AIPS
Airbus Process Specification

Stripping of electrical cables

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Contents

1 Scope

This Airbus Process Specification defines the Engineering requirements for the stripping of electrical cables.

This document is the result of the merger with AIPS07-02-009 which dealt specifically with the stripping of AD and DR series of electrical single cables.

Therefore, this AIPS deals with all the cables on aircraft.

A relevant Airbus Process Instruction (AIPI) is written to define the method and the tools for the stripping of electrical cables.

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.

A1091	Airbus Directive – Airbus requirements for the management of hazardous substances.
AIPS07-02-009	Airbus Process Specification – General requirements for the stripping of electrical single conductor cables DR and AD series.
AIPS07-09-002	Airbus Process Specification – Electrical and optical tests of aircraft wiring (functional tests excluded)
EN2083	Aerospace series – Copper and copper alloys conductors for electrical cables – Product standard.
EN2812	Aerospace series – Stripping of electric cables
EN4434	Aerospace series – Copper or copper alloy lightweight conductors for electrical cables – Product standard – (Normal and tight tolerances)
EN9103	Aerospace series – Quality management systems – Variation management of key characteristics.

3 Definition, applicability and limitations

3.1 Definition

Not applicable.

3.2 Applicability and limitations

This Airbus specification is applicable when called up in the drawing directly or through another document for the purpose given in the scope. When processing to AIPS07-02-001 is required, it shall be called up on the drawing by the words “AIPS07-02-001 – Stripping of electrical cables”.

This document is applicable for any manufacture or installation of bundles and harnesses during the life time of the aircraft.

Only the practices defined in this document are authorized.

For processes other than described in this document, a qualification to the requirements of this AIPS has to be carried out.

Size of cable (conductors):

- The cables used on Airbus aircraft have "metric" conductors, defined in European Standard EN2083 and EN4434.

- When the Airbus document designates an AWG (American Wire Gage) cable size, the cable thus named is a metric conductor cable designated by the closest AWG identification size.

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.

Maintaining the correct processes and inspection and calibration of tools is upon the responsibility of the workshop quality management.

4.1 Performance requirements

The stripping operation shall allow to remove the insulator from the conductor over a length defined with tolerances without damaging the core strands and without reducing the original performances of the cable as defined in technical specification.

Acceptance criteria of cable stripping are based on EN2812: an extract of the defect illustrations is given in Tables 2 to 4 in chapter 6.4.

The length of stripping depends on the length required to connect the conductor into the end component (this length is given in documents relating to the use of each end component)

4.2 Other requirements

Quality requirements are presented in the relevant AIPI.

4.3 Key Characteristics

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 Characteristics

Product Key Characteristic			Process Key Characteristic		
No.	**Designation**	**Requirement/ Limit**	**Sub.-No.**	**Designation**	**Requirement/ Limit**
1	Electrical continuity	Refer to AIPS07-09-002	1.1	No visual damage on cables	Refer to subclause 6.4

5 Technical qualification

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

6 First part qualification

6.1 General

Several processes can be used, including:

- Manual process (with cutting tools)
- Machine process.
- Heat process.

6.2 Means to be employed

6.2.1 Cables

The encountered cables can be single-wire (unshielded or shielded), or multiple-wire conductors (unshielded or shielded), or coaxial conductors.

The conductor(s) making up a shielded cable shall be dealt with as single conductors after the stripping of the shielding of these cables and the cutting to length.

References and types of cables concerned by this AIPS are presented in the relevant AIPI.

6.2.2 Cutting tools

Before stripping, the cable shall be cleanly cut to length. In order to prevent any mistake during the stripping operation, it is mandatory to use cutting tools which ensure the core of the cable is not damaged during the operation.

NOTE: There is a specific process of cutting for laser-marked AD cables.

If required, before the stripping operation, a geometrical reconfiguration of the cylindrical shape of the cable can be performed for cable gauges 10 to 4 using a reshaping tool.

