



# ALLOY STUD BOLT & NUT



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*The best quality, price, service and delivery in the fastener industry is backed by almost 50 years of Sanwa Iron Works experience in stud bolt and nut manufacturing and marketing. Modern equipment and facilities, dedicated personnel and lots of hard work have made us a leader in the fastener world. Come grow with us!*

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The best quality, price, service and delivery.





**\* MATERIALS  
\* SELECTION**

Temperature Range	Materials: Bolt/Nut
(-)100°C-(-)200°C	A320B8/Gr. 8
(-)46°C-(-)100°C	A320L7/Gr. 4
0°C-(-)45°C	A320L7/Gr. 4, B7/2H
0°C- 300°C	A307
300°C- 400°C	A193B7/Gr. 2H, B7/2H
400°C- 550°C	A193B16/Gr. 4

Temperature Range	Materials: Bolt/Nut
550°C- 650°C	A193B8/Gr. 8
650°C- 750°C	A193B8M/Gr. 8M
750°C	A453Gr.600/Gr.600, A453Gr.650/Gr.6C
850°C	Hastalloy B & C
850°C- 1,000°C	Chromium Alloy

(Available Stock)

**\* HIGH-TEMPERATURE HIGH-TENSION ALLOY BOLT MATERIAL Chemical & Mechanical Requirements  
ASTM A193 B7 (Cr-Mo AISI 4140, 4142, 4145)**

This material is considered as the most suitable for bolts to be used at temperatures below 450°C, with a minimum effect on its structural strength during application at a high temperature.  
The material has the following chemical properties and physical characteristics.

C	Mn	P	S	Si	Cr	Mo
0.37 ~ 0.49	0.65 ~ 1.10	max 0.035	max 0.04	0.15 ~ 0.35	0.75 ~ 1.20	0.15 ~ 0.25
Dia.	Minimum Tempering Temperature °F	Tensile Strength min, ksi	Yield Strength, min, 0.2% offset, ksi	Elongation in 2", min, %	Reduction of Area min, %	Hardness max
2½" and under	1,100	125	100	16	50	277 ~ 321HB for reference
over 2½" to 4"	1,100	115	95	16	50	
over 4" to 7"	1,100	100	75	18	50	

**ASTM A193 B7M (Cr-Mo AISI 4140, 4142, 4145)**

C	Mn	P	S	Si	Cr	Mo
0.37 ~ 0.49	0.65 ~ 1.10	max 0.035	max 0.040	0.15 ~ 0.35	0.75 ~ 1.20	0.15 ~ 0.25
Dia.	Minimum Tempering Temperature °F	Tensile Strength min, ksi	Yield Strength, min, 0.2% offset, ksi	Elongation in 2", min, %	Reduction of Area min, %	Hardness max
2½" and under	1,150	105	80	18	50	235HB, 99HRB

**ASTM A193 B16 (Cr-Mo-V)**

This material is considered as the most suitable for bolts to be used at temperatures above 450°C, even at a high temperature range, the material has superior physical characteristics to those ASTM A-193 B7 previously mentioned.  
The chemical properties and physical characteristics are as follows:

C	Mn	P	S	Si	Cr	Mo	V
0.36 ~ 0.47	0.45 ~ 0.70	max 0.035	max 0.040	0.15 ~ 0.35	0.80 ~ 1.15	0.50 ~ 0.65	0.25 ~ 0.35
Dia.	Minimum Tempering Deg. °F	Tensile Strength min, ksi	Yield Strength, min, 0.2% offset, ksi	Elongation in 2", min, %	Reduction of Area min, %	Hardness max	
2½" and under	1,200	125	105	18	50	253 ~ 319HB for reference	
over 2½" to 4"	1,200	110	95	17	45		
over 4" to 7"	1,200	100	85	16	45		

**ASTM A193 B5 (5% Cr AISI 501)**

C	Mn	P	S	Si	Cr	Mo
min 0.10	max 1.00	max 0.040	max 0.030	max 1.00	4.00 ~ 6.00	0.40 ~ 0.65
Dia.	Minimum Tempering Temperature °F	Tensile Strength min, ksi	Yield Strength, min, 0.2% offset, ksi	Elongation in 2", min, %	Reduction of Area min, %	Hardness max
up to 4" incl	1,100	100	80	16	50	—

