AIPS
Airbus Process Specification

Manual fastening of 2- or 4- start quick release fasteners with or without acres sleeves

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Contents

1 Scope

This Airbus Process Specification defines the Engineering requirements for manual fastening of 2- or 4- start quick release fasteners with or without acres sleeves.

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.

AIPS01-01-004	Installation of Solid Rivets
AIPS01-02-003	Preparation of holes in metallic materials for fastening
AIPS01-02-005	Preparation of holes in non-metallic materials for fastening
AIPS01-02-013	Blind Rivet Installation
AIPS01-02-014	Installation of Cold Expanded Retainers
AIPS01-03-005	Installation of Metallic Inserts (Acres Sleeves)
AIPS05-02-011	Rework of Paints on Metallic and Non-metallic Structural Parts
AIPS05-05-001	Sealing of Aircraft Structure
AIPS01-02-017	General assembly and installation of fasteners
EN9103	Variation management of key characteristics

4- start quick release fastener system:

ABS0481	Sleeve, Bolt, clearance, 100° countersunk head
ABS0551	Stud, 4 lead thread, 100° countersunk head
ABS0552	Receptacle, two lug, 4 lead thread
ABS0556	Retaining ring, corrosion resisting steel
ABS0557	Acres Sleeve, 100° countersunk, corrosion resisting steel
ABS1725	Retainer for Quick Release Fastener System

2- start quick release fastener system:

ABS0895	Sleeve, 100° Countersunk, corrosion resisting steel
ABS1725	Retainer for Quick Release Fastener System
ABS1734	Aerospace series - Stud, with Tapered Shank
ABS1735	Aerospace series - Washer, Retaining for use with Tapered Shank Stud
ABS1763	Grommet, for use with quick release studs
EN6088	Aerospace series - Stud
EN6089	Aerospace series - Washer, retaining
EN6091	Aerospace series - Circlip
EN6092	Aerospace series - Receptacle, floating, double lug
EN6093	Aerospace series - Receptacle, floating, single lug
EN6094	Aerospace series - Washer, spring, countersunk
ABS0336	Stud
ABS0337	Receptacle, with 2 leads .1120-40UNC-3A
ABS0338	Lock-Washer

3 Definition, applicability and limitations

3.1 Definition

'Stack-up'	The combination of material thickness of the joint or assembly elements to be fastened
'Grip Length'	The maximum/minimum dimensions of a joint/assembly thickness that the fastener is capable of joining
'2 – start'	The system (stud and receptacle) has two sets of threads
'4 – start'	The system (stud and receptacle) has four sets of threads
'Acres sleeve'	Sleeve used to protect composite panels from damage
'Structure'	Describes the component upon which the receptacle is installed
'Metallic Insert'	Collective term for acres sleeve and grommet.

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 AIPS01-03-002 is required, it shall be invoked on the drawing by the words "manual fastening of 2- or 4- start quick release fasteners with or without acres sleeves to AIPS01-03-002".

This Airbus Process Specification covers the requirements for the installation of 2 - or 4 - start quick release fasteners with or without metallic inserts, as used to assemble composite or metallic panels to metallic or composite frame structures (see figures 1, 2, 3 & 4).

