



Testing laboratory Approval for Independent Laboratory

MEMO Nº: AM-LAB-001-19 Rev.0

Approval Date: 13 September 2011

SUBJECT: Reference Independent Testing Laboratory Approval

Revision Date: 13 September 2019

SCOPE: See Annex 1.

Element Materials Technology Seville
Parque Tecnológico Aeroespacial Aerópolis
Wilburg y Orville Wright 1.
41300. La Rinconada. SEVILLA

In accordance with CASA1400 is hereby approved as:

REFERENCE INDEPENDENT TESTING LABORATORY According to CASA-1400-55-FT

LIMITATIONS:

The approval is limited to the tests describe in Annex I.

COMPLEMENTARY ACTIONS TO BE PERFORMED BY ELEMENT MATERIAL TECHNOLOGY SEVILLE

The Qualification Dossier has to be maintained by supplier as process owner.

REFERENCE DOCUMENTATION:

178951	Nadcap Doc.	Nadcap NMMT Audit
181576	Nadcap Doc.	Nadcap MTL Audit
906/LE1788	ENAC Doc.	ENAC Accreditation
MTAD-LAB-0005/08 Rev.1	Airbus DS Doc	Old coversheet reference approval as TEIMS

REMARKS:

Airbus Defence and Space does not consider as valid any deviation not expressly stated in this document.

V°B

Daniel Sánchez Vivat

Materials and Processes Project Engineers-TEIMS
AIRBUS DEFENCE AND SPACE

Norberto Roiz Lafuente

HO Materials and Processes Project Engineers-TEIMS
AIRBUS DEFENCE AND SPACE

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ANNEX 1

AC7122/1 Rev B - Nadcap Audit Criteria for Non Metallic Materials Testing – Mechanical Testing

- 1.1.1 Tensile Ambient Temperature
- 1.1.2 Tensile Non–ambient Temperature
- 1.1.3 Tensile Strain Measurement
- 1.12.1 Climbing Drum Peel
- 1.13.1 Floating Roller Peel
- 1.17.1 Bearing Strength
- 1.18.1 G1c
- 1.2.1 Compression Ambient Temperature
- 1.2.2 Compression Non–ambient Temperature
- 1.2.3 Compression Strain Measurement
- 1.21.1 Flatwise tension Sandwich
- 1.22.1 Sandwich Flexure
- 1.3.1 Shear Ambient Temperature by SBS
- 1.3.2 Shear Ambient Temperature ± 45 Tension
- 1.3.5 Shear Non–ambient (any method)
- 1.3.6 Shear Strain Measurement
- 1.4.1 Flexural Ambient Temp
- 1.4.2 Flexural Non–ambient
- 1.4.3 Flexural Strain measurement
- 1.9.1 Single Lap Shear Ambient Temperature
- 1.9.2 Single Lap Shear Non–ambient Temperature

AC7122/2 Rev A - Nadcap Audit Criteria for Non Metallic Materials Testing – Physical Testing

- 2.2.1 Density/ Specific Gravity
- 2.2.2 Fiber Tow Density (Archimedes Method)
- 2.3.1 Resin/Fiber /Void Content by: Acid Digestion
- 2.3.3 Resin/Fiber /Void Content by: Solvent wash
- 2.5.1 Volatile Content
- 2.7.1 Flow
- 2.8.1 Fiber Areal Weight
- 2.8.2 Prepreg Areal/Adhesive Film Weight

AC7122/4 Rev A - Nadcap Audit Criteria for Non Metallic Materials Testing – Thermal Analysis

- 4.1.1 Dynamic Mechanical Analysis (DMA)
- 4.3.1 Differential Scanning Calorimetry (DSC)

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AC7101/3 Rev C - Nadcap Audit Criteria for Materials Test Laboratories – Mechanical Testing

(A) Room Temperature Tensile
 (CT) Compression Testing
 (KR) Curve (Resistance to Fracture) Testing
 (O) High Cycle Fatigue
 (P) Fracture Toughness
 (XE) Crack Propagation/Crack Growth Testing
 (XN) Bend Testing

AC7101/4 Rev F - Nadcap Audit Criteria for Materials Test Laboratories – Metallography and Microindentation Hardness

(L0) Metallographic Evaluation
 (L11) Grain Size
 (L3) Near Surface Examinations – Oxidation/Corrosion
 (L8) Near Surface Examinations – Alpha Case: Wrought Titanium
 (XL) Macro Examination

