

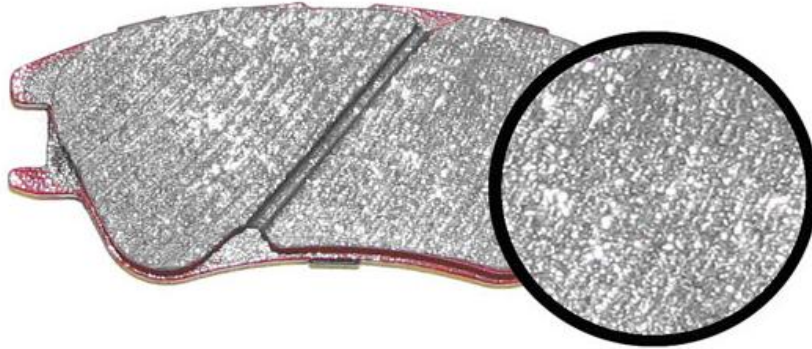


Metallic Carbon Plus Brake Pads Profile

Perfil de las Pastillas Metallica Carbon Plus



Characteristics



Friction Coefficient GG
Coeficiente de Fricción GG

Low Fade
Bajo desvanecimiento

Flash Mold Production
Producción por molde rápido

Excelent Stopping Power
Excelente Potencia de frenado

Materials: - Carbon Elements
- Inorganic Fiber, Kevlar
- Resin

Long Life
Larga duración

Materiales: - Elementos de Carbón
- Fibras Inorgánicas, Kevlar
- Resin

Low Dust
Bajo Polvo



Physical Properties

a. Physical Properties

Density

	Temperature [°C]	Operation	Remarks
1	R.T.	Weight	In Air
2	R.T.	Weight	In Water

Hardness

	Scale	Rockwell	Penetrator Diameter,mm	Standards Loading [N]	Test Loading [N]
1	R	HRR	12.7	98.07	588.4

pH Value

	Scale	pH Value (Buffer Solution)	Soak Solution
1	0.00~14.00	4.00,6.86,9.18	KCl(aq.3mol/L)

Shear Strength

	Positive Pressure [MPa]	Shear Force [KN]	Loading Ratio [N/s]	Power [KW]
1	0-0.5	0-100	4500±500	1.5

Porosity

	Temperature [°C]	Time [hr]	Remarks
1	90±10	8	In Oil
2	90±10→R.T.	Over 12	In Oil

Impact Strength

	Impact Speed [m/s]	Impact Power [J]	Impact Angel [°]	Sample size [mm]
1	2.9	0.5	150	55*10*6

Physical Properties

b. Physical Properties

Density (g/cm ³)	2.95~3.05	Hardness/HRR	105~115
pH Value	7.50~8.20	Shear (N/mm ²)	>5.0
Porosity/%	2.50~3.00	Impact (KJ/m ²)	1.130~1.450

Compressibility

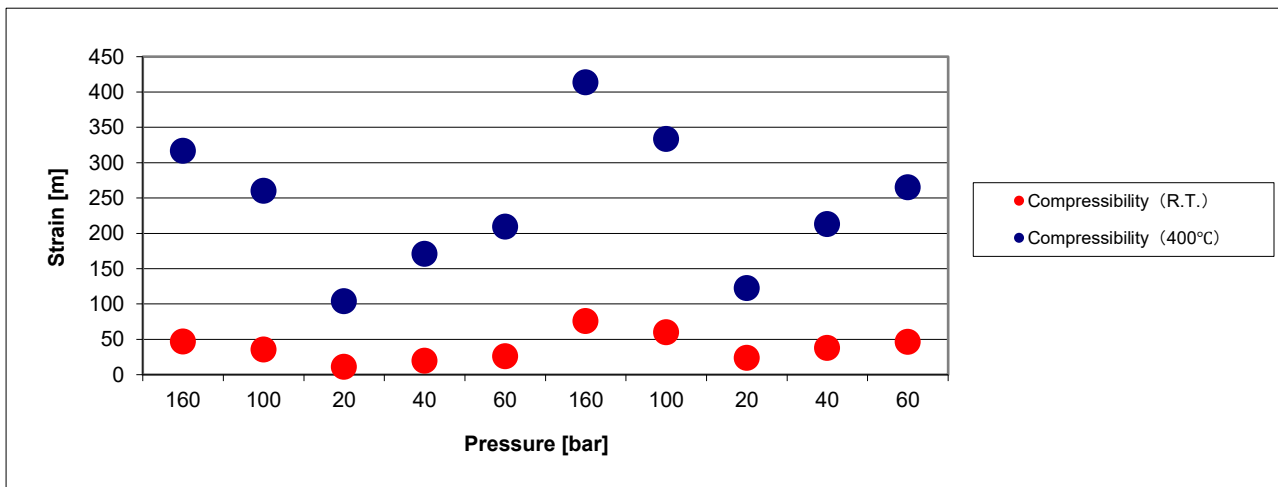
	Load Increment Ratio [Mpa/sec]	Initial Loading [Mpa]	Test Loading [Mpa]	Cycle
1	8±1	0.5	2~16	3

