

AIPS
Airbus Process Specification

General requirements for the crimping of 24 to 12 size aluminium electrical cables ABS0949 (AD series) onto contacts ABS1380 and ABS1381

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

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1 Scope

This Airbus Process Specification defines the requirement for General requirements for the crimping of 24 to 12 size aluminium electrical cables ABS0949 (AD series) onto contacts ABS1380 and ABS1381. 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.

ABS0949	Electrical aluminium cables AD type
ABS1380	Contact, electrical, male, for aluminium cable, product standard
ABS1381	Contact, electrical, female, for aluminium cable, product standard
ABS1405	Contact, electrical, male and female, for aluminium cable, technical specification
AIPS07-01-001	Manufacturing and installation of cable harnesses
AIPS07-02-009	General requirements for the stripping of DR and AD electrical cables
AIPS07-03-001	General requirements for the crimping of electric connections
AP2253	Technical qualification of manufacturing processes
EN2083	Copper or copper alloy conductors for electrical cables, product standard
EN3155	Electrical contacts used in elements of connection
EN4434	Copper or copper alloy lightweight conductors for electrical cables, product standard
MIL-C-22520	Crimping tools, terminal, hand or power actuated, general specification for,
MIL-I-81969	Installing and removal tools, connector electrical contact

3 Definition, applicability and limitations

3.1 Definition

Size of cable (conductors) : Since 1983, to reduce weight, 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 Gauge) cable size, the cable thus named is a metric conductor cable designated by the closest AWG identification size

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 AIPS 07-04-023 is required, it shall be invoked on the drawing by the words "General requirements for the crimping of 24 to 12 size aluminium electrical cables ABS0949 (AD series) onto contacts ABS1380 and ABS1381" of AIPS 07-04-023. Process instructions shall not be called on drawing.

Application paragraph contains in terms of requirements:

3.3 Limitations of the process

4 Requirements

4.1 Technical requirements

See ABS1405.

Mechanical crimping and contact sealing are done simultaneously on the contact end to ensure the electrical and mechanical connection of the cable to the end fitting and the sealing on this link.

For general rules applicable to manufacturing of harnesses and specially in this case, for the storage of all components, please refer to AIPS07-01-001.

4.2 Quality requirements

See AIPS07-02-009 for stripping.

See AIPS07-03-001 for crimping.

5 Process qualification

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

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6 Process work and quality control instructions

6.1 Process work instructions

6.1.1 Products

6.1.1.1 Cable

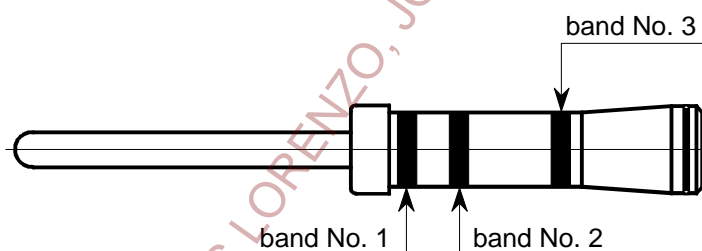
The ABS0949AD cable core is made from aluminium alloy, the small sizes such as AWG24 and AWG22 use a specific strand made from copper alloy to increase the tensile strength value.

6.1.1.2 Contacts

The ABS1380 and ABS1381 contacts design is very similar to the EN3155-XXX used today for copper cable, however the electrical crimping configuration is different to the one offered by MIL-C-22520 tools. The crimping barrel is longer to allow a second crimping for the sealing on insulation of the cable.

Colored stripes indicate the dedicated use to aluminium cable (band N°1), size of contact (band N°2), size of the cable to be crimped in (band N°3). Refer to the standards for further details.

Figure 1 - Uncrimped contact



6.1.2 Tools

6.1.2.1 Stripping tools

Refer to AIPS07-02-009 for the stripping tools for ABS0949AD cables.

The stripping lengths are indicated in table 1.

Table 1 - Stripping lengths

Cable size	Stripping lengths +/- 0,2 mm
24	4,2 mm
22	4,2 mm
20	4,2 mm
18	4,2 mm
16	5,4 mm
14	5,7 mm
12	5,7 mm

6.1.2.2 Crimping Tools

Those tools are dedicated to this specific use.