**ASTM A193 B8 (AISI 304) B8A Chemical Requirements**

C	Mn	P	S	Si	Cr	Ni
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	18.00 ~ 20.00	8.00 ~ 10.50

**ASTM A193 B8C (AISI 347) B8CA**

C	Mn	P	S	Si	Cr	Ni	Columbium + Tantalum
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	17.00 ~ 19.00	9.00 ~ 13.00	10 x Carbon content, min

**ASTM A193 B8M (AISI 316) B8MA B8M2 B8M3**

C	Mn	P	S	Si	Cr	Ni	Mo
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	16.00 ~ 18.00	10.00 ~ 14.00	2.00 ~ 3.00

**ASTM A193 B8N (AISI 304N) B8NA**

C	Mn	P	S	Si	Cr	Ni	Nitrogen
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	18.00 ~ 20.00	8.00 ~ 10.50	0.10 ~ 0.16

**B8MN, B8MNA**

C	Mn	P	S	Si	Cr	Ni	Mo	Nitrogen
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	16.00 ~ 18.00	10.00 ~ 14.00	2.00 ~ 3.00	0.10 ~ 0.16

**ASTM A193 B8P (AISI 305) B8PA**

C	Mn	P	S	Si	Cr	Ni
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	17.00 ~ 19.00	10.50 ~ 13.00

**ASTM A193 B8T (AISI 321) B8TA**

C	Mn	P	S	Si	Cr	Ni	Titanium
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	17.00 ~ 19.00	9.00 ~ 12.00	5 x Carbon content, min

**ASTM A193 B8R B8RA**

C	Mn	P	S	Si	Cr	Ni	Mo	Nitrogen	Columbium + Tantalum	V
max 0.06	4.00~6.00	max 0.040	max 0.030	max 1.00	20.50~23.50	11.50~13.50	1.50~3.00	0.20~0.40	0.10~0.30	0.10~0.30

**ASTM A193 B8S B8SA**

C	Mn	P	S	Si	Cr	Ni	Nitrogen
max 0.10	7.00 ~ 9.00	max 0.040	max 0.030	3.50 ~ 4.50	16.00 ~ 18.00	8.00 ~ 9.00	0.08 ~ 0.18



### Monel K-500

Ni	C	Mn	Fe	S	S	Cu	Al	Ti
63 ~ 70	max 0.25	max 1.50	max 2.00	max 0.01	max 1.00	balance	2 ~ 4	0.25 ~ 1.00

### Monel 400

Ni	C	Mn	Fe	S	Si	Cu
66.5	max 0.30	max 2.0	max 2.5	max 0.024	max 0.50	balance

### ⊗ NUT MATERIAL Chemical & Mechanical Requirements

#### ASTM A194 Gr. 2H

This is the nut material for bolts made from ASTM A-193 B7, considered to be used with suitable heat treatment. The chemical properties and physical characteristics are as follows:

**(AVAILABLE STOCK)**

C	Mn	P	S	Si	Brinell Hardness	Rockwell Hardness
min 0.40	max 1.00	max 0.040	max 0.060	max 0.40	To 1½" incl, 248 to 352 Over 1½", 212 to 352	C 24 to 38, B ... C max 38, B min 95

#### ASTM A194 Gr. 2HM

C	Mn	P	S	Si	Brinell Hardness	Rockwell Hardness
min 0.40	max 1.00	max 0.040	max 0.050	max 0.40	159 to 237	C max 22, B ...

#### ASTM A194 Gr. 4

This material is considered as the most suitable for nuts, when they are used with bolts made from ASTM A-193 B 16 and A-320 L7. Even at high temperature range, then material has superior physical characteristics to those ASTM A-194 2H previously mentioned. The chemical properties and physical characteristics are as follows:

C	Mn	P	S	Si	Mo	Brinell Hardness	Rockwell Hardness
0.40 ~ 0.50	0.70 ~ 0.90	max 0.035	max 0.04	0.15 ~ 0.35	0.20 ~ 0.30	248 to 352	C 24 to 38, B ...

