

**AIPS**  
**Airbus Process Specification**  
  
**General requirements**  
**for crimping of electrical contacts**

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## 1 Scope

This Airbus Process Specification defines the Engineering requirements for the crimping of electrical contacts.

This specification does not give detailed instructions; these are given in the Process Instructions (PI) / Airbus Process Instruction (API) 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 requirements for the management of hazardous substances.
ABS0831-003	Connector ARINC600, with grounding contacts.
ABS0949	Aerospace series – Cables, aluminium conductors, gauges 24 to 000, UV laser printable.
ABS1111	Aerospace series – Contacts, electrical, twinax, female.
ABS1112	Aerospace series – Contacts, electrical, twinax, male.
ABS1380	Aerospace series – Contact, electrical, pin, for aluminium cable.
ABS1381	Aerospace series – Contact, electrical, socket, for aluminium cable.
AIPS07-02-001	Airbus Process Specification – General requirements for the stripping of electrical cables.
AIPS07-04-024	Airbus Process Specification – General requirements for the crimping of 10 to 04 size aluminium electrical cables ABS0949 AD series onto contacts ABS1380 and ABS1381.
AIPS07-04-028	Airbus Process Specification – Installation of twinax contacts ABS1111 and ABS1112.
AIPS07-04-031	Airbus Process Specification – General requirements for the crimping of 24 to 12 size aluminium electrical cables ABS0949 (AD series) onto contacts ABS1380 and ABS1381 with multi-gauges crimping tools.
AIPS07-04-032	Airbus Process Specification – Installation of MIL BUS 1553 standard components.
AIPS07-05-002	Airbus Process Specification – Installation of rectangular rack connectors ARINC404 family.
AIPS07-05-003	Airbus Process Specification – Installation of rack connectors ASNE0161/0163/0165 and ABS0831 (ARINC600).
AIPS07-05-038	Airbus Process Specification – Installation of coaxial contacts.
AIPS07-05-043	Airbus Process Specification – Installation of quadrax contacts ABS0973 and ABS0974.
AIPS07-05-051	Airbus Process Specification – General requirements for installation of components for CAN BUS.
AIPS07-05-076	Airbus Process Specification – AIPS for Milbus 1553 coupler (flight control system)
ARINC600	Air transport avionic equipment interfaces.
ASNE0086	Connector – Receptacle, rectangular, multicontact, male shell, double MIL-C-81659B.
ASNE0145	Rectangular connectors multicontacts, simple male shells.
ASNE0146	Rectangular connectors multicontacts, simple female shells.
ASNE0147	Connector – Receptacle, rectangular, multicontact, female shell, double MIL-C-81659B.
ASNE0161	Connectors, rectangular ARINC600, size 1, plugs.
ASNE0163	Connectors, rectangular ARINC 600 size 2 plugs.

ASNE0165	Connectors, rectangular ARINC 600 size 3 plugs.
ASNE0726	Connectors rectangular multicontacts, triple male shells, sealed and unsealed.
ASNE0729	Connectors rectangular multicontacts, triple female shells, sealed and unsealed.
EN2083	Aerospace series – Copper and copper-alloys conductor for electrical cables – Product standard.
EN2242	Aerospace series – Control of tools used for crimping of electric cables defined by EN2083 and EN2346.
EN2591-417	Aerospace series – Elements of electrical and optical connection, Test methods – Part 417: Tensile strength (crimped connections)
EN3719	Aerospace series – Aluminium or aluminium alloy conductors for electrical cables – Product standard.
EN9103	Aerospace series – Quality management systems - Variation management of key characteristics.
MIL-STD-1553	Interface Standard for digital time division command/response multiplex Data Bus.
MIL-C-22520/2	Crimping tools, terminal, hand, wire termination for wire barrel sizes 12 through 20.

### 3 Definition, applicability and limitations

#### 3.1 Definition

Not applicable.

#### 3.2 Applicability and limitations

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 AIPS07-03-001 is required, it shall be invoked on the drawing by the words "AIPS07-03-001 – General requirements for crimping of electrical contacts".

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

Only the practises defined in this document are authorized.

Size of cables (conductors):

- Since 1983, to reduce weight, the cables used on Airbus aircraft have "Metric" conductors, defined in European Standard EN2083.
- 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.

## 4.1 Performance requirements

### 4.1.1 Technical requirements

- The crimping shall ensure the electrical and mechanical connection of the cable to end.
- The crimping shall compress the strands of the cable without leading to breakage or initiating rupture.
- The resulting crimping indent shall not cause cracks or a visible separation of the surface treatment.
- The connection shall not reduce the original electrical characteristics of the cable.
- The geometrical distortion shall not hinder or prevent normal use of the assembly.
- The connection shall allow the assembly obtained (cable + end fitting + connected item) to meet the requirements given in the standards relevant to the various associated components.
- No sliding movement of the cable shall be detected with respect to the end fitting, for Aluminium cables crimped on contacts, there are two requirements, see note 2 in table 1.