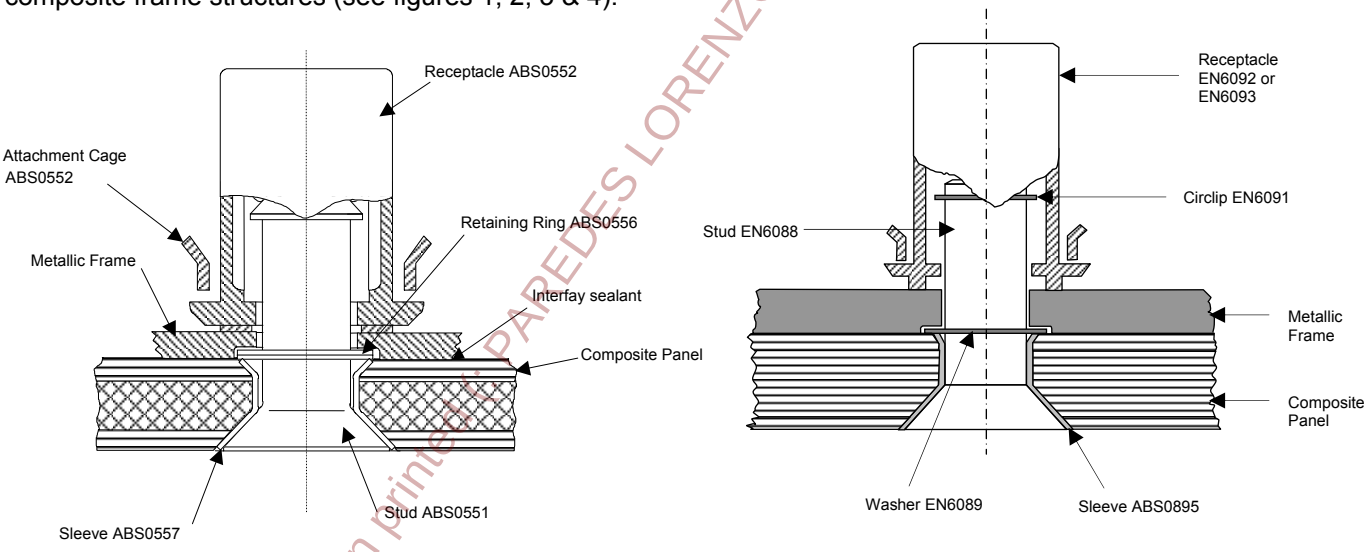


Figure 1: Example of final assembly – 2 - or 4 - start quick release fastener system (composite panels with acres sleeves)

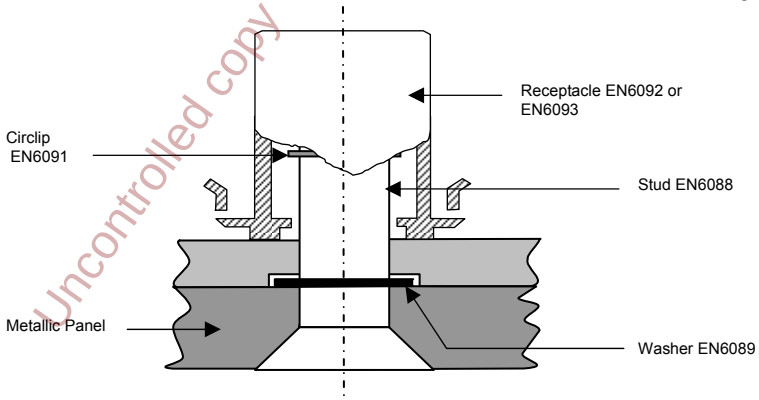


Figure 2 : Example of final assembly – 2 - start EN quick release system (metallic panels without metallic inserts)

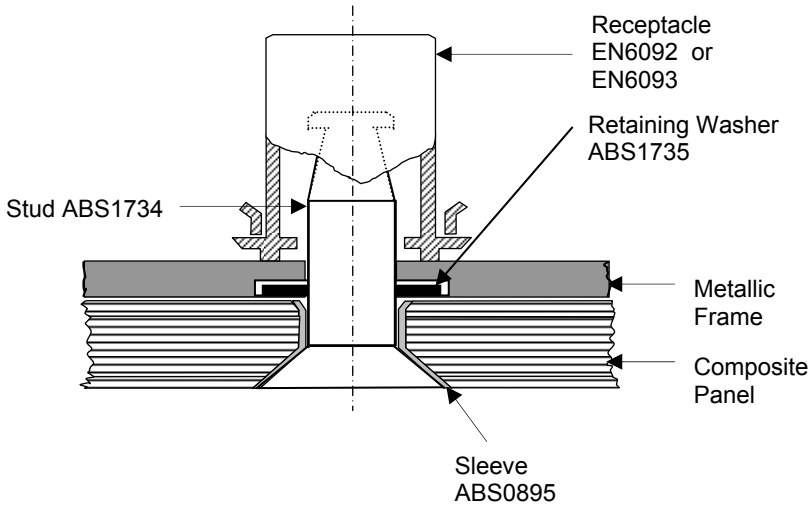


Figure 3 : Example of final assembly – 2 - start tapered quick release system (composite panels with acres sleeves)

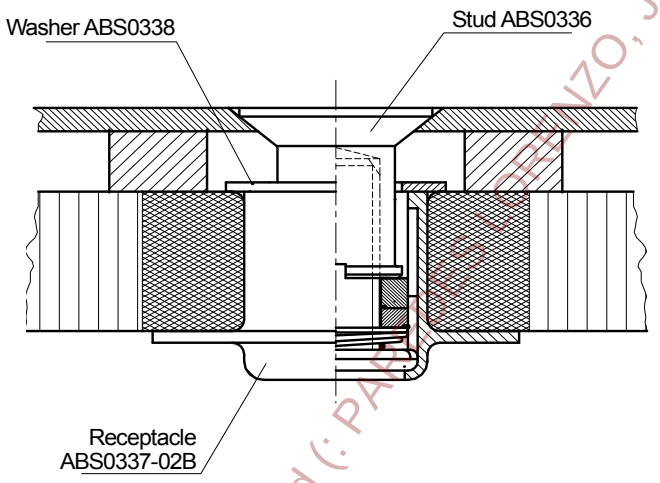


Figure 4 : Example of final assembly – 2 - start ABS0336 / ABS0337 quick release system

