AIPS
Airbus Process Specification

Accelerated drying of external paints

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Contents

1 Scope

This Airbus Process Specification defines the Engineering requirements for Accelerated drying of external paints.

This specification does not give detailed instructions; these are given in the Process Instructions (PI) / Airbus Process Instruction (AIPI) and the Work Instructions.

This specification shall not be used as an inspection document.

It shall be applied when mentioned in the relevant standard, material specification or Definition Dossier.

2 Normative References

Only normative references cited in the text are listed hereafter.

The latest issue of the publication referenced shall be used.

EN9103:		Aerospace series - Quality management systems - Variation management of key characteristics
AIPS05-02-003	:	Application of external paint systems
AIPI05-02-003	:	Application of external paint systems
AIPI09-04-001	:	Surface preparation prior to external paint application
AM2435	:	External Painting Quality Criteria
ISO 2409	:	Paint and varnishes – Cross cut test
ISO 2812/2	:	Determination of resistance to liquids
AP5374:		Technical qualification of a manufacturing process
A1091		Airbus Requirements for the Management of Hazardous Substances
EC n°1907/2006		REACh **/ R**egistration, **E**valuation, **A**uthorisation and **R**estriction of **Ch**emical substances
EC n°1272/2008		CLP / Regulation on classification, labelling and packaging of substances and mixtures, amending and repealing.

3 Definition, Applicability and Limitations

3.1 Definition

3.1.1 Accelerated drying of external paints

Accelerated drying is an artificial process to raise the temperature above standard ambient conditions, stabilize and control the temperature during paint drying.

3.1.2 Drying stages

The target of accelerated drying is the reduction of the drying time of the applied external paint film. There are different drying stages existing and it is up to the user to select which drying stage he need.

Tack free
The paint film no longer feels tacky to the touch, or sticky when gently touched.

Dry to handle
Paint film has reached a state of cure such that it can be lightly handled without causing permanent damage to the paint film.

Dry to tape
Coating is sufficiently dry to allow masking tape to be applied and removed on the surface with no lasting impressions.

Dry to sand

Coating cured sufficiently to be lightly abraded with 320 to 400 grade waterproof silicon carbide paper without the paper becoming excessively clogged or damage occuring to the coating surface.

Dry to overcoat
Paint film capable of accepting next coat in system to ensure adhesion is reached.

Full cure

Paint film achieves the degree of chemical cure required to meet and surpass the performance requirements of the specification. This is dependent on the paint chemistry and coating system applied.

3.2 Applicability and Limitations

The process is applicable to individual layers of the external paint system (e.g. external paint primer, top coats, clear coats, wear resistant coatings, …) and to any combination of paints applied to external surface.

There are different methods available for increasing the temperature: For example drying by using infra red radiation equipment, drying in a circulating air oven or drying with directed hot air flow.

The drying time is influenced by different criteria:

- The needed drying stage
- The choice of the paint product
- The environmental conditions (mainly by the selected temperature)
- The selected drying process (IR, oven or directed hot air flow)

The process described in this document is applicable to all aircraft programs.

The accelerated drying process is applicable for all paint systems which are applied according to AIPS 05-02-003 *Application of external paint systems.* Nevertheless, for each paint system has to be demonstrated that there is no detrimental influence on the dry film properties resulting from the accelerated drying (see chapter 5).

The accelerated drying process can be applied to cured fibre reinforced thermostes and thermoplastics, Glare and metal substrates as well.

The temperature during the accelerated drying is limited to a maximum of 80°C for parts and components made of metal and 65°C maximum for parts and components made of fibre reinforced thermostes and thermoplastics and Glare.

These stated temperatures refer to the temperature of the structure, rather than the temperature of the surrounding air.

4 Engineering Requirements

Engineering requirements are minimum requirements specified by Responsible Engineering to ensure optimal performance of the manufacturing process.

All Engineering requirements have to be met and controlled in production.

4.1 Performance Requirements

4.1.1 Prior the application

The accelerated drying process shall be carried out only on external paint systems applied in accordance with AIPS05-02-003.

4.1.2 During application

Strictly control of the temperature to avoid temperatures outside the given limits.
These limits are as follows:

- max 65°C for parts and components made of CFRP, GFRP and Glare
- max 80°C for parts and components made of metal

Additionally see the relevant AIPI for the process application.