Compressibility (R.T.)

Load/bar	160	100	20	40	60	160	100	20	40	60
Cycle	3↓	3↑	3↑	3↑	3↑	1↓	1↑	1↑	1↑	1↑
Mean Value	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]
	46.6	35.3	11.1	19.8	26	75.8	59.8	23.7	37.5	46.5

Compressibility (400°C)

Load/bar	160	100	20	40	60	160	100	20	40	60
Cycle	2↓	2↑	2↑	2↑	2↑	1↓	1↑	1↑	1↑	1↑
Mean Value	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]	[μm]
	316.8	259.9	103.7	170.8	209.4	413.6	333.4	122.6	213.1	265.1



SAE J-661 Chase Test

Test Request #:
109511-1-1



Customer Ref:
BPD1685 D1685-8870

SAE J661 Rev Oct 2021 Brake Lining Quality Test

Test Information

Customer Name	International Motor Products, Inc.
Requestor	Rodolfo Lopez
Program Number	109511-1-1
Test Coordinator	Eric DeJules
Test Equipment	Chase Machine 13
Test Dates	11/27/2023 - 11/28/2023
Datalogger	v1.0.21
Template Version	1.83

Setup Details

Sample Material	BPD1685 D1685-8870
Sample Size	1 Inch x 1 Inch
Sample Manufacturer	International Motor Products, Inc.
Test Pressure	150 psi

Sample Test Summary

Normal Friction Coefficient	0.522	Pass
Normal Friction Class	G	
Hot Friction Coefficient	0.468	Pass
Hot Friction Class	G	
Minimum Bold Coefficient	0.442	Pass
Max Variation Below Average for Bold Readings	0.029	Pass
Max % Variation for Bold Readings	6.08%	Pass

Pass / Fail

Pass

Comments:

Authorized by: Eric DeJules
(313) 625-4000

Title: Test Engineer

Issue Date: 11/30/2023

Data applicable to the materials tested and parameters agreed to by customer. Valid if signed by the test engineer. Report can be copied in full. Uncertainty of Measurement details are available upon request.