#### ASTM A194 Gr. 8 (AISI 304)

This is the nut material for bolts made from ASTM A-193 B8 and A-320 B8, considered to be used with suitable heat treatment. The chemical properties and physical characteristics are as follows:

C	Mn	P	S	Si	Cr	Ni	Brinell Hardness	Rockwell Hardness
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	18.00 ~ 20.00	8.00 ~ 10.50	126 to 300	C ..., B 60 to 105

#### ASTM A194 Gr. 8M (AISI 316)

This is the nut material for bolts made from ASTM A-193 B8M and A-320 B8M, considered to be used with suitable heat treatment. The chemical properties and physical characteristics are as follows:

C	Mn	P	S	Si	Cr	Ni	Mo	Brinell Hardness	Rockwell Hardness
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	18.00 ~ 18.00	10.00 ~ 14.00	2.00 ~ 3.00	126 to 300	C ..., B 60 to 105

#### ASTM A194 Gr. 8C (AISI 347)

This is the nut material for bolts made from ASTM A-193 B8C, A-320 B8C, and A-453 Gr. 660, considered to be used with suitable heat treatment. The chemical properties and physical characteristics are as follows:

C	Mn	P	S	Si	Cr	Ni	Cb + Ta	Brinell Hardness	Rockwell Hardness
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	17.00 ~ 19.00	9.00 ~ 13.00	10 x C%, min	126 to 300	C ..., B 60 to 105

#### ASTM A194 Gr. 8T (AISI 321)

This is the nut material for bolts made from ASTM A-193 B8T and A-320 B8T, considered to be used with suitable heat treatment. The chemical properties and physical characteristics are as follows:

C	Mn	P	S	Si	Cr	Ni	Ti	Brinell Hardness	Rockwell Hardness
max 0.08	max 2.00	max 0.045	max 0.030	max 1.00	17.00 ~ 19.00	9.00 ~ 12.00	5 x C%, min	126 to 300	C ..., B 60 to 105

**NOTES:** The following sizes are always available:

#### Diameter

½" ~ 3" (Fully threaded stud bolts and threaded rods)  
Up to 3½" can be roll-threaded.  
3¾" and above must be cut-threaded.  
(Maximum length is 1,500m/m for cut-threading)  
Maximum dia. 200m/m

#### Length

Max. 24ft.  
Threaded rods are usually provided 12 ft. in length.

\*The following **COATING TREATMENT** are available:

Electro Galvanize  
Zinc Plate  
Chrome Plate  
Hot Dip Galvanize  
Aluminize  
Fluorine Coating  
Molybdenum Coating

### ⊗ SUNCOAT (Stratified Fluorine Coating)

ANTI CORROSION EFFECT RESULTS OF SALT FOG TEST (DENSITY: 5%)

PREVIOUS TREATMENT	COATING 1	COATING 2	TEST TIME	RESULTS
SUNCOAT PHOSPHORIC-MANGANESE TREATMENT	PRIMARY (5 ~ 10µl)	TOP-COAT (12 ~ 20µl)	4,000hr	GOOD
NON-TREATMENT	SAME up	SAME up	1,500hr	*
PHOSPHORIC-MANGANESE TREATMENT	NOTHING	TOP-COAT (20 ~ 25µl)	750hr	*
PHOSPHORIC-ZINC TREATMENT	NOTHING	SAMP up	700hr	*

CHEMICAL AND SOLVENT RESISTANCE

CHEMICAL AND SOLVENT	EXPOSURE	RESULTS
36% HYDROCHLORIC ACID	48hours	GOOD
25% SODIUM HYDROXIDE	24hours	*
28% AMMONIUM HYDROXIDE	24hours	*
DILUTE AMMONIUM NITRATE	1,000hours	*
WET HYDROGEN SULFIDE	500hours	SLIGHT STAIN
99% ACETIC ACID	1,000hours	GOOD
METHYL ETHYL KETONE	1,000hours	*
TOLUENE	1,000hours	*
HEXANE	1,000hours	*
TRICHLOROETHYLENE	1,000hours	*
N-METHYL PYRROLIDONE	1,000	*