




## Physical Properties Test Report

**Link Test Report:** 101489-3-1  
**Test Description:** SAE J661 Rev Feb 1997 Brake Lining Quality Test  
**Purpose of Test:** To Evaluate the Characteristics of Brake Materials  
**Material Identification:** D1210  
**Test Date:** 02/02/2019 - 02/02/2019

### Requested By:

**ROYAL BRAKES CANADA**  
Quality control Department  
1500-701 WEST GEORGIA STREET  
VANCOUVER, B.C. V7Y 1C6  
CANADA

### Report Approved by:

  
\_\_\_\_\_  
Supervising Engineer, M.Sc.

Date: 2/04/19



**LINK Engineering Company**  
Dearborn Technical Center  
401 Southfield Road  
Dearborn, MI 48120  
[www.linkeng.com](http://www.linkeng.com)  
Phone: (313) 625-4000



## SAE J661 Rev Feb 1997 Brake Lining Quality Test

### Test Information

Customer Name	ROYAL BRAKES CANADA
Requestor	Quality control
Test Procedure	SAE J661
Program Number	J661noinsp.chp
Test Coordinator	CA
Test Equipment	Chase Machine #5531
Test Dates	02/02/2019 - 02/02/2019
Datalogger	v1.0.10
Template Version	3.00

### Setup Details

Sample Material	D1210
Sample Size	25.4 mm x 25.4 mm
Sample Manufacturer	ROYAL BRAKES CANADA
Test Pressure	1034 kPa

### Sample Test Summary

Normal Friction Coefficient	0.410	Pass
Normal Friction Class	F	
Hot Friction Coefficient	0.380	Pass
Hot Friction Class	F	
Minimum Bold Coefficient	0.370	Pass
Max Variation Below Average for Bold Readings	0.000	Pass
Max % Variation for Bold Readings	0.00%	Pass

**Pass / Fail**

**Pass**

### Comments:

Processed by:	Chris Arquette (313) 625-4000	Title:	Test Engineer	Date:	02/04/2019
Reviewed by:	Radoslaw Markiewicz (313) 625-4000	Title:	Supervising Engineer	Date:	02/04/2019

Data applicable to the materials tested. Report can be copied in full. Bilateral uncertainty of measurements 0.63% of FS. Coverage factor of 2. Confidence of 95%. Details available upon request.



Sample 1  
101489-3-1

**Test Number**

Manufacturer  
**ROYAL BRAKES CANADA**

**Initial Baseline**

Material  
**D1210**

Application Sample 1  
1 0.449  
20 0.436

Normal **0.410 F**

**First Fade**

Temp (°C) Sample 1  
93.3 0.431  
287.8 0.359  
(or Temp @ 10min)

Hot **0.380 F**

**First Recovery**

Temp (°C) Sample 1  
260.0 0.330  
204.4 0.335  
148.9 0.339  
93.3 0.346

<u>Average</u>	<u>Norm/Hot</u>
0.330	
0.335	Hot
0.339	Hot
0.346	

**Wear**

Application Sample 1  
1 0.353  
100 0.418

**Second Fade**

Temp (°C) Sample 1  
**93.3 0.418**  
**121.1 0.405**  
**148.9 0.404**  
**176.7 0.409**  
**204.4 0.412**  
**232.2 0.412**  
**260.0 0.411**  
**287.8 0.394**  
315.6 0.384  
343.3 0.365  
(or Temp @ 10min)

<u>Average</u>	<u>Max Var. &lt; Average</u>	<u>Norm/Hot</u>	<u>% Var</u>
<b>0.418</b>	<b>0.000</b>	<b>Normal</b>	<b>0%</b>
<b>0.405</b>	<b>0.000</b>	<b>Normal</b>	<b>0%</b>
<b>0.404</b>	<b>0.000</b>	<b>Normal</b>	<b>0%</b>
<b>0.409</b>	<b>0.000</b>	<b>-</b>	<b>0%</b>
<b>0.412</b>	<b>0.000</b>	<b>Normal</b>	<b>0%</b>
<b>0.412</b>	<b>0.000</b>	<b>Hot</b>	<b>0%</b>
<b>0.411</b>	<b>0.000</b>	<b>Hot</b>	<b>0%</b>
<b>0.394</b>	<b>0.000</b>	<b>Hot</b>	<b>0%</b>
0.384	0.000	Hot	0%
0.365	0.000	Hot	0%

