

## MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)

**Client** Rayloc  
3100 Windy Hill Rd  
Atlanta, GA 30339

**Report Number** 177978-3 Rev. A

**Vehicle Simulated** 2001 Ford Focus

**Front Lining Edge Code** CMX 722-FF

**Rear Lining Edge Code** NPTC1029-FF

**Test Completion Date** 08 December 2017  
Revised 05 January 2017

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Complete test report in Microsoft® Excel format available upon request.

**Signature**

### Greening Testing Laboratories, Inc.

19465 Mt. Elliott Avenue  
Detroit, Michigan 48234-2742 U.S.A.  
+1.313.366.7160 • fax: +1.313.366.5415  
info@greeninginc.com • www.greeninginc.com

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Test Number: M05-321-08

Report Number: 177978-3 Rev. A

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rayloc

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

**MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)**

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

**Test Number** M05-321-08  
**Test Program Number** 32640311.TST  
**Vehicle System Simulated** 2001 Ford Focus  
**Reference** Mr. Dan Berletchick  
**Test Date(s)** 04 - 05 December 2017  
**Date Test Report Prepared** 15 December 2017  
**Test Report Prepared By** K. Machus

	<u>Front Disc Brake</u>	<u>Rear Drum Brake</u>
<b>Lining Edge Code</b>	CMX 722-FF	NPTC1029-FF
<b>Brake Pad/Shoe Part Number</b>	NAPA UP-7690-X	TINACHI S747
<b>Brake Pad FMSI® Number</b>	7690-D816	1513-S747
<b>Brake Configuration</b>	single piston separate function disc brake	leading/trailing drum brake
<b>Piston / Wheel Cylinder Diameter</b>	54.0 mm	21 mm
<b>Rotor / Drum Part Number</b>	NAPA 86913CR	NAPA 4401810BRNG
<b>Brake Size (nominal)</b>		
Rotor Diameter x Thickness	256 x 22 mm	-----
Drum Diameter x Shoe Width	-----	203 x 44 mm
<b>Rotor/Drum Mass (nominal)</b>	5.2 kg	6.8 kg
<b>Rotor/Drum Effective Radius</b>	106.2 mm	112.5 mm
<b>Wheel Rotation</b>	right hand	left hand
<b>Test Fixture</b>	044621	189865
<b>Date Parts Received</b>	08 June 2017	04 April 2017

\*NOTE: Test report revised 05 January 2018 to correct linking error in Failed Power Brake Section.

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### TEST PROGRAM CONTROL PARAMETERS

#### Test Inertias

Light Load Vehicle Weight (LLVW)	52.8	kg·m <sup>2</sup>
Gross Vehicle Weight Rating (GVWR)	76.4	kg·m <sup>2</sup>
Failed Circuit at LLVW	105.8	kg·m <sup>2</sup>
Failed Circuit at GVWR	149.9	kg·m <sup>2</sup>

**Static Loaded Radius / Rolling Radius** 298.5 mm

#### Equivalent Half Vehicle Loads

Light Load Vehicle Weight (LLVW)	592.6	kg
Gross Vehicle Weight Rating (GVWR)	857.4	kg
Failed Circuit at LLVW	1187.4	kg
Failed Circuit at GVWR	1682.3	kg

**Hydraulic Split** Diagonal

**Maximum System Pressure With Assist (P<sub>500N Operational</sub>)** 12,760 kPa

**System Pressure Without Assist (P<sub>500N depleted</sub>)** 2,500 kPa



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**FRONT BRAKE PAD MEASUREMENTS**

Thickness & Mass (mm/kg)

	Location	Pre Test	Post Test	Loss		Location	Pre Test	Post Test	Loss
Inboard Pad	A	18.51	17.95	0.56	Outboard Pad	I	18.56	17.90	0.66
	B	18.53	17.93	0.60		J	18.58	17.95	0.63
	C	18.47	17.97	0.50		K	18.99	18.25	0.74
	D	18.50	18.07	0.43		L	18.45	17.73	0.72
	E	18.44	18.12	0.32		M	18.36	18.05	0.31
	F	18.42	17.91	0.51		N	18.43	18.08	0.35
	G	18.42	17.95	0.47		O	18.49	18.11	0.38
	H	18.29	17.89	0.40		P	18.44	18.04	0.40
	Average	18.45	17.97	0.47		Average	18.54	18.01	0.52
Mass	0.408	0.404	0.004	Mass	0.422	0.417	0.005		

**FRONT BRAKE ROTOR MEASUREMENTS**

Thickness & Mass (mm/kg)

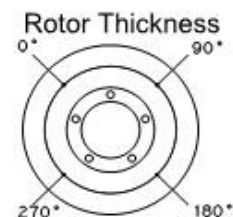
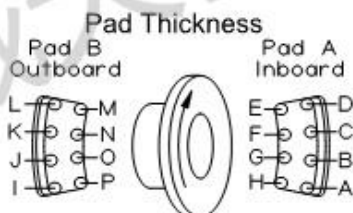
Location	Pre Test	Post Test	Loss
A	22.068	22.020	0.048
B	22.062	22.027	0.035
C	22.059	22.009	0.050
D	22.065	22.017	0.048
Average	22.064	22.018	0.046
Mass	5.220	5.218	0.002

Physical Characteristics

	Pre Test	Post Test
Surface Finish (µm) (0° Inboard Face)	1.78	0.98
Brinell Hardness (0° Inboard Face)	207	163
TIR (mm) (Inboard Face)	0.050	0.074

NOTE: Values in parentheses indicate an increase in thickness or mass.

**MEASUREMENT LOCATION DIAGRAMS**



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2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

**REAR BRAKE SHOE MEASUREMENTS**

Thickness & Mass (mm/kg)

	Location	Pre Test	Post Test	Loss		Location	Pre Test	Post Test	Loss
Leading Shoe	A	7.83	7.51	0.32	Trailing Shoe	I	5.18	4.92	0.26
	B	7.92	7.75	0.17		J	5.27	5.29	(0.02)
	C	7.75	7.63	0.12		K	5.42	5.42	0.00
	D	7.67	7.28	0.39		L	5.40	5.19	0.21
	E	7.69	7.10	0.59		M	5.28	5.09	0.19
	F	7.80	7.47	0.33		N	5.20	5.26	(0.06)
	G	7.98	7.74	0.24		O	5.15	5.17	(0.02)
	H	7.75	7.44	0.31		P	5.14	4.96	0.18
	Average	7.80	7.49	0.31		Average	5.26	5.16	0.09
Mass	0.316	0.312	0.004	Mass	0.386	0.385	0.001		

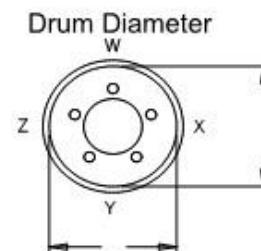
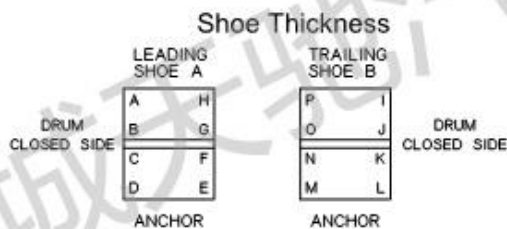
**REAR BRAKE DRUM MEASUREMENTS**

<u>Diameter &amp; Mass (mm/kg)</u>				<u>Physical Characteristics</u>				
	Location	Pre Test	Post Test	Loss	Pre Test	Post Test		
W to Y	Open	202.90	203.02	(0.12)	Surface Finish (µm) (0° Inboard Face)	2.20	0.98	
	Center	*	*			Brinell Hardness (0° Inboard Face)	*	*
	Closed	*	*					
X to Z	Open	202.92	203.02	(0.10)				
	Center	*	*					
	Closed	*	*					
	Average	202.91	203.02	(0.11)				
	Mass	6.821	6.817	0.004				

NOTE: Values in parentheses indicate an increase in thickness or mass.

\*NOTE: Unable to measure due to configuration of drum.

**MEASUREMENT LOCATION DIAGRAMS**





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### DATA NOTES

1 All average and sustained values shown in this report are calculated with respect to **DISTANCE**.

2 The data presented in this report has been gathered as follows:

START Threshold = Brake Pressure equivalent of 22N of pedal force or 20 N·m of brake torque.

AVERAGE = average value between START and STOP Threshold levels.

INITIAL Data Point = Values are taken at the point where the control level is achieved.

SUSTAINED Data = average value between the INITIAL and END data points.

END Data Point = Values are taken 0.1 seconds prior to the STOP threshold

MAXIMUM = maximum value observed in the SUSTAINED Data Interval.

STOP Threshold = 0.5 km/h prior to brake release

FINAL temperature is the highest temperature value observed in a 4.0 second "window" beginning 1.0 seconds after brake release.

3 Brake application is initiated when the control temperature (rotor) reaches the desired initial brake temperature.

4 Cooling Air Temperature = 25°C (±5°C)

5 Cooling Air Velocity = 30 km/h

6 Humidity control = 50% R/H

7 For all stops which show "zero" (0) or negative values for some of the computed pressure, torque or coefficient values:

These stops achieved final speed but did not achieve the torque level required for the particular stop. Since the START data and STOP data thresholds were satisfied, deceleration rate, distance, time to stop, etc., are accurate values, and can be used for data comparison purposes.

The presence of "zero" values generally is caused by lack of brake performance, resulting in a "clamp" condition. "Clamp" condition is defined by the brake calling for the maximum pressure the test section allows ("clamp" pressure) and the brake being unable to attain the deceleration rate required in the test section at that pressure.