AC7101/5 Rev D - Nadcap Audit Criteria for Materials Test Laboratories – Hardness Testing (Macro)

(M1) Brinell Hardness
 (M2) Rockwell Hardness

AC7101/6 Rev C - Nadcap Audit Criteria for Materials Test Laboratories – Corrosion

(Q1) Stress Corrosion

AC7101/7 Rev D - Nadcap Audit Criteria for Materials Test Laboratories – Mechanical Testing Specimen Preparation

(Z) Standard Specimen Machining

AC7101/11 Rev C - Nadcap Audit Criteria for Materials Test Laboratories – Fastener Testing

(13) Shear Strength – Double Shear
 (40L25) Metallography – Grain Size
 (40L3) Metallography – Oxidation / Corrosion
 (40L8) Metallography – Alpha Case: Wrought Titanium
 (6–M2) Hardness – Rockwell
 (8–A) Tensile Test – Axial Tensile

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906/LE1788 Rev. 8

Metallic Materials. General	
Tensile <i>Load (up to 250 kN)</i> <i>Strain (0 – 25 mm)</i>	ASTM E8/E8M-16a ASTM B557M-15 ASTM B557-15 ASTM A370-17a (sections 5 to 13) EN 2002-001: 2005 UNE-EN ISO 6892-1: 2017
Axial fatigue (HCF) <i>Load (up to 250 kN)</i>	EN 6072:2010
Fracture toughness (K1c) <i>Load (up to 250 kN)</i> <i>Strain (0 – 2,5 mm)</i>	ASTM E399-17
Rockwell Hardness <i>(Scales HRA, HRB, HRC y HR15T)</i>	ASTM E18-17e1
Metallic Materials. Aluminum Alloys and other Non-Ferromagnetic Metallic Alloys	
Electrical Conductivity <i>(0 - 59 MS/m)</i>	EN 2004-1:1996 ASTM E1004-17
Plastic and Composites. Fiber Reinforced Plastic Laminates	
Plain Tensile Test <i>Load (up to 250 kN)</i> <i>Strain (0 – 25 mm)</i> <i>Strain gages</i>	UNE-EN 2561:1996 UNE-EN ISO 527-1:2012 UNE-EN ISO 527-4:1997 UNE-EN ISO 527-5:2010 ASTM D3039/D3039M-17 EN 2597:1998 UNE EN 2597:1999 AITM 1-0007:5 (type A specimen)
Open Hole and Filled Hole Tensile Strength <i>Load (up to 250 kN)</i>	AITM 1-0007:5
Compression <i>Load (up to 250 kN)</i> <i>Strain (0 – 25 mm)</i> <i>Strain gages</i>	UNE-EN 2850: 2017 AITM 1-0008:8 (type A specimen) ASTM D6484/D6484M-14
Open Hole and Filled Hole Compression Strength <i>Load (up to 250 kN)</i>	AITM 1-0008:8 ASTM D6484/D6484M-4
Interlaminar Shear Strength <i>Load (up to 250 kN)</i>	ASTM D2344/D2344-16 UNE-EN 2563: 1997 UNE-EN ISO 14130:1999
Flexure <i>Load (up to 250 kN)</i> <i>Strain (0 – 50 mm)</i>	UNE-EN ISO 14125:1999 UNE-EN ISO 14125+A1:2011 UNE-EN 2562:1997 ASTM D790-17
In Plane Shear Strength <i>Load (up to 250 kN)</i> <i>Strain gages</i>	ASTM D3518/D3518M-13 EN 6031:2015 AITM 1-0002:3 UNE-EN ISO 14129:1999

