

APPROVAL

It is hereby certified that the company

Test laboratory RESCOLL
Site Pessac

is qualified for following
SPECIAL PROCESSES

- TEST LABORATORY
  - DSC test (Differential Scanning Calorimeter test)
  - ILSS test (Interlaminar Shear Strength test)
  - Flexural test
  - Single Lap Shear
  - Compressive test (*Monolithic* and Sandwich constructions)
  - *IPS (In plane Shear)*
  - *Tensile test*
  - *Mechanical test in temperature*
  - CDP test (Climbing Drum Peel test)
  - Floating peel test
  - Wet ageing
  - Fire test

This qualification is granted under
the conditions defined in appendix1

Marignane, 2019 July 26th

M. BLACAS
HO Special Processes Quality Management
Signed

O. GOUPILLON
Materials & Processes Quality laboratory
Signed

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APPENDIX 1

Modification follow up

Issue	Modification	Date
No Issue	Initial qualification – DSC test	11/07/2017
Issue A	Temporary approval for ILSS, CDP, sandwich compression	21/09/2018
Issue B	Extension of qualification scope and full approval for ILSS, Flexural, CDP, Floating peel, wet ageing, fire test and lap shear (SLS).	01/03/2019
Issue C	- Compression on monolithic, tensile test, IPS and mechanical test in temperature qualification extension - Modification of cross test frequency requirements : 2 years -> 3 years	26/07/2019

Note: Modification are identified with a line on the side of the document

Sum up of qualification (details see pages below)

Test	Associated standards	Internal procedure associated
DSC test (Differential Scanning Calorimeter test)	EN6041, ISO 11357 (-1, -2, -3 and -5)	MO616, MO074, MO081
ILSS test (Interlaminar Shear Strength test)	EN2563, EN 2377, ISO 14130	MO334, MO206
Flexural test	En 2562, EN 2746	MO199
Single Lap Shear	EI 071 IGC 04-26-345, EI 071 IGC 04-26-346, EN2243-1	MO 031
Compressive test (Sandwich constructions)	ASTM C364	MO656
Compressive test (Monolithic)	ISO 14126, EN2850	MO205, MO335
IPS (In plane Shear)	ISO 14129, EN6031	Mo231, MO340
Tensile test	ISO 527 (-1,-2,-4,-5), EN2597, EN2561, EN2477	MO333, MO712, MO088
Mechanical test in temperature	Specific test standard	MO091 + testing procedure
CDP test (Climbing Drum Peel test)	EI 071 IGC 04 26 270, EN2243-3	MO320
Floating peel test	EI 071 IGC 04-26-360, EN 2243-2	MO402
Wet ageing	EN2823, EN3615	MO291
Fire test	CS/FAR 25, Appendix F - Part. I, §(a)(1)(i) - Vertical Bunsen burner, 60s – AITM 2.0002 A - Part. I, §(a)(1)(ii) & (iii) - Vertical Bunsen burner, 12s – AITM 2.0002 B Part. I, §(a)(1)(iv) - Horizontal Bunsen burner, 15s – AITM 2.0003 A	/

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SPECIAL PROCESS: TEST LABORATORY (Independent)

- **Differential Scanning Calorimeter test (DSC)**

Performed in accordance with the following documents:

- EN6041 & ISO11357-1 & ISO11357-2 & ISO11357-3 & ISO11357-5:
  Analysis of non-metallic materials (uncured) by DSC (Differential scanning calorimeter)
- MO 616A: Prepregs: Incoming and storage
- MO 074O : Calibration of modulated DSC
- MO 081K : Operating procedure: measurement in DSC

With the following resources:

Cold chamber referenced CONG 1007
DSC Q2000 TA Instruments referenced DSC 1001

This Qualification is based on the following results:

