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**Date In:** February 16, 2016

**Customer:**

Lackwerke Peters Gmbh+Co Kg  
Hooghe Weg 25, Tor 1  
47906 Kempden DE

**Purchase Order Number:** 2015/140985

A. TEST OBJECTIVE:

Determine Total Mass Loss (TML) and Collected Volatile Condensable Materials (CVCM) from Outgassing

B. TEST ITEM(S):

One (1) customer-prepared coating material

C. SPECIFICATIONS / METHODS / TECHNIQUES:

1. ASTM E595-15, Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment

D. RESULTS:

The samples met the historical industry screening levels for spacecraft materials outlined in ASTM E595.

TEST REPORT PREPARED BY:

A handwritten signature in blue ink that reads "Katherine C. Higgs".

Katherine C. Higgs  
Department Manager – Materials

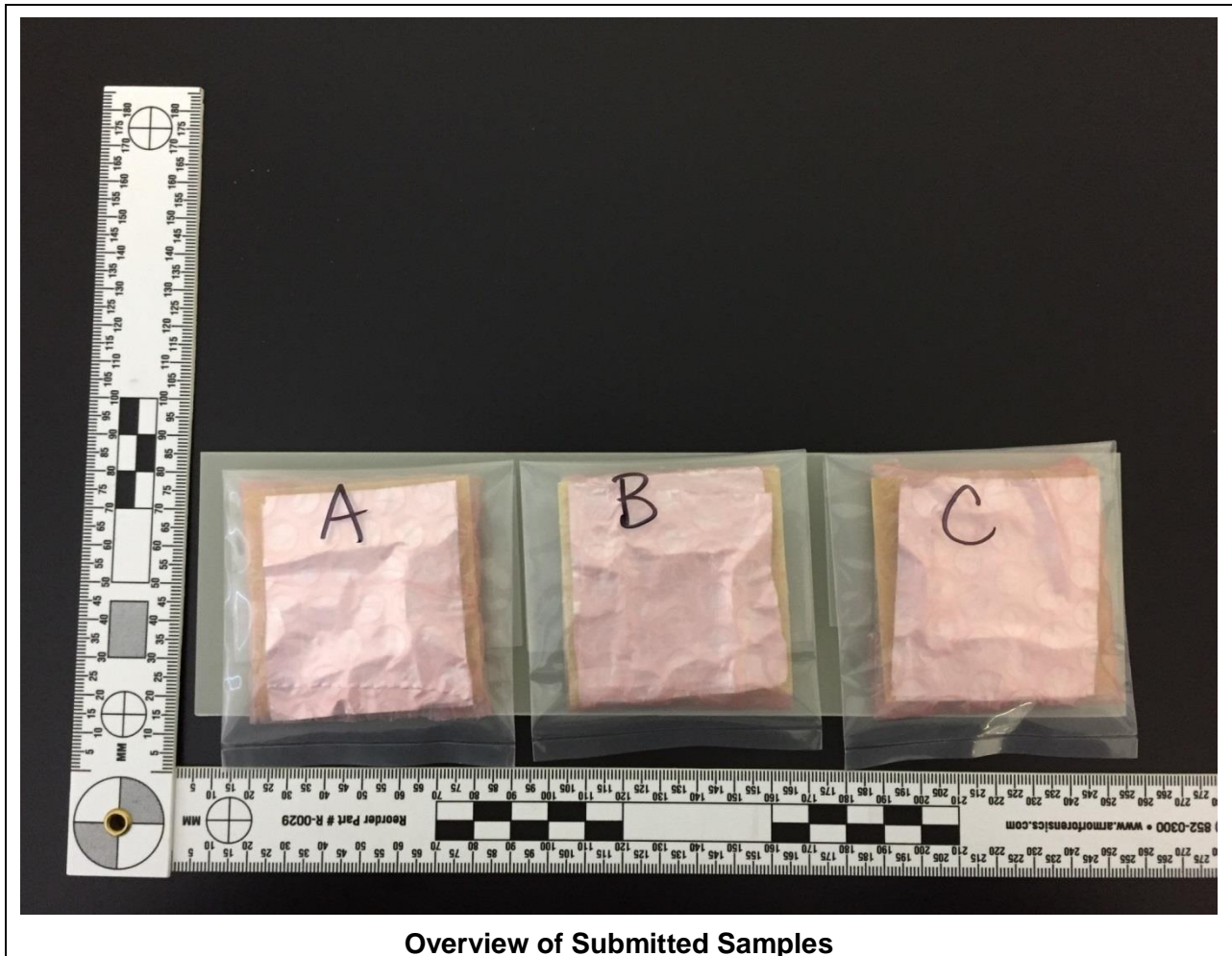
TECHNICAL/QUALITY APPROVALS:

A handwritten signature in black ink that reads "Keith M. Sellers".

