AIPS
Airbus Process Specification

Installation of Air Conditioning ducts

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Contents

1 Scope

This Airbus Process Specification defines the Engineering requirements for the installation of Air Conditioning ducts in all Airbus programs.

That includes low pressure (ventilation, recirculation, distribution) and suction (extraction) circuits. This document also gives the precautions to be taken for installing and attaching the various components: Ducts, end fittings, connections, attachments and thermal insulations.

Requirements for installation of metallic ducts and metallic connections are detailed in AIPS03-06-022 Installation of Bleed Systems (Ducts, Insulation, Senses Lines, OHDS)

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
A1091	Airbus requirements for the management of hazardous substances
ABS1631	Aerospace series – Rigid quick connection for air conditioning
ABS1914	Plastic - Tie
AIPS01-02-008	Airbus Process Specification – Torque tightening of screws, bolts and nuts
AIPS03-06-022	Airbus Process Specification – Installation of Bleed Systems (Ducts, Insulation, Senses Lines, OHDS)
AIPS07-01-006	Airbus Process Specification – Electrical bonding
AIPS09-01-002	Airbus Process Specification – Cleaning with liquid non aqueous agents including vapour phase
AIPS09-01-003	Airbus Process Specification – Cleaning with aqueous cleaning agents
AIR3565	Mineral vaseline
F007 10123000	Acceptance Criteria for Air-Conditioning Ducts
NSA2017	Torque – tightening
V007 73092	Acceptance Criteria for A350 Air-Conditioning Ducts

3 Definition, applicability and limitations

3.1 Definition

3.1.1 Nomenclature/ Abbreviations

According to table 1.

Table 1: Nomenclature/ Abbreviations

Abbreviation	Meaning
ABS	Airbus Standard
AIPI	Airbus Process Instruction
AIPS	Airbus Process Specification
e.g.	For example
EN	European Norm
GTR	Ground Test Requirements
NSA	Norme Sud Aviation
OHDS	Overheat detection system
REACh	Registration Evaluation and Authorization of Chemicals
SIDP	System Installation Design Principles
FME	Foreign Material Exclusion

3.2 Applicability and limitations

This Airbus process specification is applicable when invoked by the drawing directly or through another document for the purpose given in the scope. When processing to AIPS03-06-020 is required, it shall be invoked on the drawing by the words “AIPS03-06-020 – Installation of Air conditioning ducts”.

The purpose of this AIPS is to define the installation requirements for the Air Conditioning system installation on Airbus aircraft programs.

This document covers the following Air Conditioning sub-systems:

- Cabin Air Distribution
- Cockpit Air Distribution
- Compartment Air Extraction
- PAX Individual Ventilation
- Unpressurized Compartments Ventilation
- Avionics Equipment Ventilation
- Crew/Passenger Rest and Service Area Ventilation
- Cargo Ventilation
- Pressurization Control
- Humidification / Dehumidification
- Dry Air Generation System

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 before, during and after installation when applicable.

4.1 System Requirements

All components shall be referenced and qualified according to Airbus qualification procedure.
All Clamps used for connection shall be tightened according to NSA2017, with torque wrenches and calibrated screwdrivers. For duct attachment, refer to AIPS01-02-008.
Utmost care shall be taken when installing air conditioning ducts and flexible hoses.
It is not permitted to place objects on or to suspend objects from air conditioning ducts and flexible hoses.
It is not permitted to draw or pull parts over the ducts and hoses or to hang, lie, sit or stand on ducts and flexible hoses.
All components shall be free of oil, grease, contamination, etc.
All air conditioning ducts shall be free of foreign object prior and during the installation.

4.2 Quality and cleanliness requirements

The internal surfaces and the mating flanges of all air system components and ducting shall be completely free from residues of any unwanted material, e.g.

- dust,
- grease,
- oil,
- Corrosion Protection Material,
- Anti-Seizing Compound,
- Adhesive Particles,
- manufacturing and process residue,
- Swarf and wear debris,
- Remains of Cleaning Agent,
- contamination caused by incorrect handling.

Following cleanliness precaution has to be considered:

- Never use any kind of lubrication or preservation material if there is no demand in the drawing or on the work order.

The cleanliness shall be checked:

- at component level: The selected check method shall guarantee that all unwanted material is detected,
- at component integration level:
  - Visual Check: Do a visual check for cleanliness,
  - Wipe-off Check: if you rub off the surface with a new, lint-free, white cotton cloth, no contamination shall be visible.

Systematically, before the installation, all parts shall have already been checked and fulfill acceptance criteria mentioned in subclause 7. Special attention shall be taken on the absence of duct crazing as mentioned in subclause 7.3.
If necessary, cleaning procedure according to AIPS09-01-002 or AIPS09-01-003 shall be applied.

4.2.1 Workshop requirements

Utmost care shall be taken around the work area to avoid damages during installation. Operations (such as grinding) which may produce chips shall be avoided. Any dust development, e.g. due to sweeping, shall be avoided.
If due to high necessity such operation is performed, duct shall be cleaned as specified in subclause 4.2.3.

4.2.2 Tools and cloths requirements

Only standard and calibrated tools may be used.
Calibration valid/expiry date shall not be exceeded.
Cloths characteristics shall not induce fiber or dust system contamination.

4.2.3 Cleaning

Ducts and flexible hoses shall not show any signs of damage or dirt.
If necessary, cleaning procedure according to AIPS09-01-002 or AIPS09-01-003 shall be applied.

4.3 Preparation for installation

All ducts and circuits have to be in conformity with existing documents.
Before installation of each pipe and duct, all pipes and ducts the following features shall be checked:

- Its identification,
- Its covering,
- Its storage blanking caps,
- Its connecting end fittings, expansion joints, flanges and couplings,
- Its inner conduit for absence of foreign bodies,
- Its system attachments (rods, supports, fittings)

All duct positions have to be checked before final attachment tightening.
All torque wrenches and screw guns shall be correctly calibrated.

4.3.1 Handling of pipes and hoses

On removal from stores utmost care shall be taken when transporting air conditioning ducts to the installation area.
Utmost care shall be taken in order to avoid shocks, distortions and scratches.
Handling the air ducts at the attachment points (reinforced areas) shall be preferred. Large and/or complex components shall be transported by two (2) persons at least. Appropriate protective measures shall be taken to avoid damaging of the air ducts.
After having been removed from stores, parts shall not be stored at any place excepted at the final work station.
Utmost care shall be taken to protect ducts when parts are temporary stored. Parts storage at the installation point shall be free of any risk of damage (e.g. no stacking of pipes/ducts shall be tolerated).

4.3.2 Unpacking of components

All duct parts shall be identified on arrival and shall only be unpacked for installation on the aircraft section or on final assembly line.
Unwrap the pipe or flexible hose and remove protective caps/plugs. After removal, store the cleaned protective caps/plugs in a clean bag or container.
All removed plastic films used as end blanking system shall be disposed off in an appropriate container.
The air conditioning components shall be removed from their plastic bags only just before installation. Caps should only be removed at those points where the fitting will be installed immediately.

4.3.2.1 Storage conditions

The ducts shall be stored in their original packaging in a dry, dust-free room, at ambient temperature and away from sunlight.
Blanking caps at duct ends shall be present and shall fit over the orifice and seal correctly.
Utmost care shall be taken when handling the ducts to avoid shocks or tearing of the covering.

