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# International Standard



# 7166

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Aircraft — Rail and stud configuration for passenger equipment and cargo restraint

*Aéronefs — Fixation par rails et tétons des sièges de passagers et du fret*

First edition — 1985-08-15

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**Descriptors:** aircraft, aircraft equipment, rails, dimensions, shape.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7166 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*.

It cancels and replaces ISO Recommendation R 837-1968, of which it constitutes a technical revision.

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# Aircraft — Rail and stud configuration for passenger equipment and cargo restraint

## 0 Introduction

This International Standard specifies the geometry of aircraft floor rails which are normally set longitudinally into an aircraft floor structure. Seats, galleys, bulkheads and other removable or adjustable equipment are normally secured into the seat rails by means of studs.

This concept is also widely used in the air cargo field for the restraint of cargo: the most frequent application being in the attachment of cargo nets to pallets (see ISO 4170 and ISO 4171).

## 1 Scope and field of application

**1.1** This International Standard specifies the geometry and the partial dimensions of rails and studs used for securing passenger equipment and for cargo restraint, necessary to ensure interchangeability of these items.

**1.2** Individual strength requirements will determine the complete rail shape, such as incorporating the standard section integrally into an I-beam extrusion.

**1.3** The overall shape of the studs above the top of the rail will depend upon the application. The upper portion may be cylindrical to fit into the tubular structure of a seat or galley unit. Alternatively, it may have a ring attached to serve as a tie-down point for a rope or strap.

**1.4** The rail imparts loads in the upward, downward, sideward, forward and aft directions. Forward and aft loads are applied to the track by means of a "shear plug", a part of the pin assembly (or structure to which the stud is joined) which engages in the rail notches [20,8 mm (0.800 in) in diameter], but this is not included in this International Standard.

In the case of seat attachment or similar application, the downward load is applied to the upper face of the rail by a fitting which is also part of the seat, but this is not included in this International Standard.

## 2 References

ISO 4170, *Interline air cargo pallet nets*.

ISO 4171, *Interline air cargo pallets*.

NOTE — ISO Recommendation R 837, *Aircraft seat rails and pins*, provided only for single stud fittings. Furthermore, most of the world's passenger aircraft, and virtually all cargo equipment, used rail and stud configurations based on the USA military specification MS.33601A.

## 3 Dimensional requirements

**3.1** The dimensions and tolerances of the rail and studs shall conform to figures 1 and 2.

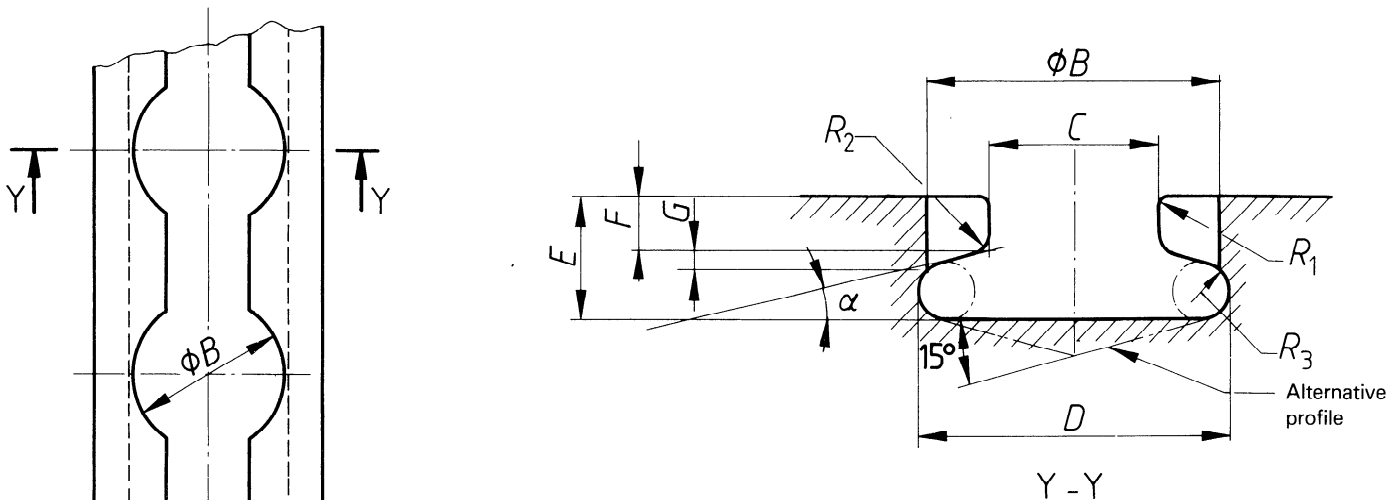
**3.2** Sharp edges and corners shall be removed.

