AIPS
Airbus Process Specification

Shimming for Assembly

Published and distributed by :
AIRBUS S.A.S.
ENGINEERING DIRECTORATE
31707 BLAGNAC Cedex
FRANCE

Contents

1 Scope

This Airbus Process Specification defines the requirement for gap filling with solid and liquid shim materials. ”Shimming for Assembly”.

The purpose of this specification is to give design and quality requirements to manufacturers. Although the essential requirements of a process are defined, the specification does not give complete in house process instructions, these shall be given in the manufacturers detailed process instruction and supporting work instructions.

This specification shall not be used as an inspection document unless parts or assemblies have been manufactured according to this specification.

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

2 Normative references

This Airbus specification incorporates by dated or undated reference provisions from other publications. All normative references cited at the appropriate places in the text are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Airbus specification only when incorporated in it by amendment of revision. For undated references, the latest issue of the publication referred to shall be applied.

National standards should be applied if Airbus standards are not available.

AIPS01-02-017	General assembly and installation of fasteners
AIPS 09-01-002:	Cleaning with liquid non aqueous agents
AIMS 10-07-000:	Technical Specification (TS) Epoxy Pastes
EN9103	Quality management systems - Variation management of key characteristics

3 Definition, applicability and limitations

3.1 Definition

Storage life	The maximum period of time from date of manufacture that material stored to Manufacturer’s instructions in unopened containers will meet all the requirements of this Specification.
Application life	The maximum period of time (at a given temperature and humidity) that shim material remains at a consistency suitable for application.
Liquid shim	Liquid shim is a two component adhesive based on epoxy resin with/without aluminium filled powder.
Solid shim	Pre-fabricated plates in suitable thicknesses for filling large gaps when joining components.
Ancillary materials	Materials which are used during manufacturing and that are not incorporated into the finished part (including release agents, cleaning products etc).

3.2 Applicability

This Airbus specification is applicable when invoked by the drawing directly or through another document for the purpose given in the scope. When processing to AIPS03-06-009 is required, it shall be invoked on the drawing by the words “Shimming for Assembly in accordance with AIPS03-06-009”. Process instructions shall not be called on drawing.

3.3 Limitations of the process

Shimming process shall only be used to fill gaps in joints with a maximum gap as defined on the drawing and within the limits of the RSDP of the relevant programme.

If local shimming of the area of fasteners is required in accordance with the drawing, the minimum diameter of cured “resin washer” shall be at least 3 times the diameter of the fastener hole.

4 Requirements

4.1 Technical requirements

4.1.1 Prior to application of liquid shim

The joint gap shall be measured to ensure that it is within the allowable shimming limits of the drawing. Gap measurement in accordance with AIPS01-02-017. If not otherwise specified on drawing, a max. force of 50N may be applied at the measuring point.

Surfaces shall be cleaned and activated in accordance with AIPS 09-01-002. The activation process shall ensure that no degradation of the substrate or of its protection shall be visible to the naked eye. Post cleaning surfaces shall be dry and free from solvent residue.

Shim material shall be kept in closed container until room temperature has been reached to prevent condensation.

Where joint seperation is required subsequent to shimming, release agent/films shall be applied. The joint shall be clean prior to final assembly in accordance with AIPS 09-01-002.

4.1.2 Application of liquid shim

There shall be no contamination, foreign particles etc within the liquid shim.

Shim material shall be fully mixed (mix ratios shall be as defined within the applicable material specification).

The application environment shall be 16° – 40°C and maximum 75% relative humidity unless stated otherwise within the applicable material specification.

The entire joint shall be filled with liquid shim, except local shimming, if specified on drawing. There shall be no voids or air inclusions
The mating faces of the joint shall be assembled and held within the work life of the shim material. Components shall be fixed in the required position during the curing time (refer to applicable material specification for curing conditions).

Excess shim material shall be removed.

The process shall not cause any damage (scratches etc) to component surfaces.

4.1.3 Subsequent processing of liquid shim

Any protective treatments that have been removed/damaged shall be restored.

The minimum cure time (as defined in AIMS 10-07-000) shall be met prior to subsequent processing (i.e machining, drilling, fastening, handling etc). Subsequent processes shall not damage the liquid shim or impair its adhesive properties.

