

## SUBSTITUTE MATERIAL (JIS, BS, DIN ) FOR ASTM SPECIFICATION

### CONTENTS

#### Section

1. Scope
2. Basis
3. Additional Requirements
4. Table
5. Table 1, Plates
6. Table 2, Pipes
7. Table 3, Tubes
8. Table 4, Forging
9. Table 5, Castings
10. Table 6, Bolts and Nuts
11. Table 7, Bars and Shapes
12. Table 8, Piping Fittings
13. Table 9, Nonferrous Materials

#### 1. SCOPE

This specification lists the Japanese Standard (JIS, JPI), British Standard (BS), and Deutsche Industrie Normen (DIN) substitutes for ASTM Specifications relating to materials for plates, pipes, tubes, forging, castings, bolts and nuts, bars and shapes, piping fittings, and nonferrous materials, in general use.

#### 2. BASIS

These substitutes are not necessarily identical to the ASTM Specifications, but are equal in terms of alloy content and have a nearly equal or higher ultimate tensile strength; exceptions to this are underlined.

#### 3. ADDITIONAL REQUIREMENTS

The requirements of the ASTM Specifications not covered by the substitute specifications are noted in the Tables, with footnotes given on Section 4.

#### 4. TABLE

Substitute materials are shown in the following Tables 1 to 9.

## STANDARD SPECIFICATION

Table 1 PLATE

ASTM	JIS	BS	DIN
A-36 Structural Steel	G 3101 SS400 G 3105 SM400A	4360 Gr 40A (1) 4360 Gr 438 (1)	17100 St44-2 17100 St44-3
A-131 Structural Steel for Ships			
Gr A	G 3106 SM400A	4360-40B	17100 St44-3
Gr B	G 3106 SM400B	4360-40B	---
Gr CS	G 3105 SM400CN	4360-40E	---
Gr D	G 3105 SM400C (2)	4360-40E	---
Gr E	G 3105 SM400CN	4360-40E	---
A-167 Stainless and Heat-Resisting Chromium,-Nickel Steel Plate, Sheet, and Strip			
Type 302	G 4304 SUS302 (3)	---	17440/1 X10CrNiS189
Type 304	G 4304 SUS304 (3)	1449-304S31 1501-304S15	17440/1 X5CrNi1810
Type 304L	G 4304 SUS304L (3)	1501-304S12 1449-304S11	17440/1 X2CrNi1911
Type 310S	G 4304 SUS310S (3)	1501-310S24 1449-310S24	---
Type 316	G 4304 SUS316 (3)	1501-316S16 1449-316S31	17440/1 X5CrNiMo17122
Type 316L	G 4304 SUS316L (3)	1501-316S12 1449-316S11	17440/1 X2CrNiMo17132
Type 321	G 4304 SUS321 (3)	1501-321S12 1449-321S31	17440/1 X6CrNiTi1810
Type 347	G 4304 SUS347 (3)	1501-347S17 1449-347S31	17440/1 X6CrNiNb1810

Note (1): Specify mechanical properties, test and inspection in accordance with ASTM.

Note (2): Plates over 1-3/8 Inches (35 m-n) in thickness shall be normalized.

Note (3): For cold rolled sheet and strip, use corresponding SUS-CP and SUS-CS steels, according to JIS G 4305 and G 4307, respectively.

STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-176 Stainless and Heat Resisting Chromium Steel Plate, Sheet, And Strip Type 403	G 4304 SUS403 (1)	14-09-403 S17 S2) 1501-403 S17 I2)	---
Type 405	G 4304 SUS405 (1)	1449-405 S17 1501-405 S17	17440/1 X6CrAl13 ---
Type 410 Type 410S	G 4304 SUS410 (1) G 4304 SUS410S (1)	1449-410 S21 ---	17440/1 X10Cr13 17440/1 X6Cr13
A-203 Pressure Vessel Plates, Alloy Steel, Nickel			
Gr A	G 3127 SL2N255	---	---
Gr D	G 3127 SL3N255	1501-503	---
Gr E	G 3127 SL3N275	---	17280 10Ni14
Gr F	G 3127 SL3N440	---	---
A-204 Pressure Vessel Plates, Alloy Steel, Molybdenum			
Gr A	G 3103 S64SOM	---	SEL 16 Mo5 17155 15 Mo3
Gr B	G 3103 SB48M	---	SEL 16 Mo5
Gr C	---	---	---
A-240 Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels			
Type 304	G 4304 SUS304 (1)	1501-304S15	17440/1 X5CrNi1810
Type 304H	---	1501-304S49	---
Type 304L	G 4304 SUS304L (1)	1501-304S12	17440/1 X2CrNi1911
Type 316	G 4304 SUS316 (1)	1501-316S16	17440/1 X5CrNiMo17122
Type 316H	---	1501-316S49	---
Type 316L	G 4304 SUS316L (1)	1501-316S12	17440/1 X2CrNiMo17132
Type 317	G 4304 SUS317 (1)	---	17440/1
Type 317L	G 4304 SUS317L (1)	---	X2CrHiMo18164