4.3.2.2 Expiry date conditions

When applicable and for all components, the expiry date shall be checked and shall be after the time of installation (installation phase).
If this date has been exceeded, refer to Quality Department.
Make sure that the components have not been damaged during storage and that their dust-proof plastic bags are correctly sealed.

4.3.3 Lubrication rules

When lubricant is required, over lubrication shall be avoided in order to prevent any system pollution by excess of lubricant inside ducts.
For metallic removable connection lubrication, please refer to AIPS03-06-022.

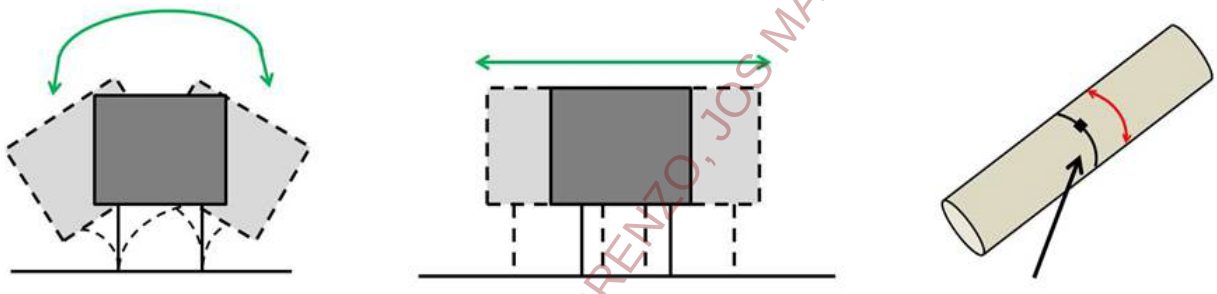
4.3.4 Installation of seals

Seal expiry dates shall be after the time of the installation.
If possible, seal position shall be checked prior to installation.
Prior to installation, the seals shall slightly be rubbed with some lubricant per AIR3565 and installed in such a way that no trouble or damage occurs, either during installation or during operation.
During installation of seals, no lubricant shall penetrate into the air conditioning system.

4.3.5 Installation of cable ties

Cable ties shall be installed with the specific installation tool as defined in the AIPI.

Cable tie installation tension shall be between 300 and 400 Newton.
Cable ties after installation are not allowed to slide along pipe. Displacements tolerated are only oscillations and micro translations of the head of cable ties after installation as described by drawings below.
Movement allowed are represented with green arrow.
Movements forbiden are represented witth red arrow.



HEAD OF CABLE TIE FRONT VIEW | **HEAD OF CABLE TIE FRONT VIEW** | **CABLE TIE ON PIPE**

Figure 1: Installation of cable ties

Note : Oscilations and micro-translations are tolerated for the head of cable tie. Rotation of whole cable tie is strictly forbidden.

Figure 2: Cable tie installation

4.3.6 Free ends protections

To prevent dirt and foreign objects to penetrate inside ducts, opened air ducts shall be closed at the end of work and/or upon completion of the installation order.
Note: If the removal of a pipe is necessary, the orifices shall be immediately blanked. The blanking system at the ends of the pipe shall fit over orifice and not inside it.
Plastic blanking cap and FME covers shall be the preferred solutions (see figures 3 and 4).

Figure 3: FME covers

Figure 4: Examples of plastic blanking caps

Cable tie tightening shall not deform the duct geometry or damage the duct itself.
The use of objects potentially introducible into ducts (e.g.: cloth, plastic films, plastic bags) shall be avoided. This will avoid any risk of duct or equipment blocking.

4.4 Installation requirements

The relevant duct radius shall always be the largest radius of a duct. This is important regarding air tightness since the contact pressure the band or sleeve/ bellow is exerting on the duct wall decreases with increasing radius.

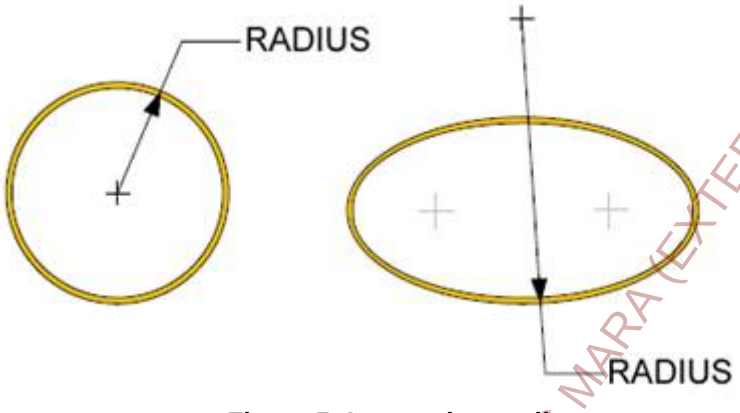


Figure 5: Larger duct radius

The use of cable tie ABS1914 is qualified only for supporting of air conditioning ducts and not for their connections with sleeve. Moreover it shall not be used on duct having a diameter greater than 230 mm or greater to 100 mm in the wet areas. For ducts having non-circular section, the equivalent diameter is given by:

$$\frac{\text{Perimeter}}{\pi}$$

4.4.1 Applicable documents

When applicable, electrical bonding connections shall be installed as per AIPS07-01-006.

4.4.2 Minimal clearances

If not specified otherwise by the definition dossier, the drainage port output shall be oriented vertically to the lowest position.

Unless otherwise specified in definition dossier, here are minimal clearances that the final installation shall fulfill:

- Between ducts and fixed structure or equipment to which it is attached: 6,35 mm (0.25 inch) minimum.
- Between ducts and fixed structure or equipment 12,7 mm (0.50 inch) minimum.
- Between ducts and other independently mounted and routed parts 25,4 mm (1.00 inch) minimum.
- Between ducts and moving parts 50,8 mm (2.00 inches) minimum.

Note: Any deviation to the required clearances shall be agreed by Air Conditioning System responsible.

4.4.3 Installation of pipes

4.4.3.1 Preliminary positioning of air ducts

Prior to any installation of parts, refer to unpacking requirements in subclause 4.3.2.
Air conditioning ducts shall not be fastened or clamped until all devices are adjusted to the correct position..
All duct installation shall be stress free. Bracket and clamp adjustment shall be performed in order to fulfill this requirement. Any over stressed situation or problematic positioning of dust shall be reported to the Quality Department.
The identification labels shall be visible when the air ducts are aligned.

4.4.3.2 Aligning air ducts and attaching fasteners

To ensure correct installation, before connection the sleeve and air conditioning ducts shall be aligned as shown in figure 6.
Dimùension “X” between the two duct ends shall be checked according to the definition dossier and the tolerances mentioned in the relevant SIDP.

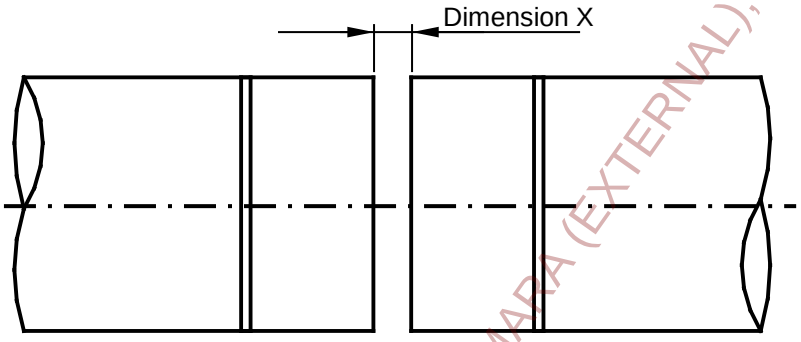


Figure 6: Specified distance of the two ducts to each other

4.4.3.3 Pretreatment of silicone seals for push-in connections

For ease of installation, some mineral vaseline shall be applied to the lips of the silicone seal only. This is done to prevent mineral vaseline from penetrating the air conditioning system.
Special care shall be taken when lubricant is applied. No lubricant shall go into the Air Conditioning system before, during or after installation.
All extra lubricant removed at the connections shall be done in such a way that no organic elements or dust remain inside the duct.
Figure 7, shows this push-in principle. Male part shall be inserted as far as possible while keeping the red marking visible.

