Charger
Vehicle VIN	9H604210
Initial Odometer	5375
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA

General Track and Weather Info

Date of Test	14-Jun-11
Driver	Ron Gromak

Track Temperature	Initial	65° F
Deg F	Midpoint	95° F
	Final	106° F

Weather Info

Temperature	Initial	57° F
Deg F	Midpoint	70° F
	Final	76° F

Conditions Sunny, Cool, Light Winds

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Charger
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	0611
DOT Code	M670 KAIR 0611
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	99

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.344	0.344	0.313		
TDC + 90°	0.313	0.344	0.344	0.313		
TDC + 180°	0.313	0.344	0.344	0.313		
TDC + 270°	0.313	0.344	0.344	0.313		
Average	0.313	0.344	0.344	0.313		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.234	0.234	0.234	0.234		
TDC + 90°	0.250	0.234	0.219	0.219		
TDC + 180°	0.234	0.234	0.234	0.219		
TDC + 270°	0.234	0.234	0.250	0.219		
Average	0.238	0.234	0.234	0.223		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Charger
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	0611
DOT Code	M670 KAIR 0611
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	99

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.344	0.328		
TDC + 90°	0.328	0.344	0.344	0.328		
TDC + 180°	0.328	0.344	0.344	0.328		
TDC + 270°	0.328	0.344	0.344	0.328		
Average	0.328	0.344	0.344	0.328		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.234	0.250	0.250	0.219		
TDC + 90°	0.234	0.234	0.234	0.219		
TDC + 180°	0.234	0.250	0.234	0.219		
TDC + 270°	0.234	0.250	0.250	0.219		
Average	0.234	0.246	0.242	0.219		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Charger
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	0611
DOT Code	M670 KAIR 0611
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	99

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.344	0.344	0.313		
TDC + 90°	0.313	0.344	0.344	0.313		
TDC + 180°	0.313	0.344	0.344	0.313		
TDC + 270°	0.313	0.344	0.344	0.313		
Average	0.313	0.344	0.344	0.313		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 37

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.266	0.266	0.250	0.234		
TDC + 90°	0.266	0.266	0.266	0.234		
TDC + 180°	0.266	0.281	0.266	0.234		
TDC + 270°	0.266	0.266	0.266	0.234		
Average	0.266	0.270	0.262	0.234		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Charger
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	0611
DOT Code	M670 KAIR 0611
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	99

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.344	0.344	0.313		
TDC + 90°	0.313	0.344	0.344	0.313		
TDC + 180°	0.313	0.344	0.344	0.313		
TDC + 270°	0.313	0.344	0.344	0.313		
Average	0.313	0.344	0.344	0.313		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.234	0.250	0.266	0.250		
TDC + 90°	0.234	0.266	0.250	0.234		
TDC + 180°	0.234	0.266	0.266	0.250		
TDC + 270°	0.234	0.250	0.250	0.234		
Average	0.234	0.258	0.258	0.242		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/14/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	60.75	154.52	150.71
2	61.61	148.90	141.22
3	59.59	131.76	133.56
4	61.25	137.43	131.89
5	61.24	142.35	136.66
6	59.57	131.35	133.23
7	60.63	138.90	136.05
8	61.00	138.83	134.34
9	60.82	142.58	138.77
10	60.17	133.08	132.33

= Average 60 mph SD feet	136.88
= Standard Deviation, 60 mph SD feet	5.69

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/14/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.05	142.15	137.30	1.0145	139.29
2	60.50	141.79	139.47	1.0145	141.50
3	60.59	143.28	140.50	1.0145	142.53
4	60.74	144.65	141.13	1.0145	143.18
5	61.33	145.10	138.86	1.0145	140.87
= Average 60 mph SD feet			139.45		141.47
= Standard Deviation, 60 mph SD feet			1.49		1.51

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/14/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.13	95.88	95.18
2	36.13	101.65	95.39
3	35.07	92.37	91.98
4	35.46	94.73	92.29
5	35.82	101.25	96.69
6	35.66	94.49	91.04
7	35.06	95.08	94.78
8	35.24	97.20	95.86
9	35.30	97.07	95.45
10	34.77	95.47	96.75

= Average 35 mph SD feet	94.54
= Standard Deviation, 35 mph SD feet	2.03

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/14/11
Driver	Ron Gromak
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.34	81.21	79.85	CW
2	41.36	99.51	93.07	CW
3	40.02	101.93	101.85	CW
4	42.15	95.16	85.72	CW
5	40.72	79.73	76.94	CW
6	39.78	82.44	83.36	CCW
7	39.57	72.86	74.47	CCW
8	40.79	82.12	78.98	CCW
9	39.63	78.91	80.37	CCW
10	40.80	77.69	74.67	CCW

= Average 40 mph SD feet	82.93
= Standard Deviation, 40 mph SD feet	8.67

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	45.21	0.91	1.03	0.94
		Max Lat	0.91		
1	CCW	45.74	0.93	1.03	0.96
		Max Lat	0.93		

ADDITIONAL TEST CONDUCTED WITH STABILITY CONTROL TURNED OFF

1	CW	44.14	0.87	1.03	0.89
1	CCW	46.44	0.96	1.03	0.99

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	62.386	62.359
2	61.448	62.49
3	61.369	62.46
4	61.952	62.575
5	61.787	62.344
6	61.677	62.225
7	62.227	62.675
8	62.122	62.846
9	62.509	62.469
10	62.347	62.365
11	62.403	61.556
12	61.516	61.485
13	61.597	61.891
14	61.481	62.109
15	61.723	61.734
16	61.729	61.898
17	61.871	63.016
18	61.951	62.079
19	61.618	62.179
20	61.957	62.012
21	62.357	61.828
22	62.104	62.344
23	62.373	62.374
24	61.993	62.775
25	61.863	62.331
26	62.144	62.782
27	62.111	62.844
28	61.907	63.317
29	61.816	62.223
30	62.004	63.08
31	62.05	62.77
32	62.274	62.447
33	61.707	62.475
34	61.901	62.584
35	61.963	62.271
36	61.751	62.879

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
37	62.222	62.84
38	62.307	63.25
39	61.896	63.036
40	61.876	62.76
41	61.934	62.378
42	61.749	61.977
43	62.128	62.16
44	61.91	61.467
45	62.015	61.823
46	62.022	62.374
47	61.98	62.799
48	61.438	62.639
49	61.685	62.042
50	61.669	62.394
Avg =	61.944111	62.391417
Std Dev =	0.2971831	0.4210578
Min =	61.369	61.485
Max =	62.509	63.317
Range =	1.14	1.832

Temperature of rotor and tire during endurance test

Vehicle Charger Goodyear Eagle RSA

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	743	129	309	123	304	156	747	158
After 20 Laps	792	136	451*	129	330	160	760	163
After 30 Laps	747	139	350	135	347	159	742	160
After 40 Laps	700	142	333	130	356	163	724	165
After 50 Laps	740	143	305	137	314	170	720	166
After 60 Laps	850	169	386	156	370	130	713	119
After 70 Laps	927	180	379	167	414	140	785	139
After 80 Laps	913	180	400	167	393	135	735	122
After 90 Laps	896	180	369	164	390	146	745	141
After 100 Laps	868	170	413	163	425	152	746	145

* Temp high due to loose caliper, caliper tightened on track and testing continued

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/14/11
Driver	Ron Gromak
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.69	163.25	154.42	1.0003	154.46
2	60.73	156.12	152.37	1.0003	152.42
3	61.56	157.20	149.32	1.0003	149.37
4	61.88	160.02	150.43	1.0003	150.48
5	60.68	152.08	148.67	1.0003	148.71
= Average 60 mph SD feet			151.04		151.09
= Standard Deviation, 60 mph SD feet			2.35		2.35

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/14/11
Driver	Ron Gromak
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.82	108.28	103.36
2	35.88	111.21	105.84
3	35.97	114.21	108.14
4	34.61	106.74	109.15
5	36.34	115.36	107.02
6	35.79	112.49	107.56
7	35.32	107.13	105.18
8	36.27	109.24	101.75
9	36.73	113.66	103.20
10	35.66	107.96	104.00

= Average 35 mph SD feet	105.52
= Standard Deviation, 35 mph SD feet	2.43

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/14/11
Driver	Ron Gromak
Target Velocity, mph	40

Stop #	Initial Velocity, mph	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.62	80.11	77.67	CW
2	42.18	93.25	83.88	CW
3	42.03	91.62	83.00	CW
4	40.41	96.24	94.29	CW
5	40.74	87.96	84.81	CW
6	41.10	89.40	84.66	CCW
7	40.79	86.47	83.16	CCW
8	40.05	83.17	82.98	CCW
9	40.09	86.99	86.62	CCW
10	39.41	81.15	83.61	CCW

= Average 40 mph SD feet	84.47
= Standard Deviation, 40 mph SD feet	4.15

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	46.93	0.98	1.01	0.99
		Max Lat.	0.98		
1	CCW	44.35	0.88	1.01	0.89
		Max Lat.	0.88		

ADDITIONAL TEST CONDUCTED WITH STABILITY CONTROL TURNED OFF

1	CW	45.14	0.91	1.01	0.92
1	CCW	45.45	0.92	1.01	0.93

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet
Recheck and record cold tire inflation pressure

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.078125	-0.109375	-0.109375	-0.078125	0	0
TDC + 90°	-0.0625	-0.109375	-0.125	-0.09375	0	0
TDC + 180°	-0.078125	-0.109375	-0.109375	-0.09375	0	0
TDC + 270°	-0.078125	-0.109375	-0.09375	-0.09375	0	0
Average	-0.074219	-0.109375	-0.109375	-0.089844	0	0

% Wear	23.75%	31.82%	31.82%	28.75%	LF AVG	29.03%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.09375	-0.09375	-0.09375	-0.109375	0	0
TDC + 90°	-0.09375	-0.109375	-0.109375	-0.109375	0	0
TDC + 180°	-0.09375	-0.09375	-0.109375	-0.109375	0	0
TDC + 270°	-0.09375	-0.09375	-0.09375	-0.109375	0	0
Average	-0.09375	-0.097656	-0.101563	-0.109375	0	0

% Wear	28.57%	28.41%	29.55%	33.33%	RF AVG	29.96%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.078125	-0.09375	-0.078125	0	0
TDC + 90°	-0.046875	-0.078125	-0.078125	-0.078125	0	0
TDC + 180°	-0.046875	-0.0625	-0.078125	-0.078125	0	0
TDC + 270°	-0.046875	-0.078125	-0.078125	-0.078125	0	0
Average	-0.046875	-0.074219	-0.082031	-0.078125	0	0

% Wear	15.00%	21.59%	23.86%	25.00%	LR AVG	21.36%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.078125	-0.09375	-0.078125	-0.0625	0	0
TDC + 90°	-0.078125	-0.078125	-0.09375	-0.078125	0	0
TDC + 180°	-0.078125	-0.078125	-0.078125	-0.0625	0	0
TDC + 270°	-0.078125	-0.09375	-0.09375	-0.078125	0	0
Average	-0.078125	-0.085938	-0.085938	-0.070313	0	0

% Wear	25.00%	25.00%	25.00%	22.50%	RR AVG	24.38%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	29.03%
RF AVG	29.96%
LR AVG	21.36%
RR AVG	24.38%

Chevrolet Tahoe/Firestone Firehawk GT Pursuit

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Tahoe
Vehicle VIN	AR245440
Initial Odometer	0052
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT

General Track and Weather Info

Date of Test	8-Jun-11
Driver	Matt Rogers

Track Temperature	Initial	87° F
Deg F	Midpoint	108° F
	Final	116° F

Weather Info

Temperature	Initial	80° F
Deg F	Midpoint	87° F
	Final	98° F

Conditions Hot, Hazy, Humid

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Tahoe
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	1811
DOT Code	W2C5 FJ5 1811
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	H
Load Index	108

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.344	0.328		
TDC + 90°	0.328	0.344	0.344	0.328		
TDC + 180°	0.328	0.344	0.344	0.328		
TDC + 270°	0.328	0.344	0.344	0.328		
Average	0.328125	0.34375	0.34375	0.328125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.266	0.266	0.250		
TDC + 90°	0.219	0.266	0.250	0.250		
TDC + 180°	0.219	0.266	0.250	0.250		
TDC + 270°	0.234	0.297	0.266	0.250		
Average	0.21875	0.2734375	0.2578125	0.25		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Tahoe
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	1811
DOT Code	W2C5 FJ5 1811
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	H
Load Index	108

Tire Position Right Front Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.344	0.313		
TDC + 90°	0.328	0.344	0.344	0.313		
TDC + 180°	0.328	0.344	0.344	0.313		
TDC + 270°	0.328	0.344	0.344	0.313		
Average	0.328125	0.34375	0.34375	0.3125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.297	0.266	0.250		
TDC + 90°	0.250	0.281	0.250	0.250		
TDC + 180°	0.250	0.281	0.250	0.250		
TDC + 270°	0.266	0.281	0.266	0.234		
Average	0.2539063	0.28515625	0.2578125	0.2460938		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Tahoe
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	1811
DOT Code	W2C5 FJ5 1811
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	H
Load Index	108

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.344	0.328		
TDC + 90°	0.328	0.344	0.344	0.328		
TDC + 180°	0.328	0.344	0.344	0.328		
TDC + 270°	0.328	0.344	0.344	0.328		
Average	0.328125	0.34375	0.34375	0.328125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.266	0.219	0.281	0.250		
TDC + 90°	0.266	0.297	0.297	0.250		
TDC + 180°	0.250	0.281	0.281	0.266		
TDC + 270°	0.266	0.297	0.281	0.266		
Average	0.2617188	0.2734375	0.2851563	0.2578125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Tahoe
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	1811
DOT Code	W2C5 FJ5 1811
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	H
Load Index	108

Tire Position Right Rear Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.313	0.313		
TDC + 90°	0.328	0.344	0.313	0.313		
TDC + 180°	0.328	0.344	0.313	0.313		
TDC + 270°	0.328	0.344	0.313	0.313		
Average	0.328125	0.34375	0.3125	0.3125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.313	0.281	0.234		
TDC + 90°	0.281	0.313	0.297	0.234		
TDC + 180°	0.266	0.313	0.297	0.250		
TDC + 270°						
Average	0.265625	0.3125	0.2916667	0.2395833		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/8/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	61.18	142.77	137.32
2	62.64	153.33	140.69
3	61.77	151.09	142.56
4	62.09	147.19	137.44
5	61.39	149.29	142.61
6	60.62	140.24	137.39
7	61.47	141.49	134.80
8	61.03	140.28	135.60
9	62.14	148.42	138.38
10	61.30	143.50	137.50

= Average 60 mph SD feet	138.43
= Standard Deviation, 60 mph SD feet	2.69

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/8/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	60.74	139.76	136.36	0.9777	133.31
2	61.28	142.61	136.73	0.9777	133.68
3	60.98	139.38	134.95	0.9777	131.94
4	60.30	139.25	137.89	0.9777	134.81
5	61.02	143.27	138.53	0.9777	135.44
= Average 60 mph SD feet			136.89		133.84
= Standard Deviation, 60 mph SD feet			1.39		1.36

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/8/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.40	101.25	98.99
2	34.59	109.42	112.02
3	35.58	112.40	108.77
4	35.35	96.06	94.16
5	35.47	87.92	85.58
6	34.72	89.33	90.78
7	36.88	111.01	99.99
8	34.37	93.16	96.62
9	35.68	81.25	78.19
10	35.18	104.32	103.23

= Average 35 mph SD feet	96.84
= Standard Deviation, 35 mph SD feet	10.26

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/8/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.08	65.30	65.04	CW
2	40.55	74.34	72.33	CW
3	40.69	66.86	64.60	CW
4	40.33	77.49	76.24	CW
5	41.76	84.73	77.73	CW
6	40.52	78.71	76.72	CCW
7	40.42	81.29	79.61	CCW
8	38.57	65.40	70.33	CCW
9	39.05	75.65	79.37	CCW
10	38.87	71.21	75.40	CCW

= Average 40 mph SD feet	73.74
= Standard Deviation, 40 mph SD feet	5.51

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	45.16	0.91	0.95	0.87
		Max Lat	0.91		
1	CCW	44.81	0.89	0.95	0.85
		Max Lat	0.89		

