NICOMATIC R&D LABORATORY	QUALIFICATION TEST REPORT	QTR18034a
EMM SERIE ACCORDING TO MIL-DTL-83513G STANDARD		Page : 1 /15
		Qualification status : PASSED

THERMAL VACUUM OUTGASSING

According to ASTM E595 & ECSS-Q-ST-70-02C

ISSUE	MODIFICATION	VISA	DATE
a	Original Issue	AJ	30/06/20
b			
c			

	Name	Duty	Date	Visa
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1 Conclusion

The materials used in EMM connectors are **qualified** regarding OUTGASSING according to ASTM E595 & ECSS-Q-ST-70-02C.

2 Technical Features Proposal

Materials Qualified according to ECSS-Q-ST-70-02C (Requirment TML < 1% / CVCM < 0.1%):
- PEEK: TML = 0.18% / CVCM = 0.01%
- LCP: TML = 0.06% / CVCM = 0.01%
- STYCAST 2651 (Backpotting used for EMM connectors): TML = 0.43% / CVCM = 0.01%

3 Connate Reports

M18985 Nicomatic.pdf

4 Information about the tests

4.1 Object

The object of this test is to check the EMM materials regarding Thermal vacuum outgassing according to ASTM E595 (ECSS-Q-ST-70-02C) standard.

4.2 Reference documents/Qualification Plan

- MDC.P16020.a
- ASTM E595
- ECSS-Q-ST-70-02C

4.3 Tested Products

Designation	Article Reference*	Drawing issue*	Batch / DI*	Quantity
C18892-30 (Female, Straight on PCB, E60 guiding)	C18892-30	na	DI7576	20
C18900-30 (Female Straight on PCB, E50)	C18900-30	na	DI7577	20
C18891-30 (Male, Straight on PCB, E10)	C18891-30	na	DI7579	20
C18904-30 (Male, 90° on PCB, E11 guiding)	C18904-30	na	DI7578	20
C18893-30 (Female, 90° on PCB, E61 guiding)	C18893-30	na	DI7580	20
C18901-30 (Female, 90° on PCB, E51 jackscrew)	C18901-30	na	DI7581	20
C18981-30-0250 (Male, on cable AWG30, E01 jackscrew)	C18981-30-0250	na	DI7592	20
C18980-30-0250 (Male, on cable AWG28, E01 jackscrew)	C18980-30-025	na	DI7591	20
C18902-30-0250 (Male, on cable AWG26, E01 jackscrew)	C18902-30-0250	na	DI7588	20
C18979-30-0250 (Male, on cable AWG24, E01 jackscrew)	C18979-30-0250	na	DI7589	20
C18902-30-0250-BP (Male, on cable AWG26, E01 jackscrew BP)	C18902-30-0250-BP	na	DI7586	20
18224-AWG24	18224-AWG24	na	DI7594	25
18224-AWG26	18224-AWG26	na	DI7596	25
18240-AWG28	18240-AWG28	na	DI7597	25
18240-AWG30	18240-AWG30	na	DI7598	25

4.4 Persons present during the tests

Name	Duty
A.DEGRET	Test Operator

4.5 Date and place of the tests

Airbus Defence and Space Lab. from 12/02/18 to 15/02/18

4.6 Environmental conditions

Ambient temperature: See Test procedure
Pressure: See Test procedure
Humidity: See Test procedure

4.7 Incidents during the test

None

4.8 Test Equipments

Outgassing Test bench Micro VCM AIRBUS D&S
Type : Spectrophotomètre infrarouge à Transformée de Fourier
Fabricant: PERKIN ELMER
Modèle : SPECTRUM ONE
N° série : 70961
Plage de longueur d'onde : 2 à 25 µm

4.9 Test Tooling

Designation	Tooling reference

5 Requirements according to MIL-DTL-810G standard

RML < 1 % of the sample mass
CVCM < 0.1% of the sample mass

5.1 Collected volatile condensable material (CVCM)

Quantity of outgassed matter from a test specimen that condenses on a collector maintained at a specific temperature for a specific time
NOTE: CVCM is expressed as a percentage of the initial specimen mass and is calculated from the condensate mass determined from the difference in mass of the collector plate before and after the test.