### 4.1.2 Tensile strength

The tensile strength of crimped connections for the various cable and material sections must be greater than the values given in table 1.

NOTE: The tensile strength values are in compliance with standard EN2242 for copper cables and EN3719 for aluminium cables except for the specific use at AIRBUS of special barrels on removable contacts.

**Table 1 – Minimum tensile strength of crimped connections**

Dimensions in daN

Section (mm <sup>2</sup> )	Cable size AWG (See note 1)	Copper cable	Aluminium cable
		On contacts	On contacts ABS1380 / ABS1381
			Re (See note 2)
0,15	26	3,9	Refer to AIPS07-04-031
0,25	24	5,5	
0,40	22	6	
0,60	20	9	
1	18	15 (12*)	
1,2	16	18	
2	14	30	
3	12	45	Refer to AIPS07-04-024
5	10	70	
9	8	108	

(continued)

**Table 1 – Minimum tensile strength of crimped connections (concluded)**

Dimensions in daN

Section (mm <sup>2</sup> )	Cable size AWG (See note 1)	Copper cable	Aluminium cable
		On contacts	On contacts ABS1380 / ABS1381 Re (See note 2)
14	6	154	Refer to AIPS07-04-024
22	4	198	
34	2	272	N/A
42	1	320	
53	0	420	
68	00	530	
85	000	640	
107	0000	840	

(\*) 12 daN → Only when the size 18 cable is crimped to a size 20 contact.  
NOTE 1: AWG → Nearest American Wire Gauge (see also subclause 3.2)  
NOTE 2: No displacement shall be detected before the Re (Elastic Limit) value is reached.

#### 4.1.3 Connection of specific component

The direct connection of a component (diode, resistor) to an end fitting must be considered as the crimping of a nickel-plated copper alloy multistrand cable of same diameter.

Example: Ø 0,6 mm: as 24 size  
 Ø 0,8 mm: as 22 size  
 Ø 1 mm: as 20 size

#### 4.1.4 Hardness of connecting area

The materials used to manufacture the end fittings (heat treated if necessary) must provide for crimping of the cable cores in compliance with subclause 4.1.2 without causing cracks under the crimping indents and avoiding all abnormal damage to the crimping tools.

### 4.2 Process requirements

For Technical Qualification, refer to the relevant Airbus Procedure.

#### 4.2.1 Principle

As is the case all processes for implementing standard items, the qualification of end fitting crimping cannot be dissociated from qualification of the end fittings themselves.

Indeed, each end fitting complies with a standard (NSA, ASNE, DAN, ABS, EN) and its qualification has been achieved on the basis of a crimping process performed with a tool imposed by the technical department who performed the qualification of this fitting.

This process is therefore the only one to be authorized.

This crimping tool generally has its own standard (e.g. crimping tool MIL-C-22520/2-01). Its P/N and its setting are mentioned in the AIPS and in the relevant AIPI for each connecting item.

#### **4.2.2 Precautions**

Stripping must be in compliance with AIPS07-02-001.

Tools used for crimping must comply with the standards defining them (e.g. M22520/2-01) or with the supplier's documents when they are not standard tools (e.g. AMP 59500)

- The following essential checks must be made:
- Good apparent state of preservation.
- No traces of oxidation, burrs, sharp corner or any other defects on parts in contact with the component to be crimped or with the cable.
- Good condition of dies.
- Good condition of positioning stop and jam rigging pins.
- Free operation of the tool: no hard points or jamming.
- Operation of rack: crimping limitation, release prohibited until crimping has been completed.
- Wear of dies using a GO/NO-GO Plug gage associated with each crimping tool (this check is to be made at intervals suited to the use made of the tool)

The performance of the connections made shall be in compliance with this document (see subclause 4.2)

### **4.3 Other requirements**

#### **4.3.1 Test method**

As per EN2591-417.

Samples shall be tested to destruction.

The first termination to part from the cable shall be taken as the resultant pull off load.

#### **4.3.2 Surface treatment**

The surface treatments applied to the end fittings must provide for crimping of the cable cores in compliance with subclause 4.1.2 without leading to visible separation or damage under the crimping indents.

The base material must not be visible when magnified by 10.

#### **4.3.3 Geometrical distortion of the end fittings**

Geometrical distortion related to crimping must not hinder or lead to additional precautions in the use of the end fitting from the cavity.

For removable contacts, the geometrical distortions must not hinder or prevent normal usage of the tools planned for the installation or the removal of the item from the cavity.