ADDITIONAL RUNS MADE WITH STABILITY CONTROL OFF

1	CW	46.61	0.97	0.95	0.92
1	CCW	49.47	1.09	0.95	1.04

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	68.4	68.1
2	67.9	67.5
3	68.8	68
4	70	67.7
5	70.5	68.3
6	69.8	68.2
7	71	68.4
8	70.5	68.3
9	70.7	68.5
10	70.3	67.9
11	68.3	68.3
12	68.9	68.6
13	69.1	68.7
14	68.9	68.6
15	68.9	68.6
16	68.2	68.4
17	68.6	68.3
18	68.8	68.2
19	68	68.5
20	67.7	68
21	68.8	68.2
22	68.3	67.6
23	67.8	68.5
24	68.3	68.2
25	68.3	67.9
26	68.1	68.5
27	68.2	68.7
28	67.5	68.5
29	68.1	68.2
30	67.9	68.2
31	67.9	68.7
32	68.5	68.2
33	68.6	67.7
34	68	68.2
35	67.4	68.4
36	68.5	68.9

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
37	67.9	68.8
38	68.3	68.3
39	68	69.1
40	68.1	69.3
41	67.8	68.5
42	68	68.3
43	68.5	68.5
44	68.1	68.2
45	68.5	68.2
46	67.7	68.7
47	68	68.2
48	67.5	68.4
49	67.6	68.4
50	67.6	69.1
Avg =	68.708333	68.269444
Std Dev =	0.9475909	0.3284765
Min =	67.4	67.5
Max =	71	68.9
Range =	3.6	1.4

Temperatures of rotor and tire during endurance test

Vehicle Tahoe Firestone Firehawk GT

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	827	153	375	142	386	150	800	175
After 20 Laps	820	168	335	148	425	162	780	192
After 30 Laps	822	171	376	145	420	160	807	180
After 40 Laps	847	160	370	146	500	155	834	190
After 50 Laps	807	165	360	148	480	164	758	175
After 60 Laps	701	170	330	158	366	139	625	149
After 70 Laps	885	169	420	164	402	153	769	164
After 80 Laps	918	178	595	158	450	156	766	166
After 90 Laps	945	167	623	158	437	146	806	161
After 100 Laps	942	177	644	160	425	159	812	161

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/8/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.08	160.77	155.14	0.9734	151.01
2	61.14	153.91	148.23	0.9734	144.29
3	60.56	149.78	147.03	0.9734	143.12
4	60.16	152.05	151.26	0.9734	147.24
5	61.38	159.43	152.36	0.9734	148.31
= Average 60 mph SD feet			150.81		146.79
= Standard Deviation, 60 mph SD feet			3.25		3.16

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/8/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	34.94	103.04	103.40
2	34.16	104.79	110.03
3	34.80	105.62	106.84
4	34.52	108.56	111.60
5	34.97	116.71	116.93
6	34.69	111.29	113.27
7	36.29	123.60	114.98
8	35.57	118.71	114.94
9	34.86	107.74	108.61
10	34.67	130.22	132.68

= Average 35 mph SD feet	113.33
= Standard Deviation, 35 mph SD feet	7.96

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/8/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	42.52	96.44	85.35	CW
2	38.51	102.56	110.67	CW
3	39.68	78.32	79.59	CW
4	39.14	83.63	87.33	CW
5	38.52	77.05	83.07	CW
6	41.06	88.47	83.98	CCW
7	40.34	98.68	97.01	CCW
8	39.67	79.58	80.91	CCW
9	40.08	74.54	74.24	CCW
10	41.20	90.35	85.16	CCW

= Average 40 mph SD feet	86.73
= Standard Deviation, 40 mph SD feet	10.25

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	44.38	0.88	0.97	0.85
		Max Lat.	0.88		
1	CCW	44.71	0.89	0.97	0.86
		Max Lat.	0.89		
ADDITIONAL RUNS MADE WITHOUT STABILITY CONTROL OFF					
1	CW	44.05	0.87	0.97	0.84
1	CCW	45.43	0.92	0.97	0.89

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.125	-0.078125	-0.078125	-0.078125	0	0
TDC + 90°	-0.109375	-0.078125	-0.09375	-0.078125	0	0
TDC + 180°	-0.109375	-0.078125	-0.09375	-0.078125	0	0
TDC + 270°	-0.09375	-0.046875	-0.078125	-0.078125	0	0
Average	-0.109375	-0.070313	-0.085938	-0.078125	0	0

% Wear	33.33%	20.45%	25.00%	23.81%	LF Avg	25.65%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.078125	-0.046875	-0.078125	-0.0625	0	0
TDC + 90°	-0.078125	-0.0625	-0.09375	-0.0625	0	0
TDC + 180°	-0.078125	-0.0625	-0.09375	-0.0625	0	0
TDC + 270°	-0.0625	-0.0625	-0.078125	-0.078125	0	0
Average	-0.074219	-0.058594	-0.085938	-0.066406	0	0

% Wear	22.62%	17.05%	25.00%	21.25%	RF Avg	21.48%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.0625	-0.125	-0.0625	-0.078125	0	0
TDC + 90°	-0.0625	-0.046875	-0.046875	-0.078125	0	0
TDC + 180°	-0.078125	-0.0625	-0.0625	-0.0625	0	0
TDC + 270°	-0.0625	-0.046875	-0.0625	-0.0625	0	0
Average	-0.066406	-0.070313	-0.058594	-0.070313	0	0

% Wear	20.24%	20.45%	17.05%	21.43%	LR Avg	19.79%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.078125	-0.03125	-0.03125	-0.078125	0	0
TDC + 90°	-0.046875	-0.03125	-0.015625	-0.078125	0	0
TDC + 180°	-0.0625	-0.03125	-0.015625	-0.0625	0	0
TDC + 270°	-0.328125	-0.34375	-0.3125	-0.3125	0	0
Average	-0.128906	-0.109375	-0.09375	-0.132813	0	0

% Wear	39.29%	31.82%	30.00%	42.50%	LR Avg	35.90%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF Avg	25.65%
RF AVG	21.48%
LR AVG	19.79%
RR AVG	35.90%

Chevrolet Tahoe/Goodyear Eagle RSA

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Tahoe
Vehicle VIN	AR245440
Initial Odometer	197
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA

General Track and Weather Info

Date of Test	6/10/11 & 6/13/11
Driver	Matt Rogers

		6/10/11	6/13/11
Track Temperature	Initial	66° F	63° F
Deg F	Midpoint		79° F
	Final		101° F
Weather Info			
Temperature	Initial	56° F	57° F
Deg F	Midpoint		64° F
	Final		78° F

Conditions 6/10 Cloudy & Cool

6/13 Sunny & Cool

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Tahoe
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1611
DOT Code	4BC5 JAIR 1611
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	108

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.359	0.359	0.328		
TDC + 90°	0.328	0.359	0.359	0.328		
TDC + 180°	0.328	0.359	0.359	0.328		
TDC + 270°	0.328	0.359	0.359	0.328		
Average	0.328	0.359	0.359	0.328		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.172	0.172	0.188	0.203		
TDC + 90°	0.219	0.156	0.172	0.203		
TDC + 180°	0.109	0.172	0.188	0.203		
TDC + 270°	0.219	0.188	0.188	0.203		
Average	0.180	0.172	0.184	0.203		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Tahoe
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1611
DOT Code	4BC5 JAIR 1611
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	108

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.344	0.328		
TDC + 90°	0.328	0.344	0.344	0.328		
TDC + 180°	0.328	0.344	0.344	0.328		
TDC + 270°	0.328	0.344	0.344	0.328		
Average	0.328	0.344	0.344	0.328		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.188	0.203	0.219		
TDC + 90°	0.188	0.172	0.203	0.234		
TDC + 180°	0.234	0.172	0.203	0.219		
TDC + 270°	0.219	0.172	0.203	0.219		
Average	0.211	0.176	0.203	0.223		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Tahoe
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1611
DOT Code	4BC5 JAIR 1611
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	108

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.344	0.328		
TDC + 90°	0.328	0.344	0.344	0.328		
TDC + 180°	0.328	0.344	0.344	0.328		
TDC + 270°	0.328	0.344	0.344	0.328		
Average	0.328	0.344	0.344	0.328		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.219	0.188	0.219	0.234		
TDC + 90°	0.219	0.203	0.219	0.219		
TDC + 180°	0.234	0.188	0.203	0.219		
TDC + 270°	0.234	0.203	0.219	0.234		
Average	0.227	0.195	0.215	0.227		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Tahoe
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1611
DOT Code	4BC5 JAIR 1611
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	108

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.344	0.328		
TDC + 90°	0.328	0.344	0.344	0.328		
TDC + 180°	0.328	0.344	0.344	0.328		
TDC + 270°	0.328	0.344	0.344	0.328		
Average	0.328	0.344	0.344	0.328		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.266	0.250	0.250	0.219		
TDC + 90°	0.266	0.234	0.234	0.234		
TDC + 180°	0.266	0.250	0.234	0.250		
TDC + 270°	0.266	0.250	0.234	0.234		
Average	0.266	0.246	0.238	0.234		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	61.15	136.84	131.75
2	60.15	136.10	135.41
3	60.90	138.52	134.48
4	62.36	147.96	136.96
5	61.00	143.81	139.13
6	61.49	144.81	137.89
7	61.32	144.47	138.32
8	60.95	144.81	140.33
9	62.12	146.45	136.64
10	61.11	144.26	139.07

= Average 60 mph SD feet	137.00
= Standard Deviation, 60 mph SD feet	2.56

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.07	144.57	139.56	1.0082	140.71
2	60.72	142.85	139.46	1.0082	140.61
3	61.55	148.02	140.65	1.0082	141.80
4	60.83	144.48	140.59	1.0082	141.74
5	62.17	152.70	142.21	1.0082	143.37
= Average 60 mph SD feet			140.49		141.65
= Standard Deviation, 60 mph SD feet			1.11		1.12

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.30	105.92	104.14
2	35.20	96.16	95.05
3	35.51	98.44	95.65
4	36.50	105.80	97.30
5	35.31	101.77	99.98
6	35.65	99.12	95.53
7	36.14	105.29	98.75
8	34.98	96.65	96.79
9	35.13	103.73	102.94
10	36.70	112.05	101.92

= Average 35 mph SD feet	98.81
= Standard Deviation, 35 mph SD feet	3.29

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.42	85.22	79.46	CW
2	43.57	94.98	80.04	CW
3	40.86	86.19	82.61	CW
4	40.53	83.99	81.80	CW
5	40.53	95.85	93.36	CW
6	40.46	80.93	79.11	CCW
7	41.75	87.10	79.97	CCW
8	40.23	81.85	80.94	CCW
9	41.03	85.65	81.42	CCW
10	40.10	82.44	82.01	CCW

= Average 40 mph SD feet	82.07
= Standard Deviation, 40 mph SD feet	4.13

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	43.93	0.86	1.02	0.88
		Max Lat	0.86		
1	CCW	45.68	0.93	1.02	0.95
		Max Lat	0.93		

ADDITIONAL RUNS MADE WITHOUT STABILITY CONTROL OFF

1	CW	44.62	0.89	1.02	0.90
1	CCW	46.59	0.97	1.02	0.99

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	66.297	66.356
2	66.163	66.95
3	66.054	65.928
4	66.726	66.381
5	66.865	66.703
6	65.824	66.777
7	65.973	67.477
8	66.388	66.927
9	66.43	67.585
10	66.099	67.485
11	66.409	67.441
12	66.579	67.415
13	66.316	67.4
14	66.184	66.865
15	66.928	67.376
16	66.312	67.548
17	66.064	66.91
18	66.222	67.035
19	66.086	66.458
20	66.242	67.133
21	66.491	67.203
22	65.808	67.024
23	65.803	67.66
24	65.675	66.995
25	66.372	66.685
26	66.379	67.46
27	66.118	66.744
28	66.301	66.663
29	66.119	66.976
30	66.363	66.846
31	66.209	66.682
32	65.532	67.308
33	66.266	67.352
34	66.029	66.919
35	66.231	66.91
36	65.679	66.998

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
37	66.422	67.742
38	65.688	67.295
39	66.338	66.713
40	66.601	67.097
41	66.279	67.201
42	66.376	66.28
43	66.514	66.284
44	66.481	67.04
45	66.403	67.694
46	67.035	66.902
47	66.911	66.898
48	67.576	67.338
49	66.799	67.258
50	66.192	67.589
Avg =	66.209333	67.015972
Std Dev =	0.309473	0.3972125
Min =	65.532	65.928
Max =	66.928	67.66
Range =	1.396	1.732

Temperature of rotor and tire during endurance testing

Vehicle Tahoe Goodyear Eagle RSA

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	782	125	298	115	420	135	793	162
After 20 Laps	760	125	640	115	480	150	795	168
After 30 Laps	810	118	400	116	580	150	827	170
After 40 Laps	814	125	393	113	585	149	834	170
After 50 Laps	812	130	420	120	605	150	840	170
After 60 Laps	900	167	545	155	525	111	840	132
After 70 Laps	920	180	585	170	530	115	870	133
After 80 Laps	925	180	610	174	520	112	870	125
After 90 Laps	945	176	615	176	570	115	883	131
After 100 Laps	950	175	628	175	585	117	915	136

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage **Test aborted due to excess**

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1			
2			
3			
4			
5			

= Average 60 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Test aborted due to excess tire wear

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

= Average 35 mph SD feet
= Standard Deviation, 35 mph SD feet

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Test aborted due to excess tire wear

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1				CW
2				CW
3				CW
4				CW
5				CW
6				CCW
7				CCW
8				CCW
9				CCW
10				CCW

= Average 40 mph SD feet
= Standard Deviation, 40 mph SD feet

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Test aborted due to excess tire wear

Run #	Direction	Velocity	Lateral Accel,G
1	CW		0
		Max Lat.	0
1	CCW		0
		Max Lat.	0

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.15625	-0.1875	-0.171875	-0.125	0	0
TDC + 90°	-0.109375	-0.203125	-0.1875	-0.125	0	0
TDC + 180°	-0.21875	-0.1875	-0.171875	-0.125	0	0
TDC + 270°	-0.109375	-0.171875	-0.171875	-0.125	0	0
Average	-0.148438	-0.1875	-0.175781	-0.125	0	0

% Wear	45.24%	52.17%	48.91%	38.10%	LF AVG	46.11%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.125	-0.15625	-0.140625	-0.109375	0	0
TDC + 90°	-0.140625	-0.171875	-0.140625	-0.09375	0	0
TDC + 180°	-0.09375	-0.171875	-0.140625	-0.109375	0	0
TDC + 270°	-0.109375	-0.171875	-0.140625	-0.109375	0	0
Average	-0.117188	-0.167969	-0.140625	-0.105469	0	0

% Wear	35.71%	48.86%	40.91%	32.14%	RF AVG	39.41%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.109375	-0.15625	-0.125	-0.09375	0	0
TDC + 90°	-0.109375	-0.140625	-0.125	-0.109375	0	0
TDC + 180°	-0.09375	-0.15625	-0.140625	-0.109375	0	0
TDC + 270°	-0.09375	-0.140625	-0.125	-0.09375	0	0
Average	-0.101563	-0.148438	-0.128906	-0.101563	0	0

% Wear	30.95%	43.18%	37.50%	30.95%	LR AVG	35.65%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.0625	-0.09375	-0.09375	-0.109375	0	0
TDC + 90°	-0.0625	-0.109375	-0.109375	-0.09375	0	0
TDC + 180°	-0.0625	-0.09375	-0.109375	-0.078125	0	0
TDC + 270°	-0.0625	-0.09375	-0.109375	-0.09375	0	0
Average	-0.0625	-0.097656	-0.105469	-0.09375	0	0

% Wear	19.05%	28.41%	30.68%	28.57%	RR AVG	26.68%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	46.11%
RF AVG	39.41%
LR AVG	35.65%
RR AVG	26.68%

Chevrolet Impala/Goodyear Eagle RSA

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Impala
Vehicle VIN	B1100004
Initial Odometer	1889
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA

General Track and Weather Info

Date of Test	9-Jun-11
Driver	Matt Rogers

Track Temperature	Initial	74° F
Deg F	Midpoint	81° F
	Final	83° F

Weather Info

Temperature	Initial	68° F
Deg F	Midpoint	71° F
	Final	71° F

Conditions Cloudy, Some Wind 10-12 mph

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1411
DOT Code	MKXOBEER
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	97

