GB/T 1228 Heavy Hex Socket Head Cap Screw Specification

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GB/T 1228 specifies the dimensions and tolerances for heavy hex socket head cap screw. The full dimensional table is reproduced below, followed by the DIN, ISO and ASME parts that match or supersede it.

Standard

GB/T 1228

Product

Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046)

Governing standards

GB/T 1228 / ASTM A325

Equivalence between national standards is dimensional, not always metallurgical. Check the property class separately when substituting.

The table below lists the dimensions catalogued for heavy hex socket head cap screw under GB/T 1228. The scope of GB/T 1228 itself is not summarised here — where a figure matters, confirm it against the published document.

GB/T 1228 — Scope

The table below lists the dimensions catalogued for heavy hex socket head cap screw — gb/t 1228 / astm a325 (series 046) under GB/T 1228. The scope of GB/T 1228 itself is not summarised here — where a figure matters, confirm it against the published document.

Tolerance & Product Grades

Product grade is a concept from dimensional fastener standards and does not apply to GB/T 1228. Tolerances for this part are the limits shown against each dimension in the table.

Dimensions Specified by GB/T 1228

Size	Pitch (mm)	Length L (mm)	Head diameter dk (mm)	Head height k (mm)	Hex
M3	0.5	20	5.5	3	2.5
M4	0.7	25	7.0	4	3.0
M5	0.8	30	8.5	5	4.0
M6	1.0	40	10.0	6	5.0
M8	1.25	50	13.0	8	6.0
M10	1.5	60	16.0	10	8.0
M12	1.75	80	18.0	12	10.0
M14	2.0	80	21.0	14	12.0
M16	2.0	100	24.0	16	14.0
M18	2.5	100	27.0	18	14.0
M20	2.5	120	30.0	20	17.0
M24	3.0	150	36.0	24	19.0
M30	3.5	180	45.0	30	22.0
M36	4.0	200	54.0	36	27.0

Equivalent Standards

Where direct equivalents exist (ISO ↔ DIN, ISO ↔ ASME), they are listed on the parent Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) page.

> *Always confirm against the dimensions on this page, since some "equivalent" standards differ in tolerances and head geometry.*

Companion Standards

A complete specification for heavy hex socket head cap screw — gb/t 1228 / astm a325 (series 046) normally cites several documents: one for the geometry, one for the material or mechanical properties, and one for the finish. GB/T 1228 is one of them, not all of them.

Custom manufacturing · Made to drawing

Need a screw to this standard in a non-standard size?

Parts built to GB T 1228 are already in the catalog, so a special is usually a variation on existing tooling rather than a new design — which is what keeps the cost down. Made by cold heading or warm forging.

Minimum order from 2,000 pieces; samples within 7 days of drawing approval.

Custom screw manufacturing

(https://engineeringhardware.com/custom/screws/)

(https://engineeringhardware.com/custom/screws/)

Send a drawing (https://engineeringhardware.com/custom/screws/#rfq)

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.

Dimensioned line drawing of M3 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) to GB/T 1228 / ASTM A325. Side view and top view, drawn to the dimensions in the table below and redrawn for any size selected.

Opens a short step to confirm the exact specification before you enter contact details.

Request a Quote

Click “Request this configuration” under the drawing to confirm the exact specification, then add your contact details. You can also send the request without a specification — but only an accurate selection gets an accurate quote.