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Plastic and Composites. Fiber Reinforced Plastic Laminates (Cont.)	
Interlaminar fracture toughness <i>Load (up to 250 kN)</i>	EN 6033: 2015
Determination of the Extent of Cure by Differential Scanning Calorimetry (DSC)	UNE-EN 6064:2017 AITM 3-0008:1
Determination of Glass Transition Temperature by Modulated Differential Scanning Calorimetry (MTDSC)	ASTM E2602-09
Determination Extent of Cure by Modulated Differential Scanning Calorimetry (MTDSC)	Internal Procedure
Determination of Glass Transition Temperature by Dynamic Mechanical Analysis (DMA)	AITM 1-0003:3
Fiber, Resin, Void Volume	ASTM D2734-16 (métodos A y C) ASTM D3171-15 (método I procedimientos A, B y E y método II) UNE-EN 2564:1999
Plastic and Composites. Plastics	
Tensile Strength <i>Load (up to 250 kN)</i> <i>Strain (0 – 25 mm)</i> <i>Strain gages</i>	ASTM D638-14 UNE-EN ISO 527-1:2012
Compression Strength <i>Load (up to 250 kN)</i> <i>Strain (0 – 25 mm)</i> <i>Strain gages</i>	ASTM D695-15 UNE-EN ISO 604:2003
Qualitative analysis by infrared spectroscopy (FTIR)	ASTM E573-01(13) ISO 4650:2012
Plastic and Composites. Cores and Sandwich Materials	
Climbing Drum Peel <i>Load (up to 250 kN)</i>	ASTM D1781-98(12) UNE-EN 2243-3: 2006
Compression <i>Load (up to 250 kN)</i>	ASTM C365/C365M- 16 UNE-EN ISO 844: 15
Flexure <i>Load (up to 250 kN)</i> <i>Strain (0 – 25 mm)</i>	AITM 1-0018: 2 ASTM C393/C393M- 16
Core Shear <i>Load (up to 250 kN)</i>	ASTM C273/C273M- 16
Flatwise Tensile <i>Load (up to 100 kN)</i>	ASTM C297/C297M- 16 UNE-EN 2243-4: 2006 AITM 1-0025: 1

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Plastic and Composites. Adhesives	
Flatwise Tensile <i>Load (up to 100 kN)</i>	ASTM C297/C297M- 16 UNE-EN 2243-4: 2006 AITM 1-0025: 1
Interlaminar fracture toughness <i>Load (up to 250 kN)</i>	AITM 1-0053:6
Peel Metal-Metal <i>Load (up to 100 kN)</i>	UNE-EN 2243-2:2006 ISO 4578:97 ASTM D3167- 10
Single Lap Shear <i>Load (up to 100 kN)</i>	ASTM D3165 07 ASTM D1002-10 AITM 1-0019:4 ISO 4587:03 UNE-EN 2243-1:06
Plastic and Composites. Fiber Reinforced Plastic Preimpregnates, Adhesives, Resins and Other Non-Cured Systems	
Volatile Content <i>(Temperature from 0 °C to 180 °C)</i>	UNE-EN 2330:1996 UNE-EN 2558:1997
Resin/Fiber Content	UNE-EN 2331:1996 (Method C) UNE-EN 2559:1997 (Method C)
Mass per Unit of Area	UNE-EN 2329:1996 UNE-EN 2557:1997
Differential Scanning Calorimetry (DSC)	AITM 3-0002:2 UNE-EN 6041:2018
Determination of Glass Transition Temperature by Modulated Differential Scanning Calorimetry (MTDSC)	ASTM E2602-09
Qualitative analysis by infrared spectroscopy (FTIR)	AITM 3-0003:2 ASTM E1252-98(13)
Gel Time	AITM 3-0004:2

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OTHERS	
Pin-Type Bearing Test of Metallic Materials	ASTM E238
Analysis of Aluminum Alloys by Spark Atomic Emission Spectrometry	ASTM E1251
Surface Roughness Measurements using Surface Contact Stylus Method	AITM 1-0070
Metallic and oxide coatings. Measurement of coating thickness. Microscopical method	UNE EN ISO 1463
Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)	ASTM G34
Node Tensile Strength of Honeycomb Core Materials	ASTM C363/ 363M
Water Pick Up Test-Method to determine the impregnation level of Prepreg Materials	AITM 2-0061
Aerospace series. Fibre reinforced plastics. Procedure for the determination of the conditions of exposure to humid atmosphere and the determination of moisture absorption	prEN 3615
Aerospace series. Fibre reinforced plastics. Determination of the effect of exposure to humid atmosphere on physical and mechanical characteristics	UNE-EN 2823
Paint and varnishes. Cross-cut Test <i>Wet and dry</i>	ISO 2409 UNE-EN ISO 2812-2
Compressive properties of Polymer Matrix Composite Materials using a Combined Loading Compression (CLC) Test Fixture	ASTM D6641/D6641M
Aerospace series. Carbon fibre thermosetting resin. Unidirectional Laminates. Compression test parallel to fibre direction <i>Types B₁ and B₂</i>	prEN 2850
Fiber Reinforced Plastics. Determination of Compression Strength After Impact	AITM1-0010
Fiber Reinforced Plastics. Determination of Compression and Tension Strength After Impact	AITM1-0076
Aerospace series. Non-metallic materials. Foaming structural adhesives. Test methods. Part 2: Compressive tube shear	prEN 2667-2
Test Method for determining the Pore Content of Fiber Reinforced Plastics using Automatic Image Analysis	AITM 4-0003