SAE J-661 Chase Test

Test Request #:
109511-1-1



Customer Ref:
BPD1685 D1685-8870

Test Number							Manufacturer: International Motor Products, Inc. Material: BPD1685 D1685-8870		
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5				
	109511-1-1	109511-1-2	109511-1-3	109511-1-4	109511-1-5				
Initial Baseline									
Application	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5				
1	0.360	0.373	0.352	0.343	0.352				
20	0.323	0.324	0.354	0.326	0.356				
First Fade									
Temp (°F)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5				
200.0	0.345	0.342	0.369	0.324	0.361		Normal	0.522	G
550.0	0.419	0.422	0.415	0.370	0.417		Hot	0.468	G
(or Temp @ 10min)									
First Recovery									
Temp (°F)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average	Norm/Hot		
500.0	0.439	0.430	0.456	0.400	0.427	0.430			
400.0	0.474	0.448	0.468	0.435	0.447	0.454	Hot		
300.0	0.461	0.439	0.478	0.448	0.458	0.457	Hot		
200.0	0.414	0.383	0.408	0.406	0.427	0.408			
Wear									
Application	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5				
1	0.432	0.431	0.479	0.433	0.433				
100	0.523	0.521	0.507	0.495	0.500				
Second Fade							Max Var.		
Temp (°F)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average	< Average	Norm/Hot	% Var
200.0	0.482	0.472	0.511	0.496	0.505	0.493	0.021	Normal	4%
250.0	0.519	0.516	0.540	0.505	0.531	0.522	0.017	Normal	3%
300.0	0.516	0.534	0.558	0.520	0.557	0.537	0.021	Normal	4%
350.0	0.527	0.527	0.535	0.545	0.533	0.533	0.006	-	1%
400.0	0.540	0.531	0.532	0.538	0.534	0.535	0.004	Normal	1%
450.0	0.541	0.535	0.524	0.517	0.520	0.527	0.010	Hot	2%
500.0	0.507	0.511	0.504	0.498	0.492	0.502	0.010	Hot	2%
550.0	0.504	0.500	0.465	0.459	0.498	0.485	0.026	Hot	5%
600.0	0.445	0.443	0.457	0.445	0.435	0.445	0.010	Hot	2%
650.0	0.396	0.401	0.431	0.407	0.410	0.409	0.013	Hot	3%
(or Temp @ 10min)									
Second Recovery							Max Var.		
Temp (°F)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average	< Average	Norm/Hot	% Var
600.0	0.417	0.422	0.434	0.418	0.411	0.420	0.009	-	2%
500.0	0.457	0.421	0.453	0.432	0.429	0.438	0.017	Hot	4%
400.0	0.503	0.463	0.491	0.456	0.442	0.471	0.029	Hot	6%
300.0	0.493	0.486	0.490	0.497	0.482	0.490	0.008	Hot	2%
200.0	0.442	0.472	0.470	0.490	0.479	0.471	0.029	-	6%
Final Baseline									
Application	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5				
1	0.476	0.457	0.485	0.484	0.488				
20	0.410	0.437	0.457	0.510	0.480				