5.2 Total mass loss (TML)

Total mass loss of material outgassed from a specimen that is maintained at a specific constant temperature and operating pressure for a specified time
NOTE: TML is calculated from the mass of the specimen as measured before and after the test and is expressed as a percentage of the initial specimen mass.

6 Test Procedure according to ECSS-Q-ST-70-02C

6.1 Test process for general spacecraft application

6.1.1 Cleaning of cups and collector plates

a. The supplier shall clean specimen cups and collector plates with a compatible solvent.

NOTE Solvent compatibilities with different materials are provided in ECSS-Q-ST-70-01.

6.1.2 Conditioning of cups and collector plates

a. The supplier shall condition the specimen cups for at least 24 hours in an environment of (22 ±3) °C and (55 ± 10) % RH.
b. The supplier shall perform a bakeout of the collector plates for at least 16 hours in a vacuum oven at a pressure lower than 1 Pa, and at a minimum temperature of 125 °C.
c. After the bakeout the supplier shall condition them for a minimum 24 hours in a desiccator containing silica gel.
d. During the test, the supplier shall expose three specimen cups for each material and three empty specimen cups.
e. During the test, the supplier shall place collector plates in front of each cup.
f. The supplier shall use the three collector plates facing the empty cups as blanks.
NOTE This is to verify the cleanliness of the equipment.
g. The supplier shall incorporate corrections based on the blanks in the actual mass loss calculations.

6.1.3 Conditioning of samples

a. The supplier shall prepare material specimens in the manner laid down in clause 5.2.
b. The supplier shall condition them for at least 24 hours at (22 ± 3) °C and (55 ± 10) % RH.

6.1.4 Weighing of samples

a. The supplier shall fill the pre-weighed specimen cups with 100 mg to 300 mg of specimen (substrate not included).
NOTE For low density foams a sample mass of 100 mg can be obtained by choosing a sample cup of bigger size, or compressing the foam into the sample cup.
b. The supplier shall perform weighing on a microbalance (see 5.2.4.1c.) located in a room conditioned at (22 ± 3) °C and (55 ± 10) % RH just before the loading of the test system.

6.1.5 Weighing of collector plates

a. The supplier shall weigh the collector plates just before the loading of the test system.
NOTE This is done by taking them from the desiccator one by one.

6.1.6 Loading of system

a. The supplier shall load the test system with:

- the specimen cups,
- the blank cups,
- the blank collectors,
- the two chromium-plated collectors, and
- one infrared-transparent collector or three chromium-plated collectors per material.

6.1.7 Pump-down and heating

a. The supplier shall carry out the pump down of the test system in the following procedure:

- at 10-3 Pa bring the heater bar(s) to the specified temperature within one hour;
- control the cooling plate(s) at 25 °C;
- maintain these temperatures for a period of 24 hours following the instant at which the heater bar(s) reach(es) the specified temperature.

b. The supplier shall ensure that the specified temperature does not exceed the maximum bakeout temperature.

6.1.8 End of test

a. After 24-hour exposure, the supplier shall switch off the heaters
b. The supplier shall vent the system up to 1 × 104 Pa to 2 × 104 Pa with dry nitrogen or rare gas.
c. The supplier shall continue cooling until the end of the test.

6.1.9 Gas inlet

a. When the temperature of the heater bar(s) has fallen to 50 °C, the supplier shall admit dry nitrogen or rare gas up to atmospheric pressure.
NOTE The cooling normally takes (90 - 120) minutes.

6.1.10 Unloading of system

a. The supplier shall unload the system as soon as possible.
b. The supplier shall keep the specimen cups in a desiccator for not more than 30 minutes.
c. The supplier shall keep the collector plates in a desiccator for one hour.
d. The supplier shall weigh the specimen cups and collector plates.
NOTE This is done by taking them from the desiccator one by one and returned immediately thereafter.

6.1.11 Storage of collector plates

a. The supplier shall store the specimen cups with material samples in a room, at an ambient temperature of (22 ± 3) °C and a relative humidity of (55 ± 10) %, for 24 hours.
b. The supplier shall reweigh them afterwards.