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.359	0.359	0.297		
TDC + 90°	0.297	0.359	0.359	0.297		
TDC + 180°	0.297	0.359	0.359	0.297		
TDC + 270°	0.297	0.359	0.359	0.297		
Average	0.297	0.359	0.359	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.109	0.094	0.109	0.094		
TDC + 90°	0.109	0.094	0.109	0.094		
TDC + 180°	0.109	0.094	0.109	0.094		
TDC + 270°	0.109	0.094	0.109	0.094		
Average	0.109	0.094	0.109	0.094		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1511
DOT Code	MKXOBEER
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	97

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.359	0.359	0.297		
TDC + 90°	0.297	0.359	0.359	0.297		
TDC + 180°	0.297	0.359	0.359	0.297		
TDC + 270°	0.297	0.359	0.359	0.297		
Average	0.297	0.359	0.359	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.109	0.156	0.156	0.125		
TDC + 90°	0.094	0.141	0.125	0.109		
TDC + 180°	0.094	0.125	0.141	0.109		
TDC + 270°	0.094	0.141	0.141	0.109		
Average	0.098	0.141	0.141	0.113		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1511
DOT Code	MKXOBEER
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	97

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.359	0.359	0.297		
TDC + 90°	0.297	0.359	0.359	0.297		
TDC + 180°	0.297	0.359	0.359	0.297		
TDC + 270°	0.297	0.359	0.359	0.297		
Average	0.297	0.359	0.359	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.328	0.344	0.281		
TDC + 90°	0.250	0.344	0.344	0.297		
TDC + 180°	0.250	0.328	0.344	0.281		
TDC + 270°	0.250	0.328	0.344	0.281		
Average	0.250	0.332	0.344	0.285		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	1511
DOT Code	MKXOBEER
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	97

Tire Position Right Rear Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.359	0.359	0.297		
TDC + 90°	0.297	0.359	0.359	0.297		
TDC + 180°	0.297	0.359	0.359	0.297		
TDC + 270°	0.297	0.359	0.359	0.297		
Average	0.297	0.359	0.359	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.328	0.328	0.281		
TDC + 90°	0.250	0.328	0.328	0.266		
TDC + 180°	0.281	0.313	0.313	0.266		
TDC + 270°	0.234	0.328	0.328	0.266		
Average	0.254	0.324	0.324	0.270		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/9/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	59.59	144.46	146.46
2	60.68	152.37	148.96
3	59.05	146.08	150.84
4	58.94	149.60	155.03
5	59.85	148.53	149.28
6	60.61	161.10	157.88
7	59.36	150.18	153.42
8	59.92	152.87	153.26
9	59.69	150.39	151.97
10	59.29	155.31	159.03

= Average 60 mph SD feet	152.61
= Standard Deviation, 60 mph SD feet	3.97

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/9/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.64	164.96	156.29	1.0333	161.50
2	60.00	156.61	156.63	1.0333	161.85
3	61.07	158.70	153.18	1.0333	158.28
4	60.15	151.77	151.00	1.0333	156.03
5	59.70	148.28	149.77	1.0333	154.76
= Average 60 mph SD feet			153.38		158.48
= Standard Deviation, 60 mph SD feet			3.07		3.18

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/9/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	36.12	109.44	102.77
2	34.66	104.92	107.01
3	36.16	112.94	105.82
4	35.72	101.81	97.74
5	35.06	100.64	100.28
6	35.81	122.76	117.24
7	35.69	122.05	117.35
8	35.09	101.15	100.64
9	34.25	93.43	97.55
10	36.59	118.07	108.04

= Average 35 mph SD feet	105.44
= Standard Deviation, 35 mph SD feet	7.22

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/9/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.60	92.40	85.45	CW
2	41.12	80.36	76.03	CW
3	41.39	91.53	85.48	CW
4	40.22	79.74	78.86	CW
5	41.33	82.93	77.70	CW
6	40.28	85.46	84.29	CCW
7	39.77	90.49	91.53	CCW
8	41.12	96.31	91.13	CCW
9	40.42	90.55	88.69	CCW
10	39.40	87.81	90.50	CCW

= Average 40 mph SD feet	84.97
= Standard Deviation, 40 mph SD feet	5.74

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ index
1	CW	45.55	0.92	1.04	0.96
		Max Lat	0.92		
1.00	CCW	46.02	0.94	1.04	0.98
		Max Lat	0.94		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	64.674	
2	64.302	
3	65.022	
4	65.209	
5	65.555	
6	65.697	
7	65.616	
8	65.753	65.498
9	65.912	64.996
10	65.476	65.711
11	65.853	65.936
12	65.034	65.648
13	65.196	65.373
14	65.464	65.401
15	65.498	65.536
16	65.107	65.304
17	65.444	65.303
18	65.445	64.798
19	65.02	65.083
20	65.504	65.278
21	65.651	65.081
22	65.12	65.716
23	65.079	65.454
24	65.415	65.345
25	65.813	65.401
26	65.959	65.649
27	65.096	65.132
28	66.154	65.499
29	65.33	65.799
30	65.723	65.415
31	65.076	64.9
32	64.796	64.894
33	65.939	64.853
34	65.117	65.459
35	65.019	65.075
36	65.397	65.267
37	65.849	65.104
38	65.484	65.057
39	65.425	65.288
40	64.853	65.332
41	64.15	64.873
42	64.305	64.658
43	63.812	65.125
44	64.235	65.419
45	64.423	65.052
46	64.87	64.985
47	64.628	65.184
48	64.527	65.016
49	64.566	64.898
50	64.872	65.09
Avg =	65.374028	65.338069
Std Dev =	0.3986455	0.2967317
Min =	64.302	64.798
Max =	66.154	65.936
Range =	1.852	1.138

Temperatures of rotor and tire during endurance test

Vehicle Impala Goodyear RSA

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	646	165	358	110	380	137	633	193
After 20 Laps	684	174	350	122	369	141	650	200
After 30 Laps	683	170	332	121	365	140	652	194
After 40 Laps	673	172	342	122	367	144	645	191
After 50 Laps	615	168	325	118	351	138	605	184
After 60 Laps	720	173	406	140	357	109	658	143
After 70 Laps	752	174	430	131	375	104	695	137
After 80 Laps	750	170	445	133	410	115	695	148
After 90 Laps	750	166	431	117	402	119	704	150
After 100 Laps	742	182	415	136	381	119	685	157

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/9/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	62.08	162.78	152.05	1.0076	153.20
2	60.29	157.82	156.32	1.0076	157.50
3	60.61	157.10	153.98	1.0076	155.15
4	60.08	154.21	153.82	1.0076	154.99
5	60.28	158.51	157.03	1.0076	158.22
= Average 60 mph SD feet			154.64		155.81
= Standard Deviation, 60 mph SD feet			2.02		2.04

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/9/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	36.13	115.87	108.74
2	35.32	95.81	94.06
3	34.65	109.79	112.01
4	35.41	112.67	110.07
5	36.17	122.34	114.54
6	35.33	114.28	112.14
7	35.06	116.10	115.70
8	34.06	105.92	111.86
9	36.14	115.79	108.58
10	35.25	113.61	112.04

= Average 35 mph SD feet	109.97
= Standard Deviation, 35 mph SD feet	6.03

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/9/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.00	76.10	72.44	CW
2	41.77	87.74	80.47	CW
3	41.57	72.36	67.00	CW
4	41.74	90.67	83.28	CW
5	41.66	110.22	101.64	CW
6	39.41	93.64	96.45	CCW
7	39.61	90.02	91.81	CCW
8	38.06	89.11	98.42	CCW
9	38.68	91.14	97.46	CCW
10	40.00	93.41	93.41	CCW

= Average 40 mph SD feet	88.24
= Standard Deviation, 40 mph SD feet	11.84

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	47.49	1.01	1.01	1.02
		Max Lat.	1.01		
1	CCW	48.55	1.05	1.01	1.06
		Max Lat.	1.05		

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.1875	-0.265625	-0.25	-0.203125	0	0
TDC + 90°	-0.1875	-0.265625	-0.25	-0.203125	0	0
TDC + 180°	-0.1875	-0.265625	-0.25	-0.203125	0	0
TDC + 270°	-0.1875	-0.265625	-0.25	-0.203125	0	0
Average	-0.1875	-0.265625	-0.25	-0.203125	0	0

% Wear	63.16%	73.91%	69.57%	68.42%	LF AVG	68.76%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.1875	-0.203125	-0.203125	-0.171875	0	0
TDC + 90°	-0.203125	-0.21875	-0.234375	-0.1875	0	0
TDC + 180°	-0.203125	-0.234375	-0.21875	-0.1875	0	0
TDC + 270°	-0.203125	-0.21875	-0.21875	-0.1875	0	0
Average	-0.199219	-0.21875	-0.21875	-0.183594	0	0

% Wear	67.11%	60.87%	60.87%	61.84%	RF AVG	62.67%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.03125	-0.015625	-0.015625	0	0
TDC + 90°	-0.046875	-0.015625	-0.015625	0	0	0
TDC + 180°	-0.046875	-0.03125	-0.015625	-0.015625	0	0
TDC + 270°	-0.046875	-0.03125	-0.015625	-0.015625	0	0
Average	-0.046875	-0.027344	-0.015625	-0.011719	0	0

% Wear	15.79%	7.61%	4.35%	3.95%	LR AVG	7.92%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.03125	-0.03125	-0.015625	0	0
TDC + 90°	-0.046875	-0.03125	-0.03125	-0.03125	0	0
TDC + 180°	-0.015625	-0.046875	-0.046875	-0.03125	0	0
TDC + 270°	-0.0625	-0.03125	-0.03125	-0.03125	0	0
Average	-0.042969	-0.035156	-0.035156	-0.027344	0	0

% Wear	14.47%	9.78%	9.78%	9.21%	RR AVG	10.81%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	68.76%
RF AVG	62.67%
LR AVG	7.92%
RR AVG	10.81%

Chevrolet Impala/Pirelli P6 4 Season

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Impala
Vehicle VIN	BL1100004
Initial Odometer	2185
Tire Manufacturer	Pirelli
Tire Brand Name	P6 4 Season

General Track and Weather Info

Date of Test	15-Jun-11
Driver	Matt Rogers

Track Temperature	Initial	62° F
Deg F	Midpoint	77° F
	Final	85° F

Weather Info

Temperature	Initial	57° F
Deg F	Midpoint	63° F
	Final	67° F

Conditions Light Clouds, Cool, Winds 10 - 12 mph

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Pirelli
Tire Brand Name	P6 4 Season
Tire Build Date	3010
DOT Code	XL X0 H093
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	97

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.344	0.344	0.297		
TDC + 90°	0.203	0.344	0.344	0.297		
TDC + 180°	0.203	0.344	0.344	0.297		
TDC + 270°	0.203	0.344	0.344	0.297		
Average	0.203	0.344	0.344	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.109	0.109	0.109		
TDC + 90°	0.172	0.109	0.141	0.125		
TDC + 180°	0.188	0.125	0.125	0.125		
TDC + 270°	0.188	0.109	0.125	0.125		
Average	0.184	0.113	0.125	0.121		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Pirelli
Tire Brand Name	P6 4 Season
Tire Build Date	3010
DOT Code	XL X0 H093
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	97

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.344	0.344	0.297		
TDC + 90°	0.297	0.344	0.344	0.297		
TDC + 180°	0.297	0.344	0.344	0.297		
TDC + 270°	0.297	0.344	0.344	0.297		
Average	0.297	0.344	0.344	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.156	0.125	0.141	0.078		
TDC + 90°	0.156	0.109	0.125	0.078		
TDC + 180°	0.156	0.125	0.141	0.078		
TDC + 270°	0.172	0.141	0.125	0.078		
Average	0.160	0.125	0.133	0.078		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Pirelli
Tire Brand Name	P6 4 Season
Tire Build Date	3010
DOT Code	XL X0 H093
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	97

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.344	0.344	0.297		
TDC + 90°	0.297	0.344	0.344	0.297		
TDC + 180°	0.297	0.344	0.344	0.297		
TDC + 270°	0.297	0.344	0.344	0.297		
Average	0.297	0.344	0.344	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.313	0.250	0.281		
TDC + 90°	0.266	0.313	0.313	0.266		
TDC + 180°	0.281	0.313	0.313	0.281		
TDC + 270°	0.266	0.328	0.328	0.281		
Average	0.273	0.316	0.301	0.277		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Pirelli
Tire Brand Name	P6 4 Season
Tire Build Date	3010
DOT Code	XL X0 H093
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	97

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.344	0.344	0.297		
TDC + 90°	0.297	0.344	0.344	0.297		
TDC + 180°	0.297	0.344	0.344	0.297		
TDC + 270°	0.297	0.344	0.344	0.297		
Average	0.297	0.344	0.344	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.313	0.313	0.281		
TDC + 90°	0.281	0.313	0.313	0.281		
TDC + 180°	0.203	0.281	0.328	0.281		
TDC + 270°	0.266	0.328	0.313	0.281		
Average	0.250	0.309	0.316	0.281		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/15/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	59.88	144.33	144.89
2	59.70	139.23	140.63
3	60.69	148.45	145.11
4	61.21	155.04	148.99
5	61.12	156.87	151.17
6	60.74	152.17	148.47
7	60.77	156.81	152.89
8	60.45	153.50	151.21
9	60.61	154.69	151.58
10	60.91	152.85	148.30

= Average 60 mph SD feet	148.32
= Standard Deviation, 60 mph SD feet	3.79

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/15/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.35	154.15	147.42	1.0099	148.88
2	59.99	147.74	147.79	1.0099	149.25
3	61.44	150.36	143.40	1.0099	144.82
4	60.68	152.69	149.30	1.0099	150.78
5	60.86	153.48	149.20	1.0099	150.68
= Average 60 mph SD feet			147.42		148.88
= Standard Deviation, 60 mph SD feet			2.40		2.42

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/15/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.07	111.14	110.71
2	35.25	108.75	107.23
3	35.73	114.49	109.84
4	37.07	109.57	97.67
5	37.26	105.31	92.95
6	36.60	120.57	110.27
7	36.52	103.63	95.18
8	35.38	113.87	111.45
9	36.12	105.11	98.71
10	36.33	108.13	100.37

= Average 35 mph SD feet	103.44
= Standard Deviation, 35 mph SD feet	7.17

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/15/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	42.52	92.69	82.04	CW
2	41.75	90.71	83.25	CW
3	41.09	85.65	81.18	CW
4	41.06	85.53	81.16	CW
5	41.28	87.48	82.16	CW
6	39.92	81.97	82.31	CCW
7	39.79	81.98	82.84	CCW
8	39.89	83.66	84.11	CCW
9	38.99	75.29	79.26	CCW
10	39.12	80.19	83.83	CCW

= Average 40 mph SD feet	82.21
= Standard Deviation, 40 mph SD feet	1.44

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	47.28	1.00	1.03	1.03
		Max Lat	1.00		
1	CCW	47.00	0.98	1.03	1.01
		Max Lat	0.98		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	64.822	63.601
2	64.395	63.501
3	64.155	63.949
4	64.404	63.79
5	64.575	64.102
6	64.515	63.775
7	63.601	63.978
8	64.379	63.905
9	64.512	64.045
10	64.432	64.215
11	64.244	64.28
12	64.315	64.062
13	64.513	63.859
14	64.827	64.244
15	64.395	64.507
16	64.353	64.121
17	64.639	64.513
18	64.576	64.474
19	64.167	64.387
20	64.138	64.71
21	64.108	63.79
22	64.241	64.471
23	64.313	64.087
24	64.247	64.334
25	64.263	64.433
26	64.18	64.482
27	64.516	64.25
28	64.368	64.512
29	64.566	64.303
30	64.408	64.633
31	64.361	64.124
32	63.933	64.03
33	64.385	64.345
34	64.114	64.19
35	64.374	64.719
36	64.157	64.757

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
37	64.553	64.166
38	64.794	64.613
39	64.641	64.288
40	64.32	64.123
41	63.88	63.58
42	63.49	63.706
43	63.268	64.214
44	63.926	63.798
45	63.917	64.456
46	63.977	63.903
47	64.087	63.975
48	63.698	64.296
49	64.012	64.081
50	64.357	64.226
Avg =	64.346972	64.207722
Std Dev =	0.2320869	0.3152705
Min =	63.601	63.501
Max =	64.827	64.757
Range =	1.226	1.256