Any other use of these tools is strictly forbidden.

When this has already been done, the tool shall be submitted to a complete checking and calibration before re-using.

Any additional tool required to help the users to reduce the effort can be used under local quality agreement. As an example, some references for these adaptors are given in Annex A.

Table 2 - References of the crimping tools

ABS contact reference	Contact size	Wire gauge	Crimping Tool / Color of Handle	Locator
ABS1380-08M1012	10	12	ALNP 12-A / Yellow	TPAL 15 (TPAL 5 *)
ABS1381-03F1012				TPAL 13
ABS1380-08M1212	12	12		TPAL 12 (TPAL 2*)
ABS1380-18M1212				
ABS1381-03F1212				
ABS1381-19F1212				
ABS1380-08M1214	12	14	ALNP 14-A / Orange	TPAL 21
ABS1380-18M1214				TPAL 24
ABS1380-16M1214				TPAL 20 (TPAL 10*)
ABS1381-03F1214				
ABS1381-19F1214				
ABS1380-08M1614	16	14	ALNP 16-A / Blue	TPAL 18
ABS1381-03F1614				
ABS1380-08M1216	12	16		TPAL 21
ABS1380-16M1216				TPAL 23
ABS1380-18M1216				TPAL 17 (TPAL 7*)
ABS1381-03F1216				
ABS1381-19F1216				
ABS1380-08M1616	16	16		TPAL 18
ABS1381-03F1616				TPAL 11 (TPAL 1*)
ABS1380-18M1616				
ABS1381-19F1616				
ABS1380-08M1618	16	18	ALNP 18-A / Brown	TPAL 18
ABS1381-03F1618				
ABS1380-18M1618				TPAL 11 (TPAL 1*)
ABS1380-16M1618				
ABS1381-19F1618				
ABS1380-08M1620	16	20	ALNP 20-A / Red	TPAL 22
ABS1380-16M1620				TPAL 16 (TPAL 6*)
ABS1380-18M1620				
ABS1381-03F1620				
ABS1381-19F1620				
ABS1380-14M2020	20	20		TPAL 19 (TPAL 9*)
ABS1381-15F2020				
ABS1380-16M2020				TPAL 14 (TPAL 4*)
ABS1380-18M2020				
ABS1381-19F2020				

Continued...

6.1.2.2 Crimping Tools, continued

ABS contact reference	Contact size	Wire gauge	Crimping Tool / Color of Handle	Locator
ABS1380-14M2022	20	22	ALNP 22-A / Green	KAL 3
ABS1381-15F2022				KAL 1
ABS1380-16M2022				
ABS1380-18M2022				
ABS1381-19F2022				
ABS1380-22DKZ22	22	22		KAL 2
ABS1380-16M2222				
ABS1381-22DLZ22				
ABS1380-22D2222				
ABS1380-14M2024	20	24	ALNP 24-A / Black	KAL 3
ABS1381-15F2024				KAL 1
ABS1380-16M2024				
ABS1380-18M2024				
ABS1381-19F2024				
ABS1380-22DKZ24	22	24		KAL 2
ABS1380-16M2224				
ABS1381-22DLZ24				
ABS1380-22D2224				

*: Acceptable reference. The operator shall pay more attention on the crimping process to avoid contact bending than with other locator references.

6.1.3 Crimping of a contact

General remark about crimping process: Because of quite high effort necessary to crimp contacts on cables sizes 20 to 12 with manual tools, the crimping operation can be carried out by two persons: one to position and hold the contact with the cable in the manual crimping tool, and the other one to crimp.

This can be avoided by the use of an actuator to decrease the crimping effort (see Annex A).

6.1.3.1 With manual tools

Choose the contact in accordance with the size of the cable and the designated connector.

Strip the cable to the length according to table 1, using the tool with respect to the cable size. (see AIPS07-02-009).

Figure 2

Control the stripping of this operation according to AIPS07-02-009.

Choose the crimping tool with respect to the size of the cable according to table 2.

Tool color handle and the barrel corresponding band shall be identical.

Figure 3



Figure 4



Choose the locator as per table 2 and assemble to crimping tool,

Make one complete cycle without contact to verify that the tool is operating correctly.