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**TEST PROCEDURE**

TABLE 2 - SERVICE BRAKES TEST PROCEDURE - FMVSS 135

Section Number	FMVSS 135 Reference	Inertia Level [Equation from Table 1]	Braking Speed [km/h]	Brake Application Control (IBT, Cycle Time, or Distance)	Pressure Apply Rate [kPa/sec]	Pressure Limit [kPa]	Decel Level [g]	# of Stops/ Strubs
10	7.1 Burnish at GVWR	Eq. 4 or 5	80	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.31	200
20	7.4 (1) 3500 kPa Adhesion Utilization Ramps at GVWR	Eq. 4 or 5	50	IBT = 65 °C first, then 100 °C	700-2000	3500 kPa	—	3
30	7.4 (2) 12 000 kPa Adhesion Utilization Ramps at GVWR	Eq. 4 or 5	100	IBT = 65 °C first, then 100 °C	5000	12 000 kPa	—	3
40	7.5 Cold Effectiveness at GVWR	Eq. 4 or 5	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.90	6
50	7.6 High Speed Effectiveness at GVWR	Eq. 4 or 5	160 (80% V <sub>max</sub> for V <sub>max</sub> < 200 km/h)	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.80	6
55	7.7 Stops with engine off at GVWR	Eq. 4 or 5	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.90	6
60	7.5 Cold Effectiveness at LLW	Eq. 6 or 7	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.90	6
70	7.6 High Speed Effectiveness at LLW	Eq. 6 or 7	160 (80% V <sub>max</sub> for V <sub>max</sub> < 200 km/h)	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.80	6
80	7.8 Failed Antilock System at LLW	Eq. 6 or 7	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.60	6
90.a	7.10 Hydraulic Circuit Failure at LLW for front brakes	Eq. 9 for front-to-rear split Eq. 12 or 13 for diagonal split	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.70 front-to-rear split 0.45 diagonal split	4
90.b	7.10 Hydraulic Circuit Failure at LLW for rear brakes	Eq. 9 for front-to-rear split Eq. 12 or 13 for diagonal split	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.35 front-to-rear split 0.45 diagonal split	4
100.a	7.10 Hydraulic Circuit Failure at GVWR for front brakes	Eq. 8 for front-to-rear split Eq. 10 or 11 for diagonal split	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.60 front-to-rear split 0.40 diagonal split	4
100.b	7.10 Hydraulic Circuit Failure at GVWR for rear brakes	Eq. 8 for front-to-rear split Eq. 10 or 11 for diagonal split	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.40 front-to-rear split 0.40 diagonal split	4
110	7.8 Failed Antilock System at GVWR	Eq. 4 or 5	100	IBT = 100 °C	20 000	P <sub>500N</sub> operational	0.60	6
120	Cool Down at GVWR	Eq. 4 or 5	5	Until 5 °C above cooling air temp	—	—	—	—
130	Warm Up at GVWR	Eq. 4 or 5	50	Until 65° at 60 seconds cycle time	20 000	P <sub>500N</sub> operational	0.31	As needed
140	7.11 Failed Power-Brake Unit at GVWR	Eq. 4 or 5	100	IBT = 65 °C first, then 100 °C	20 000	P <sub>500N</sub> depleted	—	6
150	7.12 Parking Brake forward	—	Reserved for rear brakes; See appendix A					
155	7.12 Parking Brake reverse	—	Reserved for rear brakes; See appendix A					
160	7.13 Heating Strubs at GVWR	Eq. 4 or 5	120-60	IBT = 55 °C first, then cycle time of 45 seconds	20 000	P <sub>500N</sub> operational	0.31	15

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**TEST PROCEDURE**

TABLE 2 - SERVICE BRAKES TEST PROCEDURE - FMVSS 135 (CONTINUED)

Section Number	FMVSS 135 Reference	Inertia Level [Equation from Table 1]	Braking Speed [km/h]	Brake Application Control (IBT, Cycle Time, or Distance)	Pressure Apply Rate [kPa/sec]	Pressure Limit [kPa]	Decel Level [g]	# of Stops/ Snubs
170	7.14-1 First Hot Stop at GWR	Eq. 4 or 5	100	20 seconds after the end of the last snub from section 160	20 000	P <sub>best cold effect</sub>	—	1
180	7.14-2 Second Hot Stop at GWR	Eq. 4 or 5	100	20 seconds after the end of section 170	20 000	P <sub>COGN operational</sub>	0.90	1
190	7.15 Brake Cooling Stops at GWR	Eq. 4 or 5	50	Cycle distance = 1.5 km after the end of section 180	20 000	P <sub>COGN operational</sub>	0.31	4
200	7.16 Recovery Performance at GWR	Eq. 4 or 5	100	Cycle distance = 1.5 km after the start last stop of section 190	20 000	P <sub>best cold effect</sub>	—	1
				20 seconds after the end of stop 1 of this section				1
210	7.17 Final Inspection	Perform final inspection and measurements						



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2001 FORD FOCUS - FMSI@ NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

#### PRE TEST PHOTOGRAPHS - FRONT BRAKE



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#### PRE TEST PHOTOGRAPHS - REAR BRAKE





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### POST TEST VISUAL INSPECTION - FRONT BRAKE

**Inboard Pad:** The pad has moderate glazing, light grooving and light resin bleed.

**Outboard Pad:** The pad has moderate glazing, light grooving and light resin bleed.

**Rotor:** The braking surface has light grooving, light lining transfer and is black/grey in color.

All other test hardware appears in good condition.

### POST TEST PHOTOGRAPHS





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### POST TEST VISUAL INSPECTION - REAR BRAKE

**Leading Shoe:** The lining has moderate glazing, light grooving, light resin bleed and 95% contact.

**Trailing Shoe:** The lining has moderate glazing, light grooving, light resin bleed and 95% contact.

**Drum:** The braking surface has light grooving, light lining transfer and is black/grey in color.

All other test hardware appears in good condition.

### POST TEST PHOTOGRAPHS



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#### EFFECTIVENESS SUMMARY - FRONT BRAKE

Section	Specific Torque			% of Section 7.5 Cold Effects.
	Minimum	Average	Maximum	
7.5 Cold Effectiveness at GVWR	0.128	0.128	0.130	100%
7.6 High Speed Effectiveness at GVWR	0.107	0.110	0.112	86%
7.7 Stops With Engine Off at GVWR	0.107	0.112	0.115	87%
7.5 Cold Effectiveness at LLVW	0.112	0.119	0.124	93%
7.6 High Speed Effectiveness at LLVW	0.119	0.124	0.126	96%
7.8 Failed Antilock System at LLVW	0.120	0.122	0.125	95%
7.10 Hydraulic Circuit Failure at LLVW (Diagonal Split)	0.121	0.134	0.139	104%
7.10 Hydraulic Circuit Failure at GVWR (Diagonal Split)	0.112	0.119	0.122	93%
7.8 Failed Antilock System at GVWR	0.114	0.129	0.134	101%
7.11 Failed Power-Brake Unit at GVWR	0.106	0.128	0.139	100%
7.13 Heating Snubs at GVWR	0.120	0.128	0.141	100%
7.14-1 First Hot Stop at GVWR	0.121	0.121	0.121	95%
7.14-2 Second Hot Stop at GVWR	0.136	0.136	0.136	106%
7.15 Brake Cooling Stops at GVWR	0.142	0.153	0.164	119%
7.16 Recovery Performance at GVWR	0.139	0.145	0.150	113%

#### DECELERATION SUMMARY

Set point (g/kPa)	Highest Level attained (g)	Pressure at Highest Level (kPa)	
		Highest Level (kPa)	Pressure Limit (kPa)
0.90	0.74	0	12,760
0.80	0.66	0	12,760
0.90	0.66	0	12,760
0.90	0.82	6,760	12,760
0.80	0.77	7,020	12,760
0.60	0.59	4,294	12,760
0.45	0.43	10,878	12,760
0.40	0.37	10,878	12,760
0.60	0.57	6,912	12,760
2,500	0.25	2,502	2,500
0.31	0.31	4,250	12,760
10,910	0.63	9,162	12,760
0.90	0.71	9,834	12,760
0.31	0.31	3,024	12,760
10,910	0.76	9,162	12,760

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### EFFECTIVENESS SUMMARY - REAR BRAKE

Section	Specific Torque			% of Section 7.5 Cold Effects.
	Minimum	Average	Maximum	
7.5 Cold Effectiveness at GVWR	0.087	0.092	0.097	100%
7.6 High Speed Effectiveness at GVWR	0.064	0.068	0.074	73%
7.7 Stops With Engine Off at GVWR	0.065	0.068	0.070	73%
7.5 Cold Effectiveness at LLVW	0.099	0.103	0.106	111%
7.6 High Speed Effectiveness at LLVW	0.067	0.071	0.075	77%
7.8 Failed Antilock System at LLVW	0.112	0.114	0.118	124%
7.10 Hydraulic Circuit Failure at LLVW (Diagonal Split)	0.080	0.082	0.084	89%
7.10 Hydraulic Circuit Failure at GVWR (Diagonal Split)	0.082	0.083	0.084	90%
7.8 Failed Antilock System at GVWR	0.080	0.084	0.086	91%
7.11 Failed Power-Brake Unit at GVWR	0.090	0.101	0.113	110%
7.13 Heating Snubs at GVWR	0.050	0.066	0.091	72%
7.14-1 First Hot Stop at GVWR	0.064	0.064	0.064	70%
7.14-2 Second Hot Stop at GVWR	0.071	0.071	0.071	77%
7.15 Brake Cooling Stops at GVWR	0.084	0.092	0.101	100%
7.16 Recovery Performance at GVWR	0.080	0.081	0.082	88%

### DECELERATION SUMMARY

Set point (g/kPa)	Highest Level attained (g)	Pressure	
		at Highest Level (kPa)	Pressure Limit (kPa)
0.90	0.74	4,208	12,760
0.80	0.66	5,094	12,760
0.90	0.66	5,138	12,760
0.90	0.82	6,738	12,760
0.80	0.77	6,912	12,760
0.60	0.59	4,274	12,760
0.45	0.43	7,236	12,760
0.40	0.37	7,236	12,760
0.60	0.57	6,878	12,760
2,500	0.25	2,478	2,500
0.31	0.31	4,220	12,760
10,910	0.63	9,204	12,760
0.90	0.71	7,224	12,760
0.31	0.31	3,008	12,760
10,910	0.76	9,116	12,760