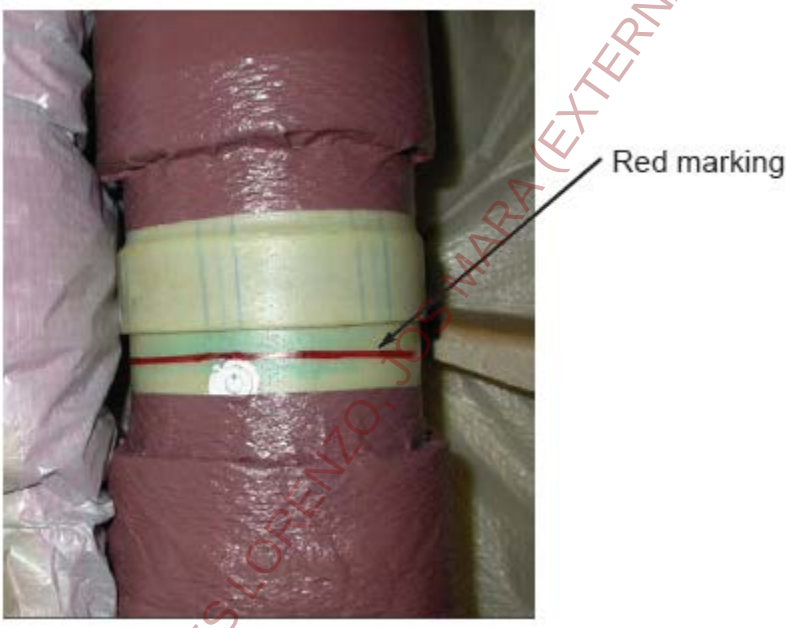


Figure 7: Correct installation of push-in connections

4.4.3.4 Clamping of composite ducts

Prior to the clamping phase, all ducts shall be aligned as detailed in subclause 4.4.3.2.
The attachment location is characterized by a reinforcement area of the ducts, sometimes covered by adhesive tape. The adhesive tape is designed as a protection against mechanical damaging.
The bracket (see Figure 8) shall be positioned on the reinforcement area or on the adhesive tape.
Any deviation shall be reported to the competent Quality Department.

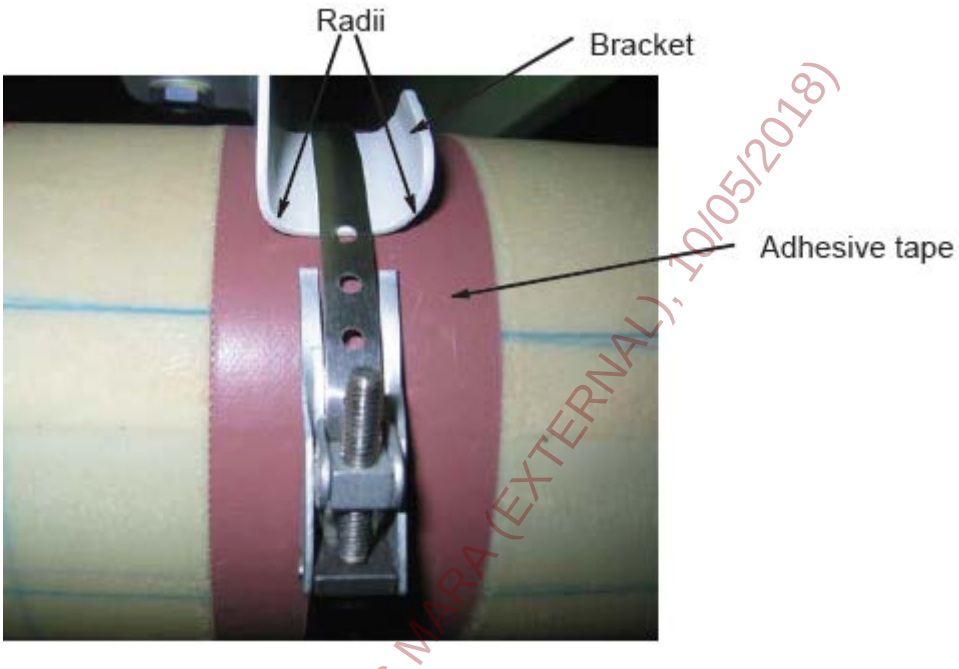


Figure 8: Attachment to a bracket

After torque tightening, the clamp attachment shall have full contact with the air duct.
Note: For non-circular ducts, the clamp attachment shall be positioned onto the smaller radius as show in Figure 9.

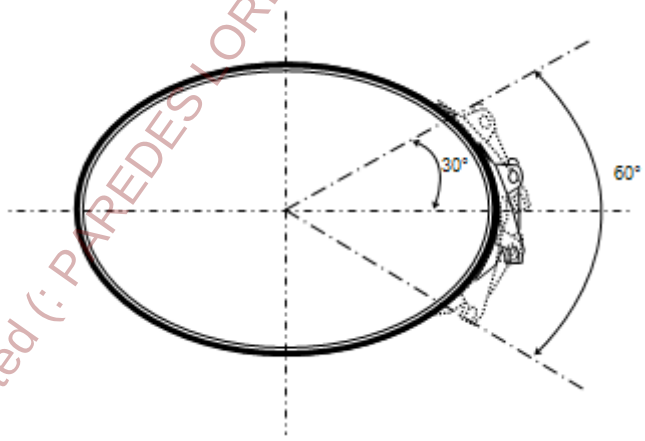


Figure 9: Clamp positioning on non-circular ducts

A tolerance of 60° around the smaller radius is accepted only if the clamp attachment radius area is too wide.
If clamp attachment radius is smaller than the smallest duct radius, it has to be reported to the competent department (Manufacturing and Design Department).
The clamp strip should preferably be guided centrally along the bracket. In no case may the clamp strip be guided along the radii of the bracket (see figure 10).
The clamp strip shall lie between the 2 feet of the clamp attachment (see Figure 10).
The adhesive tape may slightly be constricted – due to the clamp being tightened – consequently slight crimping of the tape is acceptable. However, the adhesive tape shall not be penetrated (see also subclause 7.5).

