

A2 (304) Stainless Steel Shim Rings (Support Washers)

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Fasteners/Washers Shim Rings (Support Washers)/A2 (304) Stainless Steel Shim Rings (Support Washers)
Washers · DIN 988
Mechanical properties, corrosion behaviour and the full dimensional range for this grade

A2 Stainless Steel Shim Rings (Support Washers) are supplied to ISO 3506 group A2 (304 / 1.4301), commonly supplied A2-70. Corrosion behaviour is good general corrosion resistance, the material is largely non-magnetic, and the usable service range is approx. -200 °C to +400 °C, subject to the property class and the joint. In practice this grade is the most common stainless group for indoor and general outdoor fasteners.

Grade

ISO 3506 group A2 (304 / 1.4301), commonly supplied A2-70

Corrosion resistance

Good general corrosion resistance

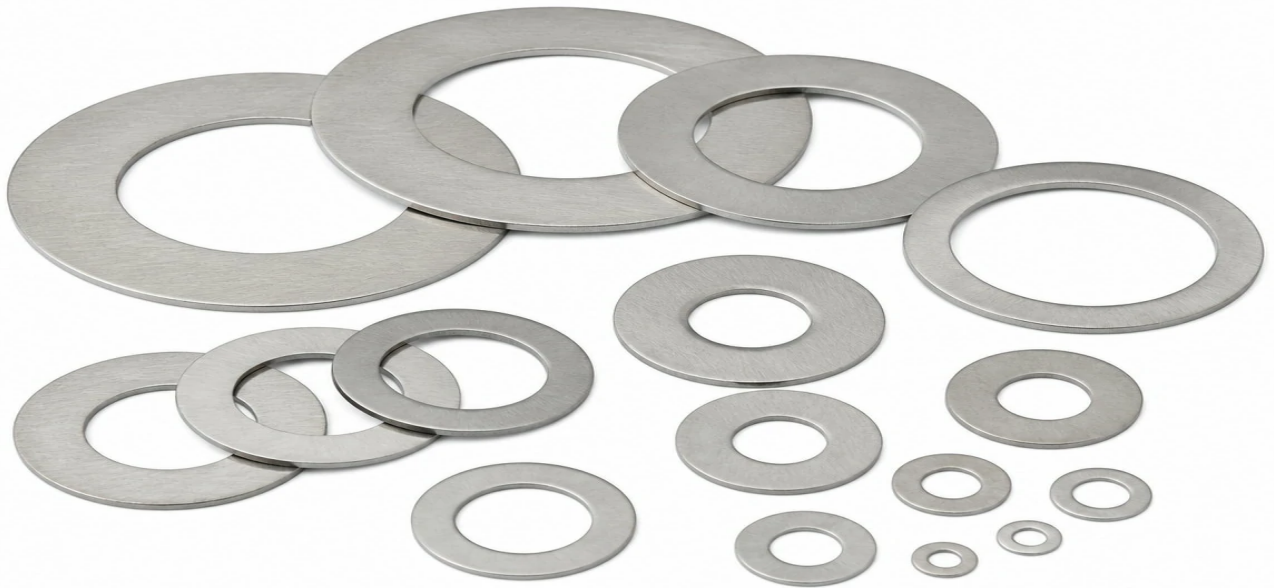
Magnetic response

Largely non-magnetic

Service temperature

approx. -200 °C to +400 °C, subject to the property class and the joint

Property values are typical for the grade. Certified mechanical test data is available on request for production orders.



A2 Stainless Steel Shim Rings (Support Washers) combine the dimensional form of DIN 988 with the material properties of grade ISO 3506 group A2 (304 / 1.4301), commonly supplied A2-70: good general corrosion resistance, largely non-magnetic, service range approx. -200 °C to +400 °C, subject to the property class and the joint. This page summarizes the grade data, its corrosion behavior in service, the comparable grades, and the sizes supplied.