6.1.12 Infrared analyses

a. The supplier shall examine the infrared-transparent collector plates in the transmission mode, with the aid of an infrared spectrometer of such a sensitivity so that an IR spectrum of the condensed contaminants is obtained.
NOTE 1 See also clause 5.3.2.14.
NOTE 2 In special cases the standard metal collector plates can be analysed by infrared reflection techniques, however, no quantitative information can be expected from this reflection method. The contaminants can also be washed from the metal collector plates and the washing liquid can be used for further analyses.

6.1.13 Cleaning of system

a. After each test, the supplier shall clean the heater bar(s), condensor plate(s) and screen(s) of the equipment with a compatible volatile solvent.
b. The supplier shall perform baking at 25 °C above the specified test temperature if the blank collectors indicate a mass increase > 30 µg during the previous test.
NOTE It is a good practice to bake the system once every four months.

6.1.14 Improved sensitivity of the CVCM measurements

a. In cases where the CVCM outgassing requirements are more stringent than the standard detection limits, a quartz crystal microbalance should be installed as a fourth collector plate.
NOTE 1 See clause 5.5.2.
NOTE 2 The infrared transmission data (see 5.3.2.12) can also be used for equivalent mass determination as the intensities of the infrared absorption bands are related to the mass of the contaminants by the law of Lambert-Beer.

7 Test setup

See M18985 Nicomatic.pdf report

8 Measurements results

MATÉRIAU	FABRIQUANT	CONFORMITE A LA SPECIFICATION ECSS-Q-ST-70-02C
PEEK 450 G	Vink	CONFORME A LA SPECIFICATION ECSS-Q-ST-70-02C
VECTRA®E130i	Ticona	CONFORME A LA SPECIFICATION ECSS-Q-ST-70-02C
Stycast 2651 MM+Catalyseur 9	/	CONFORME A LA SPECIFICATION ECSS-Q-ST-70-02C

N°	ITS 18/07/040			
MATERIAU	TML EN %	RML EN %	CVCM EN %	WVR EN %
PEEK 450 G	0.18	0.13	0.01	0.04
	0.18	0.13	0.01	0.04
	0.18	0.13	0.01	0.05
MOYENNE	0.18	0.13	0.01	0.04

N°	ITS 18/07/041			
MATERIAU	TML EN %	RML EN %	CVCM EN %	WVR EN %
VECTRA®E130i	0.06	0.05	0.01	0.01
	0.06	0.05	0.01	0.01
	0.06	0.05	0.01	0.01
MOYENNE	0.06	0.05	0.01	0.01

N°	ITS 18/07/042			
MATERIAU	TML EN %	RML EN %	CVCM EN %	WVR EN %
Stycast 2651 MM + Catalyseur 9	0.36	0.31	0.00	0.05
	0.35	0.31	0.00	0.04
	0.43	0.37	0.01	0.06
MOYENNE	0.38	0.33	0.00	0.05

See Material Identification Card in Appendix

The spectrums are attached in Appendix 2. The analysis is purely qualitative.
We particularly monitor the presence of following pics regarding the ESA standard:
- 2925cm-1 (hydrocarbons)
- 1735 cm-1 (esters)
- 1260 cm-1 (Methyl Silicone)
- 1120 cm-1 (phenyl silicone)