Temperatures of rotor and tire during endurance test

Vehicle Impala Pirelli P6 4 Season

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	630	152	379	121	401	133	648	175
After 20 Laps	649	158	348	122	397	125	649	170
After 30 Laps	667	158	355	122	361	128	646	158
After 40 Laps	645	167	356	130	367	133	626	168
After 50 Laps	652	141	380	122	393	128	630	167
After 60 Laps	751	179	390	133	389	119	670	151
After 70 Laps	755	175	400	131	410	119	696	153
After 80 Laps	770	179	421	128	431	122	708	153
After 90 Laps	720	175	395	122	395	118	680	153
After 100 Laps	648	192	339	146	333	116	603	144

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/15/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	59.64	152.08	153.91	0.9999	153.89
2	60.47	162.09	159.56	0.9999	159.55
3	59.98	155.02	155.13	0.9999	155.12
4	60.37	155.94	154.02	0.9999	154.01
5	60.53	158.60	155.84	0.9999	155.83
= Average 60 mph SD feet			155.69		155.68
= Standard Deviation, 60 mph SD feet			2.31		2.31

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/15/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	37.60	122.59	106.22
2	35.06	106.71	106.35
3	35.67	118.66	114.23
4	34.86	114.13	115.06
5	35.77	117.64	112.66
6	36.19	125.97	117.86
7	35.03	108.56	108.41
8	35.99	117.57	111.19
9	35.06	113.13	112.78
10	34.97	113.27	113.45

= Average 35 mph SD feet	111.82
= Standard Deviation, 35 mph SD feet	3.81

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/15/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	42.44	100.90	89.65	CW
2	41.93	99.47	90.53	CW
3	41.27	97.52	91.60	CW
4	39.95	94.92	95.13	CW
5	41.41	94.71	88.36	CW
6	40.09	87.56	87.18	CCW
7	39.57	85.95	87.83	CCW
8	39.62	85.66	87.29	CCW
9	39.46	85.30	87.65	CCW
10	39.13	83.36	87.09	CCW

= Average 40 mph SD feet	89.23
= Standard Deviation, 40 mph SD feet	2.58

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	46.48	0.96	1.01	0.97
		Max Lat.	0.96		
1	CCW	46.85	0.98	1.01	0.99
		Max Lat.	0.98		

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.015625	-0.234375	-0.234375	-0.1875	0	0
TDC + 90°	-0.03125	-0.234375	-0.203125	-0.171875	0	0
TDC + 180°	-0.015625	-0.21875	-0.21875	-0.171875	0	0
TDC + 270°	-0.015625	-0.234375	-0.21875	-0.171875	0	0
Average	-0.019531	-0.230469	-0.21875	-0.175781	0	0

% Wear	9.62%	67.05%	63.64%	59.21%	LF AVG	49.88%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.140625	-0.21875	-0.203125	-0.21875	0	0
TDC + 90°	-0.140625	-0.234375	-0.21875	-0.21875	0	0
TDC + 180°	-0.140625	-0.21875	-0.203125	-0.21875	0	0
TDC + 270°	-0.125	-0.203125	-0.21875	-0.21875	0	0
Average	-0.136719	-0.21875	-0.210938	-0.21875	0	0

% Wear	46.05%	63.64%	61.36%	73.68%	RF AVG	61.18%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.015625	-0.03125	-0.09375	-0.015625	0	0
TDC + 90°	-0.03125	-0.03125	-0.03125	-0.03125	0	0
TDC + 180°	-0.015625	-0.03125	-0.03125	-0.015625	0	0
TDC + 270°	-0.03125	-0.015625	-0.015625	-0.015625	0	0
Average	-0.023438	-0.027344	-0.042969	-0.019531	0	0

% Wear	7.89%	7.95%	12.50%	6.58%	LR AVG	8.73%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.03125	-0.03125	-0.015625	0	0
TDC + 90°	-0.015625	-0.03125	-0.03125	-0.015625	0	0
TDC + 180°	-0.09375	-0.0625	-0.015625	-0.015625	0	0
TDC + 270°	-0.03125	-0.015625	-0.03125	-0.015625	0	0
Average	-0.046875	-0.035156	-0.027344	-0.015625	0	0

% Wear	15.79%	10.23%	7.95%	5.26%	RR AVG	9.81%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	49.88%
RF AVG	61.18%
LR AVG	8.73%
RR AVG	9.81%

Chevrolet Impala/Nokian WRG2

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Impala
Vehicle VIN	B1100004
Initial Odometer	2037
Tire Manufacturer	Nokian
Tire Brand Name	WRG2

General Track and Weather Info

Date of Test	14-Jun-11
Driver	Matt Rogers

Track Temperature	Initial	65° F
Deg F	Midpoint	95° F
	Final	106° F

Weather Info

Temperature	Initial	57° F
Deg F	Midpoint	70° F
	Final	76° F

Conditions Sunny, Cool, Light Winds

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Nokian
Tire Brand Name	WRG2
Tire Build Date	2210
DOT Code	60AD 2210
UTQG Treadwear Rating	420
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	102

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 40

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.156	0.141	0.141	0.156		
TDC + 90°	0.156	0.141	0.156	0.156		
TDC + 180°	0.156	0.141	0.156	0.156		
TDC + 270°	0.156	0.141	0.141	0.156		
Average	0.156	0.141	0.148	0.156		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Nokian
Tire Brand Name	WRG2
Tire Build Date	2210
DOT Code	60AD 2210
UTQG Treadwear Rating	420
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	102

Tire Position Right Front Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) 40

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.109	0.125	0.156	0.141		
TDC + 90°	0.109	0.125	0.156	0.156		
TDC + 180°	0.109	0.125	0.141	0.125		
TDC + 270°	0.125	0.125	0.156	0.141		
Average	0.113	0.125	0.152	0.141		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Nokian
Tire Brand Name	WRG2
Tire Build Date	2210
DOT Code	60AD 2210
UTQG Treadwear Rating	420
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	102

Tire Position Left Rear Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.313	0.328	0.313		
TDC + 90°	0.297	0.313	0.328	0.313		
TDC + 180°	0.297	0.313	0.297	0.313		
TDC + 270°	0.281	0.313	0.328	0.328		
Average	0.293	0.313	0.320	0.316		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Impala
Tire Manufacturer	Nokian
Tire Brand Name	WRG2
Tire Build Date	1511
DOT Code	60AD 2210
UTQG Treadwear Rating	420
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	102

Tire Position Right Rear Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) 40

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.328	0.328	0.313		
TDC + 90°	0.313	0.328	0.313	0.313		
TDC + 180°	0.297	0.313	0.328	0.313		
TDC + 270°	0.313	0.328	0.328	0.313		
Average	0.301	0.324	0.324	0.313		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/14/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	59.14	150.33	154.73
2	60.18	160.26	159.32
3	60.47	158.02	155.60
4	59.86	157.07	157.80
5	60.65	164.55	161.05
6	60.23	153.93	152.75
7	61.06	172.09	166.15
8	61.08	164.10	158.34
9	59.96	153.75	153.98
10	60.49	162.49	159.89

= Average 60 mph SD feet	157.96
= Standard Deviation, 60 mph SD feet	3.96

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/14/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.06	164.91	159.25	1.0145	161.55
2	60.30	160.32	158.71	1.0145	161.01
3	60.57	163.42	160.35	1.0145	162.67
4	60.23	158.77	157.57	1.0145	159.85
5	60.43	161.27	159.01	1.0145	161.31
= Average 60 mph SD feet			158.97		161.28
= Standard Deviation, 60 mph SD feet			1.00		1.02

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/14/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	36.09	103.92	97.76
2	36.40	104.37	96.47
3	35.35	99.86	97.92
4	35.27	102.50	100.91
5	37.28	111.13	97.95
6	36.04	106.49	100.45
7	35.25	103.20	101.72
8	35.65	104.26	100.47
9	35.13	104.02	103.28
10	35.75	104.21	99.91

= Average 35 mph SD feet	99.68
= Standard Deviation, 35 mph SD feet	2.11

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/14/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.23	91.97	86.57	CW
2	40.35	74.64	73.34	CW
3	40.55	85.26	82.94	CW
4	40.37	89.36	87.74	CW
5	42.45	95.15	84.48	CW
6	39.34	83.95	86.79	CCW
7	37.78	78.41	87.91	CCW
8	39.24	82.73	85.97	CCW
9	39.26	84.92	88.17	CCW
10	39.51	87.46	89.66	CCW

= Average 40 mph SD feet	85.36
= Standard Deviation, 40 mph SD feet	4.64

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	46.95	0.98	1.03	1.01
		Max Lat	0.98		
1	CCW	46.40	0.96	1.03	0.99
		Max Lat	0.96		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	64.604	64.184
2	64.886	64.31
3	64.902	64.576
4	65.24	64.563
5	65.1	64.721
6	65.417	64.44
7	65.358	64.642
8	64.89	64.876
9	65.428	64.46
10	65.799	65.039
11	64.99	65.265
12	65.091	64.866
13	65.311	64.81
14	64.936	64.849
15	64.957	64.87
16	64.821	64.619
17	65.446	65.225
18	65.036	65.161
19	65.001	65.184
20	64.967	65.079
21	64.526	64.99
22	64.759	64.662
23	64.337	65.192
24	64.491	64.796
25	65.019	65.125
26	64.795	65.093
27	65.161	64.569
28	64.614	64.936
29	64.713	64.903
30	64.642	64.935
31	64.899	64.902
32	64.885	64.961
33	64.531	65.487
34	65.11	65.236
35	64.676	65.266
36	65.124	65.272
37	65.318	65.104
38	64.742	65.137
39	64.854	64.965
40	64.608	65.232
41	64.477	65.466
42	64.392	65.379
43	64.038	65.574
44	63.898	65.16
45	63.69	65.193
46	64.654	65.19
47	64.111	64.486
48	64.217	65.299
49	64.117	65.264
50	64.299	64.975
Avg =	64.957278	64.890667
Std Dev =	0.3138025	0.3026347
Min =	64.337	64.184
Max =	65.799	65.487
Range =	1.462	1.303

Temperatures of rotor and tire during endurance test

Vehicle Impala Nokian WRG2

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	677	140	366	106	406	125	667	161
After 20 Laps	700	148	365	110	383	136	683	166
After 30 Laps	748	142	381	109	402	132	731	167
After 40 Laps	695	147	355	113	403	131	655	160
After 50 Laps	980	156	352	117	411	138	671	164
After 60 Laps	710	169	396	127	335	99	626	125
After 70 Laps	775	173	415	125	396	110	690	137
After 80 Laps	751	180	430	134	395	106	663	130
After 90 Laps	760	177	428	131	419	112	690	139
After 100 Laps	741	171	400	127	397	126	673	155

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/14/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	60.70	159.60	155.92	1.0003	155.96
2	60.98	160.23	155.14	1.0003	155.19
3	60.33	158.36	156.62	1.0003	156.67
4	60.97	163.74	158.58	1.0003	158.62
5	60.10	156.46	155.95	1.0003	156.00
= Average 60 mph SD feet			156.44		156.49
= Standard Deviation, 60 mph SD feet			1.30		1.30

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/14/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	37.09	120.29	107.12
2	36.10	119.41	112.28
3	37.19	128.44	113.74
4	36.16	115.50	108.21
5	35.13	119.67	118.81
6	36.23	117.18	109.35
7	37.11	121.99	108.50
8	35.47	110.66	107.74
9	35.53	114.54	111.15
10	35.60	112.40	108.66

= Average 35 mph SD feet	110.56
= Standard Deviation, 35 mph SD feet	3.59

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/14/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	42.17	113.58	102.20	CW
2	41.03	100.40	95.44	CW
3	41.86	104.76	95.66	CW
4	41.15	94.54	89.32	CW
5	41.42	100.19	93.45	CW
6	40.29	92.88	91.53	CCW
7	39.55	85.96	87.92	CCW
8	40.71	92.68	89.46	CCW
9	39.75	83.89	84.94	CCW
10	39.56	85.56	87.50	CCW

= Average 40 mph SD feet	91.74
= Standard Deviation, 40 mph SD feet	5.07

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	46.29	0.95	1.01	0.97
		Max Lat.	0.95		
1	CCW	45.92	0.94	1.01	0.95
		Max Lat.	0.94		

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.1875	-0.203125	-0.203125	-0.1875	0	0
TDC + 90°	-0.1875	-0.203125	-0.1875	-0.1875	0	0
TDC + 180°	-0.1875	-0.203125	-0.1875	-0.1875	0	0
TDC + 270°	-0.1875	-0.203125	-0.203125	-0.1875	0	0
Average	-0.1875	-0.203125	-0.195313	-0.1875	0	0

% Wear	54.55%	59.09%	56.82%	54.55%	LF AVG	56.25%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.234375	-0.21875	-0.1875	-0.203125	0	0
TDC + 90°	-0.234375	-0.21875	-0.1875	-0.1875	0	0
TDC + 180°	-0.234375	-0.21875	-0.203125	-0.21875	0	0
TDC + 270°	-0.21875	-0.21875	-0.1875	-0.203125	0	0
Average	-0.230469	-0.21875	-0.191406	-0.203125	0	0

% Wear	67.05%	63.64%	55.68%	59.09%	RF AVG	61.36%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.03125	-0.015625	-0.03125	0	0
TDC + 90°	-0.046875	-0.03125	-0.015625	-0.03125	0	0
TDC + 180°	-0.046875	-0.03125	-0.046875	-0.03125	0	0
TDC + 270°	-0.0625	-0.03125	-0.015625	-0.015625	0	0
Average	-0.050781	-0.03125	-0.023438	-0.027344	0	0

% Wear	14.77%	9.09%	6.82%	7.95%	LR AVG	9.66%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.0625	-0.015625	-0.015625	-0.03125	0	0
TDC + 90°	-0.03125	-0.015625	-0.03125	-0.03125	0	0
TDC + 180°	-0.046875	-0.03125	-0.015625	-0.03125	0	0
TDC + 270°	-0.03125	-0.015625	-0.015625	-0.03125	0	0
Average	-0.042969	-0.019531	-0.019531	-0.03125	0	0

% Wear	12.50%	5.68%	5.68%	9.09%	RR AVG	8.24%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	56.25%
RF AVG	61.36%
LR AVG	9.66%
RR AVG	8.24%

Chevrolet Impala/Cooper CS4

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	Chevy Impala
Vehicle VIN	B1100004
Initial Odometer	1840
Tire Manufacturer	Cooper
Tire Brand Name	CS4

General Track and Weather Info

Date of Test	6/7/11
Driver	Matt Rogers

Track Temperature	Initial	86° F
Deg F	Midpoint	113°
	Final	

Weather Info

Temperature	Initial	78° F
Deg F	Midpoint	86°F
	Final	

Conditions Sunny, Hazy, Humid

TEST ABORTED -- TIRE FAILURE

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Chevy Impala
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	5110
DOT Code	U9X3 CLN 5110
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	98

Tire Position Left Front Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.328	0.297		
TDC + 90°	0.297	0.328	0.328	0.297		
TDC + 180°	0.297	0.328	0.328	0.297		
TDC + 270°	0.297	0.328	0.328	0.297		
Average	0.296875	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.266	0.281	0.250		
TDC + 90°	0.281	0.281	0.266	0.250		
TDC + 180°	0.266	0.281	0.266	0.250		
TDC + 270°	0.266	0.281	0.266	0.250		
Average	0.2734375	0.27734375	0.2695313	0.25		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Chevy Impala
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	5110
DOT Code	U9X3 CLN 5110
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	98

Tire Position Right Front Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.328	0.297		
TDC + 90°	0.297	0.328	0.328	0.297		
TDC + 180°	0.297	0.328	0.328	0.297		
TDC + 270°	0.297	0.328	0.328	0.297		
Average	0.296875	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.266	0.281	0.266	0.281		
TDC + 90°	0.266	0.266	0.297	0.281		
TDC + 180°	0.250	0.266	0.281	0.281		
TDC + 270°	0.250	0.250	0.266	0.281		
Average	0.2578125	0.265625	0.2773438	0.28125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Chevy Impala
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	5110
DOT Code	U9X3 CLN 5110
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	98