Why Choose A2 Stainless Steel for Shim Rings (Support Washers)

The most common stainless group for indoor and general outdoor fasteners. For shim rings (support washers), this matters when good general corrosion resistance is the primary requirement.

Mechanical & Physical Properties

Grade designation	ISO 3506 group A2 (304 / 1.4301), commonly supplied A2-70
Magnetic response	Largely non-magnetic
Service temperature	approx. -200 °C to +400 °C, subject to the property class and the joint
Corrosion characteristic	Good general corrosion resistance

Galvanic & Galling Considerations

For stainless shim rings (support washers) the compatibility question is galvanic rather than galling: joined to aluminum or galvanized steel in wet service, stainless drives corrosion of the less-noble metal. Isolate with a coating, sleeve or non-conductive washer where the joint sees moisture. Note also that stainless is softer than hardened carbon steel, so where the part carries a wear or shear duty, check the load against the grade before substituting.

Comparable Grades

For Shim Rings (Support Washers), the alternative stainless grade is A4 (316). A2 (304) suits general indoor and outdoor service; A4 (316) adds molybdenum for marine and chloride environments. Where higher strength matters more than corrosion, switch to plated alloy-steel class 8.8 or 10.9.

Using Stainless Fasteners in Aluminum

Stainless steel is more noble than aluminum, so in the presence of an electrolyte — rain, condensation, salt spray — the aluminum becomes the anode and corrodes at the joint. The effect is driven by the area ratio: a small stainless fastener in a large aluminum section is normally acceptable, while a large stainless fastener in thin aluminum is not. Where the joint is wet, isolate the two metals with a coated or nylon washer and a sealant, or specify an aluminum or coated fastener instead.

Sizes of Shim Rings (Support Washers) Available in A2 Stainless Steel

Size	Inner diameter d1 (mm)	Outer diameter d2 (mm)	Thickness s (mm)	Reference standard	Notes
3	3	6	0.1	DIN 988	Also 0.15, 0.2 thickness
4	4	8	0.1	DIN 988	Also 0.15, 0.2, 0.3 thickness
5	5	10	0.1	DIN 988	Also 0.15, 0.2, 0.3 thickness
6	6	12	0.1	DIN 988	Also 0.15, 0.2, 0.3, 0.5, 1, 1.2 thickness
7	7	13	0.1	DIN 988	Also 0.15, 0.2, 0.3, 0.5, 1, 1.2, 1.4 thickness
8	8	14	0.1	DIN 988	Also 0.15, 0.2, 0.3, 0.5, 1, 1.2, 1.5 thickness
9	9	15	0.1	DIN 988	Thickness range 0.1-1.6
10	10	16	0.1	DIN 988	Thickness range 0.1-1.8
11	11	17	0.1	DIN 988	Thickness range 0.1-1.8
12	12	18	0.1	DIN 988	Thickness range 0.1-1.8

Technical Drawing

Customize the parameters below — every spec field is editable, and the drawing redraws to match the values you choose. Changing the size will snap the other fields to that size's standard values; you can then override any individual value.

Sends the selected values to the quote form below.

Request a Quote

The form below follows the current technical drawing configuration. Change the drawing values above and the request details update automatically.

Dimensions & Specifications (DIN 988)

Size	Inner diameter d1 (mm)	Outer diameter d2 (mm)	Thickness s (mm)	Reference standard	Notes
3	3	6	0.1	DIN 988	Also 0.15, 0.2 thickness
4	4	8	0.1	DIN 988	Also 0.15, 0.2, 0.3 thickness
5	5	10	0.1	DIN 988	Also 0.15, 0.2, 0.3 thickness
6	6	12	0.1	DIN 988	Also 0.15, 0.2, 0.3, 0.5, 1, 1.2 thickness
7	7	13	0.1	DIN 988	Also 0.15, 0.2, 0.3, 0.5, 1, 1.2, 1.4 thickness
8	8	14	0.1	DIN 988	Also 0.15, 0.2, 0.3, 0.5, 1, 1.2, 1.5 thickness
9	9	15	0.1	DIN 988	Thickness range 0.1-1.6
10	10	16	0.1	DIN 988	Thickness range 0.1-1.8
11	11	17	0.1	DIN 988	Thickness range 0.1-1.8
12	12	18	0.1	DIN 988	Thickness range 0.1-1.8

Materials & Grades

Select a material class to see the grades we supply it in. Each designation is listed with its ISO/EN, AISI/SAE, JIS and GB equivalents.

