

EVALUATION TEST REPORT
CBDO-22-01/3
CATALYTIC CARBON BRAKE DISK OXIDATION TEST

For SAE AMS1431/1435
Runway Deicing/Anti-Icing Product

D-ICE KA, lot # KA-22-21

for

NORDIX CHEMICALS FACTORY d.o.o.
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by

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1. INTRODUCTION

This report presents results of Catalytic Carbon Brake Disk Oxidation test, performed on a sample of **D-ICE KA Runway Deicing/Anti-Icing Product**, provided by **NORDIX CHEMICALS FACTORY d.o.o.**. The anti-oxidant coated coupons used for performing the tests were in accordance with the SAE AIR5567A requirements, and were provided by Honeywell Aerospace, 3520 Westmoor Street, South Bend, IN 46628 USA.

The Catalytic Carbon Brake Disk Oxidation Test results, as per the AIR5567A Method, are reported for informational purpose only. The tests were performed at the Anti-icing Materials International Laboratory (AMIL), research laboratory which is located at the Université du Québec à Chicoutimi (UQAC). AMIL is independent of deicing chemical manufacturers and was found qualified on November 28, 2017 by the Performance Review Institute according to PRI document AC3002, “audit criteria for compliance to SAE AIR5567” of AMS1431 and AMS1435.

2. PROCEDURE

The Runway Deicing /Anti-Icing Product was tested in accordance with the **SAE AIR5567A[1] “Test Method for Catalytic Carbon Brake Disk Oxidation”** as per the latest revision of the SAE AMS1431 [2] and AMS1435 [3] specifications. This simple test method was designed to assess the relative effect of runway deicing chemicals on carbon brake systems by measuring the mass change of contaminated carbon brake anti-oxidant (AO) coated coupons when submitted to oxidation tests at high temperature according to the AIR5567A test method.

The carbon/carbon composite brake material CARBENIX® 4000 (C4000®) test coupons (*section 3.1) are treated with a generic anti-oxidant coating (*section 3.3) and then immersed in a runway deicer (25% w/w concentration) for 10 minutes. Deicer contaminated coupons are then dried at 150°C for 2 hours and transferred to a desiccator and cooled for a minimum of 30 minutes (*section 3.4). After the cooling period, the test coupons are heated in a still air muffle furnace at 550°C for 24 hours. After the heating period, the coupons are cooled and the normalized oxidation weight loss is calculated by means of the % weight loss (*section 3.5).

* Refer to AIR5567A

3. RESULTS

3.1 Runway Deicing/Anti-Icing Product Identification

The Catalytic Carbon Brake Disk Oxidation Test was performed on the runway deicer described in Table 1.

Table 1 - Runway Deicing/Anti-Icing Product Identification

Company	Runway Deicing/Anti-Icing Product			AMIL Label	RI ¹ (20°C)	Manuf. Date	Manuf. Location	Recep. Date
	Name	Form	Conc. % w/w					
NORDIX CHEMICALS FACTORY d.o.o.	D-ICE KA, lot # KA-22-21	Liquid	50/50	X813	1.3934	22-03-01	Zagreb, Croatia	22-03-29
			25 ²	X814	1.3617			

3.2 Test Results Summary

Table 2 presents the Catalytic Carbon Brake Oxidation test results. Figure 1 presents oxidation weight losses. The details of the test results are presented in Table 3 and the experimental data sheets are presented in Annexe A.

Table 2 - Summary of Catalytic Carbon Brake Disk Oxidation Test Results

Company	Runway Deicing/Anti-Icing Product Name	Mean Oxidation Weight Loss (%) (3.5 h)	Mean Normalized Weight Loss (%) (3.5 k)
NORDIX CHEMICALS FACTORY d.o.o.	D-ICE KA, lot # KA-22-21	23.3 ± 6.1	41.7 ± 7.4
Honeywell Aerospace	Control Coupon	0.4 ± 0.1	n.a

The Runway Deicing/Anti-Icing Product NORDIX CHEMICALS FACTORY d.o.o. D-ICE KA, lot # KA-22-21, was tested in April 2022, in accordance with



¹ Refractive Index

² 25% w/w (active ingredient); refer to AIR5567-Rev A, section 3.4

paragraph 3.2.13 of AMS1435D as per Catalytic Carbon Brake Disk Oxidation Test (AIR5567A).