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.328	0.297		
TDC + 90°	0.297	0.328	0.328	0.297		
TDC + 180°	0.297	0.328	0.328	0.297		
TDC + 270°	0.297	0.328	0.328	0.297		
Average	0.296875	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.328	0.344	0.328		
TDC + 90°	0.328	0.328	0.328	0.313		
TDC + 180°	0.328	0.328	0.344	0.313		
TDC + 270°	0.313	0.344	0.344	0.313		
Average	0.3203125	0.33203125	0.3398438	0.3164063		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	Chevy Impala
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	5110
DOT Code	U9X3 CLN 5110
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	98

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.328	0.297		
TDC + 90°	0.297	0.328	0.328	0.297		
TDC + 180°	0.297	0.328	0.328	0.297		
TDC + 270°	0.297	0.328	0.328	0.297		
Average	0.296875	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.328	0.328	0.313		
TDC + 90°	0.313	0.328	0.328	0.313		
TDC + 180°	0.297	0.313	0.328	0.313		
TDC + 270°	0.313	0.328	0.328	0.313		
Average	0.3085938	0.32421875	0.328125	0.3125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/7/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	58.80	140.24	146.05
2	60.84	147.81	143.78
3	61.00	149.53	144.65
4	59.36	144.30	147.45
5	60.60	151.75	148.74
6	60.94	151.26	146.61
7	60.78	151.79	147.94
8	60.07	144.95	144.64
9	59.36	141.40	144.45
10	60.54	146.90	144.29

= Average 60 mph SD feet	145.86
= Standard Deviation, 60 mph SD feet	1.75

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/7/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	60.32	144.50	142.97	0.9826	140.48
2	59.04	139.34	143.90	0.9826	141.40
3	60.20	141.16	140.23	0.9826	137.79
4	59.61	140.82	142.65	0.9826	140.16
5	60.53	144.25	141.74	0.9826	139.28
= Average 60 mph SD feet			142.30		139.82
= Standard Deviation, 60 mph SD feet			1.39		1.37

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/7/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.57	87.07	84.29
2	34.93	89.43	89.80
3	35.04	97.60	97.40
4	35.39	75.04	73.41
5	36.10	101.90	95.78
6	35.78	106.98	102.39
7	36.31	85.61	79.53
8	34.44	109.46	113.06
0	35.04	102.95	102.71
10	36.12	101.07	94.88

= Average 30 mph SD feet	93.32
= Standard Deviation, 30 mph SD feet	11.86

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/7/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.97	89.58	81.36	CW
2	42.46	90.54	80.37	CW
3	41.84	91.89	84.00	CW
4	41.10	97.90	92.73	CW
5	42.88	93.81	81.64	CW
6	39.20	71.22	74.17	CCW
7	39.05	75.14	78.83	CCW
8	39.03	77.45	81.37	CCW
9	40.17	76.03	75.40	CCW
10	39.30	76.45	79.22	CCW

= Average 30 mph SD feet	80.91
= Standard Deviation, 60 mph SD feet	5.09

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	45.69	0.93	0.95	0.89
		Max Lat	0.93		
1	CCW	45.39	0.92	0.95	0.87
		Max Lat	0.92		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Test aborted due to excess tire wear

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec	Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1			37		
2			38		
3			39		
4			40		
5			41		
6			42		
7			43		
8			44		
9			45		
10			46		
11			47		
12			48		
13			49		
14			50		
15					
16			Avg =		
17			Std Dev =		
18			Min =	0	0
19			Max =	0	0
20			Range =	0	0
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					

Temperatures of rotor and tire during endurance test

Vehicle Impala Cooper Tire

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	557	178	350	390	390	148	570	199
After 20 Laps	611	192	385	432	432	162	656	208
After 30 Laps	640	208	444	467	467	184	842	250
After 40 Laps								
After 50 Laps								
After 60 Laps								
After 70 Laps								
After 80 Laps								
After 90 Laps								
Post Test								

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Test aborted due to excess tire wear

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/7/11
Driver	Matt Rogers
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1			
2			
3			
4			
5			

= Average 60 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/7/11
Driver	Matt Rogers
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

= Average 30 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/7/11
Driver	Matt Rogers
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1				CW
2				CW
3				CW
4				CW
5				CW
6				CCW
7				CCW
8				CCW
9				CCW
10				CCW

= Average 30 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Test aborted due to excess tire wear

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G
1	CW		0
		Max Lat.	0
1	CCW		0
		Max Lat.	0

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.015625	-0.0625	-0.046875	-0.046875	0	0
TDC + 90°	-0.015625	-0.046875	-0.0625	-0.046875	0	0
TDC + 180°	-0.03125	-0.046875	-0.0625	-0.046875	0	0
TDC + 270°	-0.03125	-0.046875	-0.0625	-0.046875	0	0
Average	-0.023438	-0.050781	-0.058594	-0.046875	0	0

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.03125	-0.046875	-0.0625	-0.015625	0	0
TDC + 90°	-0.03125	-0.0625	-0.03125	-0.015625	0	0
TDC + 180°	-0.046875	-0.0625	-0.046875	-0.015625	0	0
TDC + 270°	-0.046875	-0.078125	-0.0625	-0.015625	0	0
Average	-0.039063	-0.0625	-0.050781	-0.015625	0	0

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	0.015625	0	0.015625	0.03125	0	0
TDC + 90°	0.03125	0	0	0.015625	0	0
TDC + 180°	0.03125	0	0.015625	0.015625	0	0
TDC + 270°	0.015625	0.015625	0.015625	0.015625	0	0
Average	0.0234375	0.0039063	0.0117188	0.0195313	0	0

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	0.015625	0	0	0.015625	0	0
TDC + 90°	0.015625	0	0	0.015625	0	0
TDC + 180°	0	-0.015625	0	0.015625	0	0
TDC + 270°	0.015625	0	0	0.015625	0	0
Average	0.0117188	-0.003906	0	0.015625	0	0

Ford CVPI/Firestone Firehawk GT Pursuit

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	CVPI
Vehicle VIN	AX125586
Initial Odometer	3217
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT

General Track and Weather Info

Date of Test	9-Jun-11
Driver	Jim Flegel

Track Temperature	Initial	74° F
Deg F	Midpoint	81° F
	Final	83° F

Weather Info

Temperature	Initial	68° F
Deg F	Midpoint	71° F
	Final	71° F

Conditions Cloudy, Some Wind 10-12 mph

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	0211
DOT Code	W278FHP
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	98

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.188	0.359	0.188	0.328	
TDC + 90°	0.328	0.188	0.359	0.188	0.328	
TDC + 180°	0.328	0.188	0.359	0.188	0.328	
TDC + 270°	0.328	0.188	0.359	0.188	0.328	
Average	0.328	0.188	0.359	0.188	0.328	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.172	0.016	0.203	0.031	0.203	
TDC + 90°	0.172	0.031	0.203	0.031	0.203	
TDC + 180°	0.219	0.016	0.219	0.031	0.203	
TDC + 270°	0.125	0.031	0.219	0.031	0.188	
Average	0.172	0.023	0.211	0.031	0.199	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	0211
DOT Code	W278FHP
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	98

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.188	0.359	0.188	0.328	
TDC + 90°	0.344	0.188	0.359	0.188	0.328	
TDC + 180°	0.344	0.188	0.359	0.188	0.328	
TDC + 270°	0.344	0.188	0.359	0.188	0.328	
Average	0.344	0.188	0.359	0.188	0.328	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.031	0.203	0.031	0.188	
TDC + 90°	0.203	0.031	0.203	0.031	0.172	
TDC + 180°	0.188	0.031	0.203	0.031	0.188	
TDC + 270°	0.203	0.031	0.219	0.031	0.188	
Average	0.199	0.031	0.207	0.031	0.184	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	0211
DOT Code	W278FHP
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	98

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.172	0.281	0.188	0.328	
TDC + 90°	0.328	0.172	0.281	0.188	0.328	
TDC + 180°	0.328	0.172	0.281	0.188	0.328	
TDC + 270°	0.328	0.172	0.281	0.188	0.328	
Average	0.328	0.172	0.281	0.188	0.328	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.031	0.188	0.031	0.203	
TDC + 90°	0.203	0.016	0.203	0.031	0.203	
TDC + 180°	0.203	0.016	0.203	0.031	0.203	
TDC + 270°	0.203	0.031	0.203	0.031	0.219	
Average	0.203	0.023	0.199	0.031	0.207	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Firestone
Tire Brand Name	Firehawk GT
Tire Build Date	0211
DOT Code	W278FHP
UTQG Treadwear Rating	340
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	98

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.188	0.359	0.188	0.328	
TDC + 90°	0.344	0.188	0.359	0.188	0.328	
TDC + 180°	0.344	0.188	0.359	0.188	0.328	
TDC + 270°	0.344	0.188	0.359	0.188	0.328	
Average	0.344	0.188	0.359	0.188	0.328	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.031	0.188	0.016	0.188	
TDC + 90°	0.172	0.031	0.203	0.031	0.188	
TDC + 180°	0.172	0.031	0.203	0.031	0.203	
TDC + 270°	0.188	0.031	0.203	0.031	0.203	
Average	0.180	0.031	0.199	0.027	0.195	

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/9/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	60.28	138.70	137.39
2	59.84	133.74	134.43
3	61.00	140.76	136.19
4	60.24	137.69	136.59
5	60.98	140.46	135.97
6	60.36	134.99	133.38
7	60.74	141.17	137.74
8	60.12	135.29	134.74
9	60.16	135.12	134.39
10	60.53	140.63	138.17

= Average 60 mph SD feet	135.90
= Standard Deviation, 60 mph SD feet	1.61

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/9/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	59.93	132.83	133.16	1.0333	137.59
2	60.77	135.90	132.46	1.0333	136.88
3	60.05	133.65	133.41	1.0333	137.85
4	60.33	134.97	133.51	1.0333	137.96
5	60.38	136.27	134.58	1.0333	139.06
= Average 60 mph SD feet			133.42		137.87
= Standard Deviation, 60 mph SD feet			0.76		0.79

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/9/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.50	105.81	102.85
2	35.67	107.60	103.63
3	35.97	111.52	105.62
4	34.97	103.95	104.13
5	35.36	121.57	119.09
6	34.85	103.94	104.83
7	35.88	107.89	102.64
8	35.33	112.58	110.48
9	34.74	105.44	107.02
10	34.78	104.41	105.76

= Average 35 mph SD feet	106.60
= Standard Deviation, 35 mph SD feet	4.95

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/9/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.77	67.32	64.79	CW
2	41.83	76.04	69.54	CW
3	41.25	65.59	61.67	CW
4	40.33	69.21	68.07	CW
5	39.44	67.90	69.85	CW
6	41.24	78.97	74.30	CCW
7	39.48	71.82	73.73	CCW
8	39.07	78.67	82.48	CCW
9	40.12	73.86	73.40	CCW
10	38.60	68.38	73.41	CCW

= Average 40 mph SD feet	71.12
= Standard Deviation, 40 mph SD feet	5.77

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	45.32	0.92	1.04	0.95
		Max Lat	0.92		
1	CCW	48.22	1.04	1.04	1.08
		Max Lat	1.04		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	63.49	62.654
2	63.152	63.042
3	63.474	62.676
4	63.003	62.288
5	62.987	62.529
6	63.154	62.983
7	63.051	63.035
8	63.157	62.678
9	63.235	62.767
10	63.154	63.358
11	63.305	62.55
12	63.448	62.545
13	62.853	63.234
14	63.625	62.761
15	63.138	62.942
16	63.07	63.149
17	63.358	63.128
18	63.163	63.555
19	63.165	63.073
20	63.115	63.4
21	63.212	62.687
22	63.602	63.044
23	62.669	62.56
24	62.847	62.982
25	62.862	63.354
26	62.894	62.99
27	62.663	63.555
28	63.005	63.125
29	62.815	63.654
30	63.445	63.46
31	63.253	62.72
32	62.8	62.907
33	62.759	63.141
34	62.2	63.322
35	62.616	62.762
36	62.993	63.279
37	62.984	63.291
38	62.498	63.117
39	62.987	63.375
40	63.18	63.726
41	62.571	62.483
42	64.095	62.93
43	62.632	62.998
44	62.606	63.085
45	62.404	63.469
46	62.427	63.083
47	62.508	63.177
48	62.71	63.003
49	62.661	63.433
50	62.61	63.374
Avg =	63.075889	62.996917
Std Dev =	0.3024549	0.338339
Min =	62.2	62.288
Max =	63.625	63.654
Range =	1.425	1.366

Temperature of rotor and tire during endurance test

Vehicle CVPI Firestone Firehawk GT

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	869	148	351	141	368	163	823	180
After 20 Laps	863	149	385	151	395	169	820	184
After 30 Laps	887	148	417	145	438	164	827	187
After 40 Laps	853	141	412	141	480	154	793	190
After 50 Laps	835	146	422	131	515	157	765	180
After 60 Laps	882	172	520	168	488	123	788	142
After 70 Laps	920	154	610	164	550	124	840	134
After 80 Laps	893	158	633	151	579	135	810	140
After 90 Laps	925	162	615	150	570	132	847	150
After 100 Laps	915	178	615	160	539	130	829	155

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/9/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	60.16	143.70	142.92	1.0076	144.00
2	60.04	139.22	139.03	1.0076	140.08
3	59.76	139.30	140.41	1.0076	141.47
4	59.89	140.38	140.88	1.0076	141.96
5	60.65	143.48	140.41	1.0076	141.48
= Average 60 mph SD feet			140.73		141.80
= Standard Deviation, 60 mph SD feet			1.41		1.42

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/9/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	34.75	125.10	126.90
2	35.87	134.52	128.06
3	35.55	120.66	116.97
4	35.77	120.18	115.10
5	34.96	125.08	125.39
6	34.33	122.27	127.11
7	35.31	125.61	123.44
8	35.78	123.74	118.41
9	35.09	123.04	122.40
10	35.85	126.77	120.87

= Average 35 mph SD feet	122.46
= Standard Deviation, 35 mph SD feet	4.54

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/9/11
Driver	Jim Flegel
Target Velocity, mph	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.30	91.70	86.02	CW
2	41.92	82.38	75.00	CW
3	40.03	84.93	84.81	CW
4	40.99	89.28	85.01	CW
5	40.68	81.98	79.27	CW
6	37.74	82.31	92.47	CCW
7	41.54	85.02	78.85	CCW
8	39.46	77.86	80.01	CCW
9	38.99	87.75	92.38	CCW
10	39.24	81.91	85.12	CCW

= Average 40 mph SD feet	83.89
= Standard Deviation, 40 mph SD feet	5.72

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	48.94	1.07	1.01	1.08
		Max Lat.	1.07		
1	CCW	47.09	0.99	1.01	1.00
		Max Lat.	0.99		

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.15625	-0.171875	-0.15625	-0.15625	-0.125	0
TDC + 90°	-0.15625	-0.15625	-0.15625	-0.15625	-0.125	0
TDC + 180°	-0.109375	-0.171875	-0.140625	-0.15625	-0.125	0
TDC + 270°	-0.203125	-0.15625	-0.140625	-0.15625	-0.140625	0
Average	-0.15625	-0.164063	-0.148438	-0.15625	-0.128906	0

% Wear	47.62%	87.50%	41.30%	83.33%	LF AVG	64.94%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.140625	-0.15625	-0.15625	-0.15625	-0.140625	0
TDC + 90°	-0.140625	-0.15625	-0.15625	-0.15625	-0.15625	0
TDC + 180°	-0.15625	-0.15625	-0.15625	-0.15625	-0.140625	0
TDC + 270°	-0.140625	-0.15625	-0.140625	-0.15625	-0.140625	0
Average	-0.144531	-0.15625	-0.152344	-0.15625	-0.144531	0

% Wear	42.05%	83.33%	42.39%	83.33%	RF AVG	62.78%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.125	-0.140625	-0.09375	-0.15625	-0.125	0
TDC + 90°	-0.125	-0.15625	-0.078125	-0.15625	-0.125	0
TDC + 180°	-0.125	-0.15625	-0.078125	-0.15625	-0.125	0
TDC + 270°	-0.125	-0.140625	-0.078125	-0.15625	-0.109375	0
Average	-0.125	-0.148438	-0.082031	-0.15625	-0.121094	0

% Wear	38.10%	86.36%	29.17%	83.33%	LR AVG	59.24%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.15625	-0.15625	-0.171875	-0.171875	-0.140625	0
TDC + 90°	-0.171875	-0.15625	-0.15625	-0.15625	-0.140625	0
TDC + 180°	-0.171875	-0.15625	-0.15625	-0.15625	-0.125	0
TDC + 270°	-0.15625	-0.15625	-0.15625	-0.15625	-0.125	0
Average	-0.164063	-0.15625	-0.160156	-0.160156	-0.132813	0

