Tension-Control Structural Bolt Assemblies (TC / Twist-Off)

Tension-Control Structural Bolt Assemblies (TC / Twist-Off) to ASTM F3125/F3125M Grade F1852 and F2280 are catalogued in sizes M16 to M20. 8 sizes are held in the table below, and the technical drawing redraws to whichever row you select.

Standard

ASTM F3125/F3125M Grade F1852 and F2280

Size range

M16-M20

Catalogued sizes

8

Dimensions are nominal values from the governing standard. Confirm the tolerance class for your application before ordering.



Product catalog

Related Heavy Hex Structural Bolts products



(https://engineeringhardware.com/product/high-strength-hexagon-bolts-din933-8-8-10-9-12-9-grades/)

Structural & Heavy Hex Bolts

High Strength Hexagon Bolts DIN933 – 8.8, 10.9, 12.9 Grades

(https://engineeringhardware.com/product/high-strength-hexagon-bolts-din933-8-8-10-9-12-9-grades/)

Hexagon Head · DIN, ANSI, GB, JIS, BSW

US$0.12 MOQ 100 boxes



(https://engineeringhardware.com/product/customized-high-strength-strength-steel-bolt-round-head-flathead-bolt-non-thread-bolt/)

Structural & Heavy Hex Bolts

Customized High Strength Strength Steel Bolt Round Head Flathead Bolt Non-Thread Bolt (https://engineeringhardware.com/product/customized-high-strength-strength-steel-bolt-round-head-flathead-bolt-non-thread-bolt/)

Countersunk Head · DIN, ANSI, GB, JIS, BSW, GOST

US$0.0528 – 0.11MOQ 1,000 pieces



(https://engineeringhardware.com/product/high-strength-hardware-a2-70-a4-80-ss304-ss316-b8-b8m-m6-m8-m10-m12-m16-m20-m24/)

Structural & Heavy Hex Bolts

High Strength Hardware A2 70 A4 80 SS304 SS316 B8 B8m M6 M8 M10 M12 M16 M20 M24 DIN931 DIN933 Stainless Steel Hex Head Bolts

(https://engineeringhardware.com/product/high-strength-hardware-a2-70-a4-80-ss304-ss316-b8-b8m-m6-m8-m10-m12-m16-m20-m24/)

Hexagon Head · DIN, ANSI, GB, JIS, BSW, GOST

US$0.006 – 0.012 MOQ 1 piece



(https://engineeringhardware.com/product/industrial-black-oxide-high-strength-hex-bolts-din-iso-metric-us-astm-unified-uk/)

Structural & Heavy Hex Bolts

Industrial Black Oxide High Strength Hex Bolts, DIN ISO Metric, Us ASTM Unified, UK Imperial Whitworth Large Size Bolts Heavy Bolt

(https://engineeringhardware.com/product/industrial-black-oxide-high-strength-hex-bolts-din-iso-metric-us-astm-unified-uk/)

Hexagon Head · DIN, ANSI, GB, JIS, BSW, GOST

US$12.00 – 36.00 MOQ 1 piece



(https://engineeringhardware.com/product/din931-galvanized-din-933-hardware-m10-a325-hex-bolt-hdg/)

Structural & Heavy Hex Bolts

DIN931 Galvanized DIN 933 Hardware M10 A325 Hex Bolt HDG

(https://engineeringhardware.com/product/din931-galvanized-din-933-hardware-m10-a325-hex-bolt-hdg/)

Hexagon Head · DIN

US$0.012 – 0.12MOQ 1,000 pieces



(https://engineeringhardware.com/product/astm-a325-galvanized-carbon-steel-hex-bolt-and-nut-with-washer/)

Structural & Heavy Hex Bolts

ASTM A325 Galvanized Carbon Steel Hex Bolt and Nut with Washer

(https://engineeringhardware.com/product/astm-a325-galvanized-carbon-steel-hex-

bolt-and-nut-with-washer/)

Hexagon Head · DIN, ANSI, GB, BSW

US$0.012 – 0.06 MOQ 1,000 pieces

View all Structural & Heavy Hex Bolts → (https://engineeringhardware.com/fastener-products/bolts/structural-heavy-hex-bolts/)

Full product catalog (https://engineeringhardware.com/products/)

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

Tension-Control Structural Bolt Assemblies are bought for a small number of well-defined jobs. These are the ones we ship them for. Stocked from 1/2-13 to M20 (screw size).

Industries that specify Tension-Control Structural Bolt Assemblies

Industrial fabrication One-pass structural assembly where repeatable tension matters more than later disassembly.

Steel erection Matched structural bolt assemblies tensioned in beam, column and splice connections.

Bridge construction Slip-critical steel joints where the final tension is set by the twist-off installation system.

Heavy transport Truck frames and chassis joints exposed to road vibration and cyclic load.

