



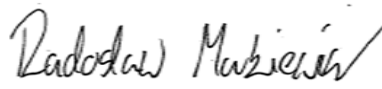
Physical Properties Test Report

Link Test Report: 105146-1-1
Test Description: SAE J661 Rev Feb 1997 Brake Lining Quality Test
Purpose of Test: To Evaluate the Characteristics of Brake Materials
Material Identification: D1304
Test Date: 12/18/2020 to 12/18/2020

Requested By:

ROYAL BRAKES CANADA
HARRY DIBADJ
1500-701 WEST GEORGIA STREET
VANCOUVER, B.C. V7Y 1C6
CANADA

Report Approved By:



Supervising Engineer, M.Sc.

Date: 12/21/20



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



Test Number
105146-1-1

Customer Reference
D1304

SAE J661 Rev Feb 1997 Brake Lining Quality Test

Test Information

Customer Name	Royal Brakes Canada
Requestor	Harry Dibadj
Test Procedure	SAE J661
Program Number	J661noinsp.chp
Test Coordinator	E. DEJULES
Test Equipment	Chase Machine 12
Test Dates	12/18/2020 to 12/18/2020
Datalogger	v1.0.10
Template Version	2.06

Setup Details

Sample Material	D1304
Sample Size	1" X 1"
Sample Manufacturer	Royal Brakes Canada
Test Pressure	150 psi

Sample Test Summary

Normal Friction Coefficient	0.429	Pass
Normal Friction Class	F	
Hot Friction Coefficient	0.406	Pass
Hot Friction Class	F	
Minimum Bold Coefficient	0.382	Pass
Max Variation Below Avg for Bold readings	0.000	Pass
Max % Variation for Bold Readings	0%	Pass

Pass / Fail

Pass

Comments:

Created by:	Chris Arquette (313) 625-4000	Title	Test Engineer	Date	12/21/2020
Reviewed by:	Radoslaw Markiewicz (313) 625-4000	Title	Supervising Engineer	Date	12/21/2020

Data applicable to the materials tested. **Valid if signed by the test engineer.** 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.



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		Test Number										
		<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>	<u>Sample 4</u>	<u>Sample 5</u>	Manufacturer					
		105146-1-3					Royal Brakes Canada					
				Initial Baseline			Material					
<u>Application</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>	<u>Sample 4</u>	<u>Sample 5</u>	D1304						
1	0.350					Normal					0.429	F
20	0.440					Hot					0.406	F
				First Fade								
<u>Temp (°F)</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>	<u>Sample 4</u>	<u>Sample 5</u>							
200.0	0.438											
500.0	0.444											
(or Temp @ 10min)				First Recovery								
<u>Temp (°F)</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>	<u>Sample 4</u>	<u>Sample 5</u>	<u>Average</u>	<u>Norm/Hot</u>					
500.0	0.468					0.468						
400.0	0.475					0.475	Hot					
300.0	0.465					0.465	Hot					
200.0	0.471					0.471						
				Wear								
<u>Application</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>	<u>Sample 4</u>	<u>Sample 5</u>							
1	0.511											
100	0.426											
				Second Fade			Max Var.					
<u>Temp (°F)</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>	<u>Sample 4</u>	<u>Sample 5</u>	<u>Average</u>	<u>< Average</u>	<u>Norm/Hot</u>	<u>% Var</u>			
200.0	0.382					0.382	0.000	Normal	0%			
250.0	0.456					0.456	0.000	Normal	0%			
300.0	0.431					0.431	0.000	Normal	0%			
350.0	0.451					0.451	0.000	-	0%			
400.0	0.445					0.445	0.000	Normal	0%			
450.0	0.442					0.442	0.000	Hot	0%			
500.0	0.422					0.422	0.000	Hot	0%			
550.0	0.404					0.404	0.000	Hot	0%			
600.0	0.369					0.369	0.000	Hot	0%			
650.0	0.359					0.359	0.000	Hot	0%			
(or Temp @ 10min)				Second Recovery			Max Var.					
<u>Temp (°F)</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>	<u>Sample 4</u>	<u>Sample 5</u>	<u>Average</u>	<u>< Average</u>	<u>Norm/Hot</u>	<u>% Var</u>			
600.0	0.332					0.332	0.000	-				
500.0	0.371					0.371	0.000	Hot				
400.0	0.367					0.367	0.000	Hot				
300.0	0.389					0.389	0.000	Hot				
200.0	0.422					0.422	0.000	-				
				Final Baseline								
<u>Application</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>	<u>Sample 4</u>	<u>Sample 5</u>							
1	0.394											
20	0.516											



Test Number
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Customer Reference
D1304

Manufacturer: Royal Brakes Canada
Material: D1304
Test Pressure: 150 psi

Normal **0.429** **F**
Hot **0.406** **F**

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Sample 1 of 1

Wear

	Initial	Final	Loss	Loss / %	Specific Wear	
Weight (gr)	9.157	8.353	0.804	8.78%	3.33E-01	gr/hp-hr
Thickness (inch)	0.257	0.238	0.019	7.39%	7.87E-03	in ³ /hp-hr

Baseline

Event	Initial		Final	
	Force (lb)	μ	Force (lb)	μ
1	53	0.350	59	0.394
5	58	0.386	68	0.451
10	65	0.433	72	0.480
15	64	0.429	74	0.493
20	66	0.440	76	0.516

Wear

Event	Force (lb)	μ
1	77	0.511
10	75	0.499
20	66	0.435
30	68	0.452
40	63	0.419
50	63	0.420
60	61	0.407
70	62	0.410
80	65	0.431
90	62	0.412
100	63	0.426

First Fade

Time (sec)	Force (lb)	μ	Temp (°F)
0	66	0.438	246
30	70	0.470	296
60	71	0.466	342
90	72	0.471	389
120	71	0.474	435
150	71	0.473	473
180	60	0.407	513
210	61	0.403	545
240			
270			
300			
330			
360			
390			
420			
450			
480			
510			
540			
570			
600			

Second Fade

Time (sec)	Force (lb)	μ	Temp (°F)
0	70	0.463	242
30	63	0.420	293
60	68	0.450	339
90	66	0.441	381
120	64	0.425	426
150	64	0.425	462
180	64	0.426	500
210	61	0.407	540
240	58	0.390	571
270	53	0.354	600
300	50	0.336	622
330	49	0.329	642
360			
390			
420			
450			
480			
510			
540			
570			
600			

First Recovery

Event	Force (lb)	μ	Temp (°F)
1	70	0.468	506
2	71	0.475	412
3	70	0.465	315
4	70	0.471	219

Second Recovery

Event	Force (lb)	μ	Temp (°F)
1	50	0.332	594
2	56	0.371	505
3	55	0.367	408
4	59	0.389	309
5	64	0.422	214



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Manufacturer: Royal Brakes Canada
Material: D1304
Test Pressure: 150 psi

12/18/2020
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Sample 1 of 1

Coefficient of Friction