-AH qualification program ETLL n°2017-2192
- Test results PTP COMPOSITE DSC 2013
- COFRAC Accreditation certificate n°1-1995 rev. 4 (validity : 01/2018)
- NADCAP Accreditation NMMT n°91544165819 (validity: 01/2019)
- AIRBUS Qualification certificate n°SUR2016.0390 ind E
- Safran Qualification certificate n° AQPS 518
- Supplier Testing Report : Example of BA (uncured prepreg)
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06
C Participating to the PTP Composite Scheme (www.centech-sa.fr/ptpcomposite) during the year of qualification and every three years for:

- DSC test in accordance to ISO 11357

Restrictions:

None

This qualification could be suspended or cancelled at any time in case of decrease in quality. All modifications initiated by supplier must be submitted to AIRBUS Helicopters for approval. In case of AIRBUS Helicopters documentation revision, modifications have to be implemented or request for deviation have to be submitted to AIRBUS Helicopters for approval.

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SPECIAL PROCESS: TEST LABORATORY (Independent)

- **Interlaminar Shear Strength test (ILSS)**
- **Flexural test**

Performed in accordance with the following documents:

- EN2563 July 97 Carbon Fibre Reinforced plastics unidirectional laminates - Determination of apparent interlaminar shear strenght
- EN 2377 June 89 Glass Fibre Reinforced plastics - Determination of apparent interlaminar shear strenght
- ISO14130 April 98 Composite plastics reinforced of fibres. Determination of apparent interlaminar shear strenght by flexural test
- EN2562 July 97 Carbon fibre reinforced plastics unidirectional laminates – Flexural test parallel to the fibre direction
- C - EN2746 Dec 15 Glass fibre reinforced plastics – Flexural test – Three point bend method

- MO334I : Operating procedure: Composites CIL NF EN 2563
- MO206G: Operating procedure: Composites CIL NF EN 2563, NF EN ISO 14130, NF EN2377 et ASTMD2344
- MO 199 G: Operating procedure : Composites and plastics – Characterization flexure 3 points according to NF EN ISO 178, NF EN ISO 14125, NF EN 2746, NF EN 2562 et ASTM D790

With the following resources:

Test machine: CR01 or similar
Load cell: CAFO01 10 CR01 or similar
Devices: EM 137 + EM 020 or similar

This Qualification is based on the following results:

- Audit report ETLL n°2018-1017
- Follow-up of corrective actions ETLL n°2018-2351 issue A
- AH qualification program ETLL n°2017-2192 Issue A
- AIRBUS Qualification certificate n°SUR2016.0390 ind E
- Cross checks : test report ETLL n°2018-3344
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue D

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

C Participating to the PTP Composite Scheme (www.ptpscheme.com) during the year of qualification and every three years for:

- ILSS test in accordance to EN 2563

Restrictions:

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This qualification could be suspended or cancelled at any time in case of decrease in quality. All modifications initiated by supplier must be submitted to AIRBUS Helicopters for approval. In case of AIRBUS Helicopters documentation revision, modifications have to be implemented or request for deviation have to be submitted to AIRBUS Helicopters for approval.

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- **Climbing drum peel test (CDP)**

Performed in accordance with the following documents:

- EI 071 IGC 04 26 270 issue G Determination of peeling strength climbing drum test
- EN2243-3 March 2006 Non- metallic materials – Structural adhesives test method – Part 3: Peeling test metal-honeycomb core

- MO320G : Operating procedure: Climbing drum peel NF EN 2243-3, ASTM D1781 et IGC-04-26-270

With the following resources:

Test machine: ZWICK model BT1-FB100TN S/N 176694 n° A0292 or similar
Load cell: ZWICK type XforceHP – S/N 755289 – 10 kN – class 0,5 from 30N to 10 000N or similar
Device n°: EM 010 or similar

This Qualification is based on the following results:

- Audit report ETLL n°2018-1017
- Follow-up of corrective actions ETLL n°2018-2351 issue A
- AH qualification program ETLL n°2017-2192 Issue A
- AIRBUS Qualification certificate n°SUR2016.0390 ind E
- Cross checks : test report ETLL n°2018-3344
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue D