Insert the cable into the crimping barrel and slide as far as the positive mechanical stop.

Insert the contact (equipped with cable) in the tool, verify the correct location within the tool (contact stopped by the locator to avoid to crimp on the contact shoulder).

Push on the cable and make sure that the cable and the contact are centered into the tool.

Close the tool in one continuous operation firmly and slowly (a constant speed is recommended).

Do not release the handles of tool until the crimped contact is removed.

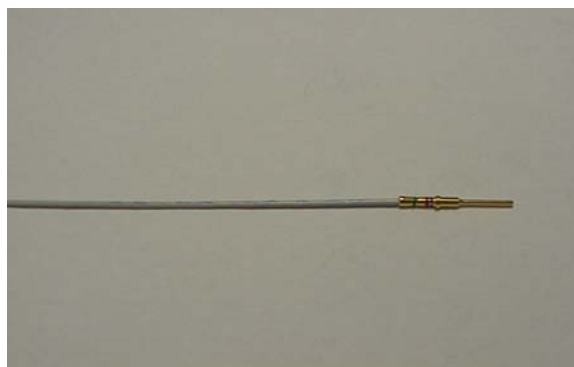
NOTE: The locator indents will automatically release when the correct pressure has been applied to the contact. The contact must be removed at this point. CAUTION if further movement of the handles is made before removing the contact a second crimp action will be initiated.

Remove the crimped contact with tool fully closed.

Figure 5



Figure 6



Then release the operating handle.

The cables handling shall be in accordance with cables installation rules (e.g.: bend radii shall be respected before and after crimping, especially in the crimping area).

Visually inspect the crimped contact in accordance with paragraph 6.2.2.

6.1.3.2 With pneumatic tools

Choose the contact in accordance with the size of the cable and the designated connector.

Strip the cable to the length according to table 1, using the tool with respect to the cable size. (see AIPS07-02-009)

Control the stripping of this operation according to AIPS07-02-009

Choose the crimping tool with respect to the size of the cable according to table 2.

Choose the locator as per table 2 and assemble to crimping tool,

Insert the cable into the tool and press the operating button. Release the button to remove the crimped contact.

The cables handling shall be in accordance with cables installation rules (e.g.: bend radii shall be respected before and after crimping, especially in the crimping area).

Visually inspect the crimped contact in accordance with paragraph 6.2.2.

6.1.3.3 Specific crimping process in aircraft or in aircraft sections

For crimping contacts in the aircraft or a section of the aircraft, it is possible to untie the cable harnesses in an appropriate length to ensure a safe working position to be able to meet paragraph 6.1.3.1 requirements.

6.1.3.4 Contact insertion into connector

Refer to the designated AIPS for the family of connector to be used.

The specified tool shall be used for the insertion and the extraction of contact.

Table 3 - Contacts Insertion / Extraction tools

Size of contact	ABS1380	ABS1381	Tool reference	Insertion tool color or reference	Extraction tool color or reference	Tool material
Size 22						
22	22D22**	None	M81969/1-01	Green	White	Metallic tubes
22	22DKZ**	22DLZ**	M81969/14-01	Green	White	Plastic tool
22	16M2222	None	M81969/14-01	Green	White	Plastic tool
Size 20 High Density and size 20						
20HD	14M20**	15F20**	M81969/39-01	Green	White	Plastic tool
20	18M20**	19F20**	M81969/14-11	Red	White	Plastic tool
Size 16 High Density and size 16						
16HD	08M16**	03F16**	M81969/14-03	Blue	White	Plastic tool
16	18M16**	19F16**	M81969/14-03	Blue	White	Plastic tool
Size 12 High Density and size 12						
12HD	08M12**	03F12**	M81969/14-04	Yellow	White	Plastic tool
12	18M12**	19F12**	M81969/14-04	Yellow	White	Plastic tool
Size 10						
10	08M10	03F10	M81969/14-05	Gray	White	Plastic tool

6.2 Quality control instructions

6.2.1 Pre-crimping check

- cable correctly stripped, (see § 6.1.3)
- conformity between cable, end fitting crimping tool and locator,
- check if the locator is secured.

