



June 20, 2017
Via Email: dan@contegointernational.com

Mr. Danny French
CEO
Contego International, Inc.
7991 W 1400 North
Silver Lake, IN 46982-9676

SUBJECT: Results of Tensile Adhesion Testing; KTA-Tator, Inc. Project No. 370421

Dear Mr. French:

In accordance with KTA-Tator, Inc. (KTA) Proposal Number PN177943 and the subsequent email authorization to proceed on June 8, 2017, KTA has completed tensile adhesion testing on the submitted samples. This report contains descriptions of the testing procedures employed and the results of the testing.

SAMPLES

The samples listed in Table 1, “Samples” were received from Contego International, Inc. (Contego) on May 4, 2017. It should be noted that at no time did KTA personnel witness the acquisition of the samples listed below.

Table 1 – Samples

KTA ID	Description	Contego Label
KTA-1	One 4" by 8" coated steel panel with two varying dry film thickness sections	Plate 1 – Polyurethane
KTA-2	One 4" by 8" coated steel panel with two varying dry film thickness sections	Plate 2 – Semi-Gloss Acrylic
KTA-3	One 4" by 8" coated steel panel with two varying dry film thickness sections	Plate 3 – Latex Eggshell
KTA-4	One 4" by 8" coated steel panel with two varying dry film thickness sections	Plate 4 – Oil Base

TENSILE ADHESION

Tensile adhesion (pull-off strength) was measured in accordance with ASTM D4541-09e1, “Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers,” Annex A4, “Self-Aligning Adhesion Tester Type V.” Prior to testing preparation, approximate dry film thickness measurements were obtained using a DeFelsko® PosiTector® 6000 non-destructive electronic coating thickness gage. The testing surfaces were abraded gently using fine sandpaper and wiped clean. The pull stubs used were 20 mm in diameter and were lightly abraded

with sandpaper prior to being attached to the coating using a two component epoxy adhesive (Araldite 2011), which was allowed to cure for 24 hours at ambient laboratory conditions ($73.5 \pm 3.5^\circ\text{F}$ and $50 \pm 5\%$ RH). The pull stubs were then detached using a Defelsko® PosiTest® AT. The force (in psi) required to remove each loading fixture was recorded along with the location of break and approximate percentage of each. The location of break is defined as follows:

Adhesive Failure: A split between layers or a split between the substrate and the first layer.

Cohesive Failure: A split within a single layer.

Glue Failure: Coating strength exceeds glue strength.

The samples submitted included two coating thicknesses sections to be tested per panel. The measured thicknesses and results of the testing can be found in Table 2, “Results of Tensile Adhesion Testing.”

Table 2 – Results of Tensile Adhesion Testing

Sample ID	Pull Stub ID	Average Panel Section Dry Film Thickness (mils)	Pull-Off Strength (psi)	Location of Break	Average Pull-Off Strength (psi)
KTA-1A	A	35.9	492	90% adhesive failure between top white and bottom white, 10% cohesive failure within top white	481
	B		453	70% cohesive failure within top white, 30% adhesive failure between top white and bottom white	
	C		497	90% adhesive failure between top white and bottom white, 10% cohesive failure within top white	
KTA-1B	A	57.4	379	70% adhesive failure between top white and bottom white, 30% cohesive failure within top white	370
	B		362	100% cohesive failure within top white	
	C		369	80% cohesive failure within top white, 20% adhesive failure between top white and bottom white	
KTA-2A	A	25.2	545	80% adhesive failure between top white and bottom white, 20% cohesive failure within top white	515
	B		462	90% adhesive failure between top white and bottom white, 10% cohesive failure within top white	
	C		537	100% adhesive failure between top white and bottom white	

Table 2 – Results of Tensile Adhesion Testing, continued

Sample ID	Pull Stub ID	Average Panel Section Dry Film Thickness (mils)	Pull-Off Strength (psi)	Location of Break	Average Pull-Off Strength (psi)
KTA-2B	A	42.2	374	50% adhesive failure between top white and bottom white, 50% cohesive failure within top white	432
	B		477	80% adhesive failure between top white and bottom white, 20% cohesive failure within top white	
	C		446	80% adhesive failure between top white and bottom white, 20% cohesive failure within top white	
KTA-3A	A	27.2	488	90% adhesive failure between top white and bottom white, 10% cohesive failure within top white	457
	B		478	90% adhesive failure between top white and bottom white, 10% cohesive failure within top white	
	C		405	95% adhesive failure between top white and bottom white, 5% glue failure	
KTA-3B	A	40.3	415	50% adhesive failure between top white and bottom white, 50% cohesive failure within top white	336
	B		401	80% cohesive failure within top white, 20% adhesive failure between top white and bottom white	
	C		192	40% adhesive failure between top white and bottom white, 30% cohesive failure within top white, 30% glue failure	
KTA-4A	A	23.4	265	60% cohesive failure within top white, 40% glue failure	380
	B		451	60% adhesive failure between top white and bottom white, 40% cohesive failure within top white	
	C		423	80% adhesive failure between top white and bottom white, 10% cohesive failure within top white, 10% glue failure	

Table 2 – Results of Tensile Adhesion Testing, continued

Sample ID	Pull Stub ID	Average Panel Section Dry Film Thickness (mils)	Pull-Off Strength (psi)	Location of Break	Average Pull-Off Strength (psi)
KTA-4B	A	39.6	552	50% adhesive failure between top white and bottom white, 40% cohesive failure within bottom white, 10% cohesive within top white	459
	B		414	60% cohesive failure within top white, 40% adhesive failure between top white and bottom white	
	C		411	80% cohesive failure within top white, 20% adhesive failure between top white and bottom white,	

If you have any questions concerning the testing or this report, please contact me by telephone at 412.788.1300 extension 185, or by email at jbaur@kta.com.

Sincerely,

KTA-TATOR, INC.



Julia M. Baur

Project Manager/Chemical Technician

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