Test Number: M05-321-08

Report Number: 177978-3 Rev. A

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rayloc

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

### MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

Measurable areas required to be reviewed under FMVSS 135 standard	Test Section	FMVSS 135 Reference	Cycle	FMVSS 135 required stopping distance (m)	Calculated stopping distance (m)	Conformance confidence	Count Meeting Requirement	Count Above 10% Margin	Average conformance Confidence over all stops in section	Evaluation of test results against FMVSS 135 requirements for stopping distance
Cold Effectiveness at GVWR	40	7.5	1	70.0	53.9	23.0%	6	6	24.3%	All Cycles Meet FMVSS 135 Guidelines
			2	70.0	52.4	25.1%				
			3	70.0	53.3	23.9%				
			4	70.0	53.0	24.2%				
			5	70.0	52.8	24.6%				
			6	70.0	52.6	24.8%				
High Speed Effectiveness at GVWR	50	7.6	1	187.5	135.2	27.9%	6	6	30.7%	All Cycles Meet FMVSS 135 Guidelines
			2	187.5	129.2	31.1%				
			3	187.5	124.5	33.6%				
			4	187.5	127.6	31.9%				
			5	187.5	131.0	30.1%				
			6	187.5	131.9	29.7%				
Stops With Engine Off at GVWR	55	7.7	1	70.0	63.4	9.5%	6	3	10.3%	All Cycles Meet FMVSS 135 Guidelines
			2	70.0	61.6	12.0%				
			3	70.0	64.9	7.3%				
			4	70.0	63.2	9.7%				
			5	70.0	62.9	10.2%				
			6	70.0	60.6	13.4%				
Cold Effectiveness at LLVR	60	7.5	1	70.0	47.8	31.7%	6	6	31.7%	All Cycles Meet FMVSS 135 Guidelines
			2	70.0	47.7	31.9%				
			3	70.0	47.7	31.8%				
			4	70.0	47.9	31.6%				
			5	70.0	47.8	31.7%				
			6	70.0	47.9	31.6%				

Test Number: M05-321-08

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

Report Number: 177978-3 Rev. A

Rayloc

### MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

Measurable areas required to be reviewed under FMVSS 135 standard	Test Section	FMVSS 135 Reference	Cycle	FMVSS 135 required stopping distance (m)	Calculated stopping distance (m)	Conformance confidence	Count Meeting Requirement	Count Above 10% Margin	Average conformance Confidence over all stops in section	Evaluation of test results against FMVSS 135 requirements for stopping distance
High Speed Effectiveness at LLVW	70	7.6	1	187.5	106.0	43.5%	6	6	43.3%	All Cycles Meet FMVSS 135 Guidelines
			2	187.5	106.4	43.3%				
			3	187.5	106.5	43.2%				
			4	187.5	106.5	43.2%				
			5	187.5	106.3	43.3%				
			6	187.5	106.0	43.5%				
Failed Antilock System at LLVW	80	7.8	1	85.0	67.3	20.9%	6	6	21.0%	All Cycles Meet FMVSS 135 Guidelines
			2	85.0	67.4	20.8%				
			3	85.0	67.2	20.9%				
			4	85.0	67.2	20.9%				
			5	85.0	67.1	21.1%				
			6	85.0	67.0	21.2%				
Hydraulic Circuit Failure at LLVW (Diagonal Split)	90	7.10	1	168.0	95.9	42.9%	4	4	44.3%	All Cycles Meet FMVSS 135 Guidelines
			2	168.0	93.2	44.6%				
			3	168.0	92.9	44.7%				
			4	168.0	92.5	44.9%				
Hydraulic Circuit Failure at GVWR (Diagonal Split)	100	7.10	1	168.0	117.8	29.9%	4	4	34.2%	All Cycles Meet FMVSS 135 Guidelines
			2	168.0	108.4	35.5%				
			5	168.0	108.7	35.3%				
			4	168.0	107.4	36.1%				

Test Number: M05-321-08

Report Number: 177978-3 Rev. A

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rayloc

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

**MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)**

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

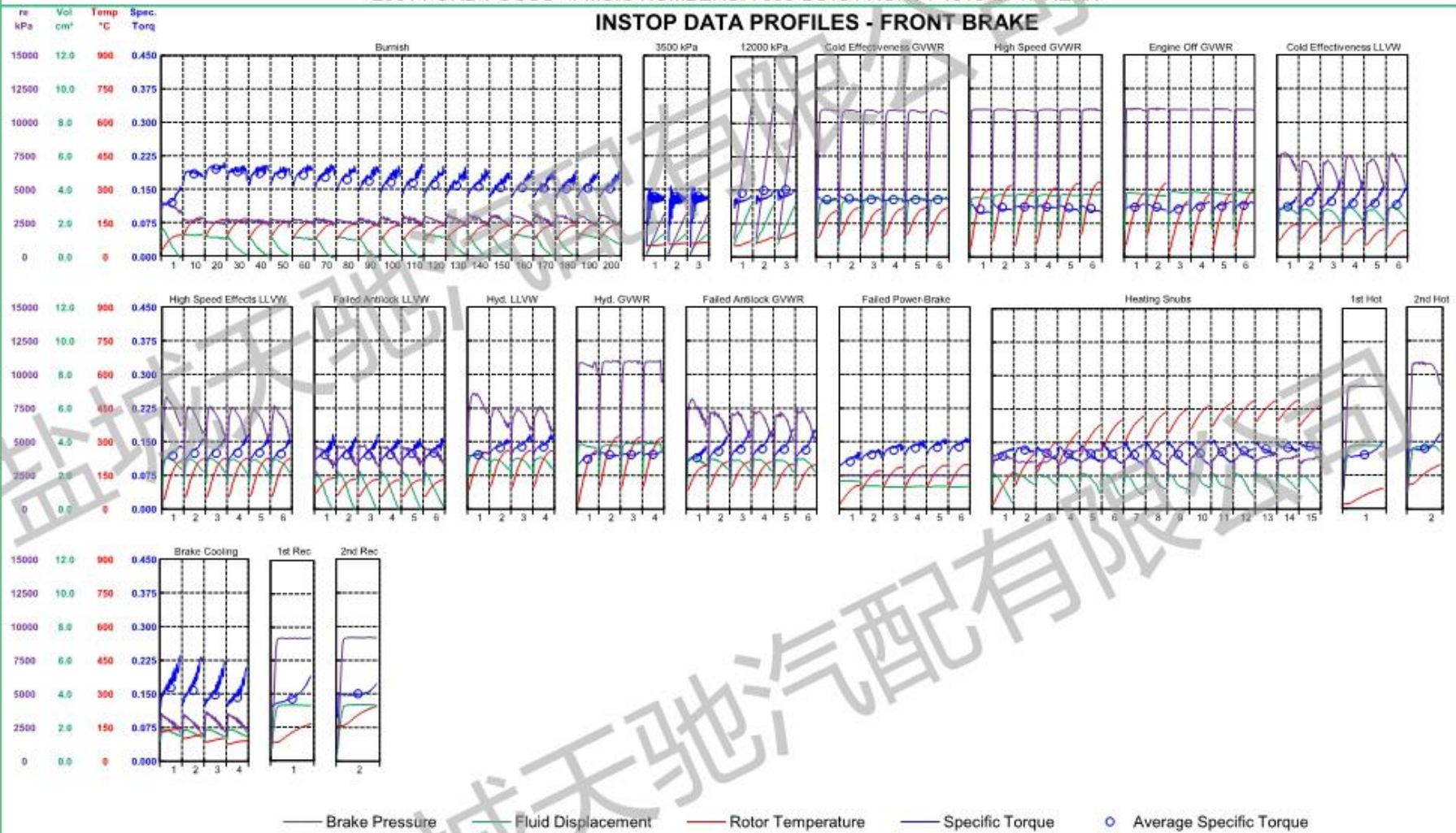
Measurable areas required to be reviewed under FMVSS 135 standard	Test Section	FMVSS 135 Reference	Cycle	FMVSS 135 required stopping distance (m)	Calculated stopping distance (m)	Conformance confidence	Count Meeting Requirement	Count Above 10% Margin	Average conformance Confidence over all stops in section	Evaluation of test results against FMVSS 135 requirements for stopping distance
Failed Antilock System at GVW	110	7.8	1	85.0	68.6	19.3%	6	6	18.9%	All Cycles Meet FMVSS 135 Guidelines
			2	85.0	69.2	18.6%				
			3	85.0	68.9	18.9%				
			4	85.0	69.1	18.7%				
			5	85.0	68.9	18.9%				
			6	85.0	69.0	18.8%				
Failed Power-Brake Unit at GVWR	140	7.11	1	168.0	195.5	-16.4%	4	0	0.2%	All Cycles Do Not Meet FMVSS 135 Guidelines
			2	168.0	173.0	-2.9%				
			3	168.0	156.8	6.7%				
			4	168.0	156.9	6.6%				
			5	168.0	160.1	4.7%				
			6	168.0	164.2	2.3%				
First Hot Stop at GVWR	170	7.14	1	101.2	62.7	38.1%	1	1	38.1%	All Cycles Meet FMVSS 135 Guidelines
First Hot Stop at GVWR	180	7.14	1	89.0	56.4	36.6%	1	1	36.6%	All Cycles Meet FMVSS 135 Guidelines
First Recovery at GVWR	200	7.16	1	36.5 - 78.2	56.0	not applicable	1		not applicable	All Cycles Meet FMVSS 135 Guidelines
Second Recovery at GVWR	200	7.16	1	36.5 - 78.2	53.1	not applicable	1		not applicable	All Cycles Meet FMVSS 135 Guidelines



# MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

## INSTOP DATA PROFILES - FRONT BRAKE



Client: Rayloc

Test Number: M05-321-08

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

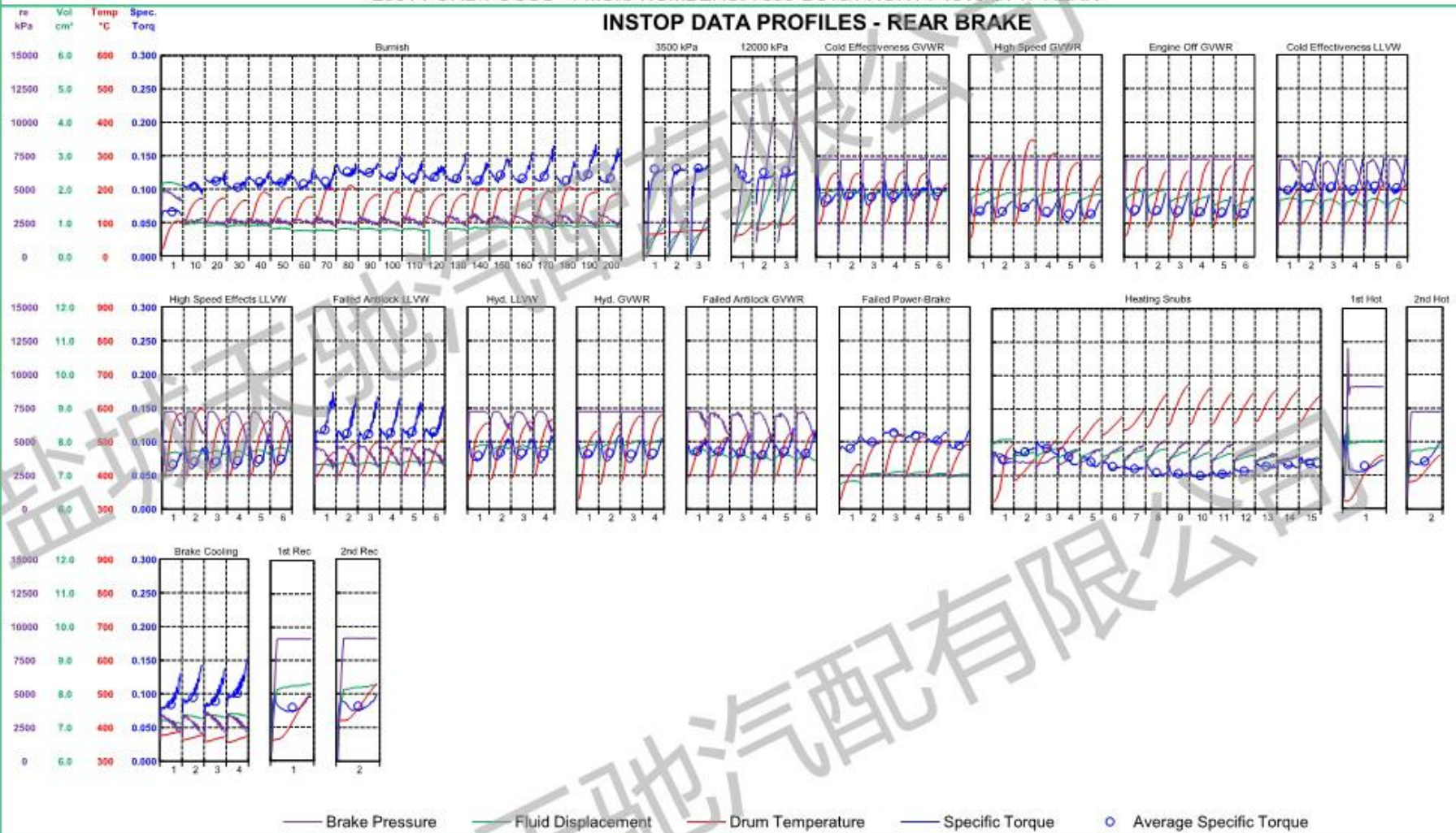
Report Number: 177978-3 Rev. A

Test Report Date: 08 December 2017

# MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

## INSTOP DATA PROFILES - REAR BRAKE



Client: Rayloc

Test Number: M05-321-08

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

Report Number: 177978-3 Rev. A

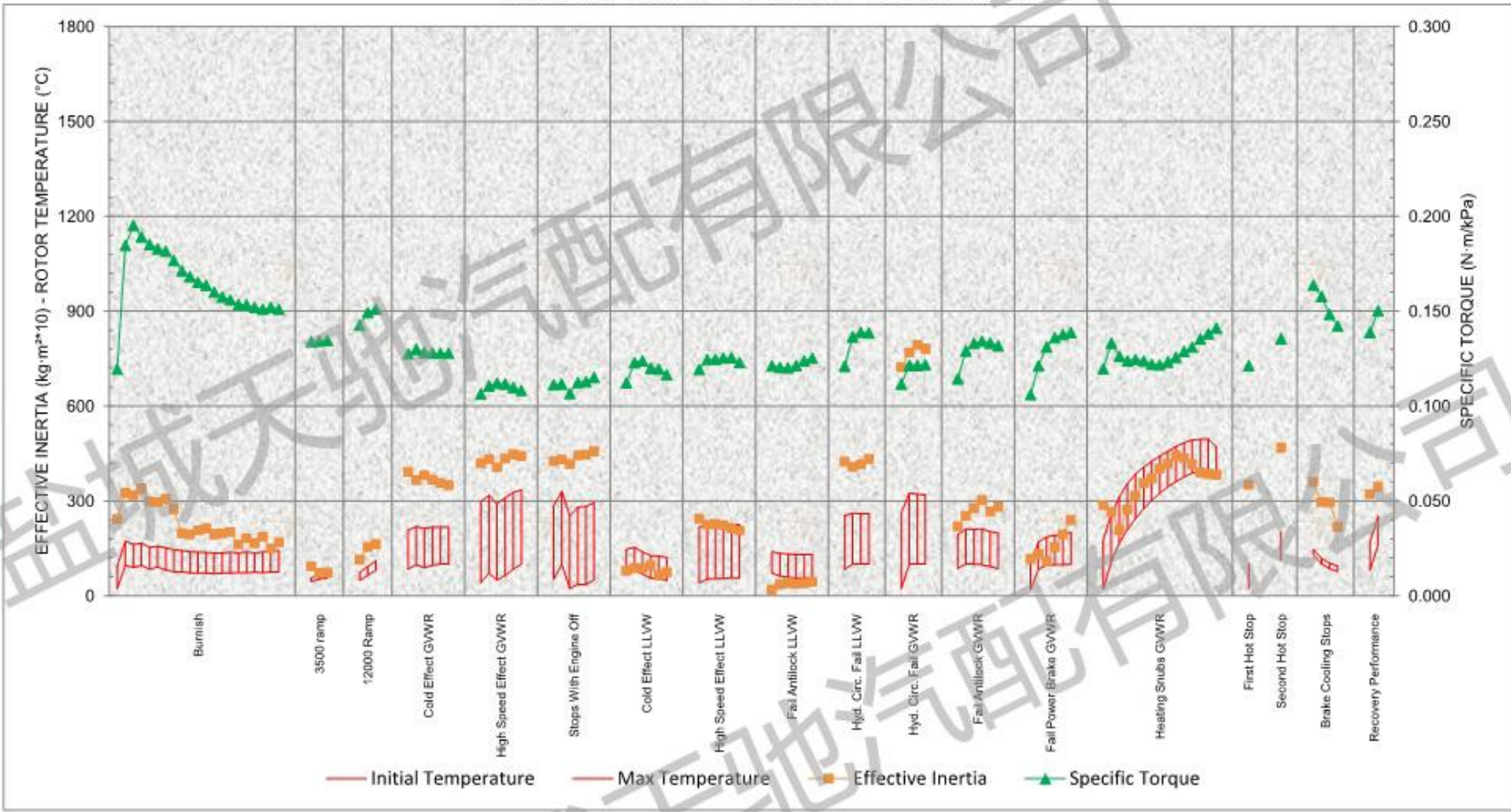
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# MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