Note (1): For cold rolled sheet and strip, use corresponding SUS-CP and SUS-CS steels, according to JIS G 4305 and G4307, respectively.

Note (2): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

## STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
Type 321	G 4304 SUS321 (1)	1501-321S12	17440/1 X6CrNiTi1810
Type 321H	---	1501-321S49	---
Type 347	G 4304 SUS347 (1)	1501-3-07S17	17440/1 X6CrNiNb1810
Type 347H	---	1501-347S49	---
Type 405	G 4304 SUS405 (1)	1501-405S17	17440/1 X6CrAl13
Type 410	G 4304 SUS410 (1)	---	17440/1 X10Cr13
Type 410S	G 4304 SUS410S (1)	---	17440/1 X6Cr13
Type 430	G 4304 SUS430 (1)	---	17440/1 X6Cr17
A-263 Corrosion-Resisting Chromium Steel-Clad Plate, Sheet, and Strip	G 3601 (2)	---	17440/1
A-264 Stainless Chromic-Nickel Steel- Clad Plate, Sheet, and Strip	G 3601 (2)	3740 (2)	17440/1
A-265 Nickel and Nickel-Base Alloy-Clad Steel Plate	G 3602 (2)	---	17743 NiCu30Fe
A-283 Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars			
Gr A	G 3101 SS330	4360 Gr 40A/B/C	17100 St33
Gr B	G 3101 55330	4360 Gr 40A/B/C	17100 St33
Gr C	G 3101 SS400	4360 Gr 40D	17100 St44-2
Gr D	G 3101 SS400	4360 Gr 43A/B/C/D	17100 St44-2

Note (1): For cold rolled sheet and strip, use corresponding SUS-CP and SUS-CS steels, according to JIS G 4305 and G4307, respectively.

Note (2): Specify mechanical properties, test and inspection in accordance with ASTM.

STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-285 Pressure Vessel Plates, Carbon Steel, Low-and Intermediate-Tensile Strength Gr A & B Gr C	--- G 3103 S8410	1501-151 Gr 360 1501-151 Gr 430	17155 H I 17155 H II
A-299 Pressure Vessel Plates, Carbon Steel, Manganese Silicon	G 3115 SPV355	---	17102 StE355
A-302 Pressure Vessel Plates, Alloy Steel Manganese-Molybderalm and Manganese-Holybdenum- Nickel Gr A Gr B Gr C Gr D	G 3119 SBV1A G 3119 SBV1B G 3119 SBV2 G 3119 SBV3	--- --- --- ---	--- --- --- ---
A-387 Pressure Vessel Plates, Alloy Steel Chromium-Molybdenum Gr 2 Class 1 Gr 11 Class 1 Class 2 Gr 12 Class 1 Class 2 Gr 21 Class 1 Gr 22 Class 1 Class 2 Gr 5 Class 1 Class 2 Gr 9 Class 1 Class 2	G 4109 SCMV1 G 4109 SCMV3 G 4109 SCMV3 G 4109 SCMV2 G 4109 SCMV2 G 4109 SCMV5 G 4109 SCMV4 G 4109 SCMV4 G 4109 SCMV6 G 4109 SCMV6 --- ---	--- 1501-621 1501-621 1501-620 1501-620 --- 1501-622 Gr 515 1501-622 Gr 515 --- --- --- ---	--- --- --- 17155 13CrMo44 --- --- 17155 10CrMo910 --- SEW590 12CrMo195 --- --- ---