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

- using the plain shank and heavy hex geometry for steel-to-steel joints
- installing a matched bolt, nut and washer assembly with a controlled twist-off spline
- setting structural tension without a separate torque reaction wrench on the nut
- selecting F1852 or F2280 together with the required installation tension
- joints where the property class is stated on the drawing
- clamping two machined faces to a calculated preload

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 reuse the twisted-off spline or substitute a generic torque value for the grade-specific installation method.
- Do not use a machine thread into unthreaded sheet or timber; use a tapping screw, rivet nut or insert made for that parent material.

Full application guide: where Tension-Control Structural Bolt Assemblies are used, how to specify them, and the cases they are wrong for (https://engineeringhardware.com/applications/tension-control-structural-bolt-assemblies/)

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 1/2-13 Tension-Control Structural Bolt Assemblies (TC / Twist-Off) to ASTM F3125/F3125M Grade F1852 and F2280. Side view and top view, drawn to the dimensions in the table below and redrawn for any size selected.

Sends the selected values to the quote form below.

Request a Quotation for Tension-Control Structural Bolt Assemblies (TC / Twist-Off)

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

Dimensions & Specifications (ASTM F3125/F3125M Grade F1852 and F2280)

Every row below is a starting point for the customizer above — pick any size and the drawing will redraw to that row.

Size	Thre
1/2-13	UNC
5/8-11	UNC
3/4-10	UNC
7/8-9	UNC
1-8	UNC
1-1/8-7	UNC
M16 (https://engineeringhardware.com/guide/size/m16-tension-control-structural-bolt-assemblies/)	Metri
M20 (https://engineeringhardware.com/guide/size/m20-tension-control-structural-bolt-assemblies/)	Metri

Tension-Control Structural Bolt Assemblies (TC / Twist-Off) (ASTM F3125/F3125M Grade F1852 and F2280) are a type of bolts used across industrial assembly. Below is the complete size table together with material, standard and application guidance.

What Are Tension-Control Structural Bolt Assemblies (TC / Twist-Off)?

Tension-Control Structural Bolt Assemblies (TC / Twist-Off) are bolts defined by ASTM F3125/F3125M Grade F1852 and F2280. They are selected by screw size and the dimensional characteristics shown below, and are available in a range of materials and

finishes to suit the application and environment.

Materials & Finishes

Common materials include carbon steel (typically zinc plated or hot-dip galvanized), alloy steel in property classes 8.8, 10.9 and 12.9, and stainless steel A2 (304) or A4 (316) for corrosion resistance. Specify the material, property class and surface finish appropriate to your load and environment.

Specification Guides

Each size, material and standard of Tension-Control Structural Bolt Assemblies (TC / Twist-Off) has its own reference page with the figures for that one configuration.

Goes With

Hardware commonly specified alongside Tension-Control Structural Bolt Assemblies (TC / Twist-Off).

Pricing

Tension-Control Structural Bolt Assemblies (TC / Twist-Off) are supplied to order. Pricing starts from approximately US$2.50 per piece for standard sizes in carbon steel; final pricing depends on size, material, finish and order quantity (MOQ applies). Submit your exact configuration with the quote form above.

Custom manufacturing · Made to drawing

Need a tension-control structural bolt assemblies (tc / twist-off) outside the standard range?

Lengths and thread lengths outside the standard table are the commonest request, followed by a drive the standard does not offer and a head marked with your own part number. Made by cold heading or hot forging.

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

Custom bolt manufacturing
(https://engineeringhardware.com/custom/bolts/)

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

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.

Video: Tension-Control Structural Bolt Assemblies (TC / Twist-Off)





Twist-off Tension Control Assemblies | Würth Knowing Episode 20

(https://www.youtube.com/watch?v=e8pqotAq8yY)

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.

Frequently Asked Questions

What is the controlling standard for Tension-Control Structural Bolt Assemblies (TC / Twist-Off)?

Tension-Control Structural Bolt Assemblies (TC / Twist-Off) are manufactured to ASTM F3125/F3125M Grade F1852 and F2280. The dimensional values on this page follow that standard.

Which sizes of Tension-Control Structural Bolt Assemblies (TC / Twist-Off) does Engineering Hardware supply?

The table on this page lists 8 sizes for Tension-Control Structural Bolt Assemblies (TC / Twist-Off), ranging from 1/2-13 to M20. Sizes outside the table can be quoted on request.

In which materials are Tension-Control Structural Bolt Assemblies (TC / Twist-Off) supplied?

Tension-Control Structural Bolt Assemblies (TC / Twist-Off) are supplied in carbon steel in property classes 8.8 / 10.9 / 12.9 and stainless A2 (304) / A4 (316), with finishes including

zinc plating, hot-dip galvanizing and black oxide. Choose material and finish to suit the load and the service environment for Tension-Control Structural Bolt Assemblies (TC / Twist-Off).

How do I request a quotation?

Use the parametric drawing on this page to set the exact configuration (size, material, finish) and click "Request this configuration" — a specialist from Engineering Hardware will respond within one business day.