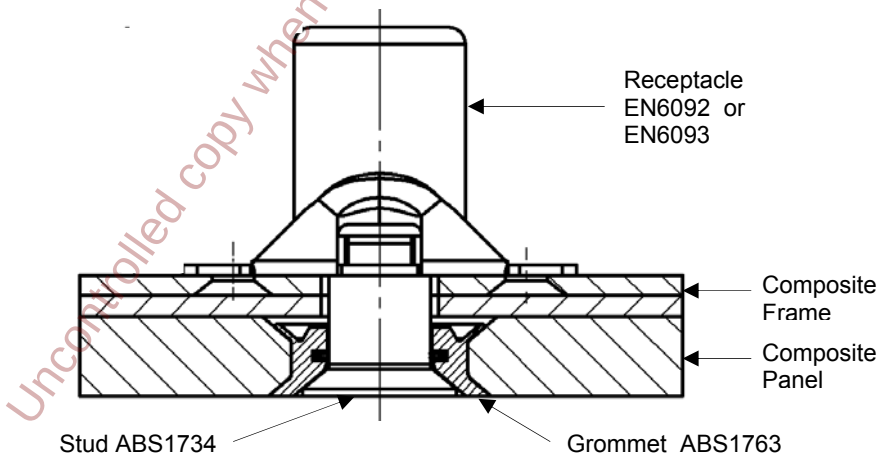


Figure 5 : Example of final assembly – 2 - start tapered quick release system (composite panels with grommet)

3.3 Limitations of the process

The requirements given in this specification are limited to the fasteners / parts quoted within section 2. For installation parameters not given for fasteners / parts where this specification has been invoked, refer to the Airbus Design Authority.

The size and shape of installation equipment may limit the application of the fasteners / parts in this specification.

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 Hole requirements

Hole, countersink and counter bore dimensional requirements shall be in accordance with table 1, with the exception of the ABS0336 / ABS0337 system, where hole dimensional requirements shall be defined on the drawing.

Parts / assemblies shall be adequately clamped as per AIPS01-02-017.

Acres sleeves / grommets shall be used in composite panels.

Table 1 : Hole requirements

Fastener Type	Fastener Part Number	Hole Requirement	Hole Preparation
Receptacle (For Metallic and Composite Structure)	EN6092 / EN6093 / ABS0552	As per annex A, figure A.3	AIPS01-02-003 for Metals or AIPS01-02-005 for Composites
Metallic Inserts (For Composite Panel)	ABS0481 / ABS0895 / ABS0557 / ABS1763	AIPS01-03-005	AIPS01-02-005
Stud (For Metallic Panel)	ABS1734 / EN6088 / ABS0551	As per annex A, figure A.5	AIPS01-02-003
Stud (For Composite Panel With Countersunk Washer)	ABS1734 / EN6088 / ABS0551	As per annex A, figure A.4	AIPS01-02-005

4.1.2 Receptacle installation

The receptacle shall have sealant applied in accordance with AIPS05-05-001 onto the mating faces of the base structure and the receptacle cage.

The hole and receptacle shall not be contaminated by sealant during assembly.

The receptacle shall be installed with rivets as per the drawing requirements. Solid rivets shall be installed in accordance with AIPS01-01-004 and Blind rivets shall be installed in accordance with AIPS01-02-013. Rivets shall be protected in accordance with the relevant rivet AIPS or drawing requirements. Any areas on which paint was removed during installation which remain unprotected shall be re-protected in accordance with AIPS05-02-011.

4.1.3 Metallic insert installation

Metallic Inserts shall be installed in accordance with AIPS01-03-005.

4.1.4 Assembly

The retaining ring shall be fitted after installation of the stud into the panel with tooling supplied by the standard part supplier. For the ABS1763 system the retaining ring is already housed in the ABS1763 grommet, the ABS1734 M code stud shall be fitted into the grommet using tooling supplied by the standard part supplier. Note that once the ABS1734 M code stud is installed into the ABS1763 grommet the stud cannot be removed individually from the grommet, both grommet and stud shall have to be removed in the case of repair.

Studs shall be installed with the torque values defined in table 2, with the exception of ABS0336, which shall be installed with the torque value as specified on the drawing.

Table 2 : Stud torque values

Fastener Part Number	Installation Torque
ABS0551	2,8Nm to 3,0Nm (24.78 lbf.in to 26.55 lbf.in)
EN6088	2,8Nm to 3,2Nm (24.78 lbf.in to 28.32 lbf.in)
ABS1734	

Installation speed shall not exceed 275 RPM.

For metallic insert installation, the installed fasteners shall meet the requirements shown in annex A, figure A.1 for ABS0481 acres sleeves and annex A, figure A.2 for ABS0895 / ABS0557 / AB1763 metallic inserts.

The machining of stud heads or metallic inserts to achieve aerodynamic flushness tolerances is not permitted.

Damage to the panel, structure and standard parts is not permitted.

Any rotation of the ABS1763 grommet or ABS0481, ABS0895 and ABS0557 acres sleeve during the final torque procedure of the stud is not permitted, this would be indicative of an incorrectly installed grommet / acres sleeve.

4.1.5 Repairs

Metallic insert repair shall be conducted in accordance with AIPS01-03-005.

