
Aerospace — Washers, flat, for pulleys, in alloy steel and cadmium plated or in corrosion-resistant steel and passivated — Dimensions and masses

Aéronautique et espace — Rondelles plates, pour poulies, en acier allié, cadmiées, ou en acier résistant à la corrosion, passivées — Dimensions et masses

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 9218 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*.

Annex A forms a normative part of this International Standard.

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Aerospace — Washers, flat, for pulleys, in alloy steel and cadmium plated or in corrosion-resistant steel and passivated — Dimensions and masses

1 Scope

This International Standard specifies the characteristics of flat washers

- in alloy steel and cadmium plated, classification 900 MPa¹⁾/235 °C²⁾; or
- in corrosion-resistant steel and passivated, classification 900 MPa¹⁾/450 °C²⁾.

This International Standard is applicable to washers used with ISO 9219 bolts, diameter codes 050 and 060, ISO 9216 nuts and ISO 1234 split pins in the assembly of ISO 7939 pulleys.

It is also applicable to washers used in the assembly of airframe rolling bearings or spherical bearings.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1234:1997, *Split pins*

ISO 7939:1988, *Aircraft — Non-metallic pulleys with ball bearings for control cables — Dimensions and loads*

ISO 8075:1985, *Aerospace — Surface treatment of hardenable stainless steel parts*

ISO 9216:2002, *Aerospace — Nuts, hexagonal, slotted (castellated), for pulleys, in alloy steel and cadmium plated or in corrosion-resistant steel and passivated — Dimensions and masses*

ISO 9219:2002, *Aerospace — Bolts, thin hexagonal head, for pulleys, close tolerance shank, short thread, in alloy steel and cadmium plated or in titanium alloy and MoS₂ lubricated or in corrosion-resistant steel and passivated — Dimensions and masses*

ISO 13715:2000, *Technical drawings — Edges of undefined shape — Vocabulary and indications*

EN 2133:1997³⁾, *Aerospace series — Cadmium plating of steels with specified tensile strength ≤ 1 450 MPa, copper, copper alloys and nickel alloys*

1) Minimum tensile strength of the material at ambient temperature.

2) Maximum temperature, determined by the surface treatment, that the bolt can withstand without continuous change in its original characteristics after return to ambient temperature.

3) AECMA Standard.

prEN 2136:—⁴⁾, Aerospace series — Steel FE-PM42 — $900 \text{ MPa} \leq R_m \leq 1\,100 \text{ MPa}$ — Bars — $D_e \leq 100 \text{ mm}$

prEN 2205:—⁵⁾, Aerospace series — Steel FE-PL43S — $900 \text{ MPa} \leq R_m \leq 1\,100 \text{ MPa}$ — Bars — $D_e \leq 40 \text{ mm}$

prEN 2438:—⁵⁾, Aerospace series — Steel FE-PL62 — $900 \text{ MPa} \leq R_m \leq 1\,100 \text{ MPa}$ — Bars — $D_e \leq 40 \text{ mm}$

prEN 2444:—⁶⁾, Aerospace series — Steel FE-PL711 — $900 \text{ MPa} \leq R_m \leq 1\,100 \text{ MPa}$ — Bars and wires — $D_e \leq 45 \text{ mm}$

AMS-QQ-P-416A:2002, Plating, cadmium (electrodeposited)

3 Requirements

3.1 Configuration, dimensions and masses

Configuration, dimensions and masses shall be in accordance with Figure 1 and Table 1. Dimensions are expressed in millimetres and apply after surface treatment. Surface roughness values apply before surface treatment.

Table 1 — Dimensions and masses

Dimensions in millimetres

| Diameter code | D_1 H13 | D_2 h14 | E $\pm 0,25$ | Mass ^a $\approx \text{kg}/1\,000$ pieces |
|---------------|--------------|--------------|-------------------|-----------------------------------------------------------|
| 050 | 5,5 | 10 | 2,5 | 1,027 |
| 060 | 6,5 | 12 | | 1,498 |

^a Calculated on the basis of $7,85 \text{ kg}/\text{dm}^3$; given for information only.

3.2 Material and surface treatment

Material and surface treatment shall be in accordance with Table 2.

Table 2 — Material and surface treatment

| Code | Material | | Surface treatment | |
|------|--------------------------------------------------------------------------------|-------------------------------|-------------------|-------------------------------|
| | Family | Standard | Type | Standard |
| A | Alloy steel, strength classification $\geq 900 \text{ MPa}^a$ | In accordance with annex A | Cadmium plating | In accordance with annex A |
| B | Corrosion-resistant steel, strength classification $\geq 900 \text{ MPa}^a$ | | Passivation | ISO 8075 |

^a Minimum tensile strength of the material at ambient temperature.

4) AECMA Standard. It has been declassified and will be replaced, at publication, by prEN 3490, Aerospace series — Steel FE-PM3901 (X15CrNi17-3) — Air melted — Hardened and tempered — $900 \text{ MPa} \leq R_m \leq 1\,100 \text{ MPa}$ — Bar for machining $D_e \leq 200 \text{ mm}$.