**Second Recovery**

Temp (°C) Sample 1  
315.6 0.360  
260.0 0.387  
204.4 0.393  
**148.9 0.383**  
**93.3 0.370**

<u>Average</u>	<u>Max Var. &lt; Average</u>	<u>Norm/Hot</u>	<u>% Var</u>
0.360	0.000	-	0%
0.387	0.000	Hot	0%
0.393	0.000	Hot	0%
<b>0.383</b>	<b>0.000</b>	<b>Hot</b>	<b>0%</b>
<b>0.370</b>	<b>0.000</b>	<b>-</b>	<b>0%</b>

**Final Baseline**

Application Sample 1  
1 0.376  
20 0.400



Manufacturer: ROYAL BRAKES CANADA  
Material: D1210  
Test Pressure: 1034 kPa

Normal **0.410** **F**  
Hot **0.380** **F**

2/2/2019  
101489-3-1  
Sample 1 of 1

**Wear**

	Initial	Final	Loss	Loss / %
Weight (gram)	8.335	8.002	0.333	4.00
Thickness (mm)	0.256	0.245	0.011	4.30
Indicator	N/A	N/A	N/A	N/A

**Baseline**

Event	Initial		Final	
	Force (N)	$\mu$	Force (N)	$\mu$
1	299.8	0.449	252.3	0.376
5	309.9	0.467	256.6	0.386
10	301.5	0.451	262.9	0.394
15	295.1	0.441	265.0	0.397
20	291.2	0.436	266.7	0.400

**Wear**

Event	Force (N)	$\mu$
1	234.6	0.353
10	236.5	0.356
20	241.3	0.362
30	251.8	0.376
40	257.8	0.386
50	262.1	0.392
60	267.5	0.400
70	269.8	0.404
80	269.7	0.405
90	277.2	0.416
100	278.8	0.418

**First Fade**

Time (sec)	Force (N)	$\mu$	Temp (°C)
0.0	285.9	0.434	82
30.0	284.9	0.428	109
60.0	286.8	0.431	130
90.0	287.1	0.431	152
120.0	288.1	0.432	173
150.0	297.0	0.445	196
180.0	293.5	0.439	219
210.0	280.5	0.422	239
240.0	274.5	0.412	259
270.0	254.8	0.382	278
290.3	237.8	0.323	289

**Second Fade**

Time (sec)	Force (N)	$\mu$	Temp (°C)
0.0	297.4	0.454	83
30.0	270.0	0.405	110
60.0	271.5	0.407	132
90.0	271.9	0.407	152
120.0	273.9	0.411	174
150.0	274.0	0.412	195
180.0	276.9	0.415	217
210.0	276.1	0.412	237
240.0	273.4	0.410	257
270.0	268.1	0.402	277
300.0	263.0	0.395	295
330.0	257.3	0.387	312
360.0	248.9	0.373	327
390.0	243.2	0.364	342
396.6	242.4	0.346	345

**First Recovery**

Event	Force (N)	$\mu$	Temp (°C)
1	220.2	0.330	259
2	222.6	0.335	207
3	226.1	0.339	154
4	230.5	0.346	100

**Second Recovery**

Event	Force (N)	$\mu$	Temp (°C)
1	239.2	0.360	314
2	258.1	0.387	262
3	262.6	0.393	209
4	254.8	0.383	155
5	247.3	0.370	101



Manufacturer: ROYAL BRAKES CANADA  
Material: D1210  
Test Pressure: 1034 kPa

2/2/2019  
101489-3-1  
Sample 1 of 1

### Coefficient of Friction