For the removal of the receptacle barrel element for EN6092 / EN6093 and ABS0552 extraction tooling as supplied by the supplier of receptacle shall be used. Tooling supplied by the receptacle supplier shall be used to re-install the barrel element.

4.1.6 Cold expanded retainer – 2- and 4- start system

Installation of ABS1725 cold expanded retainers when used with ABS0552 or EN6092 receptacles shall be carried out in accordance with the requirements of AIPS01-02-014.

4.2 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 3: Key Characteristics

Product Key Characteristics			Process Key Characteristics		
No.	**Designation**	**Requirements / Limits (sub-clause)**	**Sub.-No.**	**Designation**	**Requirement / Limit**
1	Clamping and positional accuracy	- 4.1.1: AIPS01-02-017	Shall be defined in relevant AIPI		
2	Hole, countersink and counter bore production & dimensions	- 4.1.1: Table 1			
3	Sealant application - Receptacle	- 4.1.2: AIPS05-05-001 - Mating face to structure only - No sealant contamination of the receptacle or hole			
4	Installation - Receptacle - Metallic Insert - Assembly Installation torque	- 4.1.2 - 4.1.3: AIPS01-03-005 - 4.1.4: Table 2	4.1	Installation speed	≤ 275 RPM
5	Post-installation - Receptacle - Metallic Insert - Assembly	- 4.1.2 - 4.1.3: AIPS01-03-005 - 4.1.4	Shall be defined in relevant AIPI		

5 Technical qualification

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

5.1 Composite test panels

Representative test panels shall be produced by the manufacturer to the dimensions shown in annex A, figure A.6. A test panel shall be produced for each relevant panel thickness and quick release fastener type.

Each test panel shall contain twelve holes. Checks shall be made to ensure the holes meet the requirements shown in section 4.1.1.

Twelve metallic inserts shall be installed into the appropriate thickness of panel. Checks shall be made to ensure that the requirements contained in section 4 are met.

5.2 Metallic test panels

Representative test panels shall be produced by the manufacturer to the dimensions shown in annex A, figure A.6. A test panel shall be produced for each relevant panel thickness and quick release fastener type.

Each test panel shall contain twelve holes. Checks shall be made to ensure the holes meet the requirements shown in section 4.1.1.

5.3 Qualification test report (QTR)

The results of the installation trial shall be compiled into a qualification test report (QTR) to include the following information as a minimum, and forwarded to Airbus Materials and Processes Department for approval:

(a) Actual measured hole geometries
(b) Results of visual inspection post installation
(c) Photographs of installed metallic insert (both faces)
(d) Photographs of installed stud and metallic insert
(e) Stud and metallic insert protrusion/intrusion tolerances
(f) Metallic insert flaring loads
(g) Name and address of involved workshop / plant involved.
(h) Reference to the drawing / AIPS specification.
(i) Date of installation trials and operators details.
(j) Documentation clearly defining the procedure used to produce the test panels

It is also requested that for composite panels two installed metallic inserts shall be micro sectioned and the results of which shall be sent to the Airbus Materials and Processes Department for laboratory analysis to determine any detrimental effects on the composite structure.

6 First part qualification

Not applicable.

7 Series production inspection

The shop shall perform series production inspections under serial conditions to ensure that all requirements defined in section 4 are met.

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
(normative)