6.2.2 Post crimping check (visual)

Refer to AIPS07-03-001 for general crimping rules

- No damage caused by crimping (cracks or protection separation or damage)
- Crimping indent correctly positioned on the barrel: refer to Compagnie Deutsch document, reference MC8803-19-00VA last issue.
- Shape of the sealing crimping: refer to Compagnie Deutsch document, reference MC8803-19-00VA latest issue.
- No strands outside the crimping barrel
- No strand visible at the contact end
- No sharp edges on the sealing area of the contact
- No bending visible at naked eyes

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

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.

6.2.2.1 Visual acceptance for non-laser marked cables

If applicable, the visual acceptance criteria for non-laser marked cables is given in §6.1.4.2 of AIPS07-02-009.

6.2.2.2 Visual acceptance for laser-marked cables

Contrary to for non laser-marked cables, no additional hand-made marking is necessary on laser marked cables.

Visual acceptance criteria are detailed in Annex C.

In the case that the crimped contact is not in line with Annex C requirements, the cable shall be cut between the two nearby squares after the contact barrel and stripping and crimping processes shall be performed again according to the relevant chapters of AIPS07-02-009 and AIPS07-04-023.

6.2.3 Periodical checks

Tools periodical inspection shall be realized according to the periodical check rules defined by prevailing plant documents.

The frequency of the samples periodical checks will be managed by Quality Assurance Authority.

- Tensile strength of the connections (Values as per ABS1405)
- Sealing of connections (Method and values as per ABS1405 + Annex C)
- Voltage drop test (Values as per ABS1405)

Crimping tools:

Tools used for crimping must comply with the technical specification ABS1405

The following essential checks must be made:

- good apparent state of preservation,
- no traces of oxidation, corrosion, contamination and; 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 i.e; no hard points or jamming,
- operation of rack: crimping limitation, release prohibited until crimping has been completed,
- on the crimped contact, check that there is a limited bending of the contact.

The following check shall be conducted at least every 1000 cycles or every 3 months whichever occurs sooner.

- wear of dies using GO/NO-GO pin gauges associated with each crimping tool (see Annex B)

The performances of the connections made shall be in compliance with ABS1405.

7 Health and safety

This specification does not necessarily detail all the precautions necessary to meet the requirements of health and safety.

It is the responsibility of the user of this specification to consult and establish appropriate Health and Safety precautions and the method should be operated only by trained personnel.

8 Appendix

Annex A

(informative)

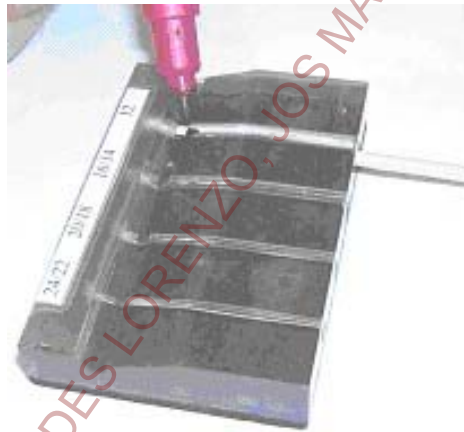
Tool adaptor references

NOTE: As examples, some references are given for information only.

Handles: 68101L92911101000

Box: 68101L92911101001

Figure 1A



Actuator: SA-P038-00 from RB3D

Each workshop can define its own adaptors.

Annex B (informative)

GO/NO-GO gauging for crimping and sealing dies

Table 1B - GO/NO-GO gauging for crimping dies

<u>Crimping tool</u>	<u>Test with GO/NO-GO (metallic) pin gauges</u> <u>Electrical crimping (in mm)</u>	
	<u>GO</u>	<u>NO GO</u>
ALNP 24A	0,82	0,92
ALNP 22A	0,86	0,96
ALNP 20A	0,86	0,96
ALNP 18A	1,15	1,25
ALNP 16A	1,35	1,45
ALNP 14A	1,25	1,35
ALNP 12A	1,75	1,85