## TEST PERFORMANCE PROFILE - FRONT BRAKE



Client: Rayloc

Test Number: M05-321-08

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

Report Number: 177978-3 Rev. A

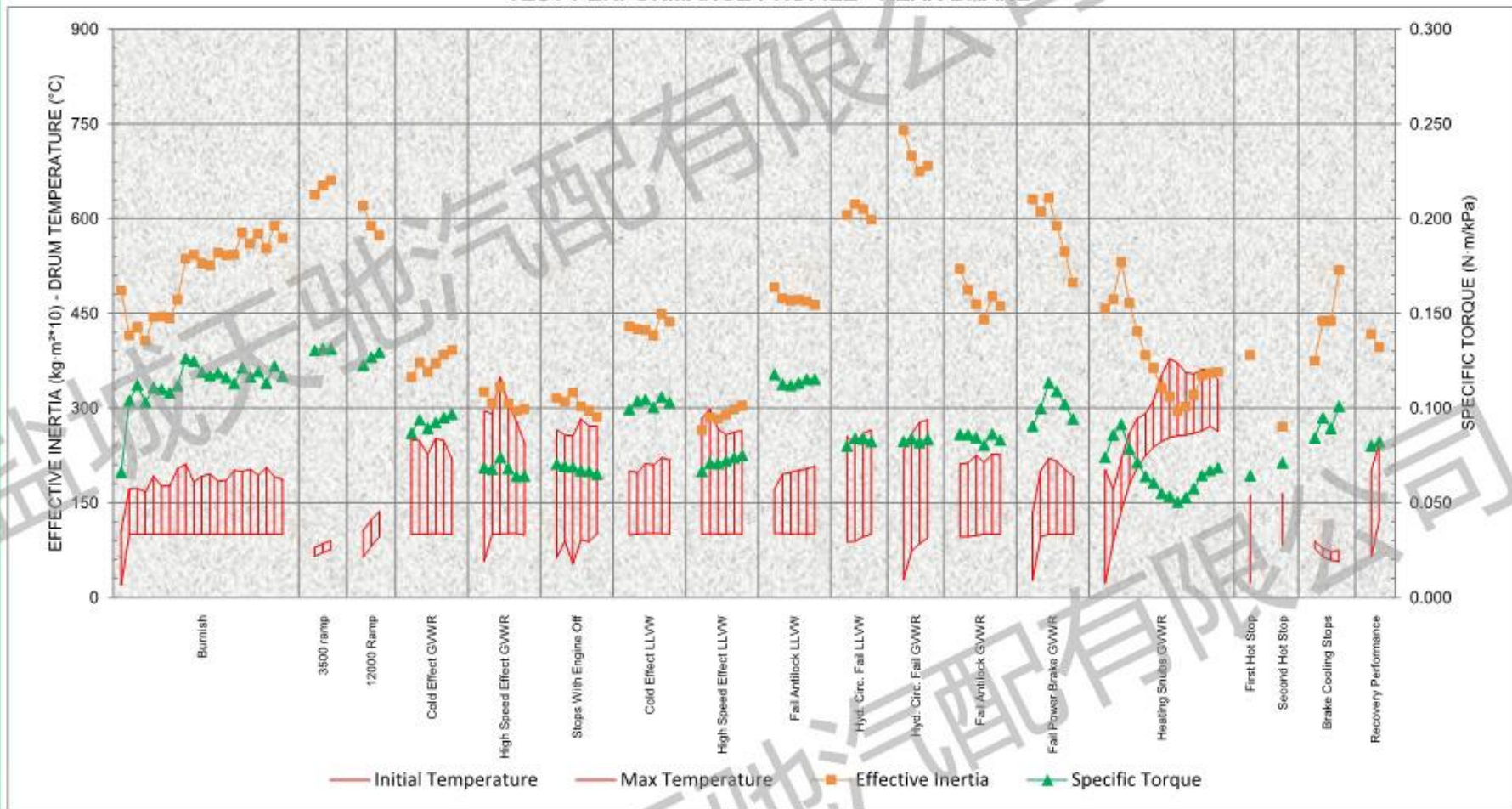
Test Report Date: 08 December 2017



# MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

## TEST PERFORMANCE PROFILE - REAR BRAKE



Client: Rayloc

Test Number: M05-321-08

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

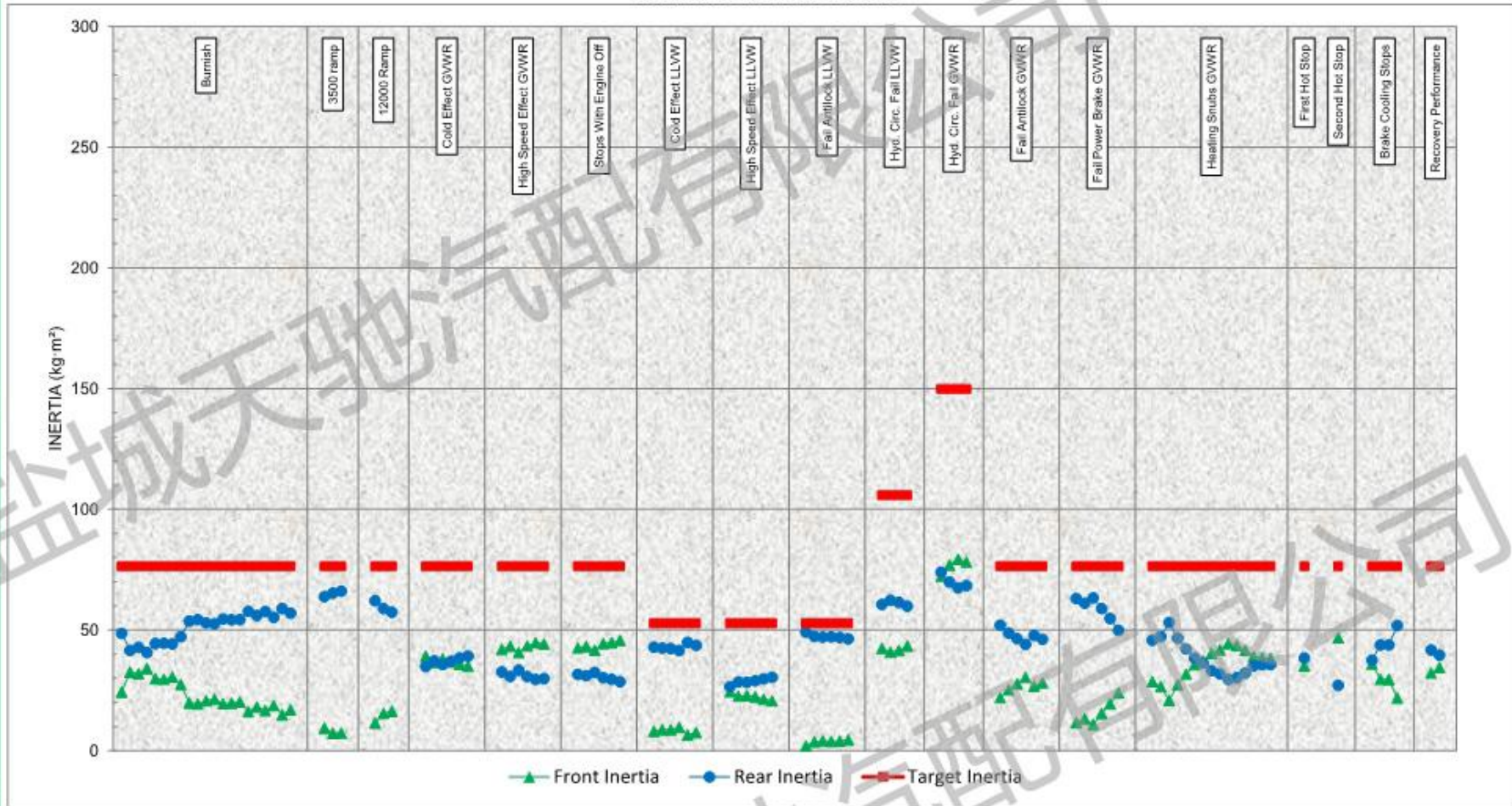
Report Number: 177978-3 Rev. A

Test Report Date: 08 December 2017

# MODIFIED SAE J2784 - FMVSS 135 INERTIA DYNAMOMETER TEST (DUAL END)

2001 FORD FOCUS - FMSI® NUMBERS: 7690-D816 FRONT / 1513-S747 REAR

## INERTIA DISTRIBUTION



Client: Rayloc

Test Number: M05-321-08

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

Report Number: 177978-3 Rev. A

Test Report Date: 08 December 2017

Light Load Vehicle Weight (LLVW) Inertia: 52.8 kg·m<sup>2</sup>

Gross Vehicle Weight Rating (GVWR) Inertia: 76.4 kg·m<sup>2</sup>

Light Load Vehicle Weight (LLVW) Failed Circuit Inertia: 105.8 kg·m<sup>2</sup>

Gross Vehicle Weight (GVWR) Failed Circuit Inertia: 149.9 kg·m<sup>2</sup>



Test Number: M05-321-08

Report Number: 177978-3 Rev. A

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rayloc

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

CYCLE NO.	SPEED		TIME		DIST. TO STOP	DECEL AVG	PRESSURE				TORQUE				TEMPERATURE								MAX FLUID DISP.		AVG SPEC. TORQ.		INERTIA										
	INIT	FNL	STOP	REPT			AVERAGE	SUSTAINED	MAXIMUM	AVERAGE	SUSTAINED	MAXIMUM	ROTOR	I/B	O/B	DRUM	LEAD	TRAIL	FRT	RR	FRT	RR	FRT	RR	FRT	RR											
	km/h		s		m	m/s <sup>2</sup>	kPa				N-m				°C								cm <sup>3</sup>		N-m/kPa		kg-m <sup>2</sup>										
<b>SECTION 10 - BURNISH</b>																																					
80 km/h - 0.31g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	79.7	0.7	7.17	0.0	81.5	3.00	3686	4468	3828	4674	6880	7170	736	441	295	460	312	847	443	23	94	25	31	168	168	20	106	20	45	20	25	2.63	2.40	0.120	0.066	24.3	48.6
10	79.9	0.7	7.17	98.4	81.1	3.04	2588	2576	2664	2652	3034	3020	746	478	268	495	276	565	301	96	172	76	80	84	105	100	172	93	109	83	85	1.48	1.13	0.185	0.104	32.5	41.5
20	79.9	0.8	7.21	101.1	81.5	3.02	2448	2436	2512	2490	2794	2694	751	478	273	492	282	546	317	90	163	72	76	79	96	100	173	94	117	82	85	1.30	1.07	0.195	0.112	31.9	42.8
30	79.9	0.7	7.23	95.9	81.9	3.01	2556	2544	2632	2620	3814	3874	746	484	262	500	271	909	476	96	166	75	79	83	100	100	167	95	117	83	85	1.59	1.18	0.189	0.103	34.0	40.6
40	79.8	0.9	7.17	111.4	81.2	3.03	2524	2512	2600	2588	3958	3796	746	468	279	484	287	1000	508	84	153	68	72	73	88	100	192	91	116	82	85	1.65	1.18	0.185	0.111	29.9	44.4
50	80.1	0.8	7.22	96.5	81.6	3.03	2556	2532	2632	2608	3870	3916	746	468	279	481	290	895	569	91	157	72	76	81	96	100	176	93	126	84	87	1.57	1.13	0.183	0.110	29.6	44.5
60	79.9	0.7	7.23	104.2	81.8	3.01	2588	2576	2664	2652	2948	2912	749	470	279	487	287	567	342	82	152	67	70	74	89	100	177	91	109	84	86	1.33	0.85	0.182	0.108	30.6	44.2
70	80.0	0.8	7.21	119.9	81.9	3.02	2600	2586	2676	2662	4022	3992	749	460	290	476	298	930	577	76	146	63	66	68	82	100	204	90	125	84	89	1.62	1.10	0.177	0.112	27.4	47.2
80	80.1	0.8	7.11	114.6	80.7	3.07	2524	2512	2600	2586	2968	2868	750	433	317	449	325	516	410	76	143	62	65	67	82	100	211	92	124	87	90	1.30	0.94	0.171	0.126	19.8	53.6
90	80.2	0.9	7.17	118.3	81.3	3.06	2556	2544	2632	2620	3990	3916	747	430	317	446	328	903	571	72	139	60	63	65	79	100	183	92	129	87	90	1.59	1.07	0.168	0.125	19.4	54.3
100	80.1	0.7	7.16	123.4	81.1	3.06	2632	2620	2708	2706	4164	4046	747	435	312	449	323	882	580	71	138	58	62	63	78	100	192	91	120	86	89	1.78	1.05	0.165	0.119	20.7	52.9
110	80.0	0.7	7.17	119.7	81.2	3.04	2676	2662	2752	2738	4250	4252	750	438	312	452	320	876	593	71	137	58	62	63	78	100	195	90	125	85	89	1.73	1.07	0.164	0.117	21.4	52.6
120	79.8	0.6	7.15	120.8	80.9	3.04	2686	2674	2774	2760	3196	3182	747	430	317	446	328	500	399	70	136	58	62	63	78	100	184	91	121	86	89	1.43	0.94	0.160	0.119	19.5	54.6
130	80.1	0.5	7.22	121.2	81.6	3.03	2730	2706	2816	2792	4240	4166	744	430	314	446	325	892	645	71	136	59	63	64	79	100	185	91	126	86	89	1.78	1.13	0.158	0.116	19.8	54.2
140	79.8	0.6	7.16	121.6	81.2	3.02	2774	2782	2850	2858	4490	4738	747	433	314	449	325	871	672	71	138	58	63	63	78	100	201	91	127	87	90	1.78	1.16	0.156	0.113	20.2	54.3
150	79.9	0.8	7.16	119.3	81.0	3.04	2730	2706	2816	2792	4382	4240	747	419	328	435	339	812	629	74	136	61	65	65	80	100	199	91	128	87	90	1.89	1.18	0.153	0.121	16.2	57.8
160	80.0	0.8	7.18	116.4	81.4	3.03	2784	2770	2860	2858	3176	3074	750	427	323	441	331	482	377	73	139	60	64	64	80	100	203	93	132	88	92	1.38	0.94	0.153	0.116	18.2	56.0
170	79.9	0.9	7.17	113.8	81.4	3.03	2774	2748	2850	2824	4708	4392	750	422	328	435	336	841	623	75	136	61	65	66	82	100	193	93	124	88	91	1.81	1.16	0.152	0.119	16.8	57.6
180	80.1	0.8	7.18	116.0	81.4	3.04	2828	2824	2914	2922	4316	4198	747	427	320	444	331	847	563	73	138	60	64	64	81	100	206	93	129	89	93	1.73	1.16	0.151	0.113	18.7	55.2
190	80.0	0.7	7.14	112.5	81.0	3.05	2740	2728	2816	2814	3218	3224	750	417	334	430	344	478	399	76	142	62	66	67	85	100	191	93	122	89	92	1.41	0.99	0.152	0.122	14.9	58.9
200	80.0	0.8	7.17	112.7	81.2	3.04	2794	2782	2882	2868	3262	3236	747	422	325	438	336	484	377	75	142	61	65	65	82	100	187	93	120	90	82	1.43	0.99	0.151	0.117	17.0	56.9
<b>SECTION 20 - 3500 kPa ADHESION UTILIZATION RAMPS AT GVWR</b>																																					
50 km/h - 2000 kPa/s Apply Rate - 100°C Initial Rotor Temperature (65°C Initial Rotor Temperature 1st Cycle Only)																																					
1	49.7	37.0	2.20	325.6	27.8	1.53					3490	3290					468	429	46	57	41	41	41	42	65	79	63	64	62	63	1.48	0.99	0.134	0.130	9.4	63.8	
2	49.9	36.9	2.20	24.1	27.8	1.56					3502	3312					470	435	52	63	42	42	43	45	71	85	64	66	61	62	1.54	1.02	0.134	0.131	7.2	65.2	
3	49.6	36.7	2.20	24.1	27.8	1.55					3512	3290					473	432	57	68	43	43	46	47	76	90	66	68	61	62	1.59	1.05	0.135	0.131	7.3	66.1	
<b>SECTION 30 - 12000 kPa ADHESION UTILIZATION RAMPS AT GVWR</b>																																					
100 km/h - 5000 kPa/s Apply Rate - 100°C Initial Rotor Temperature (65°C Initial Rotor Temperature 1st Cycle Only)																																					
1	49.9	0.8	2.51	103.6	23.0	4.17					11844	11494					1691	1411	49	74	41	41	43	46	64	106	59	66	59	59	3.49	2.27	0.143	0.123	11.5	62.1	
2	49.5	0.8	2.45	24.4	22.7	4.16					11758	11224					1755	1424	65	93	46	46	51	54	81	123	69	75	61	62	3.41	2.42	0.149	0.127	15.4	58.9	
3	49.7	0.8	2.42	24.4	22.4	4.26					11682	11224					1766	1452	82	111	52	52	61	64	96	136	77	84	65	66	3.41	2.51	0.151	0.129	16.4	57.3	