SAE J-661 Chase Test

Test Request #:
109511-1-1



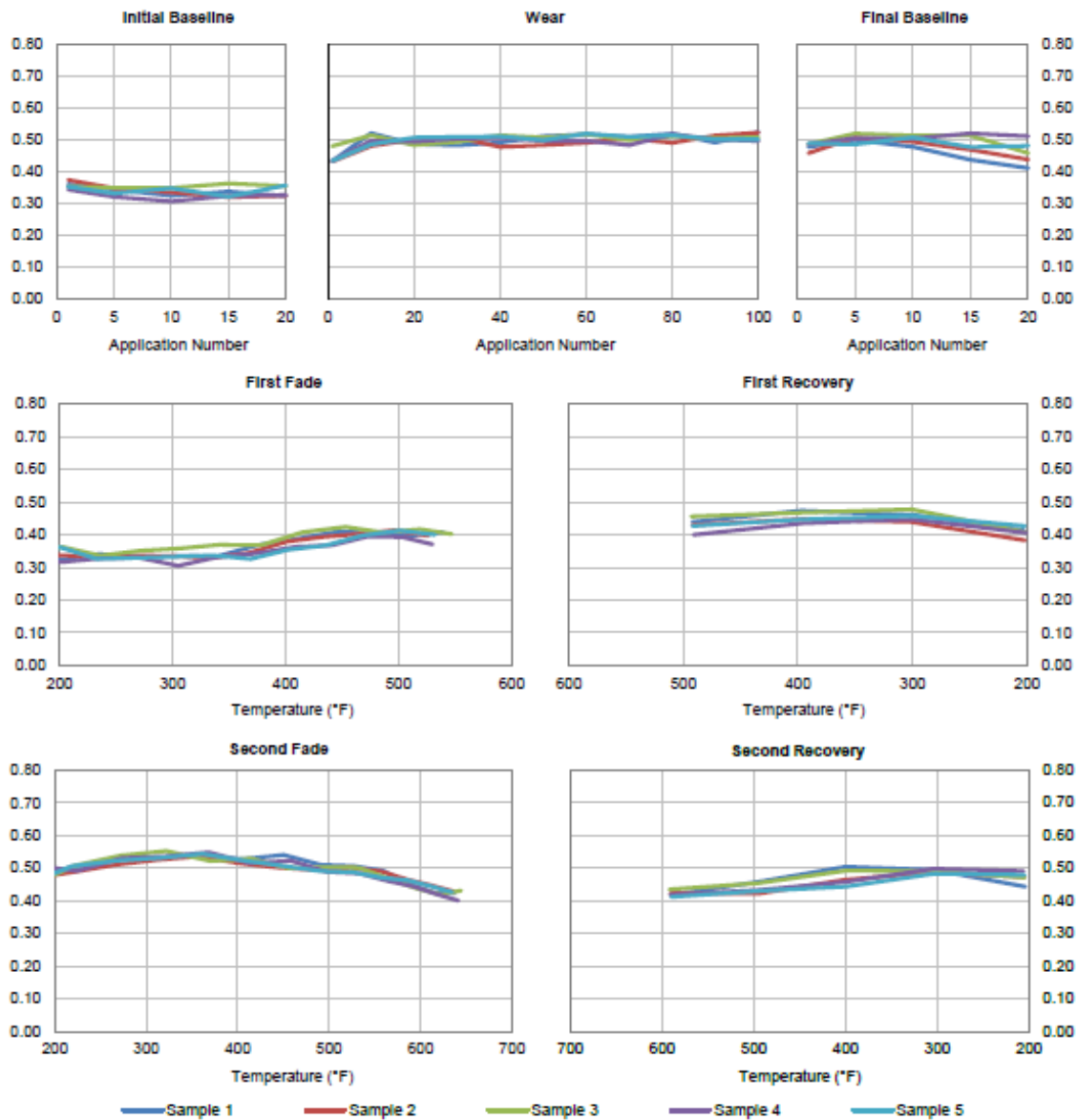
Customer Ref:
BPD1685 D1685-8870

Manufacturer: International Motor Products, Inc.
Material: BPD1685 D1685-8870
Test Pressure: 150 psi