% Wear	47.73%	83.33%	44.57%	85.42%	RR AVG	65.26%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	57.66%
RF AVG	57.86%
LR AVG	55.57%
RR AVG	68.02%

Ford CVPI/Goodyear Eagle RSA

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	CVPI
Vehicle VIN	AX125586
Initial Odometer	3365
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA

General Track and Weather Info

Date of Test	6/10/11 & 6/13/11
Driver	Jim Flegel

		6/10/11	6/13/11
Track Temperature	Initial	66° F	63° F
Deg F	Midpoint		79° F
	Final		101° F
Weather Info			
Temperature	Initial	56° F	57° F
Deg F	Midpoint		64° F
	Final		78° F

Conditions 6/10 Cloudy & Cool

6/13 Sunny & Cool

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	2509
DOT Code	M678 LNER 2509
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	98

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.328	0.328	0.281		
TDC + 90°	0.281	0.328	0.328	0.281		
TDC + 180°	0.281	0.328	0.328	0.281		
TDC + 270°	0.281	0.328	0.328	0.281		
Average	0.281	0.328	0.328	0.281		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.203	0.203	0.172		
TDC + 90°	0.188	0.203	0.219	0.172		
TDC + 180°	0.188	0.219	0.219	0.188		
TDC + 270°	0.203	0.219	0.219	0.172		
Average	0.195	0.211	0.215	0.176		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	2209
DOT Code	M678 LNER 2209
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	98

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.344	0.344	0.281		
TDC + 90°	0.281	0.344	0.344	0.281		
TDC + 180°	0.281	0.344	0.344	0.281		
TDC + 270°	0.281	0.344	0.344	0.281		
Average	0.281	0.344	0.344	0.281		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.203	0.219	0.188		
TDC + 90°	0.188	0.203	0.219	0.172		
TDC + 180°	0.188	0.188	0.219	0.188		
TDC + 270°	0.188	0.188	0.203	0.172		
Average	0.191	0.195	0.215	0.180		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

TREAD DELAMINATION AT END OF TEST

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	2509
DOT Code	M678 LNER 2209
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	98

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.328	0.328	0.281		
TDC + 90°	0.281	0.328	0.328	0.281		
TDC + 180°	0.281	0.328	0.328	0.281		
TDC + 270°	0.281	0.328	0.328	0.281		
Average	0.281	0.328	0.328	0.281		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.172	0.203	0.188		
TDC + 90°	0.188	0.188	0.203	0.188		
TDC + 180°	0.172	0.188	0.203	0.188		
TDC + 270°	0.188	0.188	0.203	0.172		
Average	0.184	0.184	0.203	0.184		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Goodyear
Tire Brand Name	Eagle RSA
Tire Build Date	2209
DOT Code	M678 LNER 2209
UTQG Treadwear Rating	260
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	W
Load Index	98

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.328	0.328	0.281		
TDC + 90°	0.281	0.328	0.328	0.281		
TDC + 180°	0.281	0.328	0.328	0.281		
TDC + 270°	0.281	0.328	0.328	0.281		
Average	0.281	0.328	0.328	0.281		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 35

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.172	0.172	0.188	0.172		
TDC + 90°	0.172	0.172	0.172	0.156		
TDC + 180°	0.156	0.156	0.188	0.172		
TDC + 270°	0.172	0.188	0.188	0.156		
Average	0.168	0.172	0.184	0.164		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once.

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	60.80	146.37	142.53
2	60.36	141.63	139.95
3	60.35	140.12	138.52
4	60.46	139.39	137.28
5	59.83	138.32	139.12
6	60.03	138.37	138.25
7	60.39	138.06	136.30
8	59.71	133.38	134.67
9	60.41	140.06	138.15
10	60.14	137.43	136.77

= Average 60 mph SD feet	138.15
= Standard Deviation, 60 mph SD feet	2.15

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	59.67	142.72	144.31	1.0082	145.49
2	59.94	137.19	137.48	1.0082	138.61
3	60.77	141.14	137.61	1.0082	138.73
4	60.93	142.10	137.79	1.0082	138.92
5	60.89	143.48	139.29	1.0082	140.44
= Average 60 mph SD feet			139.30		140.44
= Standard Deviation, 60 mph SD feet			2.90		2.92

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.99	115.18	108.91
2	35.19	111.06	109.90
3	35.60	120.33	116.31
4	36.06	118.68	111.83
5	35.73	115.42	110.76
6	36.01	118.96	112.37
7	35.71	114.72	110.22
8	35.72	121.05	116.25
9	36.08	120.96	113.82
10	35.65	119.68	115.37

= Average 35 mph SD feet	112.57
= Standard Deviation, 35 mph SD feet	2.72

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.40	93.33	87.12	CW
2	42.69	94.69	83.15	CW
3	40.85	96.54	92.56	CW
4	39.77	88.21	89.23	CW
5	41.03	85.09	80.86	CW
6	40.39	81.39	79.82	CCW
7	40.64	83.13	80.52	CCW
8	40.63	85.57	82.94	CCW
9	39.79	81.11	81.97	CCW
10	40.01	78.73	78.71	CCW

= Average 40 mph SD feet	83.69
= Standard Deviation, 40 mph SD feet	4.51

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	44.25	0.87	1.02	0.89
		Max Lat	0.87		
1	CCW	45.63	0.93	1.02	0.95
		Max Lat	0.93		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	63.093	62.931
2	62.182	62.158
3	62.616	61.843
4	62.451	62.009
5	62.973	61.774
6	63.033	61.94
7	62.68	62.121
8	62.273	62.155
9	62.614	62.335
10	63.054	61.906
11	62.787	62.083
12	62.541	61.804
13	62.69	62.217
14	62.445	62.273
15	62.394	62.874
16	62.913	62.569
17	62.779	62.327
18	62.944	62.204
19	62.541	62.257
20	62.855	63.154
21	63.103	62.305
22	62.696	62.592
23	62.52	62.401
24	62.879	62.421
25	62.749	62.362
26	62.733	62.536
27	63.281	62.258
28	62.955	62.647
29	62.847	62.383
30	62.634	62.605
31	62.472	62.612
32	62.338	62.29
33	62.293	62.389
34	62.557	62.293
35	62.492	62.164
36	63.177	62.087

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
37	62.422	62.193
38	62.662	62.751
39	62.801	63.535
40	62.733	61.934
41	62.9	62.697
42	62.766	62.261
43	62.463	62.342
44	62.804	62.322
45	62.37	62.571
46	62.629	62.235
47	62.414	62.271
48	62.582	62.667
49	62.429	62.626
50	62.836	62.786
Avg =	62.710667	62.313306
Std Dev =	0.2746157	0.3082667
Min =	62.182	61.774
Max =	63.281	63.154
Range =	1.099	1.38

Temperatures of rotor and tire during endurance test

Vehicle CVPI Goodyear Eagle RSA

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	835	132	300	125	315	136	798	155
After 20 Laps	888	130	333	130	358	140	815	160
After 30 Laps	852	128	350	128	395	155	830	160
After 40 Laps	855	142	321	121	392	152	829	158
After 50 Laps	855	131	343	125	475	152	844	160
After 60 Laps	855	175	405	170	395	115	750	125
After 70 Laps	950	174	445	170	470	122	833	128
After 80 Laps	955	169	504	179	425	118	830	123
After 90 Laps	920	170	540	164	490	122	823	126
After 100 Laps	950	172	615	170	530	132	863	128

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/10/11 & 6/13/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	60.45	149.36	147.13	0.9991	146.99
2	60.51	145.67	143.23	0.9991	143.10
3	60.08	144.76	144.40	0.9991	144.27
4	60.21	143.87	142.87	0.9991	142.75
5	59.48	141.34	143.82	0.9991	143.69
= Average 60 mph SD feet			144.29		144.16
= Standard Deviation, 60 mph SD feet			1.69		1.69

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.39	121.55	118.91
2	36.79	132.93	120.33
3	36.47	129.87	119.61
4	36.54	112.66	103.36
5	36.60	129.33	118.28
6	35.29	121.29	119.29
7	34.93	120.89	121.35
8	34.12	115.02	121.02
9	35.73	126.38	121.28
10	35.35	135.03	132.34

= Average 35 mph SD feet	119.58
= Standard Deviation, 35 mph SD feet	6.97

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/10/11 & 6/13/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	41.56	86.75	80.35	CW
2	41.58	104.82	97.03	CW
3	40.54	101.07	98.38	CW
4	40.98	95.71	91.21	CW
5	41.16	102.66	96.96	CW
6	40.07	87.69	87.40	CCW
7	39.04	79.03	82.98	CCW
8	39.86	83.24	83.82	CCW
9	40.84	84.66	81.22	CCW
10	40.40	83.77	82.11	CCW

= Average 40 mph SD feet	88.15
= Standard Deviation, 40 mph SD feet	7.16

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	47.01	0.98	1.00	0.99
		Max Lat.	0.98		
1	CCW	47.12	0.99	1.00	0.99
		Max Lat.	0.99		

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet
Recheck and record cold tire inflation pressure

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.078125	-0.125	-0.125	-0.109375	0	0
TDC + 90°	-0.09375	-0.125	-0.109375	-0.109375	0	0
TDC + 180°	-0.09375	-0.109375	-0.109375	-0.09375	0	0
TDC + 270°	-0.078125	-0.109375	-0.109375	-0.109375	0	0
Average	-0.085938	-0.117188	-0.113281	-0.105469	0	0

% Wear	30.56%	35.71%	34.52%	37.50%	LF AVG	34.57%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.078125	-0.140625	-0.125	-0.09375	0	0
TDC + 90°	-0.09375	-0.140625	-0.125	-0.109375	0	0
TDC + 180°	-0.09375	-0.15625	-0.125	-0.09375	0	0
TDC + 270°	-0.09375	-0.15625	-0.140625	-0.109375	0	0
Average	-0.089844	-0.148438	-0.128906	-0.101563	0	0

% Wear	31.94%	43.18%	37.50%	36.11%	RF AVG	37.18%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.09375	-0.15625	-0.125	-0.09375	0	0
TDC + 90°	-0.09375	-0.140625	-0.125	-0.09375	0	0
TDC + 180°	-0.109375	-0.140625	-0.125	-0.09375	0	0
TDC + 270°	-0.09375	-0.140625	-0.125	-0.109375	0	0
Average	-0.097656	-0.144531	-0.125	-0.097656	0	0

% Wear	34.72%	44.05%	38.10%	34.72%	LR AVG	37.90%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.109375	-0.15625	-0.140625	-0.109375	0	0
TDC + 90°	-0.109375	-0.15625	-0.15625	-0.125	0	0
TDC + 180°	-0.125	-0.171875	-0.140625	-0.109375	0	0
TDC + 270°	-0.109375	-0.140625	-0.140625	-0.125	0	0
Average	-0.113281	-0.15625	-0.144531	-0.117188	0	0

% Wear	40.28%	47.62%	44.05%	41.67%	RR AVG	43.40%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	34.57%
RF AVG	37.18%
LR AVG	37.90%
RR AVG	43.40%

Ford CVPI/Pirelli Pzero Nero

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	CVPI
Vehicle VIN	AX125586
Initial Odometer	3663
Tire Manufacturer	Pirelli
Tire Brand Name	Pzero Nero

General Track and Weather Info

Date of Test	15-Jun-11
Driver	Jim Flegel

Track Temperature	Initial	62° F
Deg F	Midpoint	77° F
	Final	85° F

Weather Info

Temperature	Initial	57° F
Deg F	Midpoint	63° F
	Final	67° F

Conditions Light Clouds, Cool, Winds 10 - 12 mph

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Pirelli
Tire Brand Name	Pzero Nero
Tire Build Date	4610
DOT Code	51 EK E 661
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	98

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.328	0.328	0.281		
TDC + 90°	0.313	0.328	0.328	0.281		
TDC + 180°	0.313	0.328	0.328	0.281		
TDC + 270°	0.313	0.328	0.328	0.281		
Average	0.313	0.328	0.328	0.281		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.141	0.141	0.125		
TDC + 90°	0.203	0.141	0.125	0.125		
TDC + 180°	0.203	0.141	0.125	0.109		
TDC + 270°	0.203	0.141	0.125	0.109		
Average	0.199	0.141	0.129	0.117		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Pirelli
Tire Brand Name	Pzero Nero
Tire Build Date	4610
DOT Code	51 EK E 661
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	98

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.313	0.328	0.297		
TDC + 90°	0.297	0.313	0.328	0.297		
TDC + 180°	0.297	0.313	0.328	0.297		
TDC + 270°	0.297	0.313	0.328	0.297		
Average	0.297	0.313	0.328	0.297		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.156	0.141	0.109		
TDC + 90°	0.188	0.156	0.141	0.109		
TDC + 180°	0.188	0.156	0.141	0.109		
TDC + 270°	0.188	0.156	0.141	0.109		
Average	0.188	0.156	0.141	0.109		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Pirelli
Tire Brand Name	Pzero Nero
Tire Build Date	4610
DOT Code	51 EK E 661
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	98

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.328	0.281		
TDC + 90°	0.297	0.328	0.328	0.281		
TDC + 180°	0.297	0.328	0.328	0.281		
TDC + 270°	0.297	0.328	0.328	0.281		
Average	0.297	0.328	0.328	0.281		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.172	0.141	0.141	0.141		
TDC + 90°	0.188	0.141	0.141	0.141		
TDC + 180°	0.172	0.156	0.156	0.156		
TDC + 270°	0.188	0.141	0.156	0.156		
Average	0.180	0.145	0.148	0.148		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Pirelli
Tire Brand Name	Pzero Nero
Tire Build Date	4610
DOT Code	51 EK E 661
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	AA
Speed Rating	W
Load Index	98

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.297	0.328	0.313	0.281		
TDC + 90°	0.297	0.328	0.313	0.281		
TDC + 180°	0.297	0.328	0.313	0.281		
TDC + 270°	0.297	0.328	0.313	0.281		
Average	0.297	0.328	0.313	0.281		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 38

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.172	0.156	0.156	0.141		
TDC + 90°	0.172	0.156	0.156	0.141		
TDC + 180°	0.156	0.156	0.156	0.156		
TDC + 270°	0.172	0.156	0.156	0.141		
Average	0.168	0.156	0.156	0.145		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/15/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	60.24	139.77	138.68
2	60.37	139.05	137.34
3	59.85	137.36	138.03
4	59.76	132.98	134.07
5	59.70	132.46	133.81
6	59.77	134.60	135.66
7	59.83	137.65	138.43
8	60.48	140.38	138.16
9	61.02	137.93	133.35
10	60.02	138.89	138.81

= Average 60 mph SD feet	136.63
= Standard Deviation, 60 mph SD feet	2.19

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/15/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	60.54	136.97	134.55	1.0099	135.88
2	60.56	136.03	133.55	1.0099	134.87
3	60.69	138.22	135.11	1.0099	136.45
4	60.36	135.10	133.49	1.0099	134.82
5	59.84	134.56	135.27	1.0099	136.60
= Average 60 mph SD feet			134.39		135.72
= Standard Deviation, 60 mph SD feet			0.84		0.85

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/15/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	33.73	111.14	119.66
2	35.70	108.70	104.46
3	35.22	107.43	106.10
4	35.93	109.56	103.94
5	35.53	113.37	109.98
6	35.83	113.65	108.43
7	35.02	103.69	103.55
8	34.47	104.89	108.15
9	36.16	115.91	108.60
10	35.35	107.39	105.25

= Average 35 mph SD feet	107.81
= Standard Deviation, 35 mph SD feet	4.72

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/15/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	42.17	81.65	73.47	CW
2	42.35	102.08	91.08	CW
3	40.03	72.41	72.31	CW
4	39.32	72.35	74.89	CW
5	40.27	75.75	74.74	CW
6	39.91	71.04	71.36	CCW
7	40.35	69.42	68.22	CCW
8	39.64	70.07	71.34	CCW
9	40.47	75.08	73.33	CCW
10	39.82	71.74	72.38	CCW