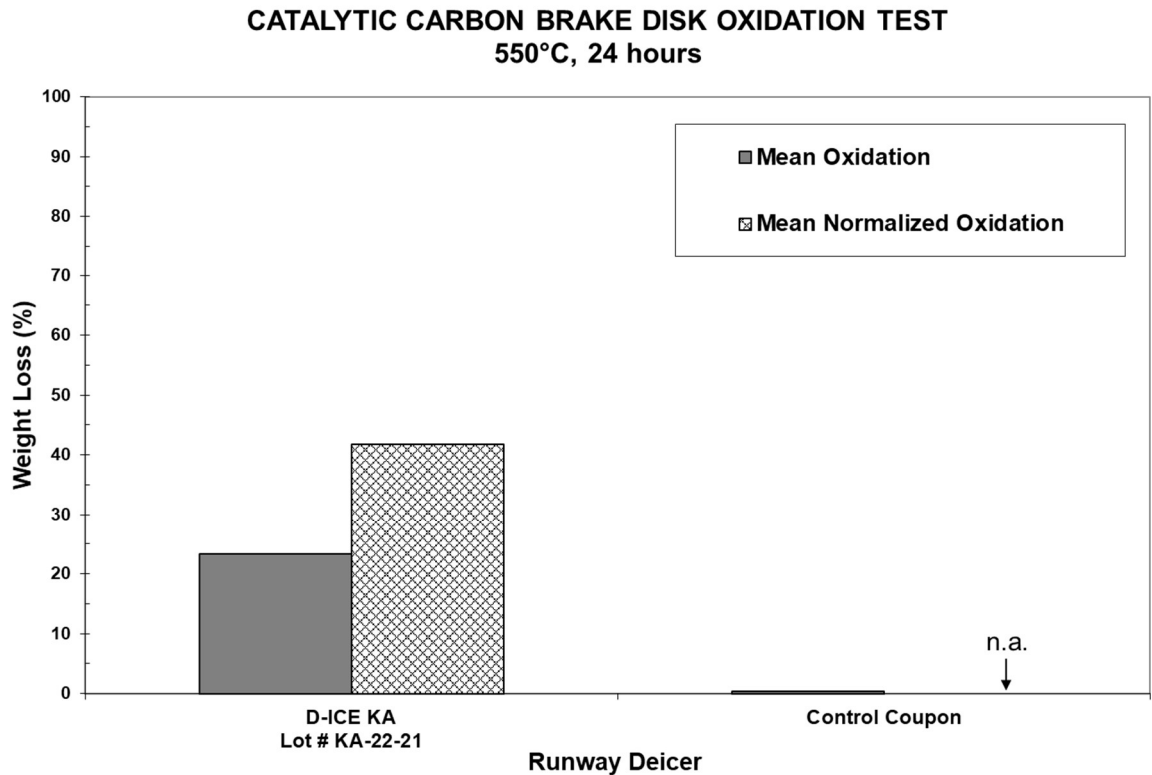


Figure 1 - Mean Weight Loss (%)

Table 3 - Oxidation Test Result - Runway Deicing/Anti-Icing Product
D-ICE KA, lot # KA-22-21

Test Parameters		AIR5567 Section ref.	Results
Deicer Concentration		-	25% w/w
Mean pick up of deicer in coupon (%)		3.4 j	1.07
Mean pick up of AO in coupons (%)		3.3 k	1.94
Mean ratio deicer pick up (%) / AO pick up (%)		3.5 i	0.56
Furnace temperature (oxidation test)	Min (°C)	-	549.7
	Max (°C)	-	549.9
	Mean (°C)	-	549.8 ± 0.1
Oxidation test time (minutes)		-	1440
Mean oxidation weight loss deicer contaminated coupons (%)		3.5 h	23.3
Standard deviation oxidation weight loss deicer contaminated coupons (%)		3.5 h	6.1

Mean normalized weight loss deicer contaminated coupons (%)	3.5 k	41.7
Standard deviation normalized oxidation weight loss deicer contaminated coupons (%)	3.5 k	7.4

Table 4 - Oxidation Test Result - Control Coupons

Test Parameters		AIR5567 Section ref.	Results
Mean pick up of AO in coupons (%)		3.3 k	1.60
Furnace temperature (oxidation test)	Min (°C)	-	550.0
	Max (°C)	-	550.8
	Mean (°C)	-	550.3 ± 0.2
Oxidation test time (minutes)		-	1440
Mean weight loss control coupons (%)		3.5 h	0.4
Standard deviation weight loss control coupons (%)		3.5 h	0.1

4. REFERENCES

1. SAE International Aerospace Information Report, "Test Method for Catalytic Carbon Brake Disk Oxidation", AIR5567, revision A, June 2010.
2. SAE International Aerospace Material Specification, "Solid Runway Deicing/Anti-Icing Product", AMS 1431, revision E, October 2018.
3. SAE International Aerospace Material Specification, "Liquid Runway Deicing/Anti-Icing Product", AMS 1435, revision D, November 2018.