Table 2B - GO/NO-GO gauging for sealing dies

<u>Crimping tool</u>	<u>SEALING CRIMPING - Test with solder wire</u>		
	<u>Min</u> <u>(in mm)</u>	<u>MAX</u> <u>(in mm)</u>	<u>Tin P/N</u> <u>(size in mm)</u>
ALNP 24A	1,22	1,28	ALNP-SG 22/24 (Ø1,57)
ALNP 22A	1,28	1,34	ALNP-SG 22/24 (Ø1,57)
ALNP 20A	1,59	1,69	ALNP-SG 20 (Ø2,07)
ALNP 18A	1,97	2,07	ALNP-SG 18 (Ø2,26)
ALNP 16A	2,31	2,41	ALNP-SG 16 (Ø2,77)
ALNP 14A	2,59	2,79	ALNP-SG 14 (Ø3,17)
ALNP 12A	3,48	3,68	ALNP-SG 12 (Ø3,85)

Measurement procedure for indenter dimensions: This shall be realized according to the incoming and periodical check rules defined by prevailing plant documents

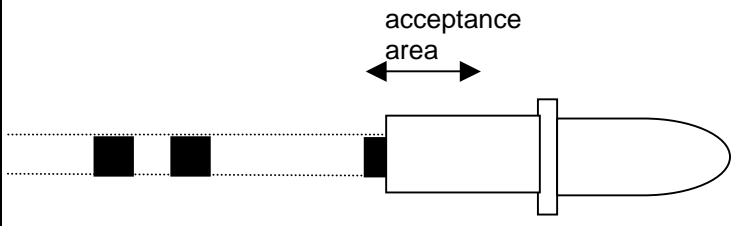
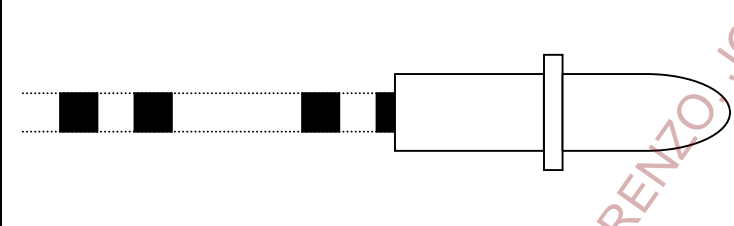
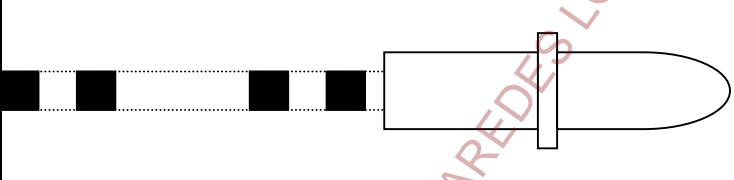
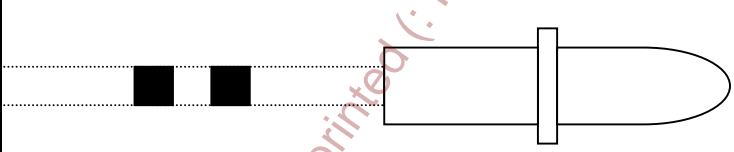
For use, refer to DMC documentation:

ALNP24A - ALNP22A - ALNP20A - ALNP18A - ALNP16A - ALNP14A - ALNP12A

All these documents are supplied with the crimping tools

Annex C (informative)

Table 1C - Visual acceptance criteria for contacts crimping on laser-marked cables

Visual observation	Comments	Decision
	1 square inside the contact (then not visible) and 1 small part of the second square visible	Correct
	1 square outside the contact (then visible) and 1 small part of the second square visible	Correct
	2 whole squares visible	Not correct
	2 whole squares not visible	Not correct

Remark : in the case that the rear part of the contact is not perfectly perpendicular to the cable (contact barrel distorted), the operator shall consider the part of the contact barrel which is facing the laser marking. Then, the acceptance criteria are the ones in the table here-below.

RECORD OF REVISIONS

Issue	Clause modified	Description of modification
1		New standard
2		
3	2	Normative references added
09/04	6.1.2.2	Table 2: tool references changed
	6.1.3.4	Table 3: references added, others deleted
	Annex B	Deleted and superseded
	Annex C	Added
	Annex D	Added
4	Table 2	Table modified
06/06	Table 3	Insertion tool, references added and modified
	6.2.2.1	Added
	6.2.2.2	Added
	Annex C	Deleted and superseded
	Annex D	Deleted