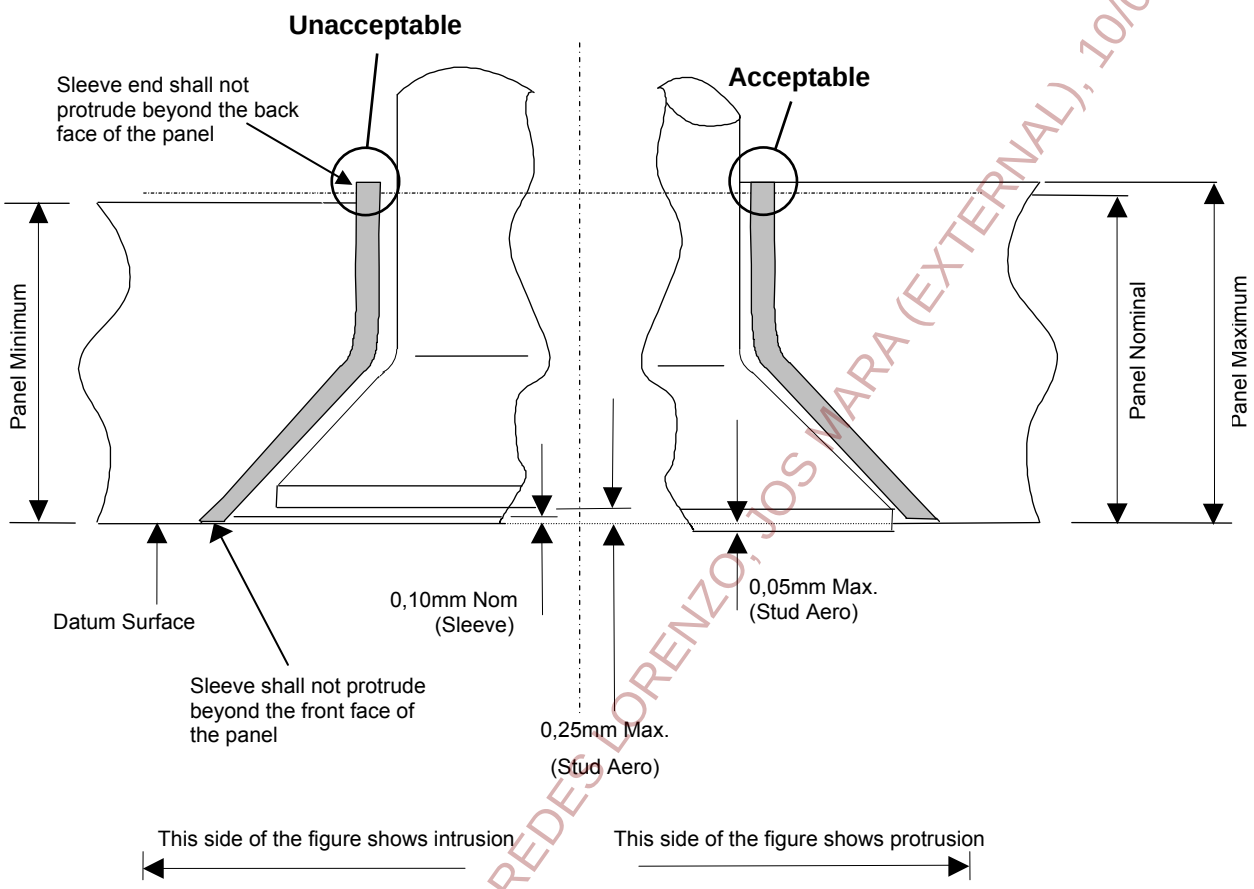


Figure A.1 : ABS0481 acres sleeve and ABS1734, EN6088 & ABS0551 stud protrusion / intrusion tolerances