ASTM	JIS	BS	DIN
A-442 Pressure Vessel Plates, Carbon Steel, Improved Transition Properties Gr 55  Gr 60	--- G 3115 SPV235	1501-151 Gr 400 1501-161 Gr 400 1501-224 Gr 400 1501-151 Gr 430 1501-161 Gr 430 1501-224 Gr 430	SEW 680 TTSt41N ---
A-516 Pressure Vessel Plates, Carbon Steel, for Moderate and Lower Temperature Service  Gr 55 Gr 60 Gr 65 Gr 70	--- G 3118 SGV410 G 3118 SGV450 G 3118 SGV480	1501-161 Gr 400 1501-224 Gr 400 1501-161 Gr 430 1501-224 Gr 430 1501-224 Gr 460 1501-224 Gr 490	- 17155 H I 17155 H II 17155 17Mn4 17155 19Mn6

Note (1): Recognize lacer minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

STANDARD SPECIFICATION

Note (1): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

Note (2): Specify mechanical properties, test and inspection in accordance with ASTM.

ASTM	JIS	BS	DIN
A-533 I Pressure Vessel Plates, Alloy Steel Quenched and Tempered Manganese- Molybdenum and Manganese- Molybdenum Nickel			
Type A Class 1	G 3120 SQV1A	---	---
Class 2	G 3120 SQV1B	---	---
Type B Class 1	G 3120 SQV2A	---	---
Class 2	G 3120 SQV2B	---	---
Type C Class 1	G 3120 SQV3A	---	---
Class 2	G 3120 SQV3B	---	---
A-537 Pressure Vessel Plates, Heat- Treated, Carbon-Manganese- Silicon Steel			
Class 1	G 3115 SPV355N	1501-224 Gr 490 (1)	17155 19Mn6 17102 StE355
Class 2	G 3115 SPV450Q	---	---
A-570 Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.			
Gr 30	G 3101 SS330	1449-HR 34/20 (1)	17100 St33
Gr 33	G 3101 SS400	1449-HR 37/23	17100 St44-2
Gr 36	G 3101 SS400	1449-KR 37/23	17100 St44-2
Gr 40	G 3101 SS400(1)	1449-HR 43/25	17100 St44-2
Gr 45	G 3101 SS490	1449-HR 43/25 (1)	17100 St52-3
Gr 50	G 3101 SS490(1)	1449-HR 50/35	17100 St52-3
A-611 Steel, Sheet, Carbon, Cold-Rolled Structural Quality			
Gr B	G 3141 SPCC (2)	---	---
Gr C	G 3141 SPCC (2)	---	1623.1 St12
Gr D	G 3141 SPCC (2)	---	---

STANDARD SPECIFICATION

Note (1): Specify Impact Test requirement per ASTM.

Note (2): Recognize larger minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

ASTM	JIS	BS	DIN
A-652 Pressure Vessel Plates, Carbon Manganese, for Moderate and Lower Temperature Service			
Gr A	G 3126 SLA235 (1)	---	---
Gr B	G 3126 SLA325 (1)(2)	---	17102 EStE315
Gr C	G 3126 SLA360 (1)	---	17102 EStE355

STANDARD SPECIFICATION

Table 2 PIPE

Note (1): Specify carbon, manganese, or silicon contents to accordance with ASTM.

Note (2): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

ASTM	JIS	BS	DIN
A-53 Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless			
Type F	G 3452 SGP	1387	1615 St33
Gr A	G 3454 STPG370	3601 ERW360 S360	1626 St37.0 1629 St37.0
Gr B	G 3454 STPG410	3601 ERW410 S410	1626 St44.0 1629 St44.0
A-106 Seamless Carbon Steel Pipe for High-Temperature Service			
Gr A	G 3456 STPT370	3602 HFS360 3602 CFS360	17175 St35.8
Gr B	G 3.455 STPT410	3602 HFS410 3602 CFS410	17175 St45.8
Gr C	G 3456 STPT480	3602 HFS460 3602 CFS460	17175 St45.8
A-134 Pipe, Steel, Electric-Fusion (Arc)- Welded (Size NPS 16 and over)			
Material			
A 283 Gr A – D	G 3457 STPY400	3602 SAW410 3601 SAW410	---
A 285 Gr A – C	G 3457 STPY400(1)	---	--
A 570 Gr 30 – 40	G 3457 STPY400 (1)(2)	---	--
A 36	G 3457 STPY400	3602 SAW410 3601 SAW410	--



## STANDARD SPECIFICATION

Note (1): Specify electric resistance-welding.

Note (2): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

Note (3): Specify carbon, manganese, or silicon contents in accordance with ASTM.