Keith M. Sellers  
Operations Manager

**TEST ITEM IDENTIFICATION**

SAMPLE TYPE	Customer-prepared coating on aluminum substrates
NUMBER OF SAMPLES SUBMITTED	One (1) material consisting of three (3) specimens
SAMPLE IDENTIFICATION	ELPEPCB Elpemer AS 2467 SM-DG
SAMPLE DISPOSITION	Sample consumed during testing



**OUTGASSING & TOTAL MASS LOSS**

REFERENCE	ASTM E595-15
TEST SPECIMENS	One (1) material consisting of three (3) specimens
REQUIREMENT	ASTM E595-15, paragraph 1.5: The criteria used for the acceptance and rejection of materials shall be determined by the user and based upon specific component and system requirements. Historically, a total mass loss (TML) of 1.00% and collected volatile condensable material (CVCM) of 0.10% have been used as screening levels for rejection of spacecraft materials.
SUMMARY	<b>The sample met historical screening levels for spacecraft materials.</b>
SAMPLE PREPARATION DETAILS	Three (3) foil substrates were cut, pre-weighed, and provided to the customer for preparation of specimens in December 2015.  After receipt, the test specimens were placed in a preformed, degreased container (boat) and then conditioned at 23°C and 50% relative humidity for a minimum of twenty-four (24) hours prior to testing.
SAMPLE PREPARATION PERFORMED BY	Partner Laboratory
PREPARATION DATE	February 22-March 2, 2016
TEST MODIFICATIONS	N/A
TEST CONDITIONS	N/A
TEST PERFORMED BY	Partner Laboratory
TEST DATE	March 2-3, 2016
EQUIPMENT USED	N/A

**RESULTS:**

The following tables summarize the test results.

PARAMETER	SCREENING LEVEL <sup>1</sup> (%)	SAMPLE ID (%)
<b>Total Mass Loss (% TML)</b>	1.00 maximum	0.57
<b>Collected Volatile Condensable Material (% CVCM)</b>	0.10 maximum	<0.01
<b>Water Vapor Recovered (% WVR)</b>	Report	0.46

<sup>1</sup> Historically used as screening for spacecraft materials.

Replicate	Mass of Test Specimen (g)	Initial Mass of Dried Collector Plates (g)	Final Mass of Collector Plates (g)
A	0.165201	4.152350	4.152350
B	0.135106	2.714946	2.714946
C	0.147038	3.038371	3.038371

Note: There was no change in the control collector plate's weight.

Observations	
Visible Condensate	No
Percent Covered	N/A
Thin	N/A
Heavy	N/A
Transparent	N/A
Opaque	N/A
Interference Fringes	N/A
Colored Fringes	N/A
Appearance After Test	No Change

**TEST METHOD****OUTGASSING & TOTAL MASS LOSS TEST METHOD**

After conditioning, the boat and the specimen were weighed and placed in the specimen compartment in a copper heating-bar that is part of the test apparatus. The copper heating-bar was then placed in the vacuum chamber, which was then sealed.

The vacuum chamber was evacuated to a vacuum of at least  $5.0 \times 10^{-5}$  torr. The heating-bar was raised to a temperature of 125°C. This caused the vapor from the heated specimen to stream from the hole in the specimen compartment. The vapor passed through the collector chamber where the vapor condensed on a previously-weighed and independently temperature-controlled, chromium-plated collector plate that was maintained at 25°C.

After 24 hours, the test apparatus was cooled and the vacuum chamber was then re-pressurized with a dry, inert gas. The specimen and the collector plates were weighed. The TML and CVCM percentages were then determined.

After the specimen was weighed to determine the TML, the WVR was determined by conditioning the specimen at 23°C with 50% relative humidity for 24 hours. The specimen was again weighed and the percent WVR was calculated.



END OF REPORT