Test Dates: 11/27/2023 - 11/28/2023

Summary of 5 Samples

Coefficient of Friction



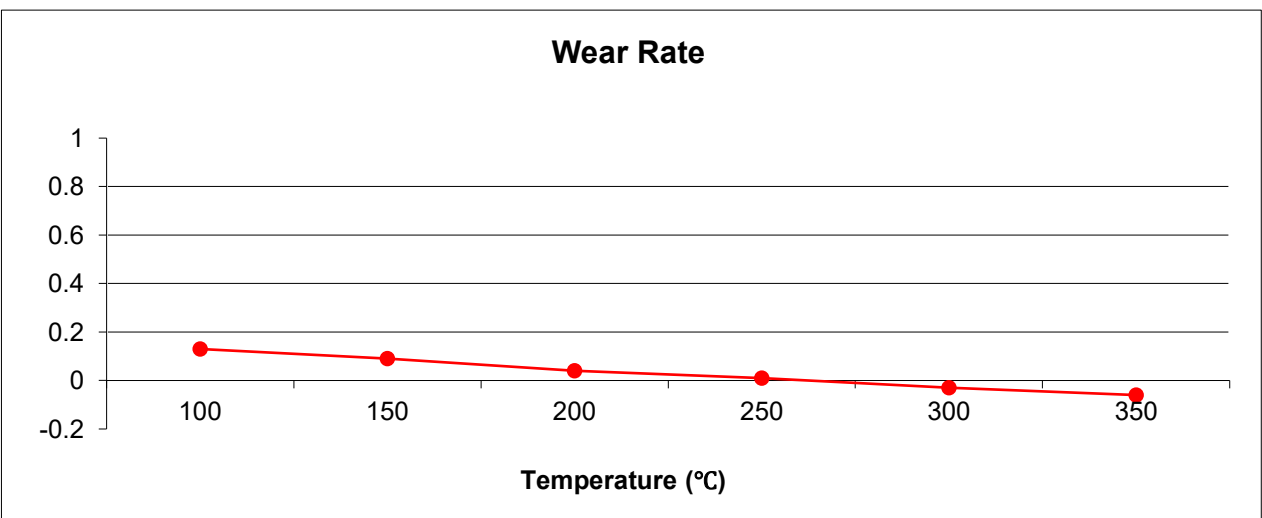
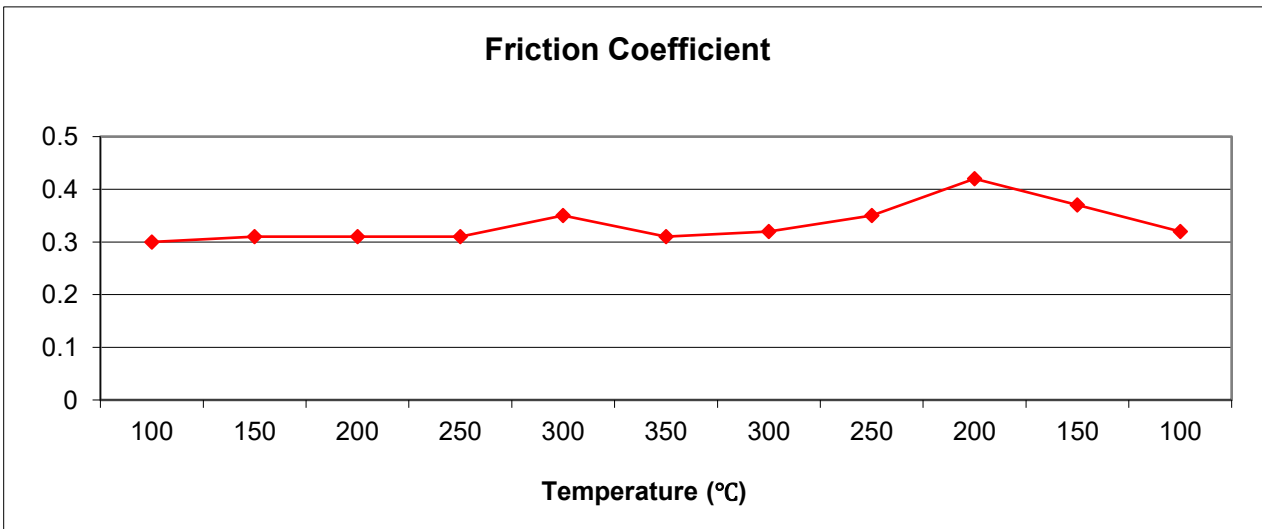
Friction and Wear - Constant Speed