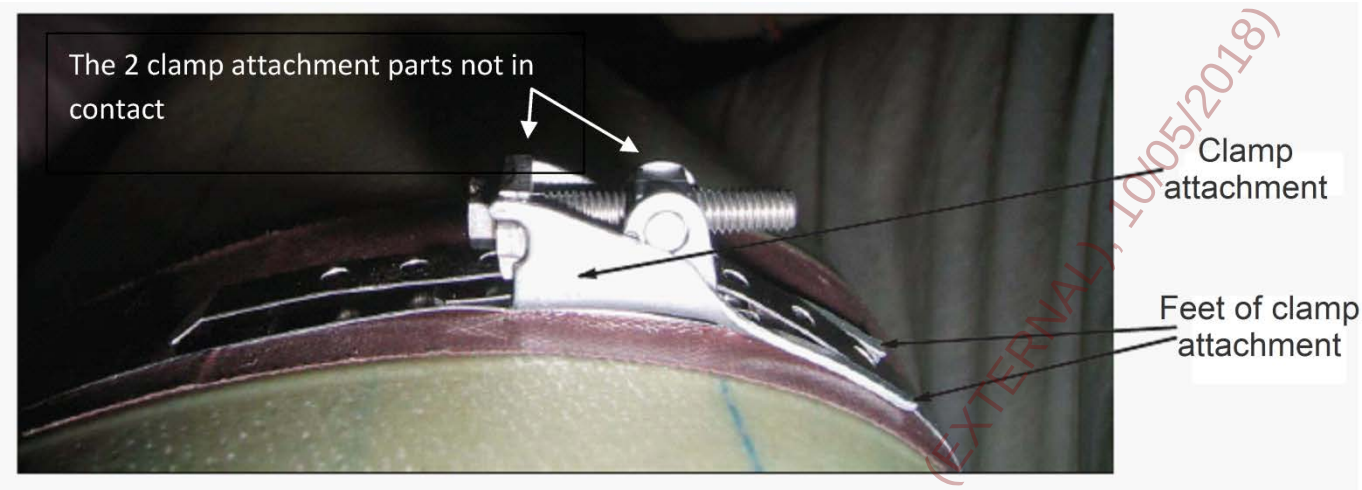


Figure 10: Position of the clamp strip after tightening

After tightening torque is applied, the two parts of the clamp attachment shall not be in contact (see Figure 10).

4.4.3.5 Clamping of diffuser ducts

Diffuser duct angular position shall be ensured as specified on the Figure 11.

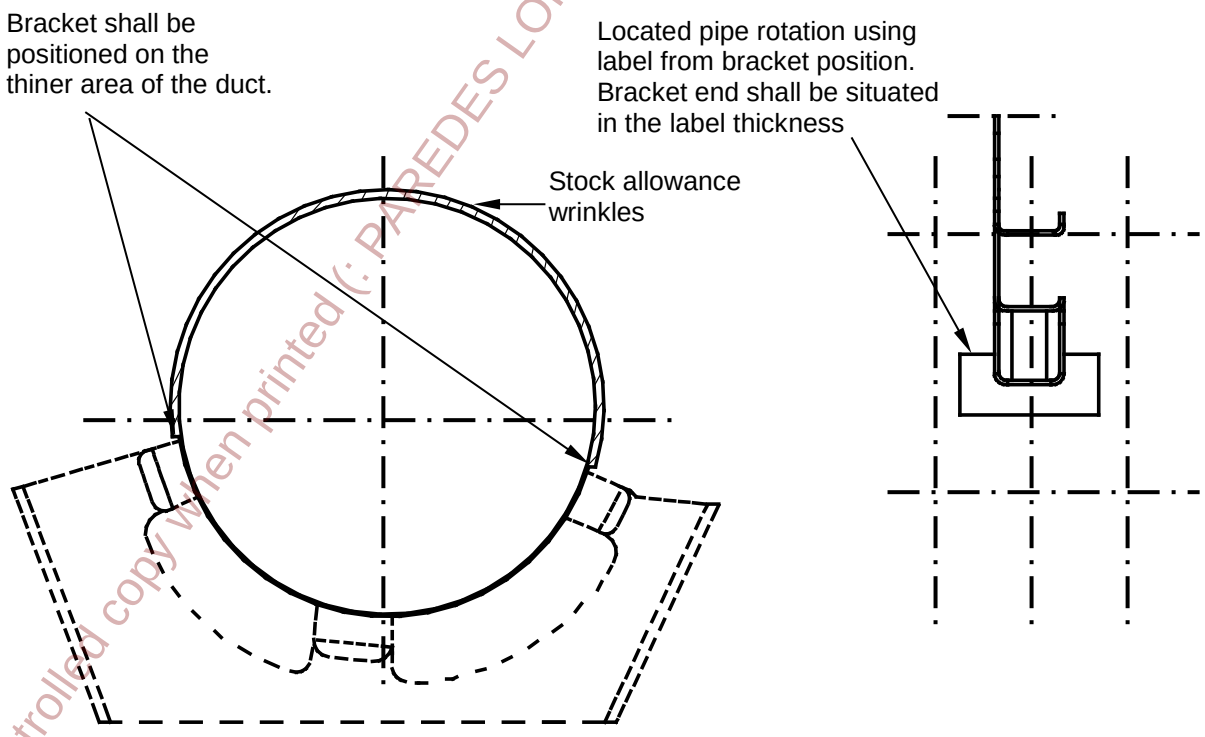


Figure 11: Angular marking for duct positioning

4.4.3.6 Clamping of insulated composite ducts

On figures 12 and 13, the clamp shall be centered on the reinforcement of the duct (Figure 12) or on the spacer (Figure 13).

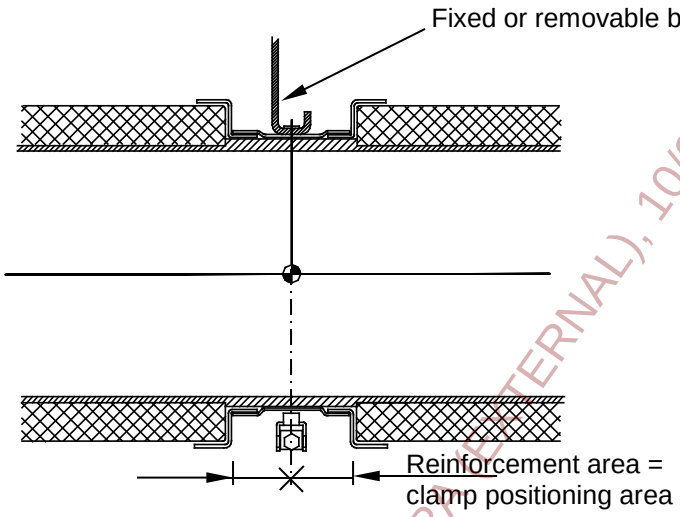


Figure 12: Insulation cut out for duct clamping

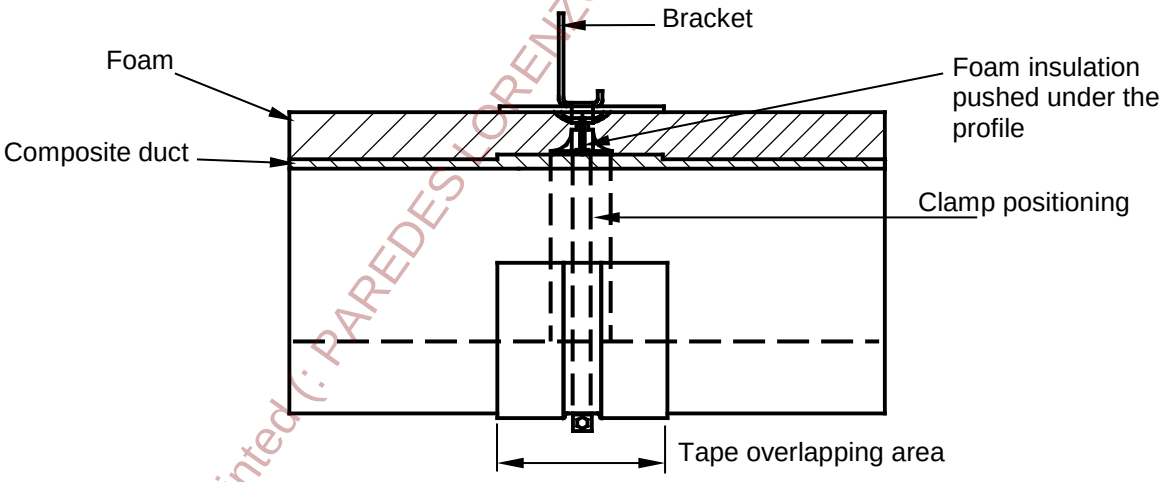


Figure 13: Pipe attachment in presence of distance profile

4.4.3.7 Brackets laminated to air ducts

Laminated brackets have to be aligned to the structure bracket before screwing.
Laminated brackets shall be installed stress free.
Installation is done using screws, washers and nuts as detailed in design document.
For torque values, refer to subclause 4.4.10.