4.1.3 After process application

Appearance of the external paint:
The dried paint systems shall be regular and uniform without blisters and other surface defects as defined in AM2435.
An influence on the colorimetry due to accelerated drying is not acceptable.

4.2 Other Requirements

Adhesion of the external paint:
Testing shall be carried out in accordance with ISO2409.
Testing shall always be carried out in combination with resistance to water in accordance with ISO2812/2.
The results shall be: Initial stage grade 0 and after 14 days water immersion grade ≤ 1.

4.3 Key Characteristic

Key Characteristics acc. to EN9103 are defined by responsible engineering based on a risk analysis for parts manufactured by this process. Key characteristics shall be defined on product level and if necessary also on process level.

They shall be subject to variation control by production organization according to EN9103.

Key Characteristics do not relieve the production organization from meeting all engineering requirements defined in this document.

Table 1: Key Characteristic

Product Key Characteristic			Process Key Characteristic		
No.	**Designation**	**Requirement/ Limit**	**No.**	**Designation**	**Requirement/ Limit**
1	Drying conditions	See § 4.1.2	1	Maximum temperature	See § 4.1.2
			2	Flash off time	These values are the outcome of qualification testing. Result shall be defined in AIPI05-02-020.
			3	Drying time	
			4	Relevant for IR drying: Distance of drying equipment to the painted surface	
			5	Relevant for hot air drying: Air velocity	
2	Appearance of the external paint	See § 4.1.3			
3	Adhesion of external paint	See § 4.2			

5 Technical Qualification

The Technical Qualification shall be performed, according to the relevant Airbus procedure.

Additionally to the standard procedures of AP5374 the following needs to be done for each new paint system submitted for accelerated drying:

5.1 Determination of the drying times

The user has to select which drying stage is needed (See §3.1.2)

By applying accelerated drying process the drying time of the external paint has to be determined to get the needed drying stage. The influence of flash-off time, color and paint film thickness needs to be considered.

5.2 Influence on the dry film properties

By applying the determined drying times, test panels have to be produced on which the following tests have to be performed in triplicate:

- dry and wet adhesion + scratch resistance
- Flexibility at 23°C
- Flexibility at low temperature (-55°C)
- Optical appearance (gloss, orange peel, colorimetry, free from blistering)

The tests conditions and acceptance criteria shall be identically to the relevant AIMS requirements of the paint system submitted for accelerated drying.

6 First Part Qualification

Not applicable.

7 Series Production Inspection

The shop shall perform the following series production inspections under serial conditions.
defined in the Process Instructions.

This shall be ensured by control of:

- the facilities (installation and equipment) and the products used,
- complience of the application process conditions with the requirements of this document and the Process Instruction.

All operators of the process shall be given appropriate training to provide the level of profiency required to ensure that the technical and quality requirements of the specification are met.

The following checks shall be conducted by the inspection department of the paint shop as reported in table 2 on aircraft, components, assemblies and / or test specimen.

- Control of the drying temperature
- Visual inspection of the appearance of the painted and dried external paint surface
- External paint system paint adhesion

Table 2: Serial checks and minimum checking frequencies

Property	Requirements	Frequency	Definition where to be conducted	
			On aircraft or components	On test specimen
Control of temperature	See § 4.1.2	permanent during process application	On all areas	Not applicable
Visual appearance	See § 4.1.3	Systematically after process application	On all areas	Not applicable
Adhesion testing	See § 4.2	For each new paint system and for each new colour	Not applicable	3 test specimen 150 x 80 mm per configuration

8 Rework

Not applicable.

9 Environment, Health and Safety

The manufacturing process shall be in line with Airbus Health and Safety and eco efficiency policies.

Compliance with A1091 shall be ensured for all materials, substances and/or articles implemented during process.

In particular, targeted substances according to A1091 shall not be used, if a safer alternative is available.

Uses made of all substances involved in the process shall be documented in Safety Data Sheet as required by REACh (EC n°1907/2006) and CLP (EC n°1272/2008) regulations.

RECORD OF REVISIONS

Issue	Clause modified	Description of modification
1 03/13		New standard.