b. Friction and wear

Equipment Name: Constant speed tester

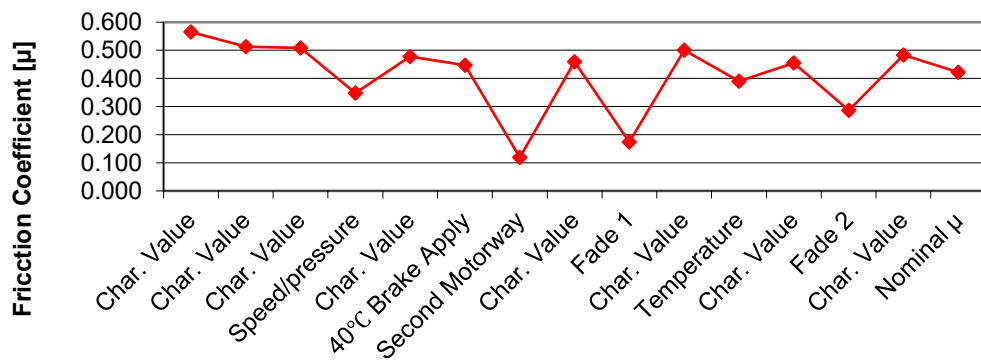
Standard Applied: GB5763-2008

Test Temperature (°C)	Friction Coefficient	Coefficient appointed	Wear Rate 10-7cm ³ / (N·m)	Test Temperature (°C)	Friction Coefficient		Wear Rate 10-7cm ³ / (N·m)
					Warming	Cooling	
100	0.25-0.65	0.35±0.08	0-0.50	100	0.30	0.32	0.13
150	0.25-0.70	0.35±0.10	0-0.70	150	0.31	0.35	0.09
200	0.25-0.70	0.35±0.10	0-1.00	200	0.31	0.42	0.04
250	0.25-0.70	0.35±0.10	0-1.50	250	0.31	0.37	0.01
300	0.25-0.70	0.35±0.12	0-2.00	300	0.35	0.32	-0.03
350	0.25-0.70	0.35±0.12	0-2.50	350	0.31		-0.06



SAE J-2522 DYNAMOMETER BRAKE EFFECTIVENESS

Vehicle	Sample Model		D787-7656	
	Engine Size		2.4	
	Required Load		942 Kg	
	Required Inertia		111.8 Kg·m2	
	Piston Diameter		56.6 mm	
	Effective Radius		112.0 mm	
Dynamometer Brake				
Characteristic Values μ			AVG	MIN
Char. Value	(6.1)	μ_{avg}	0.565	
Char. Value	(6.2)	μ_{avg}	0.513	
Char. Value	(6.3)	μ_{0p6}	0.508	
Speed/pressure	(6.4.3)	μ_{v120}	0.348	
Char. Value	(6.5)	μ_{0P6}	0.478	
40°C Brake Apply	(6.6)	μ_{T40}	0.447	
Second Motorway	(6.7)	μ_{Mw2}	0.119	
Char. Value	(6.8)	μ_{0P18}	0.459	
Fade 1	(6.9)	μ_{F1}		0.174
Char. Value	(6.10)	μ_{0P18}	0.501	
Temperature	(6.12)	T500/ μ_{T300}		0.390
Char. Value	(6.13)	μ_{0P18}	0.455	
Fade 2	(6.14)	μ_{F2}		0.287
Char. Value	(6.15)	μ_{0P18}	0.483	
Nominal μ		μ_{avg}	0.422	