[Stainless Steel](#)
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Stainless Steel

Austenitic Stainless Steel

- A1 AISI 303 · SAE 303 · SUS303 · EN 1.4305 · X8CrNiS18-9
- A2 AISI 304 · SAE 304 · SUS304 · EN 1.4301 · X5CrNi18-10 · 06Cr19Ni10
- 304L AISI 304L · SUS304L · EN 1.4307 · X2CrNi18-9 · 022Cr19Ni10
- 302 AISI 302 · SUS302 · EN 1.4310
- 305 AISI 305 · SUS305 · EN 1.4303

- A4 AISI 316 · SAE 316 · SUS316 · EN 1.4401 · X5CrNiMo17-12-2 · 06Cr17Ni12Mo2
- 316L AISI 316L · SUS316L · EN 1.4404 · X2CrNiMo17-12-2 · 022Cr17Ni12Mo2
- 321 AISI 321 · SUS321 · EN 1.4541 · X6CrNiTi18-10
- 310 / 310S AISI 310 · AISI 310S · SUS310S · EN 1.4845
- 302HQ AISI 302HQ
- A3
- A5
- 347 AISI 347 · SUS347 · EN 1.4550 · X6CrNiNb18-10
- 309 / 309S AISI 309 · AISI 309S · SUS309S

Martensitic Stainless Steel

- AISI 410 SUS410 · EN 1.4006 · X12Cr13 · 12Cr13
- AISI 420 SUS420J1 · SUS420J2 · EN 1.4021 · EN 1.4028 · 20Cr13 · 30Cr13
- AISI 431 SUS431 · EN 1.4057 · X17CrNi16-2
- C1
- C3
- C4
- AISI 440A
- AISI 440B
- AISI 440C SUS440C · EN 1.4125

Ferritic Stainless Steel

- AISI 430 SUS430 · EN 1.4016 · X6Cr17 · 10Cr17
- F1
- AISI 434
- AISI 444

Precipitation-Hardening Stainless Steel

- 17-4 PH AISI 630 · UNS S17400 · SUS630 · EN 1.4542 · X5CrNiCuNb16-4
- 15-5 PH UNS S15500
- 17-7 PH UNS S17700

Duplex and Super Duplex Stainless Steel

- Duplex 2205 UNS S31803 · UNS S32205 · EN 1.4462
- Super Duplex 2507 UNS S32750 · EN 1.4410
- D2

- D4
- D6
- D8
- Lean Duplex 2101 UNS S32101
- Super Duplex S32760 UNS S32760 · EN 1.4501

Carbon Steel

Low-Carbon Steel

- SAE 1006
- SAE 1008
- SAE 1010
- SAE 1018
- SAE 1020
- Q195
- Q235
- SAE 1012
- SAE 1015
- Q215
- ML08
- ML08AI
- ML10
- ML15
- ML20
- SWRCH6A
- SWRCH8A
- SWRCH10A
- SWRCH12A
- SWRCH15A
- SWRCH18A

Medium-Carbon Steel

- SAE 1035
- SAE 1045
- S45C
- C45

- SAE 1030
- SAE 1040
- SAE 1050
- 30
- 35
- 40
- 45
- 50
- S35C
- S40C
- S50C
- C35
- C40

High-Carbon Steel

- SAE 1060
- SAE 1070
- 65Mn
- SAE 1065
- SAE 1075
- SAE 1080
- SAE 1085
- SAE 1090
- SAE 1095
- 60
- 65
- 70
- 75
- 80
- 85