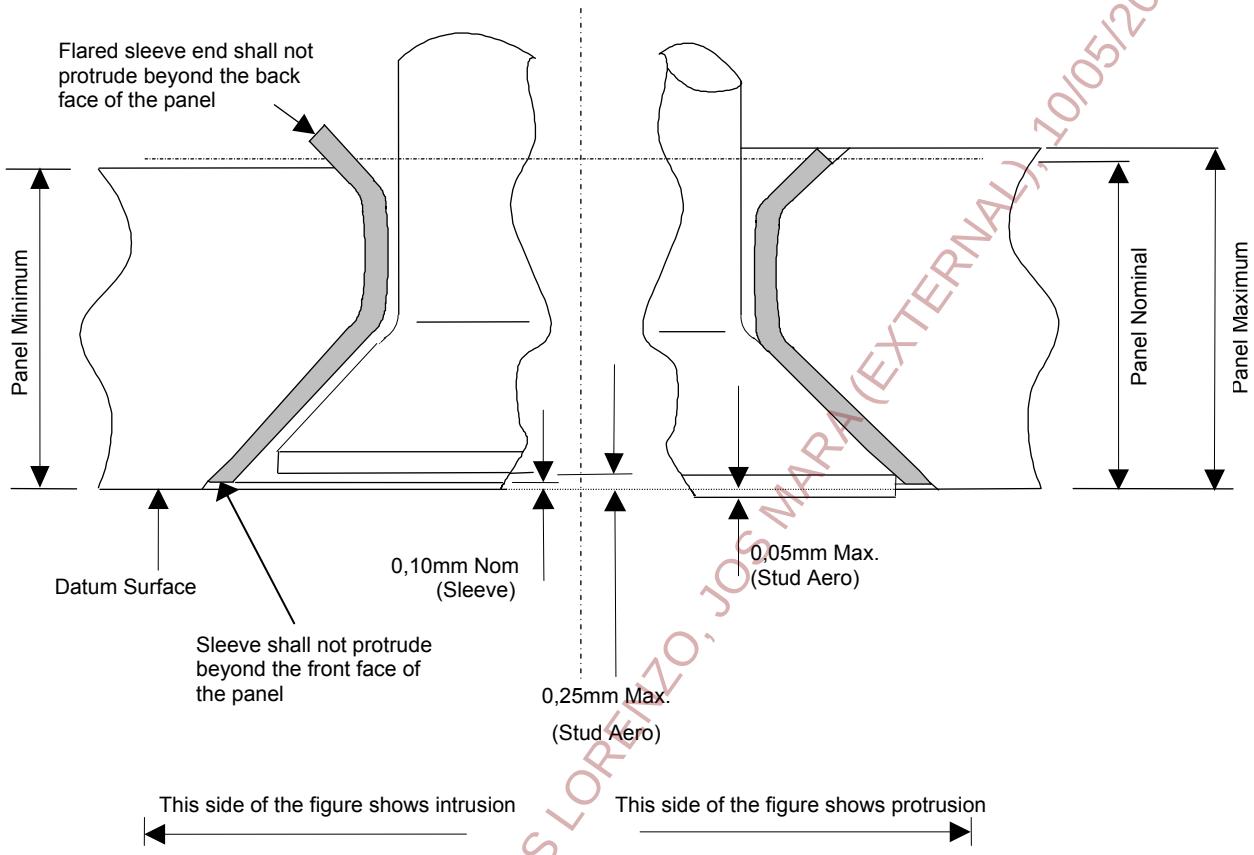
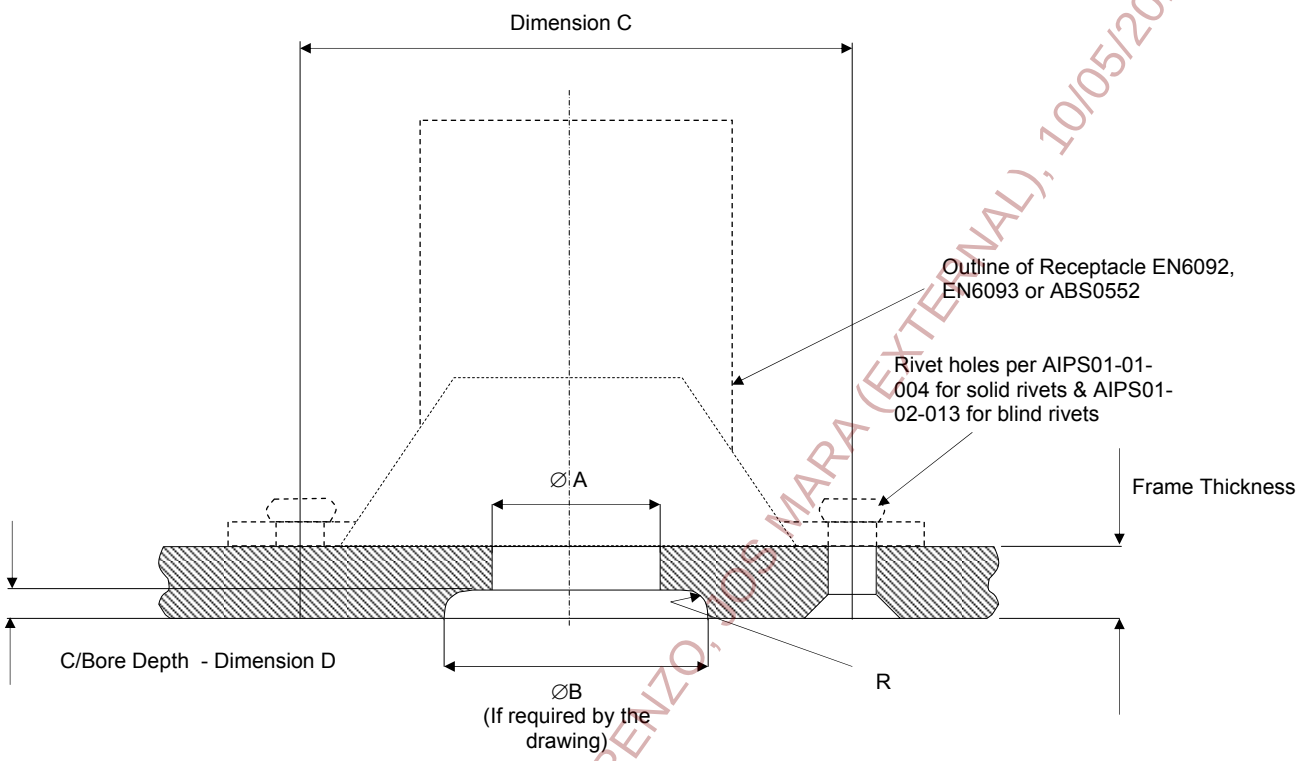


Figure A.2 : ABS0895 / ABS0557 / ABS1763 metallic insert and ABS1734, EN6088 & ABS0551 stud protrusion / intrusion tolerances



Note : Counterbore not required when using the ABS1763 as the retaining washer is housed in the grommet.