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

C Participating to the PTP Composite Scheme (www.ptpscheme.com) during the year of qualification and every three years for:

- Climbing drum peel test in accordance to EN 2243-3

Restrictions:

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- **Compressive test (Sandwich constructions)**

Performed in accordance with the following documents:

- ASTM C364 April 2016 Standard test method for Edgewise Compressive Strength of Sandwich Constructions

- MO656A : Operating procedure: Compressive test according to ASTM C364

With the following resources:

Test machine: ZWICK ZW02 or similar
Load cell: CAFO30-250-ZW02 or similar
Device n°: EM C364

This Qualification is based on the following results:

- Audit report ETLL n°2018-1017
- Follow-up of corrective actions ETLL n°2018-2351 issue A
- AH qualification program ETLL n°2017-2192 Issue A
- Cross checks : test report ETLL n°2018-3344
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue D

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

C | Participating to the inter-laboratories tests during the year of qualification and every three years for:
- Compressive test in accordance to ASTM C364

Restrictions:
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This qualification could be suspended or cancelled at any time in case of decrease in quality. All modifications initiated by supplier must be submitted to AIRBUS Helicopters for approval. In case of AIRBUS Helicopters documentation revision, modifications have to be implemented or request for deviation have to be submitted to AIRBUS Helicopters for approval

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- **Single lap shear test**

Performed in accordance with the following documents:

- EI 071 IGC 04-26-345 issue 1 Adhesives Metal/metal Shear test
- EI 071 IGC 04-26-346 issue A2 Adhesives Composite/composite Shear test
- EN 2243-1 March 2006 Non-metallic materials – Structural adhesives – Test method – Part 1 : Single lap shear
- MO 031 M : Operating procedure: Single lap shear according to NF EN 1465, NF EN 2243-1, ISO 4587, IGC 04 26 345 and IGC 04 26 346

With the following resources:

Test machine: Criterion 43 or similar
Load cell: according to instructions I012
Device n°: /

This Qualification is based on the following results:

- Audit report ETLL n°2018-1017
- Follow-up of corrective actions ETLL n°2018-2351 issue A
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue D

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

C Participating to the PTP Composite Scheme (www.ptpscheme.com) during the year of qualification and every three years for:

- Lap Joint Shear according to EN 2243-1

Restrictions:

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- **Floating peel test**

Performed in accordance with the following documents:

- EI 071 IGC 04-26-360 issue B1 Adhesives Metal/metal Peel Tests (Floating peel)
- EN 2243-2 March 2006 Non-metallic materials – Structural adhesives – Test method – Part 2 : Peel metal-metal

- MO 402 E: Operating procedure: Peel test according to EN1464, EN 2243-2, ISO 4578 and IGC 04 26 360

With the following resources:

Test machine: all test machines from RESCOLL
Load cell: according to instructions I012
Device n°: EM 005-2 and EM005-3

This Qualification is based on the following results:

- Audit report ETLL n°2018-1017
- Follow-up of corrective actions ETLL n°2018-2351 issue A
- Analysis of different RESCOLL procedures (MO xxx) see Note ETLL N°2017-2193 Issue D

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

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Participating to the PTP Composite Scheme (www.ptpscheme.com) during the year of qualification and every three years for:

- Floating roller peel according to EN 2243-2

Restrictions:

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- **Wet ageing**

Performed in accordance with the following documents:

- EN 2823 August 2017 — Non-metallic materials – Structural adhesives – Test method – Part 2 : Peel metal-metal
- prEN 3615 April 1992 — Determination of the conditions of exposure to humid atmosphere and moisture absorption
- MO 291 E : Operating procedure: Wet ageing according to EN2823 and prEN3615

C **With the following resources:**
Climatic chamber model BINDER KMF 720 or similar