ASTM	JIS	BS	DIN
A-135 Electric-Resistance-Welded Steel Pipe			
Gr A	G 3454 STPG370 (1)	3601 ERW360	1626 St37.0
Gr B	G 3454 STPG410 (1)	3601 ERW410	1626 St44.0 .
A-139 Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and over)			
Gr A – E	G 3457 STPY400 (2)(3)	3602 SAW410 (2) 3601 SAW410 (2)	---
A-211 Spiral-Welded Steel or Iron Pipe			
A 570 Gr 30-45	G 357 STPY400 (2)(3)	3602 SAW 410 (2) 3601 SAW 410 (2)	---
A 570 Gr 50	---	3502 SAW 460 (2)	
A-312 Seamless and Welded Austenitic Stainless Steel Pipe			
TP 304 (18Cr-8Ni)	G 3459 SUS304TP	3605-304S18,S25	17457/58 X5CrNi1810
TP 304H (18Cr-8Ni)	G 3459 SUS304HTP	3605-304S59	---
TP 304L (18Cr-8Ni)	G 3459 SUS304LTP	3605-304S14,S22	17457/58 X2CrNi1911
TP 309 (23Cr-12Ni)	G 3459 SUS309STP	---	---
TP 310 (25Cr-20Ni)	G 3459 SUS310STP	---	---
TP 316 (16Cr-12Ni-21Mo)	G 3459 SUS316TP	3605-316S18,S26	17457/58 X5CrNiMo17122
TP 316H (16Cr-12Ni-2Mo)	G 3459 SUS316HTP	3605-316S59	17459E X6CrNiMo1713
TP 316L (16Cr-12Ni-2Mo)	G 3459 SUS316LTP	3605-316S14,S22	17457/58 X2CrNiMo17132
TP 321 (18Cr-10Ni-Ti)	G 3459 SUS321TP	3605-321S18,S22	17457/58 X6CrNiTi1810
TP 321H (18Cr-12Ni-Ti)	G 3459 SUS321HTP	3605-321S59	SEW470 X12CrNiTi189
TP 347 (18Cr-10Ni-Cb)	G 3459 SUS347TP	3605-347S18,S17	17457/58 X6CrNiNb1810
TP 347H (18Cr-10Ni-Cb)	G 3459 SUS347H TP	3605-347S59	---

STANDARD SPECIFICATION

Note (1): Recognize Lower minimum tensile or yield strengths of the underlined substitute materials in design consideration or specify minimum tensile and yield strengths per ASTM.

Note (2): VdTuv-Werkstoffblatt

ASTM	JIS	BS	DIN
A-333 Seamless and Welded Steel Pipe for Low-Temperature Service			
Gr 1	G 3460 STPL380	3603-CFS410 LT50 3603-HFS410 LT50 3603-ERW410 LT50 3603-CEW410 LT50	17173 TTS <sub>t</sub> 35N 17174 TTS <sub>t</sub> 35N
Gr 3 (3-1/2Ni)	G 3460 STPL450	3603-HFS503 LT100 3603-CFS503 LT100	17173 I0Ni14
Gr 6	---	3603-CFS410 LT50 3603-HFS410 LT50 3603-ERW410 LT50 3603-CEW410 LT50	SEW680 TTS <sub>t</sub> 45N
Gr 8 (9Ni)	G 3460 STPL690	3603-HFS509 LT196 3603-CFS509 LT196	17173 X8Ni9
A-335 Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service			
Gr P1 (C-1/2Mo) Gr P5 (5Cr-1/2Mo)	G 3458 STPA12 G 3458 STPA25	--- 3604 CFS625 (1)	17175 15Mo5 Wbl 007/2 12CrMo195 (2)
Gr P9 (9Cr-1Mo)	G 3458 STPA26	3604 HFS625 (1) 3604-CFS629-470 (1)	Wbl 109 X12CrMo91 (2)
Gr P11 (1-1/4Cr-1/2Mo)	G 3458 STPA23	3604 CF5621 3604 HFS621	17175 13CrMo44
Gr P12 (1Cr-1/2Mo)	G 3458 STPA22	3604 CFS620-460 (1) 3604 HFS620-460 (1)	17175 13CrMo44
Gr P22 (2-1/4Cr-1Mo)	G 3458 STPA24	3604 CFS622 3604 HFS622	17175 I0CrMo910

## STANDARD SPECIFICATION

Note (1): Specify seamless.