Test Number: M05-321-08

Report Number: 177978-3 Rev. A

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rayloc

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

CYCLE	SPEED		TIME		DIST.		DECEL		PRESSURE				TORQUE				TEMPERATURE						MAX FLUID DISP.		AVG SPEC. TORQ.		INERTIA										
	NO.	INIT	FNL	STOP	REPT	TO	AVG	AVERAGE	SUSTAINED	MAXIMUM	AVERAGE	SUSTAINED	MAXIMUM	ROTOR	I/B	O/B	DRUM	LEAD	TRAIL	FRT	RR	FRT	RR	FRT	RR	FRT	RR	FRT	RR								
	km/h		s		m	m/s <sup>2</sup>	FRT	RR	kPa	FRT	RR	FRT	RR	INT	MAX	INT	MAX	INT	MAX	INT	MAX	INT	MAX	INT	MAX	cm <sup>3</sup>	N-m/kPa	kg-m <sup>2</sup>									
<b>SECTION 40 - COLD EFFECTIVENESS AT GVWR</b>																																					
100 km/h - 0.90g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	99.3	0.6	3.67	46.4	53.9	7.06	9292	6436	0	4274	10942	7322	1743	1185	558	0	369	1417	801	85	207	59	63	68	85	100	250	79	128	71	79	3.44	2.05	0.128	0.087	39.1	34.9
2	99.5	0.6	3.58	153.4	52.4	7.28	9140	6382	0	4208	10954	7312	1787	1188	599	0	394	1427	815	98	219	79	83	83	100	100	248	85	135	84	89	3.47	2.02	0.130	0.094	36.6	37.2
3	99.4	0.6	3.60	197.4	53.3	7.15	9216	6392	0	4240	10942	7312	1754	1183	571	0	380	1433	801	89	213	77	80	77	95	100	226	84	116	83	87	3.57	1.96	0.128	0.089	38.1	35.7
4	99.6	0.8	3.61	167.5	53.0	7.21	9194	6392	0	4230	10942	7408	1767	1177	590	0	391	1422	831	97	218	81	85	84	102	101	252	87	130	86	92	3.55	1.99	0.128	0.092	36.7	37.1
5	99.4	0.6	3.56	172.2	52.8	7.22	9172	6392	0	4220	10910	7398	1779	1172	607	0	402	1414	793	100	218	84	86	85	103	100	248	88	131	87	92	3.57	1.99	0.128	0.095	35.7	38.4
6	99.5	0.7	3.56	174.8	52.6	7.26	9150	6382	0	4220	10932	7344	1787	1169	618	0	407	1419	831	100	218	83	86	86	104	100	219	88	114	87	90	3.55	2.02	0.128	0.097	35.0	39.2
<b>SECTION 50 - HIGH SPEED EFFECTIVENESS AT GVWR</b>																																					
80% Vmax - 0.80g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	146.5	0.6	6.45	0.0	135.2	6.13	9944	6748	0	5204	10964	7528	1521	1059	462	0	358	1282	645	42	298	42	66	42	100	57	295	52	127	51	64	3.58	1.96	0.107	0.068	41.9	32.6
2	145.3	0.8	6.17	332.8	129.2	6.30	9932	6748	0	5148	10954	7420	1556	1099	457	0	350	1280	631	71	318	65	83	62	118	100	291	79	118	76	84	3.71	1.96	0.111	0.068	43.3	30.7
3	144.8	0.7	5.91	503.2	124.5	6.50	9888	6728	0	5094	10954	7290	1605	1108	498	0	377	1237	631	50	291	46	64	43	97	100	349	80	154	78	91	3.74	2.05	0.112	0.074	40.7	33.3
4	144.7	0.7	6.13	373.2	127.6	6.33	9888	6716	0	5128	10976	7332	1561	1105	457	0	350	1258	637	64	310	59	77	56	113	101	307	84	179	80	97	3.71	1.96	0.112	0.068	43.4	30.7
5	144.6	0.5	6.32	301.2	131.0	6.16	9910	6738	0	5170	10964	7398	1520	1088	432	0	334	1250	662	84	327	76	94	74	131	101	279	87	155	85	97	3.74	1.94	0.110	0.064	44.7	29.5
6	144.7	0.7	6.33	281.0	131.9	6.13	9954	6738	0	5182	11496	7420	1509	1078	432	0	334	1290	612	100	335	86	105	86	142	99	245	89	119	87	93	3.87	1.88	0.108	0.064	44.2	29.8
<b>SECTION 55 - STOPS WITH ENGINE OFF AT GVWR</b>																																					
100 km/h - 0.90g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	102.6	0.7	4.19	0.0	63.4	6.41	9976	6716	0	5138	11584	7312	1583	1110	473	0	361	1339	711	52	285	45	65	45	98	63	265	54	120	54	66	4.04	1.99	0.111	0.070	42.6	31.6
2	101.1	0.8	4.20	249.0	61.6	6.39	9964	6716	0	5116	11594	7366	1577	1113	465	0	355	1379	703	100	330	83	101	85	139	89	257	78	127	77	85	3.96	2.02	0.112	0.069	43.2	31.0
3	102.1	0.9	4.25	0.0	64.9	6.19	10008	6760	0	5182	10998	7354	1532	1067	465	0	358	1301	692	24	253	22	44	21	73	53	256	37	124	30	47	3.93	1.85	0.107	0.069	41.7	32.5
4	101.8	0.6	4.16	0.0	63.2	6.33	9944	6738	0	5160	11018	7668	1569	1118	451	0	347	1347	678	36	280	32	52	32	88	91	283	79	143	70	83	3.90	1.83	0.112	0.067	44.4	30.2
5	101.8	0.5	4.15	0.0	62.9	6.36	9976	6738	0	5148	11606	7604	1574	1126	448	0	342	1411	662	36	283	32	52	32	89	88	271	76	149	69	83	4.01	1.74	0.113	0.068	44.7	29.6
6	100.3	1.0	4.06	480.7	60.6	6.40	9922	6728	0	5116	11138	7430	1579	1142	437	0	334	1355	659	50	294	45	64	42	99	100	271	87	142	76	87	3.96	1.73	0.115	0.065	45.7	28.5
<b>SECTION 60 - COLD EFFECTIVENESS AT LLVW</b>																																					
100 km/h - 0.90g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	99.7	0.6	3.25	57.5	47.8	8.02	6554	6252	7488	7170	7976	7366	1357	737	621	849	708	898	760	77	147	52	54	60	74	99	200	83	110	66	71	2.95	1.77	0.112	0.099	8.0	42.9
2	99.5	0.9	3.24	119.8	47.7	8.00	6032	5938	6792	6770	7422	7224	1357	742	615	852	705	909	779	82	153	62	64	69	82	100	198	93	119	82	85	2.90	1.73	0.123	0.104	8.7	42.5
3	99.8	0.7	3.25	179.3	47.7	8.06	6010	5916	6760	6738	7336	7258	1362	745	618	855	705	911	790	69	139	58	60	61	73	101	212	92	122	83	87	2.93	1.75	0.124	0.104	8.6	42.3
4	99.7	1.0	3.26	233.7	47.9	8.01	6250	6078	7076	6944	7684	7354	1360	750	610	863	694	919	796	56	127	49	51	51	63	101	210	90	121	82	86	3.03	1.73	0.120	0.100	9.6	41.5
5	99.5	0.9	3.25	230.8	47.8	7.99	6086	5992	6880	6846	7466	7366	1362	728	634	836	722	906	809	54	126	47	49	49	62	101	221	89	124	82	87	2.93	1.77	0.120	0.106	6.5	44.9
6	99.7	0.6	3.26	287.7	47.9	8.01	6294	6090	7130	6954	7836	7462	1360	734	626	844	716	906	779	48	121	42	44	43	56	100	218	87	121	80	84	3.06	1.77	0.117	0.103	7.5	43.6