ANNEXE A

TEST DATA SHEETS

Oxidation Test Results

D-ICE KA, lot # KA-22-21 (X814).....	p. 6
Control Coupon	p. 6

REPORT #:		CBDO-22-01/3			FURNACE TEMP (°C): 549.7				min		TEST DATE: 2022-04-19		
DEICER NAME:		D-ICE KALot # KA-22-21			549.9				max		GROUP COUPON #: 228		
					549.8 ± 0.1				mean ± std. dev.				
Initial Weights (g)					Contamination (g)			Oxidation (g)	Results				
FLUID AMIL #	Coupon #	Bare Coupon Initial Weight (a)	AO Coated Coupon Initial Weight (b) After 2 hours drying	3.3 k % Weight AO Pick Up	Contaminated Coupon Initial Weight (c)	Weight Change	3.4 j % Weight DI Pick Up	24 h @ 550°C Final Weight (d)	3.5 h % Weight Change	3.5 i Ratio DI Pick Up/ AO Pick Up	3.5 k Normalized Oxidation Weight Loss		
X814	A028	20.091	20.446	1.767	20.719	0.273	1.359	14.539	29.401	0.769	38.232		
	A047	20.079	20.479	1.992	20.715	0.236	1.175	14.520	29.678	0.590	50.301		
	A053	20.292	20.637	1.700	20.841	0.204	1.005	16.970	18.071	0.591	30.562		
	A054	19.356	19.797	2.278	19.953	0.156	0.806	17.195	13.443	0.354	38.002		
	A070	19.706	20.087	1.933	20.269	0.182	0.924	15.783	21.841	0.478	45.722		
	A076	19.952	20.285	1.669	20.477	0.192	0.962	16.304	19.953	0.577	34.606		
	A104	19.650	20.102	2.300	20.322	0.220	1.120	15.337	24.249	0.487	49.821		
A114				19.544	19.912	1.883	20.147	0.235	1.202	14.108	29.697	0.639	46.504
AVERAGE				1.940		0.212	1.069		23.292	0.560	41.719		
STD DEV				0.242		0.037	0.178		6.066	0.123	7.361		

DEICER NAME:		N.A.		FURNACE TEMP (°C):				550.0	min	TEST DATE:			2015-02-05
								550.8	max				
								550.3 ± 0.2	mean ± std. dev.				
Initial Weight (g)					Contamination (g)			Oxidation (g)	Results				
Reference	Coupon #	Bare Coupon Initial Weight (a)	AO Coated Coupon Initial Weight (b)	3.3 k % Weight AO Pick Up	Contaminated Coupon Initial Weight (c)	Weight Change	3.4 j % Weight DI Pick Up	24 h @ 550°C Final Weight (d)	3.5 h % Weight Change	3.5 i Ratio DI Pick Up/ AO Pick Up	3.5 k Normalized Oxidation Weight Loss		
Control Coupon	1094	19.716	20.088	1.887	n/a	n/a	n/a	20.027	0.309	n/a	n/a		
	1233	19.581	19.975	2.012	n/a	n/a	n/a	19.881	0.480	n/a	n/a		
	1161	19.584	19.902	1.624	n/a	n/a	n/a	19.846	0.286	n/a	n/a		
	1241	19.899	20.185	1.437	n/a	n/a	n/a	20.135	0.251	n/a	n/a		
	1243	19.890	20.153	1.322	n/a	n/a	n/a	20.061	0.463	n/a	n/a		
	1245	19.976	20.245	1.347	n/a	n/a	n/a	20.168	0.385	n/a	n/a		
	1226	20.088	20.378	1.444	n/a	n/a	n/a	20.319	0.294	n/a	n/a		
	1235	19.714	20.050	1.704	n/a	n/a	n/a	19.979	0.360	n/a	n/a		
AVERAGE				1.597					0.354				
STD DEV				0.255					0.084				

ACCREDITATION



*In accordance with PRI AC3002, Audit Criteria for
Compliance to SAE AIR5567:*

Anti-Icing Materials International Laboratory (AMIL)

*Universite du Quebec a Chicoutimi
Department des Sciences Appliquees
555, Boulevard de l'Universite
Chicoutimi Quebec, Canada G7H 2B1*

*Has had its facilities examined and approved through continuing audit
procedures as established by PRI for conformance to the
applicable specification requirements for the Runway Deicing
Product Catalytic Carbon Brake Disk Oxidation acceptance test facilities.*

This certificate is granted by authority of the Performance Review Institute for:

Testing of Deicing/Anti-Icing Fluids

Certificate Number 0002
Expiration Date: 31 October 2022
Issue Date: 28 November 2017

A handwritten signature in black ink, reading "Joseph G. Pinto", is written over a horizontal line.

*Joseph G. Pinto
Vice President and Chief Operating Officer*

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