Cold-Heading Steel

- SWRCH22A
- 10B21
- SWRCH22K
- SWRCH25K

- SWRCH30K
- SWRCH35K
- SWRCH40K
- ML20Mn
- ML25
- ML30
- ML35
- ML40
- 15B25

Alloy Steel

Chromium Steel

- 40Cr
- 45Cr
- AISI 5140
- SAE 5140
- AISI 5120
- SAE 5120
- SCr420
- SCr440

Chromium-Molybdenum Steel

- 35CrMo
- 42CrMo
- AISI 4140
- SCM435
- SCM440
- 42CrMo4
- 30CrMo
- AISI 4130
- SAE 4130
- SAE 4140
- AISI 4142
- AISI 4145
- SCM415

- SCM420
- SCM445
- EN 1.7220
- EN 1.7225
- 25CrMo4
- 34CrMo4

Nickel-Chromium-Molybdenum Steel

- AISI 4340
- SAE 4340
- 40CrNiMo
- SNCM439
- EN 1.6511
- 36CrNiMo4

Boron Alloy Steel

- 10B22
- 10B21
- 15B21
- 15B25
- 20MnTiB
- 20Mn2B
- 35VB
- 40MnB

Bearing Steel

Bearing Steel

- GCr15
- AISI 52100 SAE 52100 · UNS G52986
- SUJ2
- 100Cr6 EN 1.3505
- GCr15SiMn

Spring Steel

Carbon Spring Steel

- SAE 1065
- SAE 1070
- SAE 1075
- SAE 1080
- SAE 1095
- 65
- 70
- 75
- 80
- 65Mn

Silicon-Manganese Spring Steel

- 60Si2Mn
- 60Si2MnA
- SUP6
- SUP7

Chromium-Vanadium Spring Steel

- 50CrVA
- SAE 6150
- AISI 6150
- SUP10

Stainless Spring Steel

- AISI 301
- SUS301
- EN 1.4310
- AISI 302
- AISI 304
- AISI 316
- 17-7 PH

Aluminum and Aluminum Alloys

Commercially Pure Aluminum

- 1050
- 1060
- 1070
- 1100

2xxx Series Aluminum

- 2024
- 2011
- 2014
- 2017

5xxx Series Aluminum

- 5052
- 5083
- 5754

6xxx Series Aluminum

- 6061
- 6061-T6
- 6063
- 6082
- 6082-T6

7xxx Series Aluminum

- 7075
- 7075-T6
- 7005
- 7050
- 7075-T73

Brass

Free-Cutting Brass

- C36000
- H62
- HPb59-1
- C3601
- C3602
- C3604
- CuZn36Pb3
- CuZn39Pb3
- EN CW614N
- EN CW617N
- H65

Lead-Free Brass

- C69300
- C27450
- CW510L
- CW511L

Naval Brass

- C46400
- CuZn39Sn1

Bronze

Silicon Bronze

- C65500
- C65100
- C65600

Phosphor Bronze

- C51000
- C52100

- CuSn6
- CuSn8

Aluminum Bronze

- C95400
- C95500
- C63000
- CuAl10Ni5Fe4

Copper

Copper

- C11000
- T2
- C10100
- C10200
- C12200
- T1
- TU1
- TU2

Titanium and Titanium Alloys

Commercially Pure Titanium

- Grade 2
- Grade 1
- Grade 3
- Grade 4
- TA1
- TA2
- TA3

Alpha-Beta Titanium Alloys

- Grade 5
- Ti-6Al-4V
- TC4

- UNS R56400

Low-Interstitial Grade

- Grade 23
- Ti-6Al-4V ELI
- UNS R56407

Other Titanium Fastener Alloys

- Ti-6Al-6V-2Sn
- Ti-6Al-2Sn-4Zr-2Mo
- Beta-C titanium
- Ti-10V-2Fe-3Al

Nickel and Nickel Alloys

Commercially Pure Nickel

- Nickel 200
- UNS N02200
- Nickel 201
- UNS N02201

Inconel Alloys

- Inconel 625 UNS N06625
- Inconel 718 UNS N07718
- Inconel 600 UNS N06600
- Inconel 601 UNS N06601
- Inconel 686 UNS N06686
- Inconel X-750 UNS N07750

