UDC 621.882.42

March 1990

Product grade A washers
with a hardness up to 250 HV
designed for use with cheese head screws

DIN 433 Part 1

Scheiben; Produktklasse A, bis Härte 250 HV, vorzugsweise für Zylinderschrauben

This standard, together with DIN 433 Part 2, March 1990 edition, supersedes DIN 433, March 1972 edition.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Dimensions in mm

1 Scope and field of application

This standard specifies requirements for product grade A washers with a smaller outside diameter and a hardness up to 250 HV, designed for use with screws of property class 8.8 or less.

Note. The washer hardness shall be selected as a function of the assumed bearing pressure in the bolted assembly.

2 Dimensions

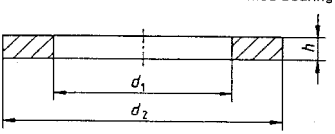

Table 1.

Nominal size	For thread size M	Clearance hole diameter, d_1 min. = nominal size	Clearance hole diameter, d_1 max	Outside diameter, d_2 max. = nominal size	Outside diameter, d_2 min.	Thickness, h Nominal size	Thickness, h max.	Thickness, h min.	Mass (7,85 kg/dm³) per 1000 units, in kg, ≈
1,1	1	1,1	1,24	2,5	2,25	0,3	0,35	0,25	0,010
1,3	1,2	1,3	1,44	3	2,75	0,3	0,35	0,25	0,014
1,5	1,4	1,5	1,64	3	2,75	0,3	0,35	0,25	0,012
1,7	1,6	1,7	1,84	3,5	3,2	0,3	0,35	0,25	0,017
2	1,8	2	2,14	4	3,7	0,3	0,35	0,25	0,022
2,2	2	2,2	2,34	4,5	4,2	0,3	0,35	0,25	0,029
2,7	2,5	2,7	2,84	5	4,7	0,5	0,55	0,45	0,055
3,2	3	3,2	3,38	6	5,7	0,5	0,55	0,45	0,079
3,7	3,5	3,7	3,88	7	6,64	0,5	0,55	0,45	0,109
4,3	4	4,3	4,48	8	7,64	0,5	0,55	0,45	0,140
5,3	5	5,3	5,48	9	8,64	1	1,1	0,9	0,326
6,4	6	6,4	6,62	11	10,57	1,6	1,8	1,4	0,790
8,4	8	8,4	8,62	15	14,57	1,6	1,8	1,4	1,52
10,5	10	10,5	10,77	18	17,57	1,6	1,8	1,4	2,11
13	12	13	13,27	20	19,48	2	2,2	1,8	2,85
15	14	15	15,27	24	23,48	2,5	2,7	2,3	5,41
17	16	17	17,27	28	27,48	2,5	2,7	2,3	7,63
19	18	19	19,33	30	29,48	2,5	2,7	2,3	8,31
21	20	21	21,33	34	33,38	3	3,3	2,7	13,2
25	24	25	25,33	39	38,38	4	4,3	3,7	22,1
31	30	31	31,39	50	49,38	4	4,3	3,7	38,0
37	36	37	37,62	58	56,8	5	5,6	4,4	61,5

Continued on pages 2 and 3

3 Technical delivery conditions

Table 2.

Material [1]		Steel		Stainless steel	
Mechanical properties	Hardness class	140 HV	200 HV	140 HV	200 HV
	Hardness [2] HV	140 to 250	200 to 250	140 to 250	200 to 250
	Material (steel group)	–		A2 and A4	F1 C1 and C4
	As specified in	–		DIN 267 Part 11.	
Limit deviations and geometrical tolerances	Product grade	A			
	As specified in	DIN 522.			
Surface finish		Bright. DIN 522 shall apply with regard to surface roughness. DIN 267 Part 9 shall apply with regard to electroplating, any other types of finish being subject to agreement.			
Acceptance inspection		DIN 522 shall apply with regard to acceptance inspection.			

[1] Washers may be made of non-ferrous metals or other materials, subject to agreement.
[2] For h not exceeding 0,5 mm, the hardness shall be HV 2 and for h exceeding 0,5 mm, HV 10.

4 Designation

Designation of a washer of nominal size 13 and hardness class 140 HV [1]:

Washer DIN 433 – 13 – 140 HV

Where stainless steel washers are to be supplied, the steel grade as specified in DIN 267 Part 11 or the material number as specified in DIN 17440 shall be included in the designation:

Washer DIN 433 – 13 – 140 HV – A2

or

Washer DIN 433 – 13 – 140 HV – 1.4306

The DIN 4000-3-1 tabular layout of article characteristics shall apply for washers complying with this standard.

Standards referred to

DIN 267 Part 9	Fasteners; technical delivery conditions; electroplated components
DIN 267 Part 11	Fasteners; technical delivery conditions; stainless and acid resistant steel components (with addenda to ISO 3506)
DIN 522	Metal washers; technical delivery conditions
DIN 4000 Part 3	Tabular layout of article characteristics for washers
DIN 17440	Stainless steels; technical delivery conditions for plate and sheet, hot rolled strip, wire rod, drawn wire, steel bars, forgings and semi-finished products

Previous editions

DIN 433: 01.21, 03.23, 10.36, 05.43, 04.46, 01.54, 03.72.

[1] This hardness class shall also be used where no material or only symbol 'St' is specified in existing documentation.

Amendments

The following amendments have been made to the March 1972 edition of DIN 433.

a) DIN 433 has been split up into two standards, Part 1 and Part 2, the reasons being given in the Explanatory notes.
b) The title of the standard has been amended.
c) Nominal size (clearance hole diameter) 1,9 has been changed to 2.
d) The outside diameters for nominal sizes 5,3, 17 and 21 have been changed.
e) The washer thickness for nominal sizes 2,2, 15, 17 and 21 has been changed.
f) Nominal sizes 25, 31 and 37 have been included.
g) Limits of size have been given on the basis of the tolerances specified.
h) Hardness classes have been introduced.
i) The technical delivery conditions have been revised.
j) The standard has been editorially revised.

Explanatory notes

In the case of hexagon head bolts and hexagon socket head cap screws, the design of the underhead fillet within the area defined by the minimum bearing face diameter, d_a, is at the manufacturer's discretion. This may occasionally result in an interference between bolt/screw and washer where the latter has a clearance hole made to the fine series as specified in ISO 273. Normally, such interference will pose no problems since, when the assembly is tightened, the washer undergoes deformation resulting in the washer being moulded to fit the shape of the underhead fillet. If washers of greater hardness are used, there is the risk that the edge of the washer will cut into the fillet and thus damage it.

Taking this into account, the responsible ISO Committee, TC 2, decided that the clearance hole edge should be provided with a chamfer or a radius to minimize the risk of such a damage. In line with this decision, the responsible technical committee in Germany deals with 'soft' and 'hard' washers in separate Parts of this standard to allow for the difference in performance of both washer types.

For washer sizes up to 37, the clearance hole diameter, outside diameter and washer thickness have been harmonized with the specifications given in the 1983 edition of ISO 7092 *) where such were available. A revised version of this ISO Standard is currently being prepared.

International Patent Classification

F16B 43/00

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*) Obtainable from *Beuth Verlag GmbH (Auslandsnormenverkauf)*, Burggrafenstraße 6, D-1000 Berlin 30.