Test Number: M05-321-08

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Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rayloc

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

CYCLE NO.	SPEED		TIME		DIST. TO STOP	DECEL AVG	PRESSURE				TORQUE				TEMPERATURE				MAX FLUID DISP.		AVG SPEC. TORQ.		INERTIA														
	INIT	FNL	STOP	REPT			AVG	AVERAGE	SUSTAINED	MAXIMUM	AVERAGE	SUSTAINED	MAXIMUM	ROTOR	I/B	O/B	DRUM	LEAD	TRAIL	FRT	RR	FRT	RR	FRT	RR												
	km/h		s		m	m/s <sup>2</sup>	FRT	RR	FRT	RR	FRT	RR	FRT	RR	FRT	RR	INT	MAX	INT	MAX	INT	MAX	INT	MAX	INT	MAX	cm <sup>3</sup>	N-m/kPa	kg-m <sup>2</sup>								
<b>SECTION 70 - HIGH SPEED EFFECTIVENESS AT LLVW</b>																																					
80% Vmax - 0.80g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	143.6	0.8	5.12	344.1	106.0	7.50	7010	6532	7662	7128	8390	7322	1271	836	435	922	459	981	678	41	217	37	49	37	79	100	284	84	158	77	92	3.17	1.75	0.119	0.067	24.4	26.5
2	143.7	0.7	5.14	324.6	106.4	7.49	6564	6404	7118	6986	7728	7258	1271	817	454	895	484	960	656	53	224	49	60	47	88	101	298	85	150	79	92	3.03	1.74	0.124	0.071	22.6	28.5
3	143.7	0.6	5.15	334.4	106.5	7.48	6554	6392	7108	6966	7728	7268	1268	817	451	901	481	957	634	54	226	50	61	48	90	100	267	85	148	80	92	3.09	1.74	0.125	0.071	22.8	28.3
4	143.5	0.6	5.15	320.9	106.5	7.46	6500	6370	7042	6944	7684	7258	1274	815	459	895	487	965	667	55	226	51	62	50	92	100	257	86	145	80	91	3.03	1.77	0.125	0.072	22.3	28.9
5	143.7	0.7	5.14	306.7	106.3	7.50	6402	6328	6934	6890	7444	7246	1271	804	467	882	500	946	634	58	226	54	64	52	95	101	262	87	147	81	92	3.01	1.80	0.126	0.074	21.3	29.8
6	143.6	0.7	5.12	336.4	106.0	7.50	6486	6348	7020	6912	7804	7278	1274	798	476	874	506	938	681	57	224	50	62	49	92	100	264	85	139	79	89	3.06	1.85	0.123	0.075	20.6	30.4
<b>SECTION 80 - FAILED ANTILOCK SYSTEM AT LLVW</b>																																					
100 km/h - 0.60g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	99.7	0.6	4.71	267.2	67.3	5.70	4056	4014	4284	4262	4914	4912	964	492	473	527	514	567	580	71	139	59	63	61	79	101	172	89	107	84	85	2.35	1.37	0.121	0.118	1.9	49.1
2	99.6	0.7	4.71	202.2	67.4	5.71	4174	4132	4424	4404	4870	4858	967	503	465	538	500	583	552	63	134	53	57	55	74	101	195	88	115	84	87	2.33	1.45	0.120	0.112	3.7	47.3
3	99.6	0.7	4.70	211.6	67.2	5.69	4186	4132	4436	4414	5054	4932	965	503	462	540	498	597	547	59	132	49	53	52	71	100	198	87	116	84	87	2.35	1.45	0.120	0.112	4.1	47.0
4	99.7	0.8	4.69	222.2	67.2	5.71	4142	4100	4392	4370	4892	4792	967	503	465	540	498	589	563	56	130	47	51	49	69	101	201	86	118	82	86	2.35	1.48	0.121	0.113	3.9	47.2
5	99.8	0.8	4.69	213.8	67.1	5.73	4076	4036	4326	4294	4794	4716	970	505	465	540	498	589	544	57	130	47	51	49	69	100	204	86	121	83	87	2.35	1.53	0.124	0.115	4.0	46.9
6	99.8	0.7	4.69	212.0	67.0	5.74	4056	4014	4294	4274	4848	4662	970	508	462	543	495	594	547	56	131	47	51	49	69	101	208	86	122	83	87	2.30	1.48	0.125	0.115	4.5	46.3
<b>SECTION 90 - HYDRAULIC CIRCUIT FAILURE AT LLVW</b>																																					
100 km/h - 0.45g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	102.7	0.8	6.50	45.0	95.9	4.24	7574	6738	8150	7224	8814	7484	1455	917	539	989	566	1073	746	84	254	46	65	61	113	88	255	64	153	47	68	3.36	1.92	0.121	0.080	42.4	60.6
2	101.3	0.7	6.42	182.7	93.2	4.25	6652	6532	7108	6998	7652	7246	1458	909	549	978	580	1046	738	100	261	77	91	84	132	89	242	85	129	80	89	2.95	1.87	0.137	0.084	40.8	62.3
3	101.2	0.6	6.41	202.6	92.9	4.25	6576	6500	7010	6966	7444	7258	1458	914	544	981	577	1043	730	100	260	81	94	86	134	96	260	91	166	87	101	3.01	1.87	0.139	0.084	41.5	61.5
4	100.8	0.7	6.39	212.5	92.5	4.24	6652	6512	7096	6976	7824	7258	1458	922	536	992	566	1081	722	100	260	81	94	85	132	100	265	95	153	90	101	3.09	1.87	0.139	0.082	43.3	59.9
<b>SECTION 100 - HYDRAULIC CIRCUIT FAILURE AT GVWR</b>																																					
100 km/h - 0.40g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	102.5	0.8	7.81	0.0	117.8	3.44	9986	6836	10748	7236	12170	7366	1679	1116	563	1320	651	1581	749	23	262	22	50	21	97	28	232	24	129	23	48	4.07	1.95	0.112	0.082	72.3	73.9
2	100.9	0.7	7.40	199.8	108.4	3.63	9910	6814	10768	7236	12160	7344	1775	1204	571	1309	590	1573	796	100	324	77	101	83	155	74	259	71	145	67	82	4.23	1.95	0.121	0.084	76.9	69.9
3	100.9	0.6	7.42	268.6	108.7	3.61	9976	6814	10824	7236	12126	7570	1770	1212	558	1317	574	1605	798	100	322	84	106	86	155	85	277	80	168	77	97	4.33	1.98	0.121	0.082	79.3	67.5
4	100.9	0.8	7.33	282.4	107.4	3.66	9998	6804	10878	7236	12148	7398	1786	1218	569	1331	588	1637	776	100	319	84	106	87	154	94	281	87	158	83	99	4.33	1.98	0.122	0.084	78.1	68.4



Test Number: M05-321-08

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Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rayloc