For removable contacts, the concentricity defects shall be limited to:

- 0,30 mm max. for size 12 and 16 contacts.
- 0,28 mm max. for size 20 contacts and below.

The increase in the crimping barrel diameter shall be limited to:

- 0,15 mm max. for size 12 and 16 contacts.
- 0,05 mm max. for size 20 contacts and below.

#### **4.4 Process work and quality control requirements**

##### **4.4.1 Process work requirement**

These requirements mainly concern:

- The length of cable to be stripped.
- The crimping tool to be used, and its setting.
- The requirements for use.

##### **4.4.2 Position of the cable insulation after crimping**

###### **4.4.2.1 Crimping with gripping of the insulation (for aluminium cable)**

Cable insulation shall be inside crimping barrel.

###### **4.4.2.2 Crimping without gripping of the insulation (for copper cable)**

Cable insulation shall be outside crimping barrel.

##### **4.4.3 Quality control requirements**

These general requirements are to be completed by the Quality Control Department, taking into account the relevant individual AIPS.

The quality of a crimped connection depends on the maintenance and the setting of the cutting, stripping and crimping tools.

##### **4.4.4 Pre-crimping checks**

- Cable correctly stripped.
- Compatibility between cable, fitting and tool.
- Crimping tool settings correct.
- Conformity of crimping tool and locator.

##### **4.4.5 Post-crimping checks**

- Crimping indents away from inspection hole.
- Cable visible through inspection hole, if applicable.
- Position of cable insulation after crimping in accordance with subclause 4.4.2.
- No damage caused by crimping, cracks subclause 4.1.4, protection subclause 4.3.2.
- Crimping indent correctly centered on the barrel.
- No damage caused on the attaching system, or to the female contact pressure system (removable contacts)
- Acceptable geometrical distortion.
- No strands outside the crimping barrel (and/or extending out of the inspection hole)
- No cut strands.



#### 4.5 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 2: Key Characteristics**

Product Key Characteristic			Process Key Characteristic		
No.	Designation	Requirement/ Limit	Sub.- No.	Designation	Requirement/ Limit
1	Tensile strength depending on the cable gauge	See table 1	-	-	-

#### 5 Technical qualification

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

#### 6 First part qualification

Not applicable.

#### 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)

**Annex A**  
**(informative)**  
**List of related AIPS for each type of contact**

**A.1 List of related AIPS for each type of contact**

According to table A.1

**Table A.1 – Related AIPS for each type of contact**

Type of contact	AIPS number	AIPS title
Contact for copper cable	Refer to the relevant AIPI	General requirements for crimping of electric connections
ABS1380 – ABS1381	AIPS07-04-031	General requirements for the crimping of 24 to 12 size aluminium electrical cables ABS0949 (AD series) onto contacts ABS1380 and ABS1381 with multi-gauges crimping tools
ABS1380 – ABS1381	AIPS07-04-024	General requirements for the crimping of 10 to 04 size aluminium electrical cables ABS0949 AD series onto contacts ABS1380 and ABS1381
Coax	AIPS07-05-038	Installation of coaxial contact
Quadrax	AIPS07-05-043	Installation of Quadrax contacts
Twinax	AIPS07-04-028	Installation of twinax contacts ABS1111 / ABS1112
Specific contacts for rectangular rack connectors	AIPS07-05-002	Installation of rectangular rack connectors ASNE0086 / ASNE0145 / ASNE0146 / ASNE0147 / ASNE0726 / ASNE0729
Contacts used with ARINC600	AIPS07-05-003	Rack connectors ASNE0161 / ASNE0163 / ASNE0165 and ABS0831
Contacts used for MIL BUS1553	AIPS07-04-032	Installation of MIL BUS 1553 standard components
Contacts used for MIL BUS1553	AIPS07-05-076	Installation of MIL BUS 1553 standard components for XWB program
Contacts used for BUS CAN	AIPS 07-05-051	Installation of components for BUS CAN

## RECORD OF REVISIONS

Issue	Clause modified	Description of modification
1 05/95		New standard.
2 12/06		Values of tensile strength modified. References added in § 2.
3 01/11		Crimping Drawing modified. Update of normative references and table 1. Addition of AIPS reference in chapter 4.2.6.2-Crimping with gripping of the insulation. Addition of KC. Remove of lugs and splices references. Addition of Annex A to list AIPS for crimping contact.
4 03/16	2	AIPS07-10-001 for brazing of electrical connections deleted.
	4.2.1	Table 1: Tensile Strength values for aluminium contacts replaced by cross reference AIPS07-04-024 & AIPS07-04-031
	Annex A	Table A1: AIPS07-10-001 for brazing of electrical connections deleted and moved to AIPS07-01-001