4.1.4 Solid shim

Shall be applied as defined on drawing or on stress / design documentation.

4.1.5 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**	**Sub.-No.**	**Designation**	**Requirement/ Limit**
1	**Integrity** - qualified means - surface preparation - liquid shim shall be fully mixed - not permitted: contamination voids air inclusion surface damage shim damage - curing time	- 4.2.3 AIPS09-01-002 - 4.1.1 / 4.1.2	1.1	means to be deployed	shall be defined in relevant AIPI
			1.2	storage / use of liquid shim	
			1.3	surface preparation	
			1.4	preparation of liquid shim	
			1.5	condition application / environment	temperature: 16° to 40°C max. 75% relative humidity
			1.6	shim application / components positioning	shall be defined in relevant AIPI
			1.7	shim worklife	
			1.8	technology times	
2	**Shim thickness** - max. thickness / shim definition - gap measurement - clamping force	- 3.3 / 4.1.4: drawing - 4.1.1: AIPS01-02-017 or drawing	2.1	gap measurement before assy	
			2.2	installing components and clamping	

4.2 Quality requirements

4.2.1 Manufacturing Shop

The Manufacturing Shop shall be approved to the requirements of the Airbus Quality Assurance Function for the production and supply of parts assembled to this process.
Facilities shall be available to ensure that material storage complies with relevant material specifications (e.g AIMS 10-07-000).

4.2.2 Process

All processes shall be qualified in accordance with section 5.

4.2.3 Tooling/Equipment

All tooling/equipment shall be certified as suitable for intended use and conforming to the requirements of this specification.

4.2.4 Material

Only qualified shim and ancillary materials shall be used.
Shim material shall meet the requirements of the relevant product specification.

4.2.5 Personnel

All operators shall be fully trained to perform liquid shim assembly according to this specification.

5 Process qualification

For technical qualification: Refer to AIRBUS qualification procedure for Manufacturing Process.

Qualification test specimens (test piece or suitable part) shall be agreed with the Airbus Materials and Processes department. The specimens shall be representative of the area to be qualified, i.e material, surface preparation, joint gaps etc. The specimens shall be inspected to ensure that the entire joint is filled with shim material, except local shimming, if specified on drawing.
Inspection is required to ensure that each requirement of section 4 is achieved.

5.1 Application

Shim shall be applied as per proposed production method. Release agent shall be applied to one surface to allow shim to be inspected as outlined in section 5.2.

5.2 Appearance

100% examination of the visible surface with naked eye on all test specimens.
The cured liquid shim material shall be free from defects such as creases, bubbles, and surface damage.

5.3 Shim mixture

The manufacturing shop shall provide evidence that the shim material is fully mixed.

5.4 Adherence

The manufacturing shop shall provide evidence that the surfaces are clean and adherence of the material is not impaired.

5.5 Reporting requirements

The test results shall be compiled into qualification test report and shall include the following information as a minimum:

(a) Actual measured gap dimensions
(b) Photographs of mating faces after surfaces have been activated.
(c) Photographs of shim material showing complete joint fill and no defects after curing.
(d) Results from compression test to verify correct mixture (section 5.3)
(e) Results from the adherence tests (section 5.4)
(f) Name and address of workshop/plant
(g) Date of trials and operator details
(h) Documentation defining the procedure that was used to perform the tests.

The report shall be issued to the Airbus Materials and Processes department.
Test specimens shall be held in archive until directed otherwise by the Airbus Materials and Processes department.

RECORD OF REVISIONS

Issue	Clause modified	Description of modification
1 12/06	N/A	New standard
2 11/08		Title on front page amended.
	1	Scope amended
	3.1	Solid Shim definition added.
	3.2	'Liquid shim' amended to read 'Shimming'
	3.3	Amended to add requirements of the RSDP for the relevant programme.
	4.1.1	Paragraph amended to include positioning requirements.
	4.1.2	Editorially corrected.
	4.1.4	Solid Shim requirements added.
	5.5	(c) Photograph of shim material. Sentence amended to add ' after curing'
	3.3 / 4.1.2 / 5	Local shimming requirements added.
3 04/10	4.1.1	Introduction of AIPS01-02-017
	4.1.2	was: application life is: work life
	4.1.5	Implementation of Key Characteristics