This Qualification is based on the following results:

- Audit report ETLL n°2018-1017
- Follow-up of corrective actions ETLL n°2018-2351 issue A
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue D

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

C Participating to the inter-laboratories tests during the year of qualification and every three years for:
- Wet ageing test in accordance toEN2823 and prEN3615

Restrictions:
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This qualification could be suspended or cancelled at any time in case of decrease in quality. All modifications initiated by supplier must be submitted to AIRBUS Helicopters for approval. In case of AIRBUS Helicopters documentation revision, modifications have to be implemented or request for deviation have to be submitted to AIRBUS Helicopters for approval

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- **Flammability & Flame Propagation**

Performed in accordance with the following documents:

CS/FAR 25, Appendix F

- Part. I, §(a)(1)(i) - Vertical Bunsen burner, 60s – AITM 2.0002 A
- Part. I, §(a)(1)(ii) & (iii) - Vertical Bunsen burner, 12s – AITM 2.0002 B
- Part. I, §(a)(1)(iv) - Horizontal Bunsen burner, 15s – AITM 2.0003 A

With the following resources:

3 Flammability chambers

This Qualification is based on the following results:

- Evaluation report ETLL n° 2017-1027

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

Restrictions:

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- **Compression on monolithic**

Performed in accordance with the following documents:

- EN 2850B Oct 2017 : Carbon Fibre reinforced plastics, compression test parallel to fibre direction
- ISO 14126 Sept 1999: Fibre-reinforced Plastic Composites - Determination of Compressive Properties in the In-plane Direction
- MO205K : Operating procedure: Composites : caractérisation en compression – Montage IITRI selon les normes ISO14126, ASTM D 3410
- MO335K : Operating procedure: Composites : caractérisation en compression – Montage selon 2850B

With the following resources:

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Test machine: ZWICK model FR04 or similar
Equipment: JIG (EM 055) or IITRI (EM053) tool or similar, Gauge.
Load cell: ZWICK CAFO07-250-FR04 – 250 kN – class 0,5 or similar

This Qualification is based on the following results:

- Audit report ETLL n°2019-2141
- Follow-up of corrective actions ETLL n°2019-2153 issue A
- AH qualification program ETLL n°2017-2192 Issue B
- AIRBUS Qualification certificate n°SUR2016.0390 ind E
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue F

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

Participating to the PTP Composite Scheme (www.ptpscheme.com) during the year of qualification and every three years for:

- Compression on monolithic test in accordance to EN2850 (2017 - 2019)

Participating to DRRR Proficiency testing for

- ISO 14126 (2015)

Restrictions:

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- **Tensile Test**

Performed in accordance with the following documents:

- EN 2597July 1998: Carbon thermosettingresin unidirectional laminates - Tensile test perpendicular to the fibre direction
- EN 2561 Sept 1195 : Carbon fibre reinforced plastics. Unidirectional laminates. Tensile test parallel the fiber direction
- EN 2747 August 1998: Glass fibre reinforced plastics. Tensile test
- ISO 527-2 fev 2012: Plastics – Determination of tensile properties – Part 2: Test conditions for moulding and extrusion plastics
- ISO 527-4 April 1997: Plastics. Determination of tensile properties. Part 4 : Test conditions for isotropic and orthotropic fibre-reinforced plastics composites
- ISO 527-5 July 2009: Plastics. Determination of tensile properties. Part 5: Test conditions for unidirectional fibre-reinforced plastic composites
- MO333I : Operating procedure: Composites – Caractérisation en traction NF EN 2561
- MO712B : Operating procedure: Composites – Caractérisation en traction NF EN 2597
- MO088X : Operating procedure: Composites – Caractérisation en traction ISO 527

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With the following resources:

Test machine: ZWICK model FR04 or similar
Equipment: Video extensometer (EXVI1004) and associated tooling, Mechanical extensometer EXTE 1006 class 0.5 or similar, gauge. Clamp EM 152 or similar.
Load cell: ZWICK CAFO07-250-FR04 – 250 kN – class 0,5 or similar

