M20 Heavy Hex Socket Head Cap Screw Dimensions

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M20 Heavy Hex Socket Head Cap Screw dimensions to GB/T 1228 / ASTM A325: head diameter 30 mm, head height 20 mm, coarse thread pitch 2.5 mm, clearance hole (ISO 273 medium) 22 mm. Tighten to approximately 420 Nm at property class 8.8 in a dry, as-supplied condition.

Head diameter

30 mm

Head height

20 mm

Coarse thread pitch

2.5 mm

Clearance hole (ISO 273 medium)

22 mm

Tightening torque (class 8.8)

420 Nm

Figures are nominal values from the governing standard. Confirm against the tolerance class for your application before machining or ordering.

Dimensional and assembly data for M20 Heavy Hex Socket Head Cap Screw to GB/T 1228 / ASTM A325. Includes head size and width across flats, clearance-hole and tapping-drill diameters, tightening torque per property class, and the sizes to step up or down to when the joint requires it.

M20 Dimensional Row (GB/T 1228 / ASTM A325)

Size	Pitch (mm)	Length L (mm)	Head diameter dk (mm)	Head height k (mm)	Hex
M20	2.5	120	30.0	20	17.0

Spanner & Drive for M20 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046)

The hex socket for M20 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) is shown in the spec table — use the matching Allen / hex key (an ISO 2936 hex key set covers the full range). Ball-end keys are for reaching the screw, not for tightening it — finish on the plain end, and on production work use a torque-controlled driver.

Hole Sizes for M20

Coarse-thread pitch (ISO 724)	2.5 mm
Through-hole / clearance (ISO 273 medium)	22 mm
Tapping drill, coarse thread	17.5 mm

Tightening Torque for M20

Class 8.8 (dry, ~μ 0.125)	≈ 420 Nm
Class 10.9 (dry, ~μ 0.125)	≈ 598 Nm
Class 12.9 (dry, ~μ 0.125)	≈ 700 Nm

Indicative dry-joint values. Lubrication can lower the required torque by 15–25%. Always confirm against the joint design, especially when going up a strength class.

Proof Load & Strength for M20

Tensile stress area As (ISO 724)	245 mm²
Proof load, class 8.8	147 kN
Proof load, class 10.9	203 kN
Proof load, class 12.9	237 kN
Min. ultimate tensile load, class 8.8	203 kN

Proof load = tensile stress area × the proof stress Sp of the class, per ISO 898-1 — Sp is a lower figure than the yield stress Rp0.2 and the two are not interchangeable. The stress area is computed from this size's own diameter and pitch, so a fine-pitch designation gives the fine-pitch figure. Design the joint so the working preload stays below the proof load of the class selected.

M20 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) Weight

A steel M20 heavy hex socket head cap screw at the listed 120 mm length weighs approximately 666 g each — about 666 kg per 1,000 pieces. Stainless A2/A4 weighs roughly the same (density 7.9–8.0 g/cm³).

Actual weight varies slightly with head form, thread and finish; use this figure for freight estimation only.

Installation Tips for M20 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046)

- Use a quality Allen key fully seated in the socket — partial engagement is the most common cause of stripped sockets at this size.
- For countersunk and button-head variants, chamfer the through-hole to seat the head flush without preloading the head/shank fillet.
- At M20 the stretch in the bolt becomes the controlling factor — for critical joints, use angle-controlled or stretch-controlled tightening instead of pure torque.

When to Step Up or Down from M20

When the joint preload approaches the proof load of M20 class 8.8, step up to M24 class 8.8 (or move to M20 class 10.9). When the joint is over-specified, M16 often saves weight and cost without losing the safety margin.

Custom manufacturing · Made to drawing

Need heavy hex socket head cap screw in a size this table does not list?

This page covers M20 heavy hex socket head cap screw. Where the standard stops, the drawing takes over: fine pitches, left-hand threads, partial

threading, and property classes above the catalogued grade where material and heat treatment allow. 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/)

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 M20 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 for M20 Heavy Hex Socket Head Cap Screw

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.

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

What is the coarse-thread pitch of M20 for Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046)?

For M20 the standard coarse pitch is 2.5 mm — this is the value used for Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046).

What torque do M20 class 8.8 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) take?

A dry M20 class 8.8 joint takes about 420 Nm (≈ 598 Nm for 10.9, ≈ 700 Nm for 12.9). Confirm against your joint design; lubrication reduces these values.

What clearance and tapping drill suit M20?

Use a 22 mm clearance hole (ISO 273 medium) for through-fixing, or a 17.5 mm tapping drill for a coarse M20 thread.

Should M20 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) be tightened by torque or by angle?

For critical structural joints at M20, angle-controlled or stretch-controlled tightening is more repeatable than pure torque — the friction scatter at large diameters can dominate the torque signal.

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

- **M3 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/size/m3-cad-svg-046-sockethead/)**
- **M4 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/size/m4-cad-svg-046-sockethead/)**
- **M5 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/size/m5-cad-svg-046-sockethead/)**
- **M6 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/size/m6-cad-svg-046-sockethead/)**
- **M8 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/size/m8-cad-svg-046-sockethead/)**
- **M10 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/size/m10-cad-svg-046-sockethead/)**
- **M12 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/size/m12-cad-svg-046-sockethead/)**
- **M14 Heavy Hex Socket Head Cap Screw — GB/T 1228 / ASTM A325 (Series 046) (https://engineeringhardware.com/guide/size/m14-cad-svg-046-sockethead/)**