**3.3** The stud fitting may have one pair of lips, formed by the diameter  $B$ , and, in this case, it is known as a single stud fitting.

**3.4** Figure 2 shows a double stud fitting. Multiple stud fittings may have up to 5 pairs of lips (or 5 studs).

## 4 Strength requirements

This International Standard is concerned only with the configuration of rails and studs. The load carrying capacity will be determined by the strength of the materials from which the items are manufactured and by the strength of the structure to which they are attached.



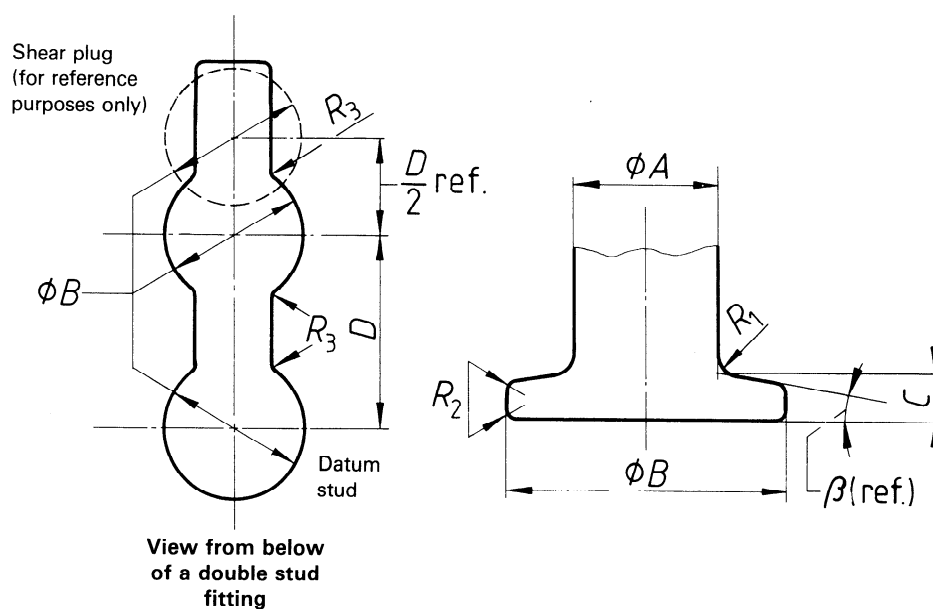
\* Tolerance of  $\pm 0,1$  mm (0.004 in) on 1 pitch.  
Tolerance of  $\pm 0,5$  mm (0.020 in) on 100 pitches.

Dimension	mm	in
A *	25,4	1.00
B	19,7 20,0	0.776 0.787
C	10,7 11,4	0.421 0.449
D	20,3 20,8	0.799 0.819
E	7,6 8,0	0.299 0.310
F	3,9 3,5	0.154 0.133
G ref.	1,3 1,0	0.051 0.039
$\alpha$	10,5° to 15,5°	
R <sub>1</sub>	0,3 0,8	0.012 0.031
R <sub>2</sub>	1,3 1,8	0.051 0.071
R <sub>3</sub>	Full	Full

NOTES

- 1 Diameter *B* and slot centreline *D* shall be coincident with slot centreline *C* to within 0,13 mm (0.005 in).
- 2 All faces shall be within 0,5° of the specified position relative to the upper surface of the rail.
- 3 For low-weight or low-load applications dimensions *E* and *F* may be reduced by 0,76 to 1,02 mm (0.03 to 0.04 in) and the rail shall be specified accordingly as a "lightweight rail".

Figure 1 — Rail



Dimension	mm	in
$A^{1)}$	9,8 9,7	0.386 0.382
$B^{1)}$	18,8 18,3	0.740 0.721
$C$	3,3 3,2	0.130 0.126
$D^{2)}$	25,5 25,3	1.004 0.996
$\beta^{3)}$	8,5° to 10,5°	
$R_1$	1,8 1,5	0.071 0.059
$R_2$	1,5 1,2	0.059 0.047
$R_3$	0,8 0,5	0.031 0.020

1) Diameters  $A$  and  $B$  shall be concentric to within 0,13 mm (0.005 in).

2) The tolerance on successive  $D$  dimensions shall not be cumulative for multiple stud fittings. All studs shall be within 0,1 mm (0.004 in) of the specified position relative to the datum stud.

3) The angular variation for those surfaces defined by angle  $E$  shall be within 0,5° of the specified plane relative to the lower surface of the stud.

Figure 2 — Stud fitting

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