INTERNATIONAL STANDARD

ISO 9217

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

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

Reference number
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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 9217 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*.

Annex A forms a normative part of this International Standard.

Aerospace — Washers, chamfered, with counterbore, 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 chamfered washers with counterbore

— in alloy steel and cadmium plated, classification 900 MPa[1)]/235 °C[2)]; or

— in corrosion-resistant steel and passivated, classification 900 MPa[1)]/450 °C[2)].

This International Standard is applicable to washers used with ISO 9219 bolts, diameter code 080 to 250, 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 MoS_2 lubricated or in corrosion-resistant steel and passivated — Dimensions and masses*

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

EN 2133:1997[3)], *Aerospace series — Cadmium plating of steels with specified tensile strength $\leqslant$ 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 MPa* $\leqslant R_m \leqslant$ *1 100 MPa — Bars —* $D_e \leqslant$ *100 mm*

prEN 2205:—[5], *Aerospace series — Steel FE-PL43S — 900 MPa* $\leqslant R_m \leqslant$ *1 100 MPa — Bars —* $D_e \leqslant$ *40 mm*

prEN 2438:—[5], *Aerospace series — Steel FE-PL62 — 900 MPa* $\leqslant R_m \leqslant$ *1 100 MPa — Bars —* $D_e \leqslant$ *40 mm*

prEN 2444:—[6], *Aeropsace series — Steel FE-PL711 — 900 MPa* $\leqslant R_m \leqslant$ *1 100 MPa — Bars and wires —* $D_e \leqslant$ *45 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 and tolerances 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 $^{+0,3}_{0}$	D_2 $^{+0,3}_{0}$	D_3 $^{+0,3}_{0}$	D_4 $^{0}_{-0,2}$	E $^{+0,2}_{0}$	H $^{0}_{-0,2}$	**Mass**[a] $\approx$ kg/1 000 pieces
080	8	10	6,2	13	2,5	4	2,9
100	10	13	8,2	16		4,5	4,8
120	12	15	10,2	18			5,5
150	15	18	12,2	22		5	9,3
170	17	20	14,2	24			10
200	20	23	16,5	28		5,5	14,7
220	22	25	18,5	30			16
250	25	28	20,5	34			22

[a] Calculated on the basis of 7,85 kg/dm^3; given for information only.

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 MPa* $\leqslant R_m \leqslant$ *1 100 MPa — Bar for machining* $D_e \leqslant$ *200 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 MPa* $\leqslant R_m \leqslant$ *1 100 MPa — Bar and wire —* $D_e \leqslant$ *45 mm*.

3.2 Material and surface treatment

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

Table 2 — Material and surface treatment

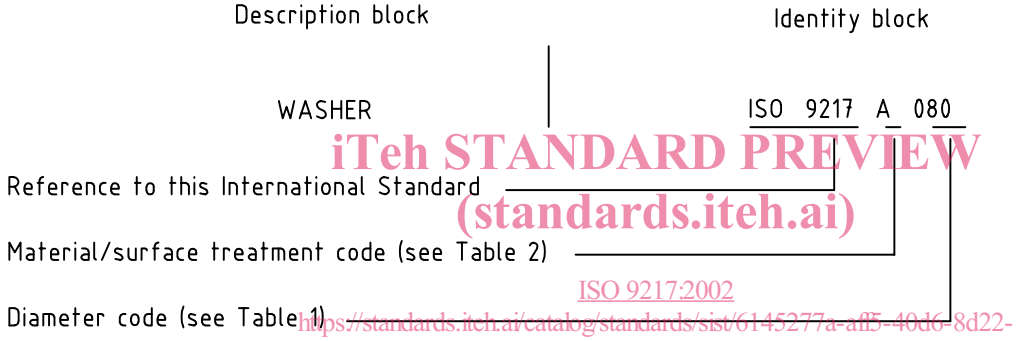
Code	Material		Surface treatment	
	Family	Standard	Type	Standard
A	Alloy steel, strength classification $\geqslant$ 900 MPa[a]	In accordance with annex A	Cadmium plating	In accordance with annex A
B	Corrosion-resistant steel, strength classification $\geqslant$ 900 MPa[a]		Passivation	ISO 8075

[a] Minimum tensile strength of the material at ambient temperature.

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

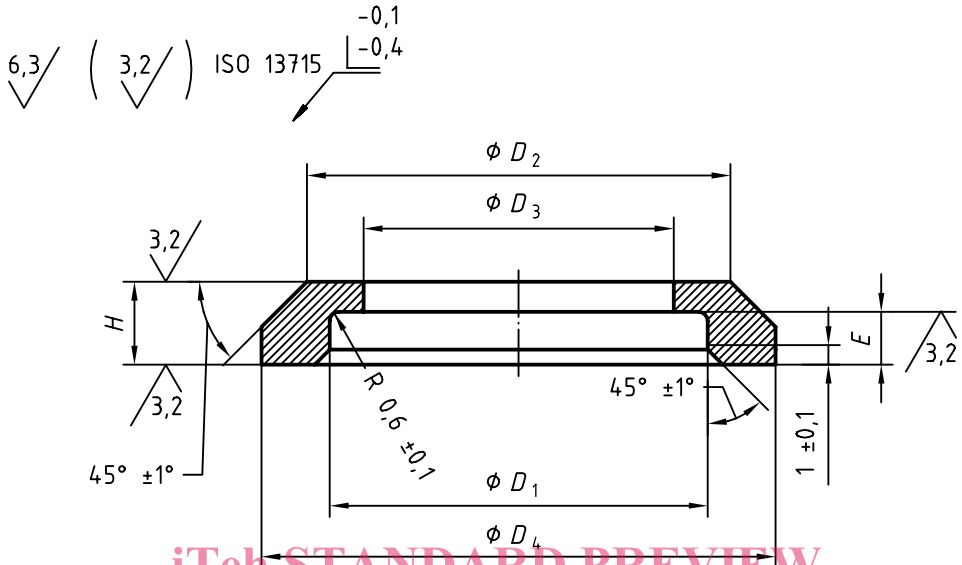


Figure 1 — Chamfered washer

Annex A
(normative)

Correspondence between national standards

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

Table A.1 — European standard

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