ASTM		JIS	BS	DIN
A-358 Electric-Fusion-welded Austenitic Chromium-Nickel Alloy Steel Pipe For High-Temperature Service				
Grade	Material			
304	A240, Type 304	G 3468 SUS304TPY	3605 LWHT 304S18	17457 X5CrNi1810
304L	A240, Type 304L	G 3468 SUS304LTPY	3605 LWHT 304S14	17457 X2CrNi1911
316	A240, Type 316	G 3468 SUS316TPY	3505 LWHT 316S18	17457 X5CrNiMo17122
316L	A240, Type 316L	G 3468 SUS316LTPY	3605 LWHT 316S14	17457 X2CrNiMo17132
321	A240, Type 321	G 3468 SUS321TPY	3605 LWHT 321S18	17457 X6CrNiTi1810
347	A240, Type 347	G 3468 SUS347TPY	3605 LWHT 347S18	17457 X6CrNiNb1810
A-376 Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service				
TP 304 (18Cr-8Ni)		G 3459 SUS304TP (1)	3605-304S18	17459 X6CrNi1811 E
TP 304H (18Cr-8Ni)		G 3459 SUS304HTP (1)	3605-304S59	---
TP 316 (16Cr-12Ni-2Mo)		G 3459 SUS316TP (1)	3605-316S18	17458 X5CrNiMo17122
TP 316H (16Cr-12Ni-2Mo)		G 3459 SUS316HTP (1)	3605-316S59	17459 X6CrNiMo1713 E
TP 321 (18Cr-10Ni-Ti)		G 3459 SUS321TP (1)	3605-321S18	17458 X6CrNiTi810
TP 321H (18Cr-10Ni-Ti)		G 3459 SUS321HTP (1)	3605-321S59	---
TP 347 (18Cr-10Ni-Cb)		G 3459 SUS347TP (1)	3605-347S18	17458 X6CrNiNb1810
TP 347H (18Cr-10Ni-Cb)		G 3459 SUS347HTP (1)	3605-347S59	---
A-409 Welded Large Diameter Austenitic Steel Pipe for Corrosive or High Temperature Service				
TP 304 (18Cr-8Ni)		G 3468 SUS304TPY	---	17457 X5CrNi810
TP 304L		G 3463 SUS304LTPY	---	17457 X2CrNi1911
TP 316 (16Cr-12Ni-2Mo)		G 3468 SUS316TPY	---	17457 X5CrNiMo17122
TP 316L		G 3468 SUS316LTPY	---	17457 X2CrNiMo17132
TP 321 (18Cr-10Ni-Ti)		G 3468 SUS321TPY	---	17457 X6CrNiTi1810
TP 347 (18Cr-10Ni-Cb)		G 3468 SUS347TPY	---	17457 X6CrN iNb1810

STANDARD SPECIFICATION

Note (i): Specify electric resistance-welding.

Note (2): Maximum carbon content shall be 0.15%.

Note (3): Specify Impact Test requirement per ASTM.

ASTM		JIS/JPI	BS	DIN
A-524 Seamless Carbon Steel Pipe for Atmospheric and Lower Temperatures Gr 1 Gr 11		---	---	SEW680 TTSt41 ---
A-587 Electric-Welded Low-Carbon Steel Pipe for the Chemical Industry		G 3454 STPG370 (1)(2)	---	1626 St37.0
A-671 Electric-Fusion-Welded Steel pipe for Atmospheric and Lower Temperatures				
Grade	Material			
CA55	A285 Gr C			
CB60	A515 Gr 60	JPI-SB42	---	---
CB70	A515 Gr 65	JPI-SB46	---	---
CB70	A515 Gr 70	JPI-SB49	---	---
CC60	A516 Gr 60	JPI-SLA24B (3)	---	---
CC65	A516 Gr 65	JPI-SLA33B (3)	---	---
CD70	A537 CL 1	---	---	---
CE55	A442 Gr 55	---	---	---
CE60	A442 Gr 60	JPI-SPV24	---	---
CF70	A203 Gr B	---	---	---
CF71	A203 Gr E	JPI-SL3N28	---	---
CK75	A299			

## STANDARD SPECIFICATION

Note (1): Specify Impact Test requirement per ASTM.