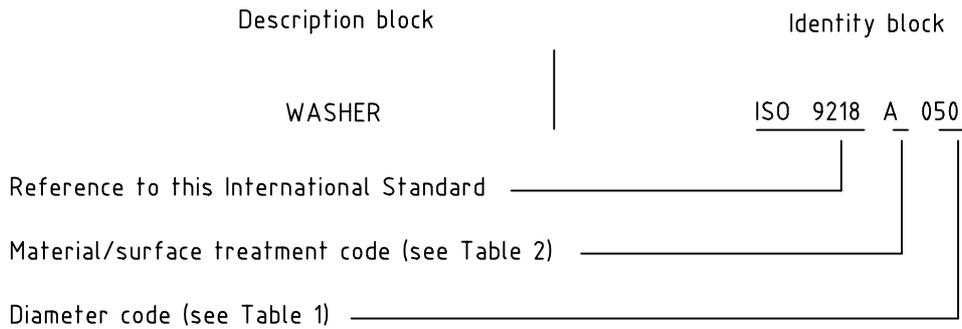
5) AECMA Standard to be published as a European Standard (CEN).

6) AECMA Standard. It has been declassified and will be replaced, at publication, by prEN 3513, Aerospace series — Steel FE-PL711 — Hardened and tempered — $900 \text{ MPa} \leq R_m \leq 1\,100 \text{ MPa}$ — Bar and wire — $D_e \leq 45 \text{ mm}$.

4 Designation

Washers in accordance with this International Standard shall be designated as shown in the following example.

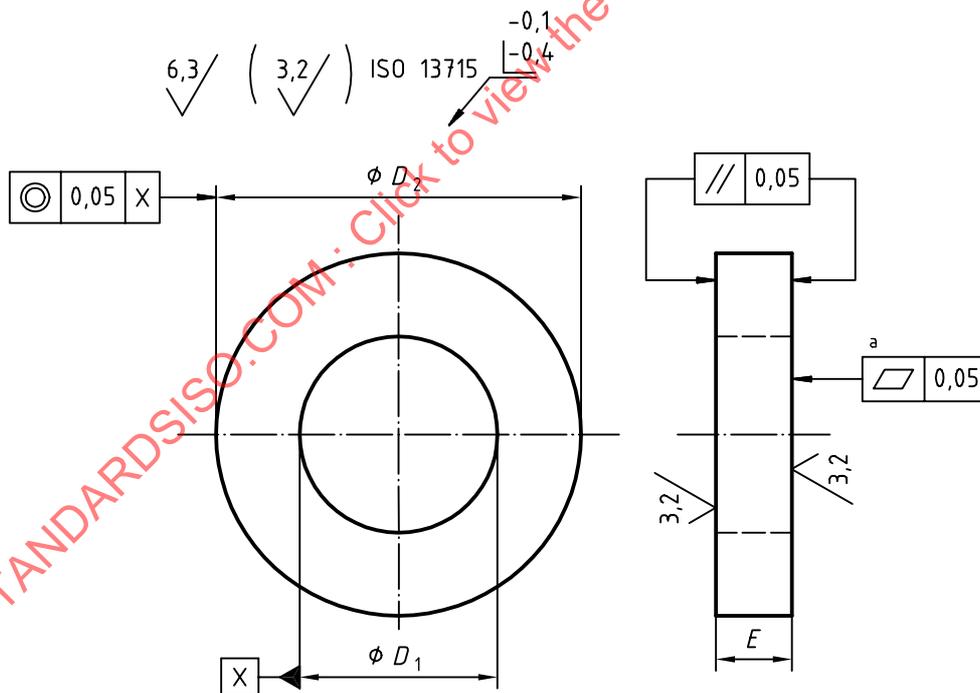
EXAMPLE



5 Marking

Marking shall be on labels and/or packaging and shall include the manufacturer's name, the quantity or mass and the identity block specified in clause 4.

Dimensions in millimetres
Surface roughness in micrometres



^a Two faces

Figure 1 — Flat washer

Annex A (normative)

Correspondence between national standards

This annex establishes a correspondence between different materials and surface treatment standards from certain user countries. Other materials and surface treatment standards may be declared in this annex in future revisions of this International Standard.

Table A.1 — European standards

| Code | Material | | Surface treatment | |
|------|----------------------------------------------------------------------|-------------------------------------|-------------------|----------|
| | Family | Standard | Type | Standard |
| A | Alloy steel, strength classification ≥ 900 MPa | prEN 2205 prEN 2438 prEN 2444 | Cadmium plating | EN 2133 |
| B | Corrosion-resistant steel, strength classification ≥ 900 MPa | prEN 2136 | Passivation | ISO 8075 |

Table A.2 — Standards from other user countries

| Code | Material | | Surface treatment | |
|------|---------------------------------------------------------------------|----------|-------------------|---------------|
| | Family | Standard | Type | Standard |
| A | Alloy steel, strength classification ≥ 900 MPa | — | Cadmium plating | AMS-QQ-P-416A |
| B | Corrosion-resistant steel strength classification ≥ 900 MPa | — | Passivation | ISO 8075 |