Figure A.3 : Frame hole geometries for receptacle

Table A.1: Dimensions for receptacle frame hole geometries

Fastener System	∅ A		∅ B		Dimension C		Dimension D		R	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4 – start	6,5 (0.26)	6,7 (0.27)	10,1 (0.40)	10,3 (0.41)	17,4 (0.68)	17,6 (0.69)	0,75 (0.026)	0,90 (0.035)	0,70 (0.028)	0,80 (0.031)
2 – start	7,00 (0.276)	7,20 (0.283)	11,8 (0.46)	12,0 (0.47)	17,4 (0.68)	17,6 (0.69)	0,65 (0.021)	0,80 (0.031)	0,70 (0.028)	0,80 (0.031)

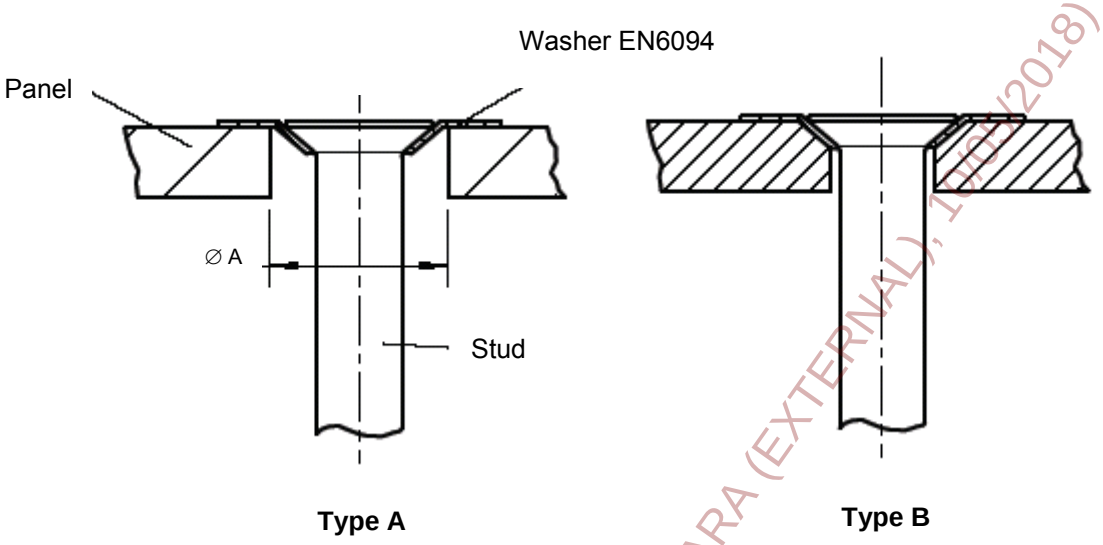


Figure A.4 : Panel hole geometries for stud installation into composite panels (with washer)

Table A.2 : Dimensions for stud panel hole geometries - composite panels with EN6094 washer (Type A)

Dimensions in mm (in)

Fastener System	∅ A					
	EN6094-16		EN6094-18		EN6094-19	
	Min	Max	Min	Max	Min	Max
2 – start with acres sleeves	10,7 (0.421)	10,9 (0.429)	10,4 (0.409)	10,6 (0.417)	11,3 (0.445)	11,5 (0.453)

If type B installation is required, the hole and countersink geometries shall be defined on the drawing. If spot facing on the panel side is specified by the drawing, dimension 'B' shall be as per figure A.2 table A.1 – design considerations shall be taken into account before the selection of a counter bore / spot face in composite applications.

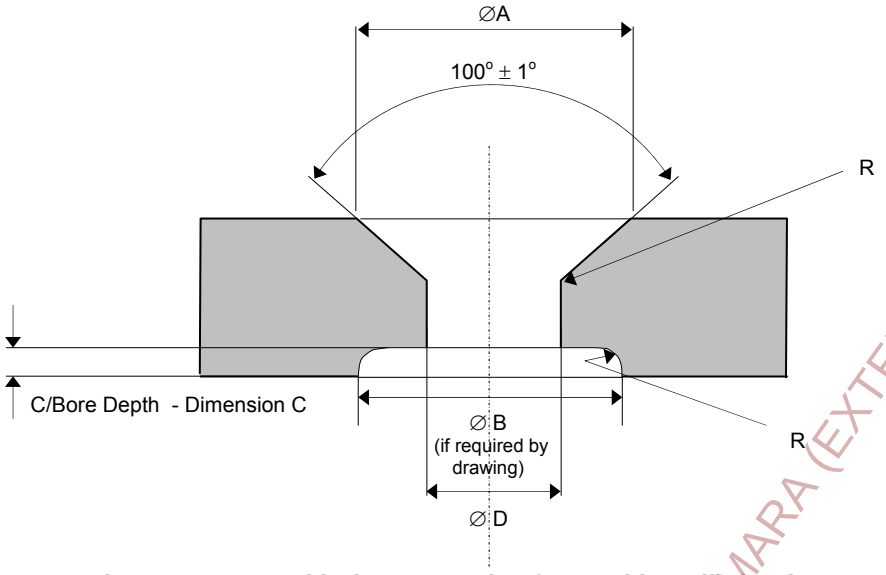


Figure A.5 : Panel hole geometries for stud installation into metallic panels

Table A.3 : Dimensions for stud panel hole geometries – metallic panels

Dimensions in mm (in)