SAE J-2521 Noise Performance

Fixture Identification: D787-7656

Required Wheel Load: 528.5 Kg

Actural Wheel Load: 528.5 Kg

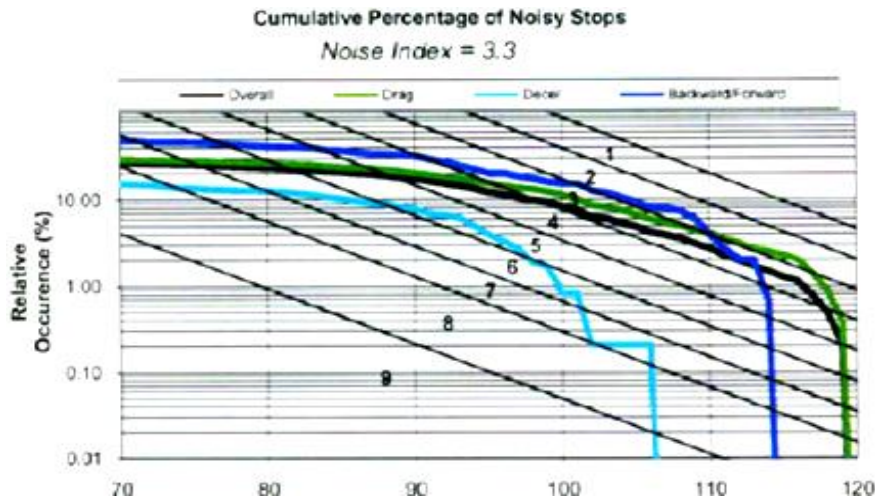
Required Inertia: 55.2 Kg·m2

Actural Inertia: 55.0 Kg·m2

Pri/Lead/Inner Lining: XBP 2701 FF

Sec/Trail/Outer Lining: XBP 2701 FF

Comments: With Normal shim No Knuckle



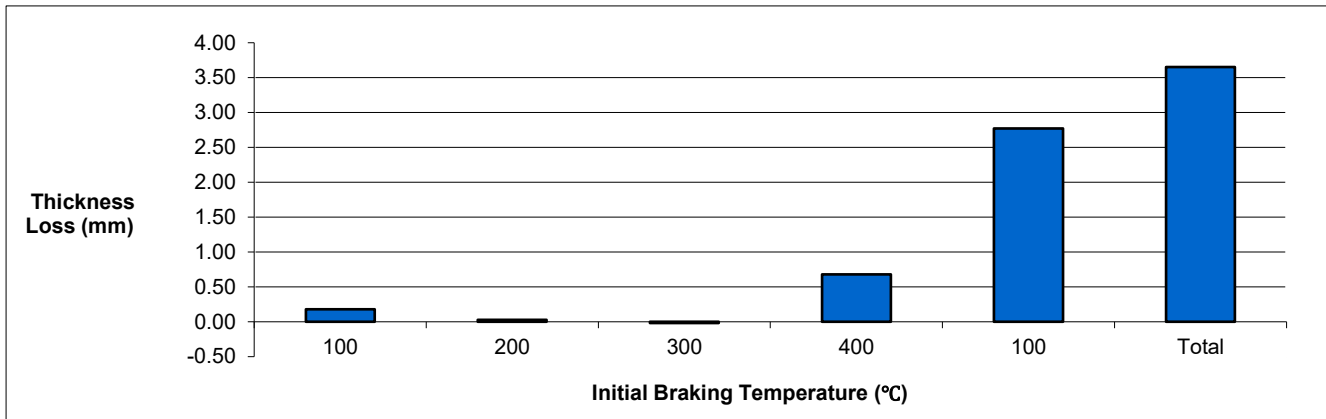
Frequency Range	Threshold	Number of Noisy Stops (per frequency range / apply type)				Percentage (%) Noisy Stops (per frequency range / apply type)			
		Overall	Drag	Decel	Back/Fwd	Overall	Drag	Decel	Back/Fwd
2 kHz to 17 kHz	>70 dB(A)	381	235	74	72	26.6%	29.4%	15.4%	48.0%
	>80 dB(A)	331	209	60	62	23.1%	26.2%	12.4%	41.3%
2 kHz to 4 kHz	>70 dB(A)	55	35	6	14	3.8%	4.4%	1.2%	9.3%
	>80 dB(A)	30	18	1	11	2.1%	2.3%	0.2%	7.3%
4 kHz to 6 kHz	>70 dB(A)	35	29	0	6	2.4%	3.6%	0.0%	4.0%
	>80 dB(A)	20	17	0	3	1.4%	2.1%	0.0%	2.0%
6 kHz to 10 kHz	>70 dB(A)	348	217	70	61	24.3%	27.2%	14.5%	40.7%
	>80 dB(A)	291	183	59	49	20.3%	22.9%	12.2%	32.7%
10 kHz to 14 kHz	>70 dB(A)	86	62	3	21	6.0%	7.8%	0.6%	14.0%
	>80 dB(A)	44	35	1	8	3.1%	4.4%	0.2%	5.3%
14 kHz to 17 kHz	>70 dB(A)	182	123	22	37	12.7%	15.4%	4.6%	24.7%
	>80 dB(A)	125	91	7	27	8.7%	11.4%	1.5%	18.0%
Total # of Stops						1430	798	482	150

SAE J-2521 Noise Performance

Applied Standar	Appended Table 1 List of Test Items				
	initial speed	Initial brake temperature °C	Braking deceleration G	Number of applications	Remark
JASO C427	50	100	0.3	500	Measure the thickness of pads for each specified temperature in parentheses are optional.
	50	200	0.3	500	
	50	300	0.3	500	
	50	400	0.3	500	
	100	100	0.3	500	

Thicknees Loss

Fixture	100	200	300	400	100	Total
D787-7656	0.18	0.03	-0.02	0.68	2.77	3.65



Weight Loss

Fixture	100	200	300	400	100	Total
D787-7656	3.75	0.75	2.75	15.75	43.50	66.50