9 Visual Inspection

Required by the applicable standard ?			
YES		NO	☐

**********END OF REPORT**********

10 APPENDIX

Internal use only ?			
YES	☐	NO	☒

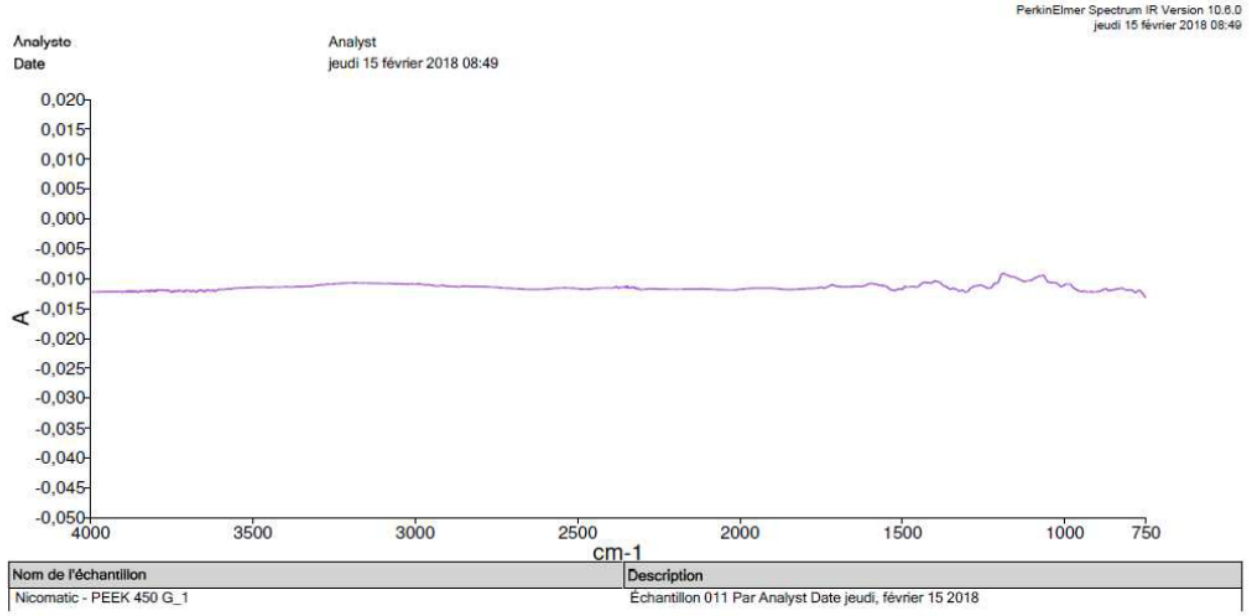
10.1 The Laboratory Advice

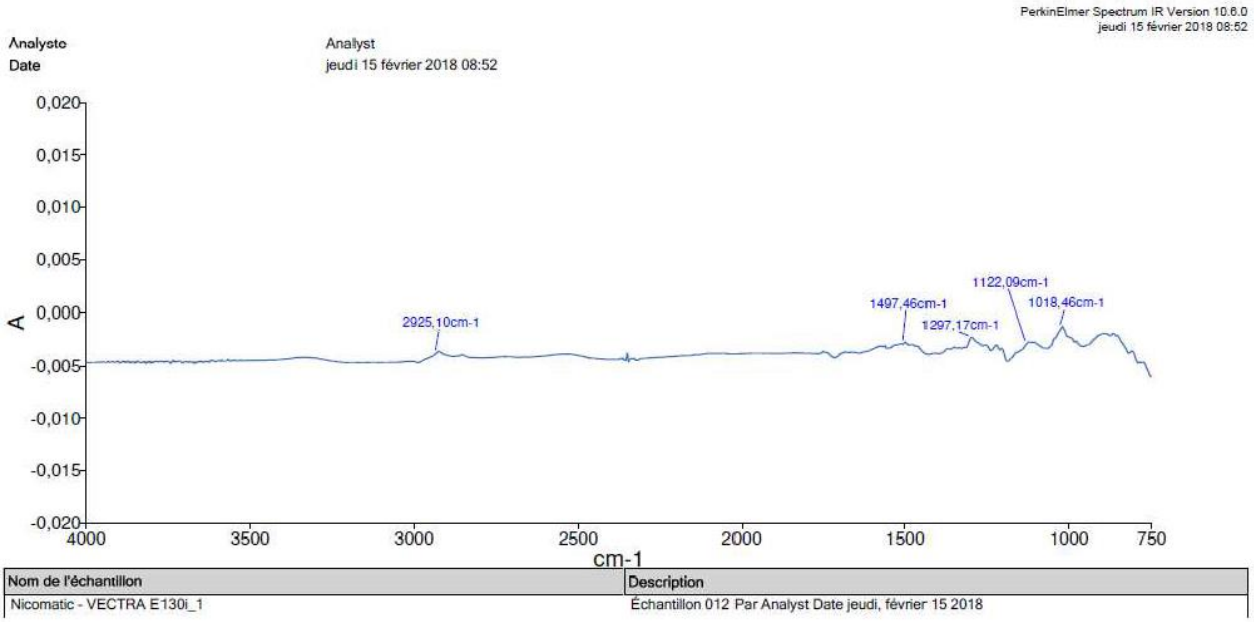
10.2 Material Identification Card

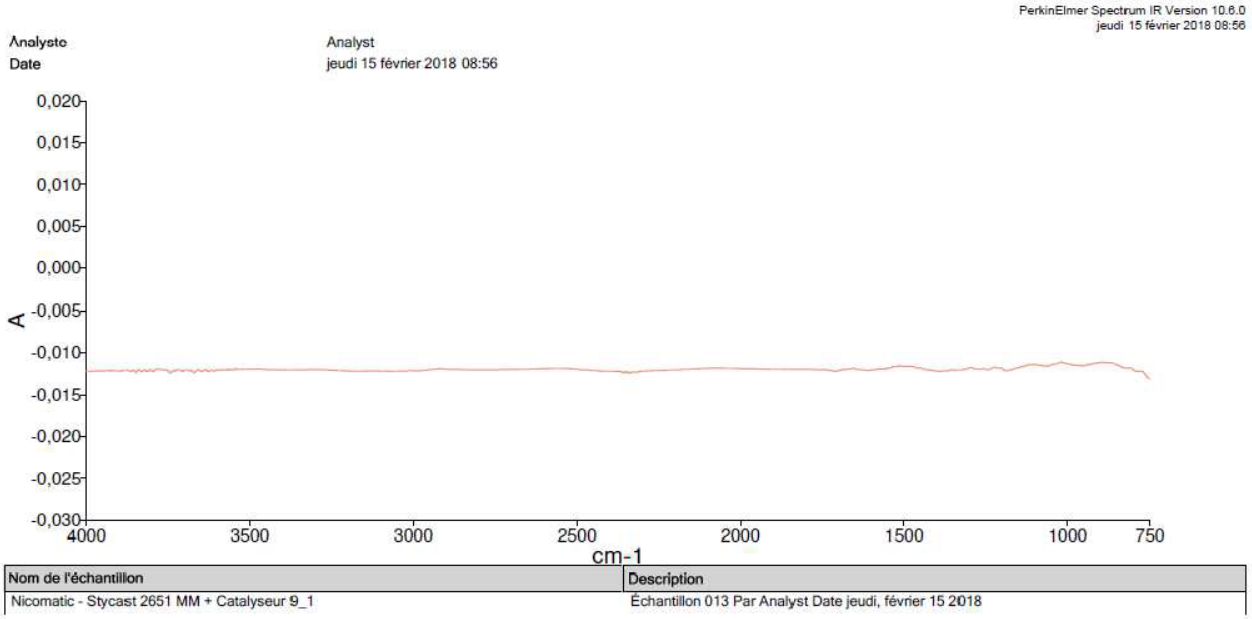
Material Identification Card					N° = ITS 18/07/041		
Description and history of sample	a) VECTRA®E130i		b) Ticona				
a) Trade name and Number							
b) Manufacturer	c)		d) Glass reinforced				
c) Type of product							
d) Chemical nature	e)						
e) Processing détails							
e.g. -joining method							
- heat treatment							
- cure and post cure							
- cleaning method							
- relevant spec N°							
Batch number:			Material density :	1610 kg/m3			
Sample quantity :			Substrat density :				
Preparation date :			Subtrat material :				
Prepared by :							
Firm :	Nicomatic		Project manager				
Sample code (refer to the DML item			or originator name				
number of the project)			Section				
Application :							
Test specification number	ECSS - Q -ST-70- 02 C		Quality control sample				
	15/11/2008		Evaluation sample				
For materials and processes division use							
Date received :	15 janvier 2018		Results :	Avera.	1°sample	2°sample	3°sample
			TML en %	0.06	0.06	0.06	0.06
Responsable (Test House) :	TOMST62		RML en %	0.05	0.05	0.05	0.05
			CVCM en %	0.01	0.01	0.01	0.01
Test date :	12 février 2018		WVR en %	0.01	0.01	0.01	0.01
Report number :	M18985		Accept	X	Reject		