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

CYCLE NO.	SPEED		TIME		DIST. TO STOP	DECEL AVG	PRESSURE				TORQUE				TEMPERATURE								MAX FLUID DISP.		AVG SPEC. TORQ.		INERTIA										
	INIT	FNL	STOP	REPT			AVERAGE	SUSTAINED	MAXIMUM	AVERAGE	SUSTAINED	MAXIMUM	ROTOR	I/B	O/B	DRUM	LEAD	TRAIL	FRT	RR	FRT	RR	FRT	RR													
	km/h	km/h	s	s	m	m/s <sup>2</sup>	FRT	RR	FRT	RR	FRT	RR	FRT	RR	INT	MAX	INT	MAX	INT	MAX	INT	MAX	INT	MAX	INT	MAX	INT	MAX	cm <sup>3</sup>	N-m/kPa	kg-m <sup>2</sup>						
<b>SECTION 110 - FAILED ANTILOCK SYSTEM AT GVWR</b>																																					
100 km/h - 0.60g Deceleration Rate - 100°C Initial Rotor Temperature																																					
1	99.4	0.7	4.77	57.0	68.6	5.55	7000	6544	7672	7170	8390	7420	1364	801	563	887	615	941	708	87	194	56	63	67	98	96	211	77	116	61	68	3.28	1.85	0.114	0.086	21.9	52.0
2	99.8	0.7	4.79	131.4	69.2	5.55	6370	6294	6912	6878	7498	7440	1364	823	541	909	593	954	681	100	211	74	80	82	113	96	213	92	129	83	88	3.00	1.70	0.129	0.086	25.3	48.7
3	99.6	0.6	4.78	155.9	68.9	5.55	6314	6252	6858	6824	7422	7300	1369	841	528	927	577	987	656	100	210	78	85	85	116	98	225	95	129	87	92	3.03	1.67	0.133	0.084	27.7	46.4
4	99.5	0.7	4.78	170.0	69.1	5.52	6390	6316	6944	6900	7434	7290	1366	858	508	946	558	992	634	98	211	78	85	84	115	100	214	96	133	89	94	3.11	1.62	0.134	0.080	30.3	44.0
5	99.5	0.7	4.77	188.5	68.9	5.54	6272	6208	6814	6782	7390	7474	1372	836	536	922	582	978	670	93	203	75	82	80	111	100	227	95	138	88	95	3.03	1.70	0.133	0.086	26.7	47.7
6	99.6	0.6	4.78	198.1	69.0	5.54	6402	6316	6956	6912	7554	7312	1369	844	525	930	574	987	659	86	198	72	78	74	107	100	226	95	135	88	94	3.11	1.62	0.132	0.083	28.1	46.1
<b>SECTION 140 - FAILED POWER-BRAKE UNIT AT GVWR</b>																																					
100 km/h - P <sub>500N</sub> Depleted Pressure - 100°C Initial Rotor Temperature (65°C Initial Temperature for First Cycle)																																					
1	99.3	0.6	13.02	0.0	195.5	1.94	2458	2446	2502	2478	2524	2554	482	261	221	266	224	323	279	20	106	21	36	21	66	27	134	22	102	20	37	1.76	0.85	0.106	0.090	11.6	63.0
2	99.1	0.6	12.38	45.0	173.0	2.19	2458	2436	2502	2478	2524	2566	541	298	243	304	249	336	271	84	171	48	63	62	110	98	200	74	140	48	68	1.65	1.10	0.121	0.100	13.2	61.1
3	99.5	0.6	11.18	123.5	156.8	2.44	2458	2436	2502	2478	2524	2512	599	323	276	331	282	366	301	98	187	70	81	80	126	100	220	95	158	82	94	1.57	1.16	0.131	0.113	10.8	63.3
4	99.4	0.6	11.06	148.9	156.9	2.43	2448	2436	2502	2478	2534	2554	598	333	265	341	271	384	295	98	181	75	87	83	131	100	216	102	165	91	101	1.57	1.16	0.136	0.109	15.4	58.9
5	99.3	0.6	11.18	157.8	160.1	2.37	2458	2436	2502	2478	2524	2554	587	339	249	344	254	395	290	98	194	77	89	83	132	100	203	102	161	93	103	1.57	1.13	0.136	0.102	19.5	54.7
6	99.4	0.7	11.42	160.1	164.2	2.32	2458	2436	2502	2478	2524	2566	571	341	230	347	235	401	293	99	200	78	91	84	136	100	192	101	153	94	101	1.62	1.07	0.139	0.094	24.0	49.9
<b>SECTION 160 - HEATING SNUBS AT GVWR</b>																																					
120 - 60 km/h - 0.31g Deceleration Rate - 45 Second Time Cycle - 55°C Initial Temperature for First Cycle Only																																					
1	121.8	59.8	5.67	89.0	144.0	3.02	3860	3840	3990	3982	4326	4240	746	462	284	481	295	527	350	23	177	23	34	23	72	23	202	22	103	22	31	2.14	2.10	0.120	0.074	28.6	45.7
2	121.5	60.0	5.59	45.0	141.3	3.05	3426	3408	3534	3516	3816	3754	749	457	293	473	303	503	342	109	259	63	74	80	134	88	171	69	87	43	49	2.11	1.73	0.133	0.086	26.5	47.2
3	121.3	59.9	5.58	45.0	140.9	3.05	3468	3440	3566	3548	4142	4014	752	438	314	452	325	476	347	168	313	98	109	126	176	137	218	97	132	69	77	2.01	1.85	0.126	0.091	20.8	53.1
4	121.0	59.6	5.55	45.0	140.1	3.05	3708	3690	3828	3808	4522	4458	749	460	290	476	301	508	328	210	355	127	138	160	208	179	260	134	179	95	105	1.98	1.83	0.124	0.078	27.3	46.6
5	120.9	59.9	5.54	45.0	138.6	3.05	3816	3798	3958	3938	4686	4554	746	476	271	492	282	532	314	245	385	154	164	190	234	206	284	164	205	120	129	2.01	1.81	0.125	0.071	31.7	42.1
6	120.7	59.9	5.54	45.0	139.6	3.04	4000	3982	4132	4112	4826	4824	749	495	254	511	265	562	312	275	407	178	188	217	257	224	291	187	206	140	147	2.01	1.78	0.124	0.064	35.6	38.4
7	120.9	59.8	5.53	45.0	139.2	3.06	4098	4068	4250	4220	5022	4944	746	500	246	519	257	581	309	302	425	199	209	243	278	238	311	205	214	156	160	2.03	1.78	0.122	0.060	37.1	36.3
8	120.9	59.9	5.52	45.0	139.1	3.06	4240	4220	4402	4382	5338	5204	748	516	232	535	241	583	279	324	442	218	227	262	298	247	352	217	225	170	174	2.03	1.81	0.122	0.055	40.3	33.1
9	120.6	60.0	5.51	45.0	138.5	3.05	4228	4198	4382	4348	5240	5214	746	522	224	540	232	621	282	345	457	234	242	280	317	253	378	227	241	181	187	2.06	1.73	0.123	0.053	41.8	31.9
10	120.4	59.9	5.51	45.0	138.7	3.04	4250	4230	4414	4392	5316	5312	748	535	213	554	219	621	271	362	472	249	257	295	331	256	371	235	257	191	198	2.08	1.71	0.126	0.050	44.4	29.5
11	120.5	59.9	5.52	45.0	138.8	3.04	4110	4090	4272	4240	5120	5052	745	530	216	548	224	661	271	377	484	262	270	310	348	257	356	240	264	198	203	2.11	1.68	0.129	0.053	43.5	30.2
12	120.4	59.8	5.51	45.0	138.4	3.05	3980	3948	4120	4100	4772	4728	748	522	227	540	235	586	273	388	493	274	280	323	359	260	354	243	269	203	209	2.03	1.62	0.131	0.057	41.6	32.1
13	120.2	59.9	5.49	45.0	138.0	3.04	3750	3732	3892	3874	4446	4414	749	508	241	527	249	573	276	396	495	283	290	332	366	264	361	249	275	208	213	2.03	1.62	0.135	0.064	39.0	35.1
14	120.2	60.0	5.49	45.0	137.8	3.04	3654	3624	3772	3754	4186	4132	748	505	243	524	252	567	265	401	496	290	297	338	373	271	361	256	280	213	218	2.01	1.57	0.138	0.067	38.5	35.6
15	120.3	59.6	5.50	60.0	138.2	3.05	3578	3548	3696	3678	4066	3982	748	505	243	524	252	575	290	379	471	285	291	326	356	263	344	253	271	214	218	1.98	1.53	0.141	0.069	38.2	35.7



Test Number: M05-321-08

Report Number: 177978-3 Rev. A

Lining Edge Codes: CMX 722-FF Front / NPTC1029-FF Rear

Rayloc

Rotor/Drum Part Numbers: NAPA 86913CR Front / NAPA 4401810BRNG Rear

CYCLE NO.	SPEED		TIME		DIST. TO STOP	DECEL AVG DIST	PRESSURE				TORQUE				TEMPERATURE						MAX FLUID DISP.		AVG SPEC. TORQ.		INERTIA																						
	INIT	FNL	STOP	REPT			FRT	RR	FRT	RR	FRT	RR	FRT	RR	FRT	RR	INT	MAX	INT	MAX	INT	MAX	INT	MAX	FRT	RR	FRT	RR																			
	km/h		s		m	m/s <sup>2</sup>	kPa				N·m				°C						cm <sup>3</sup>		N·m/kPa		kg·m <sup>2</sup>																						
<b>SECTION 170 - FIRST HOT STOP AT GVWR</b>																																															
100 km/h - P Best Cold Effect Pressure - 20 Seconds After Completion of Cycle 15 of Heating Snubs at GVWR																																															
1	99.8	0.2	4.14	0.0	62.7	6.14	8162	8046	9162	9204	9248	15604	1508	992	517	1121	544	1452	951	21	103	21	28	21	35	23	162	21	79	20	36	3.82	2.59	0.121	0.064	35.1	38.4										
<b>SECTION 180 - SECOND HOT STOP AT GVWR</b>																																															
100 km/h - 0.90g Deceleration Rate - 20 Seconds After The Completion of First Hot Stop at GVWR																																															
1	100.9	0.6	3.86	31.1	56.4	6.87	9280	6458	9834	7224	11334	7322	1717	1258	459	1575	681	1618	714	111	203	54	63	62	83	82	185	63	82	40	46	3.93	1.84	0.136	0.071	46.8	27.0										
<b>SECTION 190 - BRAKE COOLING STOPS AT GVWR</b>																																															
50 km/h - 0.31g Deceleration Rate - 1.5 km Between Cycles																																															
1	49.9	0.6	4.49	118.6	32.1	2.99	2936	2922	3088	3074	3632	3582	727	481	246	513	260	538	301	130	147	91	92	102	108	78	89	68	72	64	64	1.95	1.24	0.164	0.084	35.9	37.5										
2	49.9	0.7	4.47	108.0	32.0	3.00	2892	2878	3024	3008	3750	3516	730	457	273	487	287	519	339	101	118	78	78	84	89	64	78	62	66	60	60	1.95	1.39	0.158	0.095	29.6	43.8										
3	50.0	0.6	4.49	108.0	32.2	2.99	3078	3062	3230	3214	3784	3690	730	457	273	484	290	508	320	86	103	68	68	73	78	59	73	57	61	56	56	1.95	1.42	0.148	0.089	29.5	43.8										
4	49.7	0.6	4.49	108.1	32.1	2.98	3002	2976	3164	3148	3654	3570	728	427	301	454	320	478	350	77	94	62	62	65	71	57	74	54	59	53	53	1.95	1.45	0.142	0.101	21.9	51.8										
<b>SECTION 200 - RECOVERY PERFORMANCE</b>																																															
100 km/h - P Best Cold Effect Pressure - First Cycle 1.5 km after last cycle of Brake Cooling Stops - 20 Second Cycle Time																																															
1	101.2	0.8	3.57	65.5	56.0	7.05	7976	7830	9162	9116	9258	9278	1734	1108	626	1290	716	1747	872	82	169	62	67	67	85	64	201	56	106	53	62	3.41	2.29	0.139	0.080	32.1	41.7										
2	101.1	0.6	3.45	30.5	53.1	7.42	7922	7754	9162	9116	9248	9246	1827	1191	637	1379	741	1832	908	159	251	91	97	108	130	122	242	95	132	70	79	3.41	2.28	0.150	0.082	34.5	39.6										
<b>PARKING BRAKE STATICS</b>																																															
<b>FORWARD</b>														<b>REVERSE</b>																																	
CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE	CABLE FORCE	CABLE TRAVEL	BRAKE TORQUE												
N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m	N	mm	N·m												
254	0.49	284	254	1.25	165	508	0.71	560	507	1.45	357	760	0.91	776	760	1.58	576	1014	1.14	1093	1014	1.69	763	1266	1.33	1348	1266	1.80	955	1519	1.53	1534	1519	2.01	1144	1770	1.78	1834	1773	2.08	1114	1763	1.86	1771	1776	2.09	1084