4.4.3.8 Insulated duct

Prior to installation, all ducts and duct insulations shall be checked according to relevant documentation (see subclause 7).

4.4.4 Pipe Clamping

The length of fastening clamps to be used is detailed in the installation drawing.
The adjustment of clamp attachment shall be done according to the installation drawing.

4.4.5 Pipe connections

All duct ends shall be free from defects which could cause leaks under sleeve.
The sleeve connection shall be compliant to the following principles (see Figure 14):

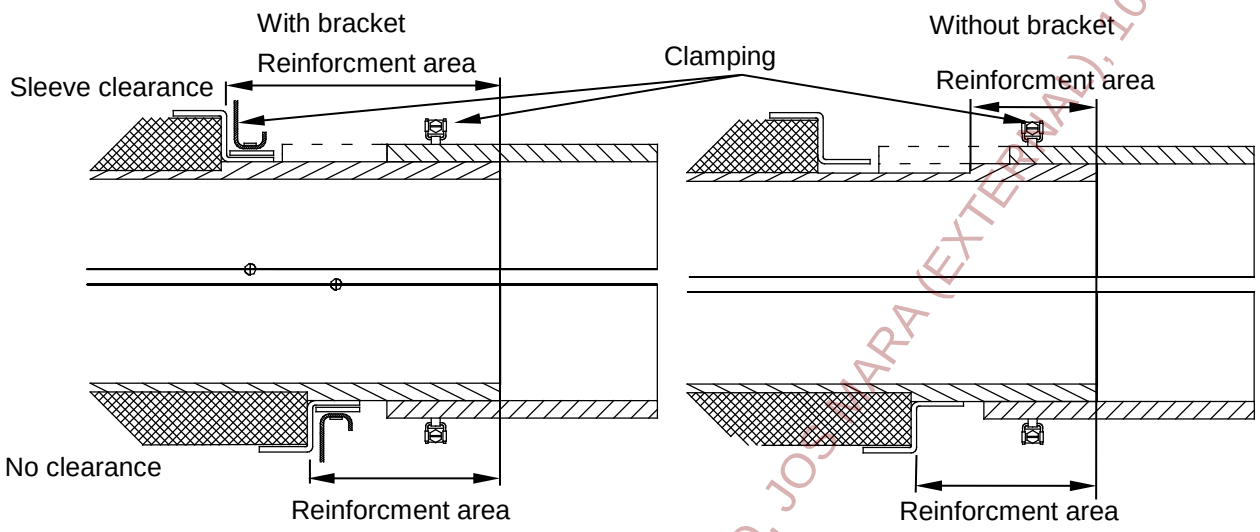


Figure 14: End ducts clearances

All clamping shall be made on reinforcement area of the ducts in order to avoid any crushing.
Duct ends which are not connected to an equipment should be red marked.

4.4.5.1 Diffuser duct connection

For specific ducts, like diffusers, angular alignment requirements shall be considered. The Figure 15 shows axial red marking on diffuser ducts.
The 2 horizontal red lines shall be aligned within the tolerance of ± 5 mm, as shown in Figure 16.

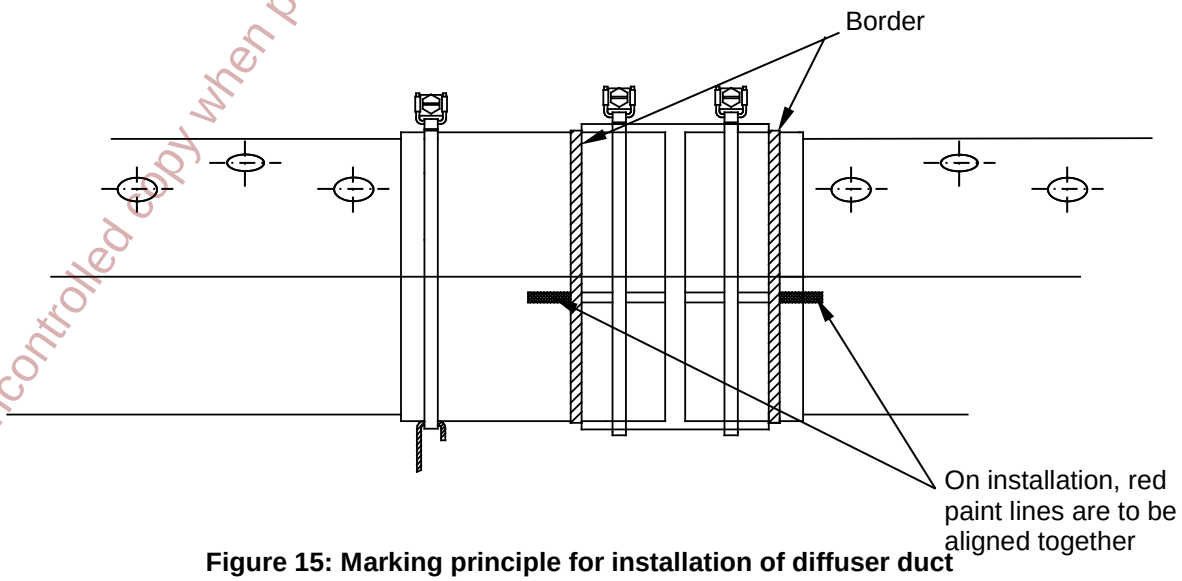


Figure 15: Marking principle for installation of diffuser duct

Figure 16: Red markings alignment

4.4.5.2 Flexible sleeves installation (bellows)

Expiry sleeve dates shall not be exceeded at the time of the installation.
Clamps have to be installed at the correct position and with the correct length.
Before installation, pipes shall be aligned within tolerances specified in relevant SIDP. These dimensions shall be mentioned on the relevant AIPI. For tightening torque, refer to subclause 4.4.10.
On duct end connections, the sleeve shall be positioned between the red markings (see figures 17 and 18) to maintain the optimum distance between the duct ends. Note: Red lines have to remain visible.
For correct installation, the following positions have to be considered and checked:

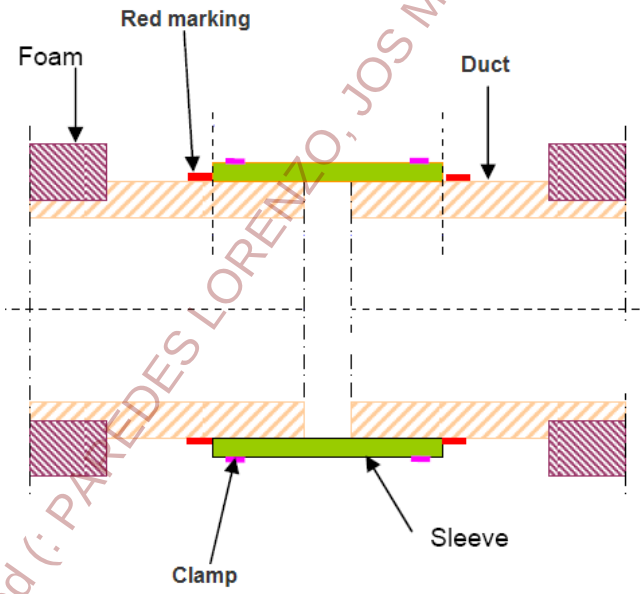


Figure 17: Flexible sleeve installation

Figure 18: Attaching the sleeves

Note: If and only if– due to installation tolerances in the aircraft – it is impossible to maintain the optimum distance, the red markings may be covered entirely or partially, provided that the distance between the duct ends is within the specified tolerance.
In all cases, distance between ducts shall be within design installation tolerances. If not possible, refer directly to the competent Quality Department.
When double clamping on each side is applied, clamp attachments shall be preferably located opposing to each other as shown in figure 19.
They shall not be positioned next to each other but shall be displaced by at least one clamp attachment length.
Location of clamp attachments shall allow a good accessibility to the screws.
If sleeves are installed on non-circular duct, the positioning of the clamp attachment shall be at the smaller radius.
The clamp attachment shall be continuously in contact with the duct.

Figure 19: Installation of two clamps on each side

4.4.5.3 Quick disconnect

Prior to the connection the two fixed flanges shall be in contact.
Quick disconnect connection shall be connected stress free.
Quick disconnect connection shall be assembled in such a way that the seal cannot be nipped at any time.
To ensure a good connection, the rotation of the mobile part shall be done until the “click” is heard.
The figure 20 shows closing principles for ABS1631.

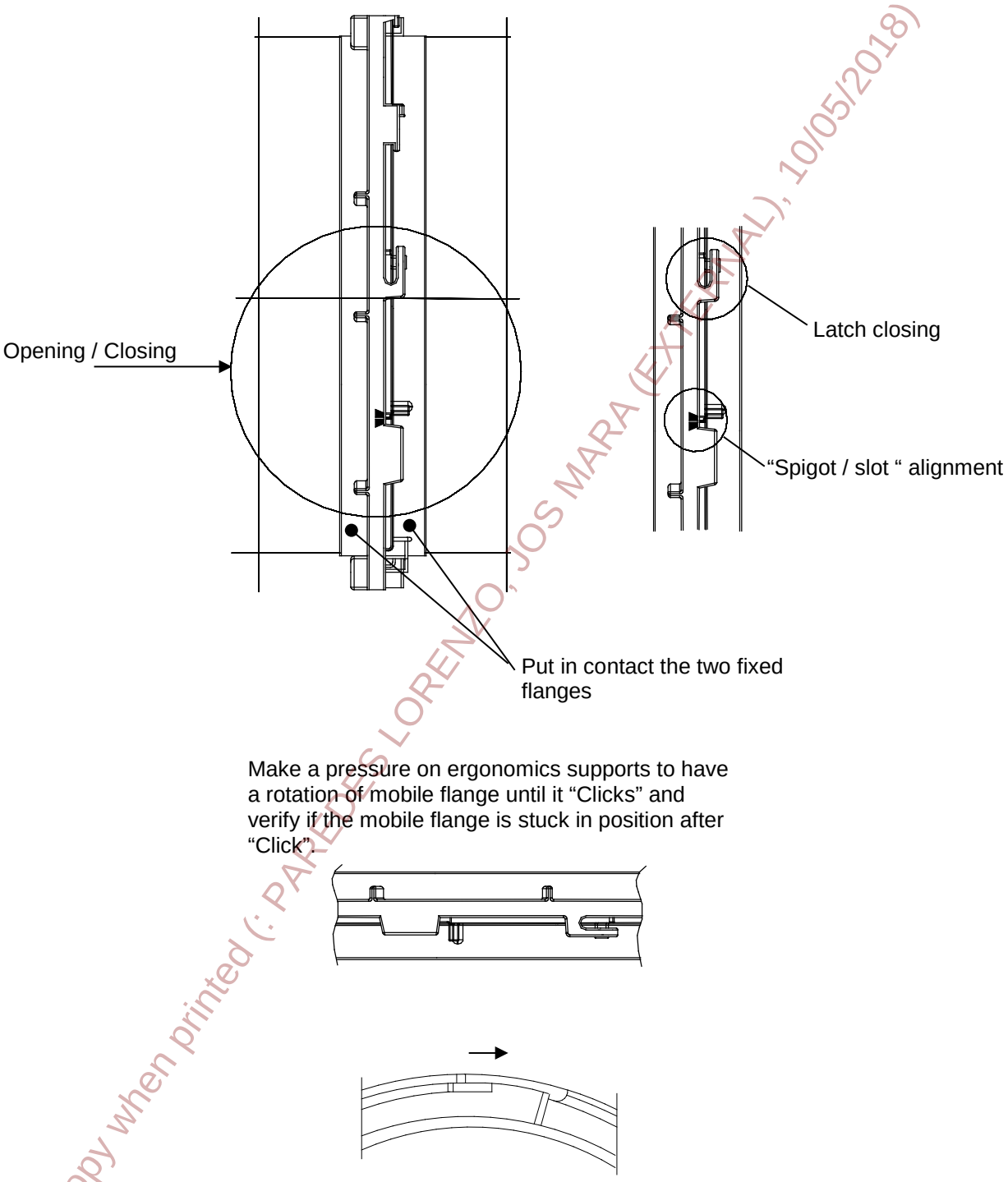


Figure 20: Quick disconnect principle

4.4.5.4 Clamp – connection attachments, stainless steel

For tightening torque, refer to subclause 4.4.10.

4.4.6 Installation of flexible hoses

4.4.6.1 Flexible hoses (insulated, non-insulated, sound absorbing)

- For correct flexible hoses installation and in order to ensure system performance, the following rules shall be applied:
- When possible, at least one bend in the hose routing shall be provided in order to accommodate length changes.
- Flexible hose installation shall be done in such a way that possible movements introduce no torsion or tension (absolutely unstressed installation).
- In case of cable tie clamping on flexible hose, a protection between cable tie and the flexible hose shall be added.
- If there is a risk of friction, please refer to relevant Quality Department.
- Bending radii specified in the relevant standards shall be respected.
- Contact between flexible hoses shall be avoided.
- An uncontrolled oscillation of the flexible hoses shall be avoided.
- Air ducting shall be routed/installed in a way that avoids water accumulation at other points than those provided with water drains.
- Any deviation to these requirement or design drawing shall be reported to the relevant Quality Department.

4.4.6.2 Circular red marking

Figure 21 shows the marking principle for flexible hose connection. Red marking can be made with indelible ink or tape. When the flexible hose is connected and clamped, the red marking shall remain visible.