Material Identification Card					N° = ITS 18/07/042		
Description and history of sample	a) Stycast 2651 MM + Catalyseur 9	b)					
a) Trade name and Number							
b) Manufacturer	c)	d)					
c) Type of product							
d) Chemical nature	e) Composition: 100% Stycast 2651 MM (Réf 13461)						
e) Processing détails	10% Catalyseur 9 (Réf 16399)						
e.g. -joining method							
- heat treatment							
- cure and post cure							
- cleaning method							
- relevant spec N°							
Batch number:	027E995913 / 027E995907	Material density :	Unknown				
Sample quantity :		Substrat density :					
Preparation date :		Subtrat material :					
Prepared by :							
Firm :	Nicomatic	Project manager					
Sample code (refer to the DML item		or originator name					
number of the project)		Section					
Application :							
Test specification number	ECSS - Q -ST-70- 02 C	Quality control sample					
	15/11/2008	Evaluation sample					
For materials and processes division use							
Date received :	15 janvier 2018	Results :	Avera.	1°sample	2°sample	3°sample	
		TML en %	0.38	0.36	0.35	0.43	
Responsable (Test House) :	TOMST62	RML en %	0.33	0.31	0.31	0.37	
		CVCM en %	0.00	0.00	0.00	0.01	
Test date :	12 février 2018	WVR en %	0.05	0.05	0.04	0.06	
Report number :	M18985	Accept	X	Reject			

Material Identification Card					N° = ITS 18/07/040		
Description and history of sample	a) PEEK 450 G	b) Vink					
a) Trade name and Number							
b) Manufacturer	c)	d) Polyétheréthercétone					
c) Type of product							
d) Chemical nature	e)						
e) Processing détails							
e.g. -joining method							
- heat treatment							
- cure and post cure							
- cleaning method							
- relevant spec N°							
Batch number:		Material density :	1.32 g/cm3				
Sample quantity :		Substrat density :	NA				
Preparation date :		Subtrat material :	NA				
Prepared by :							
Firm :	Nicomatic	Project manager					
Sample code (refer to the DML item		or originator name					
number of the project)		Section					
Application :							
Test specification number	ECSS - Q -ST-70- 02 C	Quality control sample					
	15/11/2008	Evaluation sample					
For materials and processes division use							
Date received :	15 janvier 2018	Results :	Avera.	1°sample	2°sample	3°sample	
		TML en %	0.18	0.18	0.18	0.18	
Responsable (Test House) :	TOMST62	RML en %	0.13	0.13	0.13	0.13	
		CVCM en %	0.01	0.01	0.01	0.01	
Test date :	12 février 2018	WVR en %	0.04	0.04	0.04	0.05	
Report number :	M18985	Accept	X	Reject			


PerkinElmer Spectrum IR Version 10.6.0
jeudi 15 février 2018 08:49
Analyste
Analyst
Date
jeudi 15 février 2018 08:49
A
cm-1
Nom de l'échantillon
Description
Nicomatic - PEEK 450 G_1
Échantillon 011 Par Analyst Date jeudi, février 15 2018


PerkinElmer Spectrum IR Version 10.6.0
jeudi 15 février 2018 08:52
Analyste
Analyst
Date
jeudi 15 février 2018 08:52
2925,10cm-1
1497,46cm-1
1297,17cm-1
1122,09cm-1
1018,46cm-1
A
cm-1
Nom de l'échantillon
Description
Nicomatic - VECTRA E130i_1
Échantillon 012 Par Analyst Date jeudi, février 15 2018



Nom de l'échantillon	Description
Nicomatic - Stycast 2651 MM + Catalyseur 9_1	Échantillon 013 Par Analyst Date jeudi, février 15 2018

**********END OF APPENDIX**********