Monel Alloys

- Monel 400 UNS N04400
- Monel K-500 UNS N05500

Hastelloy Alloys

- Hastelloy C-276 UNS N10276
- Hastelloy C-22 UNS N06022

- Hastelloy B-2 UNS N10665
- Hastelloy B-3 UNS N10675
- Hastelloy X UNS N06002

Other Nickel Alloys

- Alloy 20 UNS N08020
- Alloy 625
- Alloy 718
- Alloy 825 UNS N08825
- Alloy 925 UNS N09925

Iron-Nickel and High-Temperature Alloys

A286

- A-286
- UNS S66286
- EN 1.4980

Invar

- Invar 36
- Alloy 36
- UNS K93600
- FeNi36

Alloy 42

- Alloy 42
- UNS K94100
- FeNi42

Tool Steel and Specialty Hardened Steel

Tool Steel and Specialty Hardened Steel

- AISI D2
- AISI H13
- SKD11
- Cr12MoV

- AISI O1
- AISI A2
- AISI S7
- SKD61
- 9CrSi

Structural and Construction Steel

Structural and Construction Steel

- ASTM A36
- Q235B
- Q355B
- S355JR
- Q235C
- Q355C
- S235JR
- S275JR
- S355J2

Inside the plant

Manufactured in our own plant

This part is cold-formed, threaded, heat-treated and finished in-house. The stages below are where its class and finish are actually decided.

1.



01

Cold heading

Wire rod is drawn to size and cold-formed into blanks. Forming rather than cutting keeps the grain flow continuous around the head, which is where a bolt is most likely to fail.

Head dimensions and under-head radius checked at set-up and per shift.



2.

02

Thread rolling

Threads are rolled between hardened dies rather than cut. Rolled threads are stronger in fatigue than cut threads and hold pitch and flank angle far more consistently across a batch.

Go / no-go ring gauges to ISO 965 tolerance class 6g.

3.



03

Heat treatment

Quench-and-temper brings carbon and alloy steel to the property class ordered — 8.8, 10.9 or 12.9 — with the furnace charge tracked so a finished lot can be traced back to it.

Core hardness and tensile tested per lot to ISO 898-1.

4.



04

Surface treatment

Zinc, zinc-nickel, hot-dip galvanizing, black oxide, phosphate and Dacromet, selected against the service environment rather than against the price list.

Coating thickness and neutral salt spray hours to ISO 9227.

Frequently Asked Questions

Is A2 Stainless Steel food-grade?

A2 (304) is widely accepted for food contact in non-chloride environments; A4 (316) is preferred where chlorides are present.

Can A2 Stainless Steel Shim Rings (Support Washers) be used with aluminum?

Yes, but stainless drives mild galvanic corrosion of aluminum in wet service — isolate with a coating, sleeve or paint, or accept the trade-off if the joint is dry and indoor.

What's the service temperature limit for A2 Stainless Steel?

The practical service range is approx. -200 °C to +400 °C, subject to the property class and the joint.

Can A2 Stainless Steel replace plated alloy steel structurally?

Only at the standard strength classes — A2-70 / A4-80 are roughly equivalent to class 7 steel; A4-100 reaches class 8.8. For class 10.9 or 12.9 strength, plated alloy steel is required.

How do I request a quotation?

Use the technical drawing on this page to pick the exact configuration, then submit it with the quote form. We respond within one business day.

Related Pages

[View the full Shim Rings \(Support Washers\) page](#)

More Shim Rings (Support Washers) Guides

- [A4 Stainless Steel Shim Rings \(Support Washers\)](#)