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OTHERS (Cont.)	
Macroscopic and Microscopic Examination of Fiber Reinforced Plastic	AITM 4-0005
Standard Guide for Preparation of Metallographic Specimens	ASTM E3
Fibre Reinforced Plastics. Determination of Pull-Out/ Pull-Through Strength on Riveted Joints	AITM 1-0066
Determination of Gel Time and Viscosity <i>Gel Time. Method B</i>	AITM 3-0004
Paint and varnishes. Determination of film thickness <i>Method 6A. Cross-sectioning. Version 1. By grinding</i>	UNE EN ISO 2808
Measuring coating thickness by equipments of the magnetic and eddy current type	AITM 6-6006
Metallic and oxide coatings. Measurement of coating thickness. Microscopical method	UNE EN ISO 1463
Determination of electrical resistivity by ohmic method	AITM 2-0031
Reticulation tests in epoxy and polyurethane primers	I+D-E-299
Axial load on bushes and Bearings	AIPS03-03-012 ADET 0191
Shear Testing of Aluminum Alloys	ASTM B769
Shear Testing of Thin Aluminum Alloys Products	ASTM B831
Density of Sandwich Core Materials	ASTM C271/ 271M
Diffusion in alclad	I+D-P-220
Brinell Hardness of Metallic Materials	ASTM E10
Eutectic melting	I+D-P-220
Determining the Inclusion Content of Steel	ASTM E45
Intergranular Oxidation	I+D-P-225
Metallic Materials. Tensile testing <i>Room Temperature and elevated temperature</i>	UNE-EN ISO 6892-1 UNE-EN ISO 6892-2

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OTHERS (Cont.)	
Test Load for Swaging of Control Cables	I+D-P-377
Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials <i>Procedures B and D</i>	ASTM D5229/D5229M
Composite Laminates. Bearing Test on Fasteners Joints	I+D-E-325
Bearing/ Bypass interaction response of Polymer Laminates Using 2-Fasteners Specimens <i>Procedure B (Single shear): Tensile and compressive bearing/ bypass</i>	ASTM D7248/D7248M
Bearing Response of Polymer Matrix Composite Laminates <i>Procedure B (Single shear): Compressive</i>	ASTM D5961/D5961M
Paint and varnishes. Examination and preparation of test samples	ISO 1513
Industrial woven wire cloth. Technical requirements and tests	ISO 9044
Fiber Reinforced Plastics. Determination of Plain, Open Hole and Filled Hole Compression Strength <i>Specimen Types: A3 and B3</i>	AITM 1-0008
Compressive Properties of Rigid Cellular Plastics	ASTM D1621
Compression Test on Carbon Fiber Laminates	I+D-E-051
Fibre-Reinforced plastic composites. Determination of compressive properties in the in-plane direction <i>Method 2. End loading</i>	UNE-EN ISO 14126
Open-Hole Compressive Strength of Polymer Matrix Composite Laminates <i>Procedure B</i>	ASTM D6484/ D6484M
Edgewise Compressive Strength of Sandwich Constructions	ASTM C364/C364M
Fibre Reinforced Plastics. Determination of Compression Strength after Impact on Thin Skin	AITM 1-0077
Compressive Residual Strength Properties of Damage Polymer	ASTM D7137/D7137M

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OTHERS (Cont.)	
Textile-glass reinforced plastics, prepregs, moulding compounds and laminates. Determination of the textile-glass and mineral-filler content. Calcination Methods <i>Method A</i>	UNE-EN ISO 1172
Determination of Resin Content of Prepregs	QVA-Z10-46-20
Textile Glass Fibre Preimpregnates. Test Method for the Determination of the Resin and Fibre Content and Mass of fibre per Unit Area <i>Method A</i>	UNE-EN 2331
In-Plane Shear Strength of Reinforced Plastics	ASTM D3846
Determination of Interlaminar Shear Strength of Carbon, Glass and Aramid Fibre Composites	ABT 1-0006 I+D-E-031 I+D-E-255 I+D-E-352 QVA-Z10-46-09
Plastics. Differential Scanning Calorimetry (DSC). Part. 3: Determination of Temperature and Enthalpy of Melting and Crystallization	UNE-EN ISO 11357-3
Apparent Density of Rigid Cellular Plastics	ASTM D1622/D1622M DIN EN ISO 845
Textile Glass Reinforced Plastics. Determination of void content, loss on ignition, mechanical disintegration and statistical counting Methods <i>Method A: Loss on ignition</i>	UNE-EN ISO 7822
Adhesive-Bonded Surface Durability of Aluminum (Wedge Test)	ASTM D3762
General Techniques for Obtaining Infrared Spectra for Qualitative Analysis <i>ATR - Reflectance</i>	ASTM E1252 ASTM E168
Determination of the Laminate Ply Thickness	I+D-E-123 I+D-E-124 I+D-E-243
Plastics. Film and Sheeting. Determination of Thickness by Mechanical Scanning	ISO 4593
Fiber Reinforced Plastics. Determination of Fatigue of Fasteners in Mechanically Fastened Joints under Constant Amplitude Loading	AITM 1-0074
Fiber Reinforced Plastics. Constant Amplitude Fatigue Testing on Coupons <i>Annex F</i>	AITM 1-0075