This Qualification is based on the following results:

- Audit report ETLL n°2019-2141
- Follow-up of corrective actions ETLL n°2019-2153 issue A
- AH qualification program ETLL n°2017-2192 Issue B
- AIRBUS Qualification certificate n°SUR2016.0390 ind E
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue F

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

Participating to the PTP Composite Scheme (www.ptpscheme.com) every three years for:

- Tensile test in accordance to EN2561 (2018)

Participating to DRRR Proficiency testing for

- ISO 527-2 (2017)

Restrictions:

This qualification could be suspended or cancelled at any time in case of decrease in quality. All modifications initiated by supplier must be submitted to AIRBUS Helicopters for approval. In case of AIRBUS Helicopters documentation revision, modifications have to be implemented or request for deviation have to be submitted to AIRBUS Helicopters for approval.

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- **IPS (In plane shear)**

Performed in accordance with the following documents:

- EN 6031 Nov 2015: Fibre reinforced plastics, determination of inplane shear properties (+/- 45° tensile test)
- ISO 14129 dec 1997: Fiber reinforced plastic composites - determination of the in-plane shear stress/shear strain response, including the in-plane shear modulus and strength, by +/- 45° tension test method
- MO236I : Operating procedure: Composites - Caractérisation en cisaillement dans le plan ISO 14129
- MO340C : Operating procedure: Composites - Caractérisation en cisaillement dans le plan EN 6031 et ASTM-D3518

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With the following resources:

Test machine: ZWICK model FR04 or similar
Equipment: Gauge
Load cell: ZWICK CAFO07-250-FR04 – 250 kN – class 0,5 or similar

This Qualification is based on the following results:

- Audit report ETLL n°2019-2141
- Follow-up of corrective actions ETLL n°2019-2153 issue A
- AH qualification program ETLL n°2017-2192 Issue B
- AIRBUS Qualification certificate n°SUR2016.0390 ind E
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue F

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

Participating to the PTP Composite Scheme (www.ptpscheme.com) during the year of qualification and every three years for:

- Tensile test in accordance to ISO 141291 (2017-2019)

Participating to DRRR Proficiency testing for

- ISO 14129 (2015)

Restrictions:

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This qualification could be suspended or cancelled at any time in case of decrease in quality. All modifications initiated by supplier must be submitted to AIRBUS Helicopters for approval. In case of AIRBUS Helicopters documentation revision, modifications have to be implemented or request for deviation have to be submitted to AIRBUS Helicopters for approval

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- **Mechanical test in temperature**

Performed in accordance with the following documents:

- MO091K : Operating procedure: Réalisation d'essais mécanique en température

Note: This operating procedure complete the other testing procedures.

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With the following resources:

Test machine: ZWICK model FR04 or similar
Equipment: Chamber MTS 651 FR04 or similar with probes

This Qualification is based on the following results:

- Audit report ETLL n°2019-2141
- Follow-up of corrective actions ETLL n°2019-2153 issue A
- AH qualification program ETLL n°2017-2192 Issue B
- AIRBUS Qualification certificate n°SUR2016.0390 ind E
- Analysis of different RESCOLL procedures (MO) see Note ETLL N°2017-2193 Issue F

The Qualification is subject to the following specific conditions:

All Safety class according to EP04-06

Participating to the PTP Composite Scheme (www.ptpscheme.com) during the year of qualification and every three years for:

- Tensile test Elevated temperature (or other PTP with elevated or cold temperature test)

Restrictions:

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This qualification could be suspended or cancelled at any time in case of decrease in quality. All modifications initiated by supplier must be submitted to AIRBUS Helicopters for approval. In case of AIRBUS Helicopters documentation revision, modifications have to be implemented or request for deviation have to be submitted to AIRBUS Helicopters for approval