

Centrifugal Adhesion Test Data Sheet

Client: CG² NanoCoatings Inc.

Report #: 2006-CAT-02

Test #: CAT17

Candidate Coatings: AMIL # 46C

Reference substrate: Aluminium

Results:

Date: 31 March 2006			
Air Temperature: -10.0 °C ± 0.2			
Ice formation Temperature: -5.3 °C ± 1.3			
Ice thickness: 6.5 mm ± 0.5			
Ice density: 0.88 g/cm ³ ± 0.02			
Coating 46		Bare Aluminum	
Sample #	Ice Adhesion (MPa)	Sample #	Ice Adhesion (MPa)
46C1	0.145	Alu1	0.617
46C2	0.161	Alu2	0.623
46C3	0.193	Alu3	0.691
Mean	0.17 ± 0.02	Mean	0.64 ± 0.04
Adhesion Reduction Factor*: 3.8			

*Adhesion Reduction Factor =
$$\frac{\text{Mean ice adhesion on bare aluminum}}{\text{Mean ice adhesion on candidate coating}}$$

Testing:

A test series consists of three small, 3.2 x 34 x 0.2 cm, beams covered with the candidate coating, compared to three bare beams. The 6 beams are iced simultaneously with freezing drizzle to obtain a heavy rime of 0.88 g/cm³ on a 5 cm² surface to a thickness of around 5 mm at a temperature of -10 °C. Following icing, each series of beams are balanced and placed into a centrifuge specially adapted to measure ice adhesion. The centrifugal force resulting from the rotation of the centrifuge tends to detach the ice. When this force reaches that of the adherence of the ice, the ice detaches. The detachment of the ice is picked up by piezoelectric cells sensitive to vibrations in the vat which relay their signal in real time to a computer. With this signal, the rotation speed during the detachment is determined. Finally, the adherence force is measured using the speed of detachment, the mass of the ice, and the beam length.