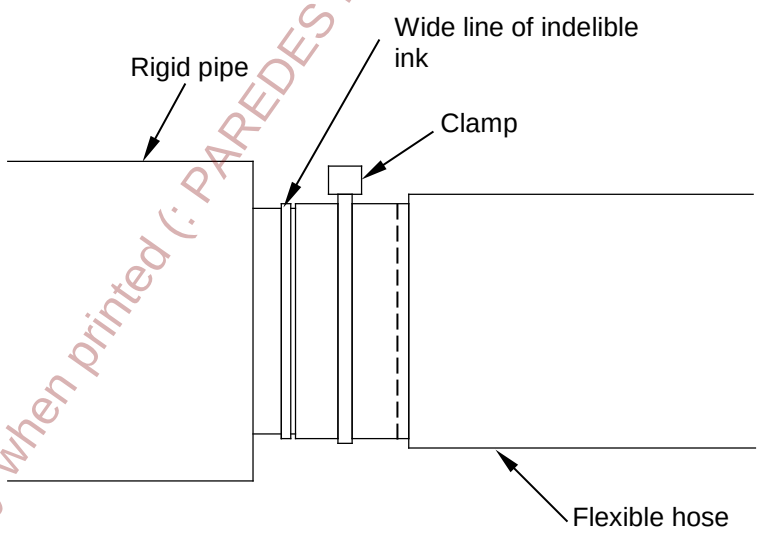


Figure 21: Flexible hose mounting principle

4.4.6.3 Tightening torque

For torque values, refer to subclause 4.4.10.

4.4.6.4 Flexible hose quick connection

Special attention shall be made in order to ensure the complete positioning of the quick connection.

4.4.7 Soft insulation installation

If specified in the manufacturing documents, air ducts shall be provided with insulating sleeves at the connections.
Soft insulations shall be installed in good condition and at the exact position specified on the drawing in agreement with the reference given on its identification label.
Soft insulation envelope shall not be torn during installation.
Soft insulation shall not be damaged in any case during installation.
When installed on horizontally installed air ducts, soft insulation shall be installed as shown in figures 22 and 23.
Any condensation water formed may thus drain off easier.
Insulating sleeves shall be fitted as tightly as possible around the connections but avoiding any damage.

Figure 22: Installing insulating sleeves on horizontal composite air ducts

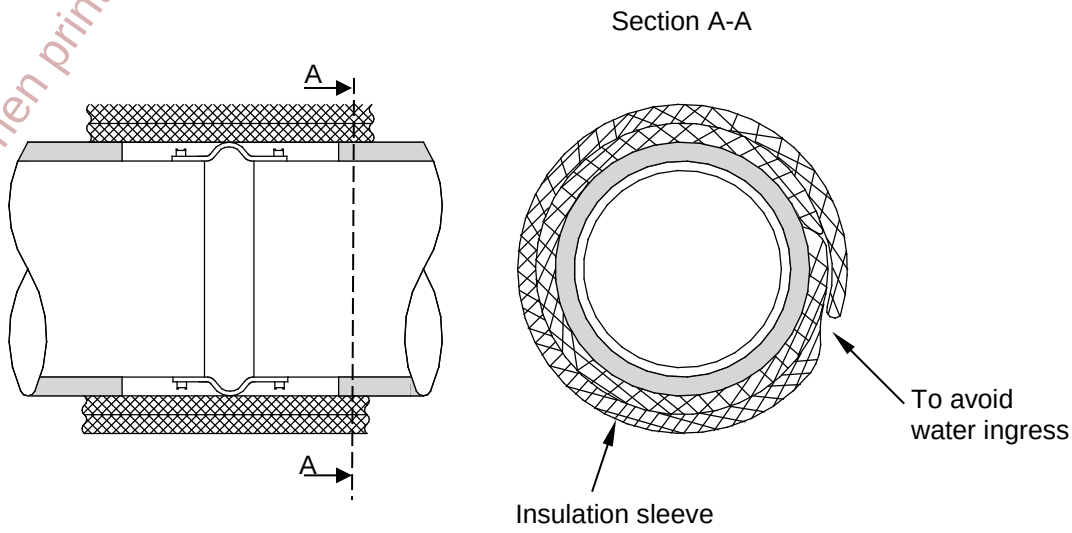


Figure 23: Insulation sleeve over duct connection

If air ducts are installed vertically, the position of the overlapping hook and loop fastener is of no importance (see figure 24).

Note: Identification number shall still be visible.

Figure 24: Installing insulating sleeves on vertical composite air ducts

With the insulating sleeves installed, the manufacturer part number of the sleeve shall be visible (see figure 21)

4.4.8 Electrical Bonding

When necessary piping shall be electrically bonded in accordance with relative installation documents and AIPS07-01-006.

4.4.9 Removal of pipes, hoses and couplings

Make sure that the air conditioning is not working before any removal of any component.
A quality check shall be done on each removed and installed part.
Any damage found on parts shall be reported to the Quality Department.

4.4.10 Tightening torque

Unless otherwise specified on the drawing, the range torque values given in NSA2017 apply for duct connection and the range torque values given in AIPS01-02-008 apply for duct attachments.
Note: As far as possible, clamps shall be tightened immediately to the minimum torque to avoid any un- tightened clamp.

4.4.11 Marking / Labeling

All labels/part markings shall always be visible when the component is installed on the aircraft.
If not possible please refer to Quality Department.

4.4.11.1 Marking of torqued unions

Not applicable.

4.4.11.2 Labels

After installation of required protection products on air conditioning ducts or hoses, all identifications, labels and markings shall remain visible. In case of conflict between a required protection and a covered label, the protection has the higher priority and may cover any label. A protection product shall not be interrupted for any markings and labels.

4.4.12 In-situ cutting / Swaging

Not applicable.

4.5 Test and quality requirements

4.5.1 Leakage tests

Leakage testing of the installed air conditioning system shall be carried out according to the relevant manufacturing documents and ground test requirements (GTR) in the presence of the responsible inspector.
In case of leak detection, refer to GTR and the competent Quality Department.

4.5.2 Quality control instructions

Quality checks shall be performed by the Quality Department or by an operator approved by the Quality Department to ensure that the requirements of this specification are met.

4.6 Other requirements

4.6.1 Qualification of operators

Personnel carrying out the work shall be adequately instructed and familiar not only with the materials and equipment but also with the contents of this process specification.

4.6.2 Manufacturing documents

Reference shall be made to this specification. The manufacturing documents shall ensure that the specified minimum distances between air conditioning ducts and adjacent components is achievable within the scope of the specified tolerances.

If in some cases the torque values for tightening of fittings differ from those given in NSA2017 or AIPS01-02-008, they shall be specified in the manufacturing documents.

4.7 Process flow chart

On the corresponding instruction, the proposed detailed process sequence shall demonstrate its capability to meet the process requirements of this specification.

4.8 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	Leakage free installation	See subclause 4.5.1	Shall be defined in the relevant AIPI		
2	Electrical continuity installation	See subclause 4.4.8			
3	Stress free installation	See subclause 4.4.3			
4	Correct tooling used	See subclause 4.2.3			
5	Damage free installation	See subclause 7			
6	The pipes are installed according to drawings ensuring that the segregation distances are achieved	See subclause 4.4.2			

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.

A350XWB
Refer to Design Technical Note V007 73092 Acceptance Criteria for A350 Air-Conditioning Ducts

A330 / A330 Neo / A340
Refer to Design Technical Note F007 10123000 Acceptance Criteria for Air-Conditioning Ducts

Other Programs
When no dedicated DTN number is recorded the Air Ducts shall be checked as described in chapter 7.