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OTHERS (Cont.)	
Tension- Tension Fatigue of Polymer Matrix Composite Materials <i>(Amplitude Loading)</i>	ASTM D3479/D3479M
Uniaxial Fatigue Properties of Plastics <i>Procedure A: Fatigue Testing in tension</i>	ASTM D7791
Flexural Fatigue Properties of Plastics <i>Procedure B: Four-point Loading Systems</i>	ASTM D7774
Open-Hole Fatigue Response of Polymer Matrix Composite Laminates	ASTM D7615/D7615M
Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials by Four-Point Bending <i>Procedure B</i>	ASTM D6272
Flexural Properties of Polymer Matrix Composites Materials <i>Procedure B: Four-point Loading Systems</i>	ASTM D7264/D7264M
Fibre-Reinforced Plastic Composites. Determination of Flexural Properties <i>Procedure B: Four-point Loading Systems</i>	UNE-EN ISO 14125
Facesheet Properties of Sandwich Constructions by Long Beam Flexure	ASTM D7249/D7249M
Structural Adhesives. Determination of the Flow of Adhesive Film	prEN2243-7
Determination of the Resin Flow of Prepregs	QVA-Z10-46-33
Mode I Interlaminar Fracture Toughness of Unidirectional Fiber-Reinforced Polymer Matrix Composites	ASTM D5528 ISO 15024
Determination of the Mode II Interlaminar Fracture Toughness of Unidirectional Fiber-Reinforced Polymer Matrix Composites	ASTM D7905/D7905M
Determination of compression strength after impact on thin skin	AITM 1-0077
Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event	ASTM D7136/D7136M
Mass per Unit Area (Weight) of Fabric	ASTM D3776/D3776M FED-STD-191 (Method 5041) ISO 3801 QVA-Z10-46-08

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OTHERS (Cont.)	
End (Warp) and Pick (Filling) Count of Woven Fabrics	ASTM D3775
Measuring the Fastener Pull-Through Resistance of a Fiber-Reinforced Polymer Matrix Composite <i>Procedure B: Tensile-Loaded Fixture</i>	ASTM D7332/ D7332M
Non-Metallic Materials Foaming Structural adhesive film. Expansion Ratio and Volatile Content	prEN 2667-3
Extractable Matter in Textiles <i>Option 2. Room Temperature Extraction</i>	ASTM D2257
Mixed Mode I – Mode II Interlaminar Fracture Toughness of Unidirectional Fiber Reinforced Polymer Matrix Composites	ASTM D6671/D6671M
Tensile Properties of Thin Plastic Sheeting	ASTM D882
Tensile Test on Glass Fiber Laminates	I+D-E-253
Tensile Test on Carbon Fiber Laminates	I+D-E-026
Tensile Test on Aramid Fiber Laminates	I+D-E-284
Open-Hole Tensile Strength of Polymer Matrix Composite Laminates	ASTM D5766/D5766M
Bond or Cohesive Strength of Sheet Plastics and Electrical Insulating Materials	ASTM D952
Flatwise Tensile Test on Carbon Fiber/ Honeycomb Core Laminates	I+D-E-246
Flatwise Tensile Test on Aramid Fiber/ Honeycomb Core Sandwich Specimens	I+D-E-288
Fibre Reinforced Plastics. Determination of Curved-Beam Failure Load	AITM 1-0069
Rheological Properties on Non-Newtonian Materials by Rotational Viscosimeter <i>Method A: Apparent Viscosity</i>	ASTM D2196
Plastics. Resins in the Liquid State or as Emulsions or dispersions. Determination of apparent viscosity using a single cylinder type rotational viscometer method	ISO 2555

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