Dimensions & Specifications (GB/T 1228 / ASTM A325)

Size	Pitch (mm)	Length L (mm)	Head diameter dk (mm)	Head height k (mm)	Hex
M3	0.5	20	5.5	3	2.5
M4	0.7	25	7.0	4	3.0
M5	0.8	30	8.5	5	4.0
M6	1.0	40	10.0	6	5.0
M8	1.25	50	13.0	8	6.0
M10	1.5	60	16.0	10	8.0
M12	1.75	80	18.0	12	10.0
M14	2.0	80	21.0	14	12.0
M16	2.0	100	24.0	16	14.0
M18	2.5	100	27.0	18	14.0
M20	2.5	120	30.0	20	17.0
M24	3.0	150	36.0	24	19.0
M30	3.5	180	45.0	30	22.0
M36	4.0	200	54.0	36	27.0

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

Carbon Steel 66

Alloy Steel 41

Bearing Steel 5

Spring Steel 25

Aluminum and Aluminum Alloys 21

Brass 17

Bronze 11

Copper 8

Titanium and Titanium Alloys 18

Nickel and Nickel Alloys 22

Iron-Nickel and High-Temperature Alloys 10

Tool Steel and Specialty Hardened Steel 9

Structural and Construction Steel 9

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

ML08Al
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

Applications & Industries

Heavy Hex Socket Head Cap Screw are bought for a small number of well-defined jobs. These are the ones we ship them for. Stocked from M3 to M36.

Industries that specify Heavy Hex Socket Head Cap Screw

Automotive & transport **Chassis, driveline and body fixings that see vibration and are assembled to a controlled preload.**

Steel fabrication **Bolted connections in frames, enclosures, walkways and weldments, on the bench and on site.**

Energy & infrastructure **Tower, pipework, switchgear and plant fixings specified for long service life and inspectable joints.**

Maintenance & MRO **Stocked replacements matched to an existing property class, thread and finish.**

Food, pharma & cleanroom **Stainless assemblies that are washed down, where the finish matters as much as the strength.**

Machine building & OEM **The default fastener on production equipment: covers, brackets, motor mounts and sub-assemblies tightened to a specified torque.**

Typical applications

- **joints where the property class is stated on the drawing**
- **clamping two machined faces to a calculated preload**
- **bolting brackets, motors and gearboxes to a frame**
- **assemblies that are dismantled for service and re-torqued**

Service conditions to specify against

Marine and coastal

Available in A4 (316) stainless for chloride exposure — coastal structures, pool halls, water treatment and deck hardware, where A2 will eventually pit.

High load

Supplied in ISO 898-1 property classes, so the joint can be designed to a stated proof load and tightened to a calculated torque rather than by feel.

Torque and preload

The joint is designed around bolt tension, so lubrication, coating and the friction coefficient all change the torque figure — state them together.

Where to use something else

- **Do not use a machine thread into unthreaded sheet or timber; use a tapping screw, rivet nut or insert made for that parent material.**

Need help matching Heavy Hex Socket Head Cap Screw to your application? Send the assembly, the load and the environment with your enquiry and we will specify the size, material and finish against them.

Video: GB/T 1228 Heavy Hex Socket Head Cap Screw Specification

(https://www.youtube.com/watch?v=DYhqqyYZ714)https://www.youtube.com/watch?v=DYhqqyYZ714)

► Watch video: https://www.youtube.com/watch?v=DYhqqyYZ714(https://www.youtube.com/watch?v=DYhqqyYZ714)

Third-party video, selected automatically for this topic. It is not produced by Engineering Hardware and is not a specification source — use the tables on this page for dimensional data.

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.

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.

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.

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.

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

Can I substitute GB/T 1228 for the corresponding DIN standard on a drawing?

On modern drawings the ISO standard is the master reference; the older DIN equivalent is a cross-reference. For most dimensional purposes the parts are interchangeable, but check tolerance grades and the head height — these are the most common points of divergence.

Which edition of GB/T 1228 does this table follow?

The table reproduces the dimensions we supply heavy hex socket head cap screw — gb/t 1228 / astm a325 (series 046) to. We do not publish an edition year against it, so where the edition is contractually significant, cite the edition you require on the enquiry and we will confirm it against the table before quoting.

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 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) page (https://engineeringhardware.com/fastener/cad-svg-046-sockethead/)

More Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) Guides

- **ASTM A325 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/standard/astm-a325-cad-svg-046-sockethead/)**