See the relevant AIPI for references of tools and specific process for AD cables.

6.2.3 Stripping tools

Several types of tools can be used:

- Hand tools (including mechanical pliers, tools with inserted blades, scalpels or cutters)
- Semi-automatic tools.
- Automatic tools.
- Thermal tools.

6.3 Different types of stripping process

For single conductors, the stripping length depend on the characteristics of the end fitting receiving the conductor (contacts, terminal lug, etc.)

The tolerance value by which the stripped length can protrude beyond the rear of the barrel (see figure 1)

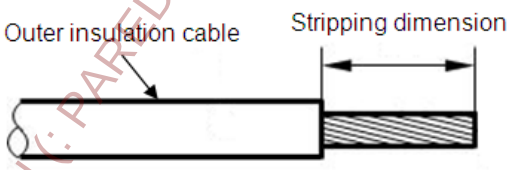


Figure 1: Stripping of single conductors

The stripping lengths for each conductor are given in the relevant documents to the use of each end item (contacts, terminal lug, etc.)

Cables stripped and ready to be crimped shall be in accordance with requirements described in tables 2, 3 and 4.

Concerning aluminum cables, stringent instructions concerning possible oxidation of the cables shall be observed.

Specific tools shall be used, the ends of cables shall be protected and a process of cutting and marking shall be respected.

In addition, there is specific process for twisted cables, sheathed cables, coaxial or triaxial cables and special cables (example: antenna cables, thermocouple cables, etc.)

These processes are explained in the relevant AIPI.

6.4 Quality control instructions

After stripping, the cable shall be free from all damage in order to conserve its mechanical and electrical characteristics.

After stripping, the core shall be free from damage to the strands and remain perfectly twisted and require no forming operations.

In the relevant AIPI, a process of quality control check is presented.

It shall be performed before, during and after stripping, by the Quality Department by sampling, to ensure the quality of the stripping operation.

These checks shall be carried out on typical simple cables, with special attention to be taken on the aluminium cables.

The representation of defects on stripping operation and decision linked to for the different types of stripping are shown in tables 2, 3 and 4.

Table 2: Conductor core stripping defects

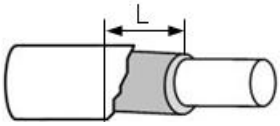
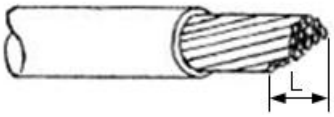
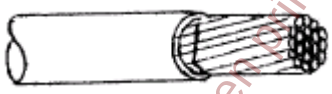
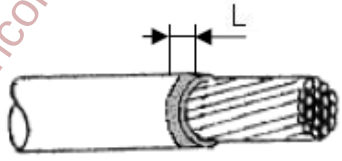
Illustration of defect	Description	Decision	Limits
	Strands cut	Rejected	—
	Core unstranded and splayed	Rejected	—
	Mark on insulator (notch, burned, visible core, …)	Rejected	Acceptable when only an external varnish is removed
	Core marked along a generating line	Rejected	Acceptable only when copper or aluminium are non visible
	Superficial contamination (burned insulator, glue residues, dust, …)	Rejected	Acceptable if non visible with naked eye
	Residual insulation	Rejected	Acceptable if L ≤ 1 mm
	Strands cut out of line	Rejected	Acceptable if L ≤ 1mm
	Strands marked(on the stripping dies zone)	Rejected	Acceptable only when copper or aluminium are non visible
	Superficial Mark on insulator (stripping jaws, clamping jaws, …)	Accepted	—
	Core unstranded (no splaying)	Accepted	—
	Heat affected zone	Accepted	Acceptable if L ≤ 1 mm
NOTE: The above sketches, showing a single-wire cable, also apply to multi-wire and coaxial cables.			