= Average 40 mph SD feet	74.31
= Standard Deviation, 40 mph SD feet	6.20

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	43.64	0.85	1.03	0.87
		Max Lat	0.85		
1	CCW	46.05	0.95	1.03	0.97
		Max Lat	0.95		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Record lap times

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	62.197	62.669
2	62.502	62.655
3	62.26	62.523
4	62.545	62.419
5	62.016	62.618
6	62.333	62.861
7	62.54	62.635
8	63.04	62.741
9	62.606	62.751
10	62.624	62.648
11	62.074	61.934
12	62.153	62.662
13	62.029	62.321
14	62.122	62.273
15	62.001	62.636
16	62.001	62.465
17	61.979	62.89
18	61.824	62.55
19	62.772	62.897
20	62.393	62.642
21	62.131	62.313
22	62.283	62.383
23	62.467	62.457
24	62.255	62.228
25	62.49	62.298
26	62.367	62.59
27	62.473	62.548
28	62.378	62.346
29	62.482	62.823
30	62.254	62.954
31	62.382	62.541
32	62.395	62.297
33	62.246	62.769
34	62.455	62.434
35	62.165	62.597
36	62.533	62.51

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
37	62.508	62.818
38	62.799	62.799
39	62.519	63.064
40	63.055	62.751
41	62.62	62.059
42	61.998	62.162
43	62.285	62.063
44	62.206	62.042
45	62.446	62.384
46	62.601	62.24
47	62.93	62.658
48	62.677	62.526
49	62.542	62.641
50	62.795	62.54
Avg =	62.326861	62.552167
Std Dev =	0.2493473	0.2196363
Min =	61.824	61.934
Max =	63.04	62.954
Range =	1.216	1.02

Temperatures of rotor and tire during endurance test

Vehicle CVPI - Pirelli Pzero Nero

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	831	140	350	142	385	141	795	162
After 20 Laps	856	147	400	151	394	152	820	161
After 30 Laps	862	149	425	159	435	156	825	167
After 40 Laps	852	152	408	152	460	155	804	163
After 50 Laps	871	143	430	152	539	156	856	161
After 60 Laps	917	157	465	155	526	140	831	149
After 70 Laps	948	168	498	154	570	141	848	150
After 80 Laps	970	171	505	155	610	144	865	157
After 90 Laps	960	173	510	159	505	136	867	159
After 100 Laps	880	177	507	173	515	136	778	142

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/15/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	61.08	150.13	144.89	0.9999	144.88
2	60.66	142.50	139.41	0.9999	139.40
3	60.58	140.22	137.53	0.9999	137.51
4	60.39	140.77	138.97	0.9999	138.96
5	60.31	138.80	137.40	0.9999	137.38
= Average 60 mph SD feet			139.64		139.63
= Standard Deviation, 60 mph SD feet			3.07		3.07

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/15/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.99	123.73	117.05
2	35.81	124.55	119.01
3	35.26	120.44	118.64
4	34.68	120.67	122.90
5	35.99	129.27	122.25
6	35.40	124.29	121.53
7	35.29	118.44	116.52
8	35.76	126.60	121.26
9	35.95	126.85	120.22
10	35.84	121.59	115.98

= Average 35 mph SD feet	119.54
= Standard Deviation, 35 mph SD feet	2.48

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/15/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.51	81.74	79.69	CW
2	42.05	87.58	79.24	CW
3	42.27	87.78	78.62	CW
4	40.56	85.92	83.54	CW
5	39.72	76.49	77.56	CW
6	40.86	84.89	81.36	CCW
7	41.37	86.10	80.51	CCW
8	40.35	78.85	77.51	CCW
9	40.42	77.15	75.56	CCW
10	40.41	75.99	74.46	CCW

= Average 40 mph SD feet	78.80
= Standard Deviation, 40 mph SD feet	2.70

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	44.79	0.89	1.01	0.90
		Max Lat.	0.89		
1	CCW	46.73	0.97	1.01	0.98
		Max Lat.	0.97		

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.125	-0.1875	-0.1875	-0.15625	0	0
TDC + 90°	-0.109375	-0.1875	-0.203125	-0.15625	0	0
TDC + 180°	-0.109375	-0.1875	-0.203125	-0.171875	0	0
TDC + 270°	-0.109375	-0.1875	-0.203125	-0.171875	0	0
Average	-0.113281	-0.1875	-0.199219	-0.164063	0	0

% Wear	36.25%	57.14%	60.71%	58.33%	LF AVG	53.11%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.109375	-0.15625	-0.1875	-0.1875	0	0
TDC + 90°	-0.109375	-0.15625	-0.1875	-0.1875	0	0
TDC + 180°	-0.109375	-0.15625	-0.1875	-0.1875	0	0
TDC + 270°	-0.109375	-0.15625	-0.1875	-0.1875	0	0
Average	-0.109375	-0.15625	-0.1875	-0.1875	0	0

% Wear	36.84%	50.00%	57.14%	63.16%	RF AVG	51.79%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.125	-0.1875	-0.1875	-0.140625	0	0
TDC + 90°	-0.109375	-0.1875	-0.1875	-0.140625	0	0
TDC + 180°	-0.125	-0.171875	-0.171875	-0.125	0	0
TDC + 270°	-0.109375	-0.1875	-0.171875	-0.125	0	0
Average	-0.117188	-0.183594	-0.179688	-0.132813	0	0

% Wear	39.47%	55.95%	54.76%	47.22%	LR AVG	49.35%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.125	-0.171875	-0.15625	-0.140625	0	0
TDC + 90°	-0.125	-0.171875	-0.15625	-0.140625	0	0
TDC + 180°	-0.140625	-0.171875	-0.15625	-0.125	0	0
TDC + 270°	-0.125	-0.171875	-0.15625	-0.140625	0	0
Average	-0.128906	-0.171875	-0.15625	-0.136719	0	0

% Wear	43.42%	52.38%	50.00%	48.61%	RR AVG	48.60%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	53.11%
RF AVG	51.79%
LR AVG	49.35%
RR AVG	48.60%

Ford CVPI/Nokian WRG2

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	CVPI
Vehicle VIN	AX125586
Initial Odometer	3517
Tire Manufacturer	Nokian
Tire Brand Name	WRG2

General Track and Weather Info

Date of Test	14-Jun-11
Driver	Jim Flegel

Track Temperature	Initial	65° F
Deg F	Midpoint	95° F
	Final	106° F

Weather Info

Temperature	Initial	57° F
Deg F	Midpoint	70° F
	Final	76° F

Conditions Sunny, Cool, Light Winds

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Nokian
Tire Brand Name	WRG2
Tire Build Date	1710
DOT Code	60C6 1710
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	103

Tire Position: Left Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.219	0.188	0.203	0.203		
TDC + 90°	0.219	0.203	0.188	0.203		
TDC + 180°	0.219	0.203	0.203	0.219		
TDC + 270°	0.219	0.203	0.219	0.219		
Average	0.219	0.199	0.203	0.211		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Nokian
Tire Brand Name	WRG2
Tire Build Date	1710
DOT Code	60C6 1710
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	103

Tire Position: Right Front Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 40

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.203	0.188	0.203	0.203		
TDC + 90°	0.203	0.188	0.203	0.203		
TDC + 180°	0.203	0.172	0.219	0.203		
TDC + 270°	0.219	0.172	0.203	0.203		
Average	0.207	0.180	0.207	0.203		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Nokian
Tire Brand Name	WRG2
Tire Build Date	1710
DOT Code	60C6 1710
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	103

Tire Position: Left Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 39

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.188	0.172	0.188	0.203		
TDC + 90°	0.188	0.156	0.188	0.219		
TDC + 180°	0.188	0.156	0.188	0.219		
TDC + 270°	0.188	0.156	0.188	0.203		
Average	0.188	0.160	0.188	0.211		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Nokian
Tire Brand Name	WRG2
Tire Build Date	1710
DOT Code	60C6 1710
UTQG Treadwear Rating	400
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	103

Tire Position: Right Rear Initial Cold Inflation Pressure (psi): 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.344	0.344	0.344	0.344		
TDC + 90°	0.344	0.344	0.344	0.344		
TDC + 180°	0.344	0.344	0.344	0.344		
TDC + 270°	0.344	0.344	0.344	0.344		
Average	0.344	0.344	0.344	0.344		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi): 40

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.156	0.156	0.172	0.188		
TDC + 90°	0.156	0.156	0.172	0.172		
TDC + 180°	0.141	0.156	0.172	0.203		
TDC + 270°	0.172	0.156	0.172	0.188		
Average	0.156	0.156	0.172	0.188		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/14/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	60.19	146.99	146.08
2	60.02	146.56	146.45
3	60.53	149.14	146.56
4	60.06	147.67	147.39
5	59.88	149.45	150.05
6	60.63	151.03	147.93
7	60.01	148.46	148.42
8	60.08	150.06	149.66
9	60.32	149.04	147.49
10	61.33	152.99	146.44

= Average 60 mph SD feet	147.65
= Standard Deviation, 60 mph SD feet	1.38

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/14/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	59.59	142.94	144.91	1.0145	147.01
2	60.76	148.88	145.17	1.0145	147.27
3	59.81	146.39	147.33	1.0145	149.47
4	60.30	149.02	147.55	1.0145	149.69
5	60.08	146.18	145.80	1.0145	147.91
= Average 60 mph SD feet			146.15		148.27
= Standard Deviation, 60 mph SD feet			1.22		1.24

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/14/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	36.07	113.99	107.32
2	36.24	105.67	98.55
3	35.38	109.69	107.35
4	35.89	106.84	101.62
5	35.62	107.42	103.73
6	35.03	100.78	100.59
7	35.64	109.33	105.44
8	35.46	107.88	105.11
9	35.47	106.16	103.35
10	36.13	108.91	102.20

= Average 35 mph SD feet	103.53
= Standard Deviation, 35 mph SD feet	2.87

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/14/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.82	80.42	77.21	CW
2	39.72	83.65	84.82	CW
3	41.37	83.83	78.39	CW
4	41.04	81.78	77.68	CW
5	41.75	84.68	77.74	CW
6	39.26	74.97	77.84	CCW
7	39.27	71.72	74.41	CCW
8	40.86	81.32	77.93	CCW
9	39.62	74.29	75.74	CCW
10	39.45	72.22	74.27	CCW

= Average 40 mph SD feet	77.60
= Standard Deviation, 40 mph SD feet	2.94

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	45.74	0.93	1.03	0.96
		Max Lat	0.93		
1	CCW	46.24	0.95	1.03	0.98
		Max Lat	0.95		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1	62.684	62.23
2	62.383	62.487
3	62.679	62.572
4	62.723	62.336
5	63.108	62.42
6	62.892	62.423
7	62.609	62.716
8	62.624	62.487
9	63.062	62.343
10	62.871	62.33
11	63.033	62.231
12	62.814	62.173
13	62.562	62.286
14	62.58	62.573
15	62.578	62.402
16	62.728	62.507
17	62.755	62.324
18	62.469	62.495
19	65.412	62.79
20	63.163	62.391
21	62.47	62.589
22	62.833	62.465
23	63.101	62.368
24	63.024	62.281
25	62.612	62.386
26	62.709	62.452
27	62.781	62.546
28	62.862	62.896
29	63.303	62.935
30	62.718	62.599
31	62.623	62.392
32	62.726	62.612
33	63.557	62.614
34	63.521	62.753
35	62.526	62.735
36	63.003	62.781

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
37	62.677	62.638
38	63.079	62.627
39	62.87	63.103
40	62.825	62.492
41	62.682	62.532
42	62.534	62.198
43	62.908	62.573
44	62.63	62.71
45	62.806	62.798
46	62.798	62.826
47	62.919	63.163
48	62.908	62.738
49	62.899	62.961
50	62.796	62.597
Avg =	62.891611	62.497778
Std Dev =	0.5136552	0.1903315
Min =	62.383	62.173
Max =	65.412	62.935
Range =	3.029	0.762

Temperatures of rotor and tire during endurance test

Vehicle CVPI Nokian WRG2

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	842	117	345	128	330	160	813	158
After 20 Laps	866	130	407	144	378	156	805	167
After 30 Laps	948	128	505	150	408	158	892	161
After 40 Laps	901	131	430	152	430	161	856	167
After 50 Laps	854	137	465	144	426	163	823	168
After 60 Laps	878	156	473	159	372	116	791	123
After 70 Laps	960	164	559	160	449	132	840	140
After 80 Laps	917	166	545	161	436	125	847	130
After 90 Laps	953	168	615	163	503	134	848	140
After 100 Laps	940	155	580	143	525	140	868	154

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/14/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjusted w/ Index
1	59.76	145.42	146.60	1.0003	146.64
2	59.93	144.29	144.61	1.0003	144.65
3	59.97	143.95	144.11	1.0003	144.16
4	60.16	145.31	144.54	1.0003	144.58
5	60.28	144.59	143.26	1.0003	143.30
= Average 60 mph SD feet			144.62		144.67
= Standard Deviation, 60 mph SD feet			1.23		1.23

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/14/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	35.99	120.95	114.40
2	35.89	115.55	109.88
3	35.15	124.09	123.03
4	34.81	120.08	121.41
5	35.27	113.83	112.07
6	36.04	121.17	114.30
7	35.62	121.43	117.26
8	35.50	116.93	113.64
9	36.24	125.13	116.70
10	36.15	122.13	114.47

= Average 35 mph SD feet	115.72
= Standard Deviation, 35 mph SD feet	4.03

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/14/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	40.49	80.13	78.18	CW
2	40.88	73.29	70.18	CW
3	40.66	96.29	93.19	CW
4	40.36	90.43	88.83	CW
5	41.10	86.51	81.94	CW
6	39.70	73.20	74.31	CCW
7	38.65	76.12	81.52	CCW
8	39.33	74.77	77.34	CCW
9	40.76	81.46	78.43	CCW
10	40.70	79.86	77.14	CCW

= Average 40 mph SD feet	80.11
= Standard Deviation, 40 mph SD feet	6.73

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjusted w/ Index
1	CW	47.24	0.99	1.01	1.01
		Max Lat.	0.99		
1	CCW	47.52	1.01	1.01	1.02
		Max Lat.	1.01		

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.125	-0.15625	-0.140625	-0.140625	0	0
TDC + 90°	-0.125	-0.140625	-0.15625	-0.140625	0	0
TDC + 180°	-0.125	-0.140625	-0.140625	-0.125	0	0
TDC + 270°	-0.125	-0.140625	-0.125	-0.125	0	0
Average	-0.125	-0.144531	-0.140625	-0.132813	0	0

% Wear	36.36%	42.05%	40.91%	38.64%	LF AVG	39.49%

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.140625	-0.15625	-0.140625	-0.140625	0	0
TDC + 90°	-0.140625	-0.15625	-0.140625	-0.140625	0	0
TDC + 180°	-0.140625	-0.171875	-0.125	-0.140625	0	0
TDC + 270°	-0.125	-0.171875	-0.140625	-0.140625	0	0
Average	-0.136719	-0.164063	-0.136719	-0.140625	0	0

% Wear	39.77%	47.73%	39.77%	40.91%	RF AVG	42.05%

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.15625	-0.171875	-0.15625	-0.140625	0	0
TDC + 90°	-0.15625	-0.1875	-0.15625	-0.125	0	0
TDC + 180°	-0.15625	-0.1875	-0.15625	-0.125	0	0
TDC + 270°	-0.15625	-0.1875	-0.15625	-0.140625	0	0
Average	-0.15625	-0.183594	-0.15625	-0.132813	0	0

% Wear	45.45%	53.41%	45.45%	38.64%	LR AVG	45.74%

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.1875	-0.1875	-0.171875	-0.15625	0	0
TDC + 90°	-0.1875	-0.1875	-0.171875	-0.171875	0	0
TDC + 180°	-0.203125	-0.1875	-0.171875	-0.140625	0	0
TDC + 270°	-0.171875	-0.1875	-0.171875	-0.15625	0	0
Average	-0.1875	-0.1875	-0.171875	-0.15625	0	0

% Wear	54.55%	54.55%	50.00%	45.45%	RR AVG	51.14%

Average Wear by Tire Position

Tire Position	% Tread Consumed
LF AVG	39.49%
RF AVG	42.05%
LR AVG	45.74%
RR AVG	51.14%

Ford CVPI/Cooper CS4

2011 NIJ-MSP Tire Test Form
General Info Form

Vehicle Application	CVPI
Vehicle VIN	AX125586
Initial Odometer	3154
Tire Manufacturer	Cooper
Tire Brand Name	CS4

