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**Aerospace — 'P' (loop style) clamps —  
Procurement specification**

*Aéronautique et espace — Colliers en 'P' (en boucle) — Spécification  
d'approvisionnement*

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## 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12319 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 10, *Aerospace fluid systems and components*.

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## Introduction

This International Standard establishes the basic performance and quality requirements for 'P' (loop style) clamps for use in aerospace fluid systems.

The procurement requirements are intended to ensure that clamps which are procured in accordance with this specification are of the same quality as the clamps used during the original qualification testing. Compliance with these test and procurement requirements is necessary for clamps that are used in fluid systems where a malfunction would affect the safety of flight.

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# Aerospace — 'P' (loop style) clamps — Procurement specification

## 1 Scope

This International Standard specifies the requirements for the procurement and quality assurance of 'P' (loop style) clamps used in the installation of aerospace fluid systems.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 2951, *Vulcanized rubber — Determination of insulation resistance*

ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps*

ISO 9679, *Aerospace — Clamps for fluid systems — Test methods*

EN 9100, *Aerospace series — Quality management systems — Requirements (based on ISO 9001:2000) and quality systems — Model for quality assurance in design, development, production, installation and servicing (based on ISO 9001:1994)*

EN 9133, *Aerospace series — Quality management systems — Qualification procedure for aerospace standard parts*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **inspection lot**

clamps from a single production batch having the same number of definition document

### 3.2

#### **definition document**

document specifying directly all the requirements for clamps

NOTE The definition document may be an International Standard, an in-house standard or a drawing.

**3.3**  
**acceptance quality level**  
**AQL**

maximum percent defective (or the maximum number of defects per hundred units) that, for the purpose of sampling inspection, can be considered satisfactory as a process average

NOTE It can also be the quality level which in a sampling plan corresponds to a specified but relatively high probability of acceptance.

**3.4**  
**burr**  
raised sharp edge, frequently with a wane on the opposite side

[ISO 8785:1998]

**3.5**  
**foreign material**  
extraneous matter on the surface of the clamp or in the surface of the cushion

EXAMPLES Contamination, dirt, slivers.

**3.6**  
**simple random sampling**  
sampling of  $n$  items from a population of  $N$  items in such a way that all possible combinations of  $n$  items have the same probability of being chosen

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**3.7**  
**major defect**  
defect, other than critical, that is likely to result in a failure or to reduce materially the usability of the considered product for its intended purpose

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**3.8**  
**minor defect**  
defect that is not likely to reduce materially the usability of the considered product for its intended purpose, or that represents a departure from established specification having little bearing on the effective use or operation of this product

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## 4 Requirements

### 4.1 Qualification

#### 4.1.1 General

Clamps supplied in accordance with this International Standard shall be representative of products which have been subjected to and which have successfully passed the requirements and tests specified in this International Standard.

#### 4.1.2 Manufacturer qualification

Manufacturer approval shall be granted by outside agency procedure (see Table A.1, Procedure 1).

#### 4.1.3 Product qualification

Product approval shall be granted by outside agency procedure (see Table A.1, Procedure 2).

## 4.2 Materials

The clamp materials shall be as described in the definition document.

## 4.3 Configuration

The clamps shall be installed on a mandrel having a diameter within  $\pm 0,025$  mm of the specified diameter. With a shim placed between the clamp feet, as specified in the part standard, having the same dimensions  $\pm 0,025$  mm thick, all dimensions shall be within those specified in the part standard. Mounting hole alignment shall be within 0,254 mm.

## 4.4 Dimensional requirements

The clamp dimensional requirements shall be as described in the definition document.

## 4.5 Mass

The clamp masses shall be as described in the definition document.

## 4.6 Surface appearance

Workmanship shall be of a sufficiently high grade to ensure that the clamps are of uniform quality, free from burrs, slivers, sharp edges or other defects which would affect their services.

## 4.7 Surface treatment

The clamp surface treatment shall be as described in the definition document.

## 4.8 Marking

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Verify that each clamp is identified according to the part standard with the standard number, size and manufacturer's name or trademark.

## 4.9 Vibration and transmissibility

When the clamps are tested in accordance with ISO 9679, they shall not exhibit any evidence of deterioration of the sheathing or cushion, nor cracking or separation of metal components, and shall maintain minimum retention values.

## 4.10 Retention

When the clamps are tested in accordance with ISO 9679, the minimum retention values shall be according to Table 1.

**Table 1 — Minimum retention values**

	Tube diameter	Minimum axial force kg
Fixed type clamps	12 mm (0,5 in)	7,0
	19 mm (0,75 in)	12,0
	25 mm (1 in)	16,0
Sliding type clamps	If the device is required to permit tube movement, a force of between 0,46 kg and 4,5 kg should be recorded.	