Table 3: Conductor shielding stripping defects

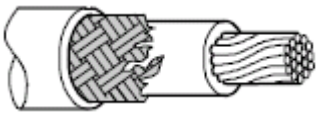
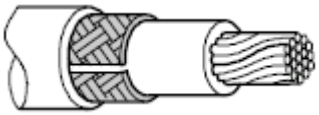
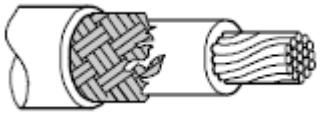
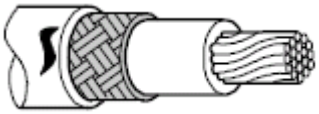
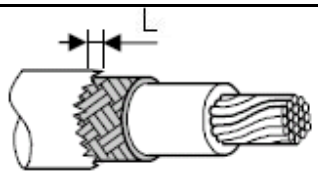
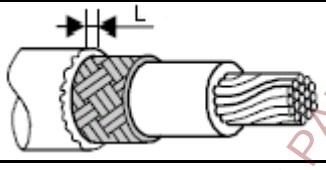
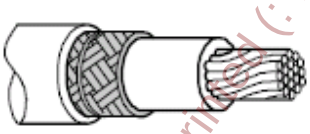
Illustration of defect	Description	Decision	Limits
	Cut of shielding not perpendicular to conductor axis	Rejected	
	Shielding marked along a generatrix	Rejected	Acceptable only when copper or aluminium is not visible
	Braid strands unwoven	Rejected	
	Mark on insulation	Rejected	Acceptable only when polyimide is not visible
	Residual insulation on shielding	Accepted	Acceptable if L ≤ 1 mm
	Cut insulation torn	Accepted	Acceptable if L ≤ 1 mm
	Strands notched in stripping zone	Accepted	Acceptable only when copper or aluminium is not visible
NOTE: The above sketches, showing a single-wire cable, also apply to multi-wire and coaxial cables.			

Table 4: Specific thermal stripping defects

Illustration of defect	Description	Decision	Limits
	Burned insulation when braid strands not joined	Rejected	
	Over heated insulation when braid strands not joined	Rejected	

7 Series production inspection

The shop shall perform the following series production inspections under serial conditions.

8 Rework

Not applicable.

9 Environment, health and safety

The manufacturing process shall be in line with Airbus Health and Safety and ecoefficiency 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 regulation (Registration Evaluation and Authorization of Chemicals)

NOTE: Specific care shall be taken when using cutting tools.

RECORD OF REVISIONS

Issue	Clause modified	Description of modification
1 2001		New standard.
4 03/09		Standard updated.
5 06/10	2	Add DW and GP cables.
	6.1.2.2.1	Thermal stripping tool added.
	6.1.2.2.4	Thermal stripping tool added.
	6.1.3.8	Thermal stripping tool added.
	6.2.4	Thermal stripping tool added.
	6.3	Thermal stripping tool added.
	Table A.1	Add stripping tools for cable DW.
	Table A.2	Add stripping tools for cable DWB.
	Table A.3	Add stripping tools for cable DWC.
	Table A.6	Add stripping tools for cable GPA.
	Table A.7	Add stripping tools for cable GPB and YK.
	Table A.8	Add stripping tools for cable GPC.
	Table D.1	Add blades DAVUM TMC-PCW7 and TMC-PCW8.
6 03/12	All	Template updated.
	All	Standard updated: - Merge with AIPS07-02-009. - Deletion of paragraphs about the directions of implementation.
7 03/16	2	Normative references updated: addition of EN2812 and AIPS07-09-002.
	Table 1	KC table updated.
	6.2.1	Wording updated (“unshielded” added).
	6.3	Wording updated (“dimension” replaced by “length”).
	Table 2	Acceptance criteria table aligned with EN2812.
	Table 3 & 4	Wording updated. “denied” replaced by “refused”. Length “L” added on two figures