General Track and Weather Info

Date of Test	6/7/11
Driver	Jim Flegel

Track Temperature	Initial	86° F
Deg F	Midpoint	113°
	Final	

Weather Info

Temperature	Initial	78° F
Deg F	Midpoint	86°F
	Final	

Conditions Sunny, Hazy, Humid

TEST ABORTED -- TIRE FAILURE

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	4910
DOT Code	U97A CLT 4910
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	99

Tire Position Left Front Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.328	0.344	0.344	0.328		
TDC + 90°	0.328	0.344	0.344	0.328		
TDC + 180°	0.328	0.344	0.344	0.328		
TDC + 270°	0.328	0.344	0.344	0.328		
Average	0.328125	0.34375	0.34375	0.328125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.281	0.281	0.281	0.266		
TDC + 90°	0.266	0.297	0.281	0.266		
TDC + 180°	0.250	0.297	0.281	0.250		
TDC + 270°	0.266	0.297	0.281	0.266		
Average	0.265625	0.29296875	0.28125	0.2617188		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	4910
DOT Code	U97A CLT 4910
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	99

Tire Position Right Front Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.328	0.328	0.313		
TDC + 90°	0.313	0.328	0.328	0.313		
TDC + 180°	0.313	0.328	0.328	0.313		
TDC + 270°	0.313	0.328	0.328	0.313		
Average	0.3125	0.328125	0.328125	0.3125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.266	0.297	0.297	0.281		
TDC + 90°	0.250	0.281	0.281	0.266		
TDC + 180°	0.266	0.297	0.297	0.266		
TDC + 270°	0.250	0.297	0.297	0.266		
Average	0.2578125	0.29296875	0.2929688	0.2695313		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	4910
DOT Code	U97A CLT 4910
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	99

Tire Position Left Rear Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.328	0.328	0.297		
TDC + 90°	0.313	0.328	0.328	0.297		
TDC + 180°	0.313	0.328	0.328	0.297		
TDC + 270°	0.313	0.328	0.328	0.297		
Average	0.3125	0.328125	0.328125	0.296875		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.250	0.266	0.266		
TDC + 90°	0.250	0.266	0.266	0.250		
TDC + 180°	0.250	0.266	0.281	0.266		
TDC + 270°	0.266	0.266	0.281	0.266		
Average	0.2539063	0.26171875	0.2734375	0.2617188		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

2011 NIJ-MSP Tire Test Form
Tire Info Sheet

Vehicle Application	CVPI
Tire Manufacturer	Cooper
Tire Brand Name	CS4
Tire Build Date	4910
DOT Code	U97A CLT 4910
UTQG Treadwear Rating	520
UTQG Load Rating	A
UTQG Traction Rating	A
Speed Rating	V
Load Index	99

Tire Position Right Rear Initial Cold Inflation Pressure (psi) 35

Initial Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.313	0.328	0.344	0.313		
TDC + 90°	0.313	0.328	0.344	0.313		
TDC + 180°	0.313	0.328	0.344	0.313		
TDC + 270°	0.313	0.328	0.344	0.313		
Average	0.3125	0.328125	0.34375	0.3125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Final Cold Inflation Pressure (psi) _____

Final Tire Tread Depth (Inches) by Groove Number

	Groove					
Position	1	2	3	4	5	6
TDC	0.250	0.250	0.281	0.266		
TDC + 90°	0.250	0.250	0.266	0.266		
TDC + 180°	0.250	0.234	0.281	0.250		
TDC + 270°	0.250	0.250	0.266	0.250		
Average	0.25	0.24609375	0.2734375	0.2578125		

TDC = Valve stem location when facing tire and degrees are measured clockwise from TDC

Stage 2-Burnish (driver + full instrumentation + full fuel)

Control tire runs this stage only once

Conduct 10 60 -> 0 mph full ABS stops

Location	Dry Asphalt
Date	6/2/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	60.99	143.05	138.44
2	60.75	139.48	136.07
3	60.08	136.68	136.29
4	60.61	139.51	136.70
5	60.99	138.49	134.03
6	60.22	138.50	137.50
7	60.17	139.65	138.84
8	60.21	137.30	136.33
9	60.52	138.35	135.98
10	60.77	140.72	137.18

= Average 60 mph SD feet	136.74
= Standard Deviation, 60 mph SD feet	1.37

Stage 3-New Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)

Location	Track Straightaway Dry Asphalt
Date	6/7/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Index	Adjustment w/ Index
1	60.15	136.80	136.14	0.9826	133.77
2	60.43	137.42	135.49	0.9826	133.13
3	60.53	140.34	137.88	0.9826	135.48
4	59.98	137.35	137.43	0.9826	135.04
5	60.72	138.65	135.37	0.9826	133.02
= Average 60 mph SD feet			136.46		134.09
= Standard Deviation, 60 mph SD feet			1.14		1.12

Stage 4-New Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)

Location	Wet Jennite (Sprinklers On)
Date	6/7/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1	34.57	97.89	100.35
2	35.97	104.81	99.22
3	35.30	119.99	117.94
4	35.45	102.36	99.80
5	34.79	104.51	105.81
6	35.35	104.92	102.85
7	34.83	98.01	98.97
8	34.43	63.76	65.91
9	34.91	102.45	102.99
10	34.59	114.51	117.27

= Average 30 mph SD feet	101.11
= Standard Deviation, 30 mph SD feet	14.23

Stage 5-New Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)

Location	Turn 6 (Sprinklers On)
Date	6/7/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1	39.42	77.80	80.09	CW
2	37.97	67.07	74.45	CW
3	38.82	65.81	69.87	CW
4	38.78	73.78	78.50	CW
5	41.14	78.51	74.23	CW
6	41.10	101.47	96.11	CCW
7	41.59	96.27	89.07	CCW
8	41.58	92.70	85.78	CCW
9	40.01	81.80	81.76	CCW
10	39.32	96.10	99.45	CCW

= Average 30 mph SD feet	82.93
= Standard Deviation, 60 mph SD feet	9.66

Stage 6-New Tire Steady State Turn Max Lateral on Dry Asphalt

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G	Index	Adjustment w/ Index
1	CW	47.69	1.01	0.95	0.97
		Max Lat	1.01		
1	CCW	45.98	0.94	0.95	0.90
		Max Lat	0.94		

Stage 7-Tire Endurance/Wear Testing

Drive 100 laps at max speed on dry asphalt track (50 each direction).

Tested aborted due to excess tire wear

Lap #	CW Lap Time, Sec	CCW Lap Time, Sec	Lap #	CW Lap Time, Sec	CCW Lap Time, Sec
1			37		
2			38		
3			39		
4			40		
5			41		
6			42		
7			43		
8			44		
9			45		
10			46		
11			47		
12			48		
13			49		
14			50		
15					
16			Avg =		
17			Std Dev =		
18			Min =	0	0
19			Max =	0	0
20			Range =	0	0
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					

Temperature of rotor and tire during endurance test

Vehicle CVPI Cooper Tire

Lap Sequence	LF		LR		RR		RF	
	Rotor	Tire	Rotor	Tire	Rotor	Tire	Rotor	Tire
After 10 Laps	819	158	337	164	312	167	778	190
After 20 Laps	901	173	396	176	418	182	864	205
After 30 Laps	829	167	411	169	450	185	778	198
After 40 Laps	834	174	434	175	495	183	805	195
After 50 Laps								
After 60 Laps								
After 70 Laps								
After 80 Laps								
After 90 Laps								
Post Test								

Stage 8-Worn Tire Dry Asphalt Stopping Distance Tests
(driver + full instrumentation + full fuel)

Control tire runs this stage

Conduct five 60 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Track Straightaway Dry Asphalt
Date	6/7/11
Driver	Jim Flegel
Target Velocity, MPH	60

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1			
2			
3			
4			
5			

= Average 60 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 9-Worn Tire Wet Jennite Stopping Distance Tests
(driver + full instrumentation + full fuel)

Conduct 10 35 -> 0 mph full ABS stops (one per lap)
For each stop record initial vehicle speed, stopping distance

Location	Wet Jennite (Sprinklers On)
Date	6/7/11
Driver	Jim Flegel
Target Velocity, MPH	35

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

= Average 30 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 10-Worn Tire Wet Asphalt Braking in a Turn Stopping Distance Tests (driver + full instrumentation + full fuel)

Conduct 10 40 -> 0 mph full ABS stops (one per lap, five in each direction)
For each stop record initial vehicle speed, stopping distance, run direction (CW, CCW)

Location	Turn 6 (Sprinklers On)
Date	6/7/11
Driver	Jim Flegel
Target Velocity, MPH	40

Stop #	Initial Velocity, MPH	Stopping Distance, Feet	V^2 Corrected SD, Feet	Run Direction
1				CW
2				CW
3				CW
4				CW
5				CW
6				CCW
7				CCW
8				CCW
9				CCW
10				CCW

= Average 30 mph SD feet
= Standard Deviation, 60 mph SD feet

Stage 11-Worn Tire Steady State Turn Max Lateral on Dry Asphalt

Test aborted due to excess tire wear

Control vehicle/tire runs three 60->0 mph full ABS (one per lap) on dynamics pad for reference purposes.

Execute steady state turns in 300-foot diameter circle
Lap 1 – 30 mph
Lap 2 – spinout -> increase vehicle speed by 2 mph each lap

Conduct steady state turn tests in both direction (clockwise, counter clockwise) until reaching loss of stability or failure to maintain turn radius.

Record highest vehicle speed for which vehicle maintains turn radius/stability.

Run #	Direction	Velocity	Lateral Accel,G
1	CW		0
		Max Lat.	0
	CCW		0
		Max Lat.	0

Stage 12- End of Test Tire Wear Check

Measure tire tread depth in each groove at four locations and record results in tire sheet

Left Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.0625	-0.0625	-0.0625	0	0
TDC + 90°	-0.0625	-0.046875	-0.0625	-0.0625	0	0
TDC + 180°	-0.078125	-0.046875	-0.0625	-0.078125	0	0
TDC + 270°	-0.0625	-0.046875	-0.0625	-0.0625	0	0
Average	-0.0625	-0.050781	-0.0625	-0.066406	0	0

Right Front	Groove					
Position	1	2	3	4	5	6
TDC	-0.046875	-0.03125	-0.03125	-0.03125	0	0
TDC + 90°	-0.0625	-0.046875	-0.046875	-0.046875	0	0
TDC + 180°	-0.046875	-0.03125	-0.03125	-0.046875	0	0
TDC + 270°	-0.0625	-0.03125	-0.03125	-0.046875	0	0
Average	-0.054688	-0.035156	-0.035156	-0.042969	0	0

Left Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.0625	-0.078125	-0.0625	-0.03125	0	0
TDC + 90°	-0.0625	-0.0625	-0.0625	-0.046875	0	0
TDC + 180°	-0.0625	-0.0625	-0.046875	-0.03125	0	0
TDC + 270°	-0.046875	-0.0625	-0.046875	-0.03125	0	0
Average	-0.058594	-0.066406	-0.054688	-0.035156	0	0

Right Rear	Groove					
Position	1	2	3	4	5	6
TDC	-0.0625	-0.078125	-0.0625	-0.046875	0	0
TDC + 90°	-0.0625	-0.078125	-0.078125	-0.046875	0	0
TDC + 180°	-0.0625	-0.09375	-0.0625	-0.0625	0	0
TDC + 270°	-0.0625	-0.078125	-0.078125	-0.0625	0	0
Average	-0.0625	-0.082031	-0.070313	-0.054688	0	0

About the National Institute of Justice

The National Institute of Justice — the research, development and evaluation agency of the U.S. Department of Justice — is dedicated to improving knowledge and understanding of crime and justice issues through science. NIJ provides objective and independent knowledge and tools to reduce crime and promote justice, particularly at the state and local levels.

NIJ's pursuit of this mission is guided by the following principles:

- Research can make a difference in individual lives, in the safety of communities and in creating a more effective and fair justice system.
- Government-funded research must adhere to processes of fair and open competition guided by rigorous peer review.
- NIJ's research agenda must respond to the real world needs of victims, communities and criminal justice professionals.
- NIJ must encourage and support innovative and rigorous research methods that can provide answers to basic research questions as well as practical, applied solutions to crime.

Partnerships with other agencies and organizations, public and private, are essential to NIJ's success.

Strategic Goals

The National Institute of Justice is committed to being a transformative force in the criminal justice field by meeting five strategic challenges:

- Fostering science-based criminal justice practice — supporting rigorous scientific research to ensure the safety of families, neighborhoods and communities. Learn how NIJ tests and evaluates programs, practices and equipment.
- Translating knowledge to practice — disseminating rigorous scientific research to criminal justice professionals to advance what works best in preventing and reducing crime. Learn about how NIJ moves research from knowledge to practice.
- Advancing technology — building a more effective, fair and efficient criminal justice system through technology. Learn about NIJ's research, development, testing and evaluation process.
- Working across disciplines — connecting the physical, forensic and social sciences to reduce crime and promote justice.
- Adopting a global perspective — understanding crime in its social context within the United States and globally. Visit NIJ's International Center.

Translational criminology is NIJ's strategy for transforming criminal justice through research. By bringing evidence to bear on crime policies and practices, NIJ forms a bridge between the work of research and the real-life challenges of fighting crime and enhancing justice. Transformation through research is a cyclical process. Continually, NIJ draws on the needs of practitioners to inform its research agenda; the cycle of transformation continues as research findings are conveyed and translated by researchers in ways that reshape practice and policy. The links in this transforming process take several forms:

- Technology working groups that provide practical insights about technology needs and challenges among criminal justice professionals.
- Topical work groups and strategic planning meetings that take stock of the current state of research knowledge.
- "Listening sessions" with practitioner, policy and research groups.

- Cutting-edge communication tools, including print and electronic media, to help NIJ constituents make sense of the research and put it to use.
- An annual national conference to assemble more than 1,000 criminal justice researchers and practitioners across the social, physical and forensic science fields.
- Building a cumulative body of knowledge with ongoing input from practitioners, policymakers and the research community to advance policy and practice.

NIJ supports research, evaluation and development in the following areas:

- Causes and correlates of crime.
- Crime prevention and control, increasing community safety.
- Prevention of violence and victimization.
- Forensic sciences, including the use of DNA evidence.
- Corrections practice and policy, including community corrections.
- Law enforcement, including technology, to improve police effectiveness, legitimacy, accountability and safety.
- Courts and adjudication.

The NIJ Director

The NIJ Director is appointed by the President and confirmed by the Senate. The Director establishes the Institute's objectives, guided by the needs of the field and the priorities of the Office of Justice Programs and the U.S. Department of Justice.

About the National Law Enforcement and Corrections Technology Center System

One office and three types of centers comprise the NLECTC system. These are:

- The Office of Law Enforcement Standards, which is a component of the Department of Commerce's National Institute of Standards and Technology.
- The National Center.
- The Technology Centers of Excellence.
- The Regional Centers.

All of these components work together as part of an integrated NLECTC system.

The Office of Law Enforcement Standards assists the National Institute of Justice to develop performance standards.

The National Center serves as the technology information clearinghouse of the NLECTC system. It also administers NIJ's equipment Compliance-Testing Program.

The Technology Centers of Excellence are the authoritative resource within the NLECTC system for practitioners and developers in their technology area(s) of focus. Their primary role is to assist in the transition of technology from the laboratory into practice. They accomplish this mainly through activities related to the testing, evaluation and demonstration of new technologies and through provision of technology assistance to first adopting agencies. Each Center of Excellence supports one or more of NIJ's technology investment portfolios.

The Regional Centers are the initial point of entry for practitioners to the NLECTC system and provide generalized technology assistance to agencies within their regions. As needed, they forward requests for specialized assistance to the appropriate Center of Excellence. They also support the Centers of Excellence in coordinating technology demonstrations and evaluations with agencies within their regions.

To receive more information or to add your name to the NLECTC mailing list, call (800) 248-2742 or (301) 519-5060, or write:

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The National Law Enforcement and Corrections Technology Center is supported by Cooperative Agreement #2010-MU-MU-K020 awarded by the U.S. Department of Justice, National Institute of Justice. Analyses of test results do not represent product approval or endorsement by the National Institute of Justice, U.S. Department of Justice; the National Institute of Standards and Technology, U.S. Department of Commerce; or Lockheed Martin. Points of view or opinions contained within this document are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.