Fastener System	∅ A		∅ B (if required by drawing)		∅ D		Dimension C		R	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4 – start	9,4 (0.37)	9,5 (0.37)	10,00 (0.394)	10,20 (0.402)	6,4 (0.25)	6,5 (0.26)	0,75 (0.026)	0,90 (0.035)	0,3 (0.01)	0,5 (0.02)
2 – start	10,4 (0.41)	10,6 (0.42)	10,80 (0.425)	11,0 (0.433)	6,4 (0.25)	6,5 (0.26)	0,65 (0.021)	0,80 (0.031)	0,3 (0.01)	0,5 (0.02)

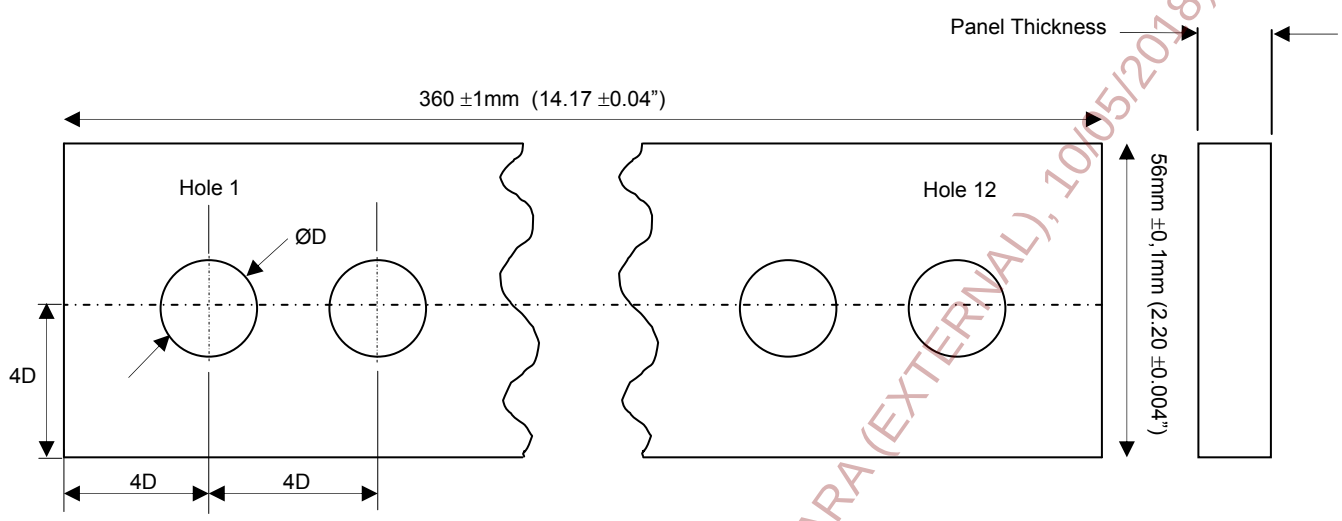


Figure A.6 : Test panel configuration

RECORD OF REVISIONS

Issue	Clause modified	Description of modification
1 06/04	Whole document	New standard.
2 07/06	Whole document	Standard modified to include A400M requirements Installation of fasteners into metallic panels included (hole geometries and design requirements) Up-date of specification to meet current AIPS requirement
3 02/09	2	The following references have been added to the Normative References: ABD0078 - Corrosion prevention AIPS01-01-004 - Solid rivet installation AIPS01-02-013 - Blind rivet installation AIPS05-02-011 – Rework on metallic and non-metallic structural parts
	2.2	Addition of ABS1734 tapered stud & ABS1735 retaining washer
	4.1.10	Addition of ABS1734 tapered stud & ABS1735 retaining washer
	4.2	Quality requirements removed
	Appendix B	Addition of ABS1734 to stud reference Addition of figure 3 Washer requirements added Spot face positioning made variable
4 04/10	2	The following references have been added to the Normative References: EN9103 - Variation management of key characteristics ABS0336 – Stud ABS0337 – Receptacle, with 2 leads.1120-40UNC-3A ABS0338 – Lock-Washer
	3.2	Figure 3 corrected Figure 4 included for ABS0336 ABS0337 system.
	4	4.1.1, 4.1.2, 4.1.3, 4.1.4 harmonised into section 4.1.1

(Continued)

RECORD OF REVISIONS (CONTINUED)

Issue	Clause modified	Description of modification
4 04/10	4	Corrected / updated in line with current AIPS principles
	4.1.2	AIPS05-02-009 & AB0078 reference removed – sentence modified accordingly.
	4.2	Quality requirements removed
	4.2	Key characteristics introduced
	Whole document	Layout / numbering updated with latest template
	Figure 5 / Figure A.2	Dimension D modified to remove the risk of retaining ring protrusion when max. paint applied to counter bore
	Figure 7 / Figure A.5	Dimension C included for counter bore depth
	Figure A.1	Introduced for ABS0481 acres sleeve requirements
	Table A.2	EN6094-19 dimensions included.
5 04/12	Whole document	ABS1763 grommet included. Table 1 typo corrected for receptacle hole geometry.