7.1 General inspection

The checks and their frequencies may be modulated according to the level of confidence acquired and the information supplied by the indicators installed (see Table 3)

Table 3: Inspection points

Check to be conducted	Requirement
Visual / touch test to be conducted on all parts (100%)	Clearances, alignment, routing and tightening torques observed

Unless otherwise specified in process or component-specific design, manufacturing or quality documents, the competent organization unit shall ensure that the following measures are taken:

- All pipes/hoses/equipments shall be subjected to a visual inspection after installation.
- Pipe attachments shall be checked for correct installation. A check that junctions are free from tension and that the pipes are correctly aligned shall be done.
- It shall be checked that the specified minimum distances have been observed in accordance with subclause 4.4.2.
- Tightening torque shall be in accordance with subclause 4.4.10.
- Electrical bonding connections for components and equipments shall be in accordance with subclause 4.4.8.
- Cleaning shall be in accordance with subclause 4.2.3.
- Leakage testing has to be carried out according to subclause 4.5.1 and relevant GTR.

7.2 Assembly of air ducts

After installation, specific inspection shall be provided on Air duct installation and connection. These checks shall demonstrate that the installation fulfill requirement specified in this instruction.
In case of deviation, the relevant Quality Department shall be informed.

7.3 Crazing

Before, during and after being assembled, the composite air ducts shall be free of crazing.
Crazing is a visible damage to the fiber structure of a laminate composite. This damage may lead to a direct failure of the component.
Air ducts with crazing shall not be installed and/or shall be removed and replaced.
Figures 22 and 23 show examples of crazing.

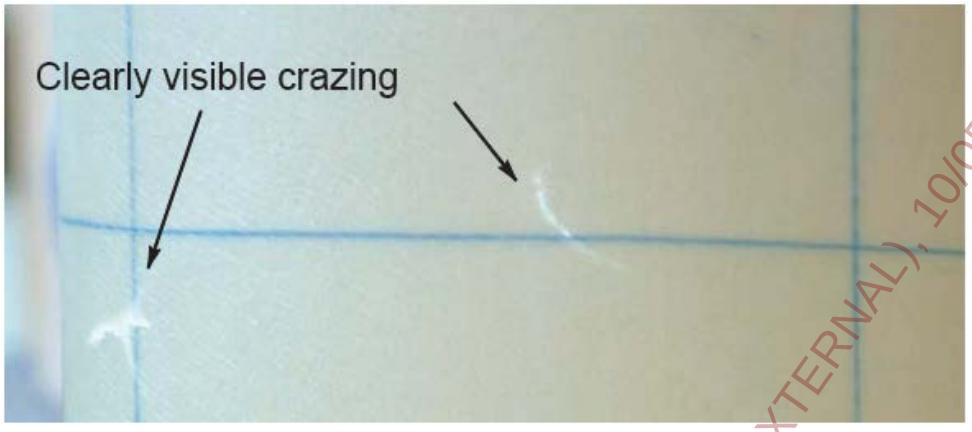


Figure 25 : Crazing at an air duct

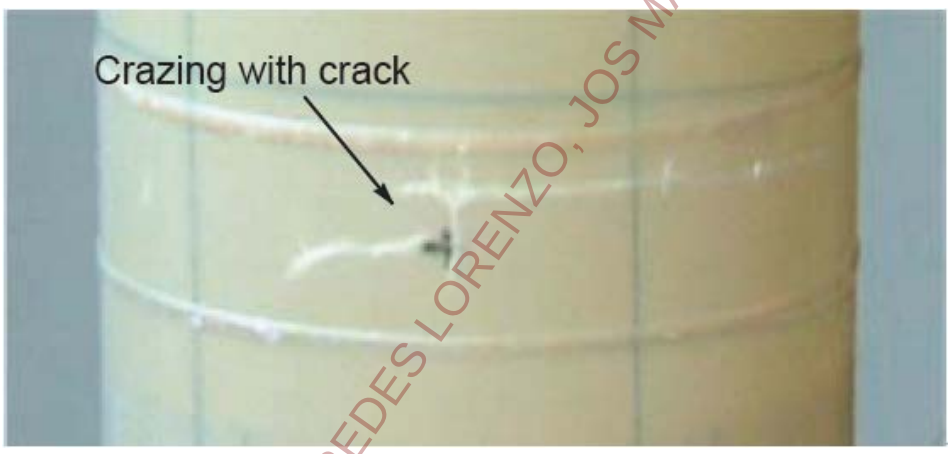


Figure 26: Crazing with crack

7.4 Damaged insulation

Composite air ducts with damaged insulation (see figure 24) shall not be installed and/or shall be removed and replaced.

Figure 27: Air ducts with damaged insulation

7.5 Damaged adhesive tape

Composite air ducts with adhesive tape that shows any hole, as shown in figure 25 shall be removed and replaced.

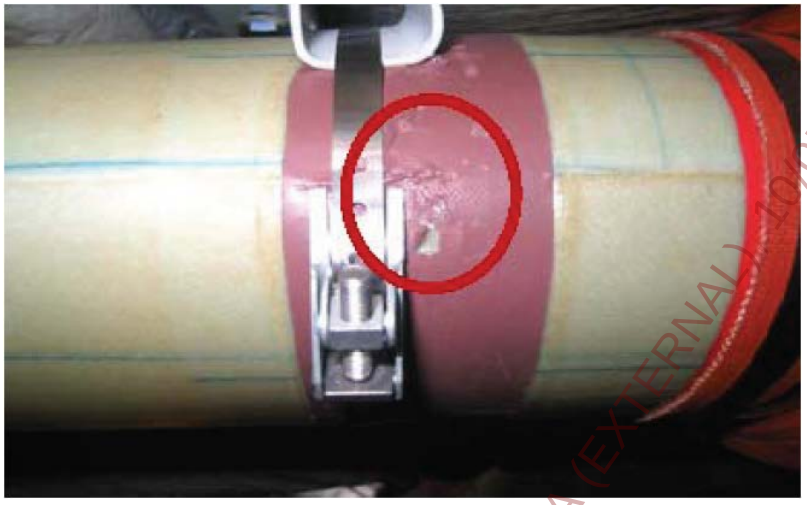


Figure 28: Damaged adhesive tape on an air duct

8 Rework

8.1 During installation

In order to avoid any contamination of the air conditioning system, all opened ends of the system and the removed parts shall immediately be closed by plastic cap, FME covers, or any recommended solution. No tape should be directly in contact with the ducts.

Note 1: Standard parts, pipes, equipments and hoses shall be packed in dust protection bags.

Note 2: Removed components have to be identified. So that re-installation is performed in accordance with clauses 3 and 4, followed by a Leakage test as per subclause 4.5.1 and relevant GTR.

8.2 After installation

If the air conditioning system has to be opened after installation the following requirements apply:

- The air supply interrupted and depressurized on the affected pipe/system (for permanently pressurized areas only).
- To avoid penetration of contamination into the air conditioning system, immediately close all open ends of the system and removed components by plastic caps or any other recommended solution. No tape should be directly in contact with the ducts.

These steps may then be followed by an inspection or replacement of components or pipes.

Installation shall be in accordance with subclauses 4.4.2 and 4.4.3, followed by a leakage test as per subclause 4.5.1 and relevant GTR.

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).

RECORD OF REVISIONS

Issue	Clause modified	Description of modification
1 06/11	All	New standard.
2 10/14	4.3.2.1 4.3.5 4.4.5.1 8.1	For storage conditions, temperature no longer specified for ambient temperature. FME covers and other examples of plastic caps added (figures 1 and 2). Tolerance ± 5 mm instead of ± 5% and figure 13 added for red marking alignment. FME covers added
3 07/17	2 All 4.3.5 4.4 4.4.2 7	ABS1914, F007 10123000 and V007 73092 added. Typo's correction. Chapter added: installation of cable ties. Statement added on radius definition and equivalent radius calculation. Note added on drainage port orientation Add note on DTN for XWB and LR programs