Note (2): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

ASTM		JIS/JPI	BS	DIN
A-672 Electric-Fusion-Welded Steel Pipe for High- Pressure Service at Moderate Temperature				
Grade	Material			
A55	A285 Gr C	JPI-SB42	---	---
B55	A515 Gr 55	---	---	---
B60	A515 Gr 60	JPI-SB42	---	---
B65	A515 Gr 65	JPI-SB46	---	---
B70	A515 Gr 70	JPI-SB49	---	---
C55	A516 Gr 55	---	---	---
C60	A516 Gr 60	JPI-SLA24B (1)	---	---
C65	A516 Gr 65	JPI-SLA33B (1)	---	---
C70	A516 Gr 70	---	---	---
D70	A537 CL 1	---	---	---
E55	A442 Gr 55	---	---	---
E60	A442 Gr 60	JPI-SPV24	---	---
L65	A204 Gr A	JPI-SB46M	---	---
L70	A204 Gr B	JPI-SB49M (2)	---	---
L75	A204 Gr C	---	---	---
N75	A299	---	---	---

STANDARD SPECIFICATION

ASTM/API		JIS/JPI	BS	DIN
A-691 Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High- Pressure Service at High Temperatures				
Grade	Material			
CM-65	A204 Gr A	JPI-SB46M	---	---
CM-70	A204 Gr B	JPI-SB49M	---	---
CM-75	A204 Gr C	---	---	---
CMSH-70	A537 CL 1	---	---	---
CMS-75	A299	---	---	---
½ Cr	A337 Gr 2 CL 1	---	---	---
1 Cr	A387 Gr 12 CL 1	JPI-SCMV2	---	---
1-1/4 Cr	A387 Gr 11 CL1	JPI-SCMV3	---	---
2-1/4 Cr	A387 Gr 22 CL1	JPI-SCMV4	---	---
5 Cr	A387 Gr 5 CL 1	JPI-SCMV6	---	---
API 5L Line Pipe				
Gr A25		63452 SGP	1387	---
Gr A		63454 STPG370	3601 ERW 360 3601 S 360	17172 StE210.7
Gr B		63454 STPG410	3601 ERW 430 (1) 3601 S 430 (1) 3601 SAW 430 (1) 6327 Part 1-8 (1)	17172 StE240.7
Gr X42		---	---	17172 StE290.7
Gr X46		---	---	17172 StE320.7
Gr X52		---	---	17172 StE360.7
Gr X56		---	---	17172 StE385.7
Gr X60		---	---	17172 StE415.7
Gr X65		---	---	17172 StE445.7TM
Gr X70		---	---	17172 StE480.7TM
---		63455 STS370	---	1630 St37.4
---		63455 STS410	---	1630 St44.4
---		63455 STS480	---	1630 St52.4

Note (1): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or

Table 3 TUBES

ASTM	JIS	BS	DIN
A-161 Seamless Low-Carbon and Carbon Molybdenum Steel Still Tubes for Refinery Service Low Carbon Steel	G 3461 ST340 (1) (2)	3059 HFS320 (2) 3059 CFS320 (2)	17175 St35.8
Gr T1	G 3462 STBA12 (1)(2)(3) G 3467 STFA12 (2)	---	17175 15Mo5
A-178 Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler Tubes			
Gr A	G 3461 STB340 (4)	3059 ERW320 (3) 3059 CEW320 (3)	17177 St37.8
Gr C	G 3461 STB410 (4)	3059 ERW360 3059 CEW360 (3)	17177 St42.8
Gr D	---	3059 ERW440 (3) 3059 CEW440 (3)	---
A-179 Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes			
	G 3461 STB340 (1)(5)(6)	3606 CFS 320 3059 S1 360 (5)(6)	17175 St35.8

Note (1): Specify seamless.

Note (2): Maximum hardness shall be as follows:

Item	Carbon Steel
Hot rolled tubes	HB 137
Cold drawn tubes	HB 125

Note (3): Specify killed steel.

Note (4): Specify electric resistance-welding.

Note (5): Specify cold drawn.

Note (6): Maximum hardness shall be Rockwell B72.

STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-192 Seamless Carbon Steel Boiler Tubes for High- Pressure Service	G 3-061 STB340 (1)(2)	3059 HFS 320 (2) 3059 CFS 320 (2) 3059 S1 360 (2) 3059 S2 360 (2)	17175 St35.8
A-199 Seamless Cold-Drawn Intermediate Alloy-Steel Heat-Exchanger and Condenser Tubes			
Gr T5	G 3462 STBA25 (3)(4)	3606 CFS 625	Wbl 007/2 12CrMo195 (6)
Gr T9	G 3462 STBA26 (3)(5)	3059 S1 629-470 (3)(5) 3059 S2 629-470 (3)(5)	Wbl 109 X12CrMo91 (6)
Gr T11	G 3462 STBA23 (3)(4)	3606 CFS621	17175 13CrMo44
Gr T22	G 3462 STBA24 (3)(4)	3606 CFS622 3059 S1 622-440 (3)(4) 3059 S2 622-440 (3)(4)	17175 10CrMo910
A-200 Seamless Intermediate Alloy-Steel Still Tubs for Refinery Service			
Gr T5	G 3462 STBA25 (4) G 3467 STFA25 (4)	3604 CFS625 (4) 3604 HFS625 (4)	Wbl 007/2 12CrMo195 (6)
Gr T7	---	---	---
Gr T9	G 3462 STBA26 (5) G 3467 STFA26 (5)	3604 CFS629-470 (5) 3604 HFS629-470 (5) 3059 S1 629-470 (5) 3059 S2 629-470 (5)	Wbl 109 X12CrMo91 (6)
Gr T11	G 3462 STBA23 (4)	3604 CFS621 (4)	17175 13CrMo44
Gr T22	G 3467 STFA23 (4) G 3462 STBA24 (4) G 3467 STFA24 (4)	3604 HES621 (4) 3059 S1 622-440 (4) 3604 CFS622 (4) 3604 HFS622 (4)	17175 10CrMo910

Note (1): Specify seamless.

Note (2): Maximum hardness shall be Rockwell 677.

Note (3): Specify cold drawn.

Note (4): Maximum hardness shall be Rockwell 885.

Note (5): Maximum hardness shall be Rockwell B89.

Note (6): VdTuv-Herkstoffblatt



STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-209 Seamless Carbon-Molybdenum Alloy-Steel Boiler and Super Heater Tubes			
Gr T1	G 3462 STBA12 (1)(2)	3059 S1 243 (2) 3059 S2 243 (2)	17175 15Mo5 ---
Gr T1a	G 3462 STBA13 (1)(3)	3059 S1 243 (3) 3059 S2 243 (3)	17175 15Mo5 ~
Gr T1b	---	---	---
A-210 Seamless Medium-Carbon Steel Boiler and Super heater Tubes			
Gr A1	G 3461 STB410 (1)(4)	3059 S1 440 S2 440 (4)	17175 St45.8
A-213 Seamless Ferritic and Austenitic Alloy-Steel Boiler, Super heater and Heat-Exchanger Tubes			
Gr T 5	G 3462 STBA25 (5)	3606 CFS 625	Wbl 007/2 12CrMo195 (7)
Gr T 11	G 3462 STBA23 (5)	3606 CFS 621	17175 13CrMo44
Gr T 12	G 3462 STBA22 (1)(5)	3506 CFS 620 3059 S1/S2 620 (5)	17175 13CrMo44
Gr T 22	G 3462 STBA24 (5)	3606 CFS 622 3059 S1/S2622- 440/490(5)	17175 10CrMo910
Gr TP 304	G 3463 SUS304 TB (1)(6)	3606 CFS 304S25	17458 X5CrNi1810
Gr TP 3D4H	G 3463 SUS304H T8 (1)(6)	3059 CFS304S59 (6)	---
Gr TP 304L	G 3463 SUS304L TB (1)(6)	3606 CFS304S22	17458 X2CrNi1911
Gr TP 310	G 3463 SUS310S TB (1)(6)	---	---
Gr TP 316	G 3463 SUS316 TB (1)(6)	3606 CFS316S25	17458 X5CrNiMo17122
Gr TP 316H	G 3463 SUS316H TB(1)(6)	3059 CFS316S59 (6)	17459E X6CrNiMo1713
Gr TP 316L	G 3463 SUS316L TB (1)(6)	3606 CFS316S29	17458 X2CrNiMo17132
Gr TP 321	G 3463 SUS321 TB (1)(6)	3606 CF5321S22	17458 X6CrNiTi1810
Gr TP 321H	G 3463 SUS321H TB(1)(6)	3059 CFS321S59 (6)	---
Gr TP 347	G 3463 SUS347 TB (1)(6)	3606 CFS347S17	17458 X6CrNiNb1810
Gr TP 347H	G 3463 SUS347H TB(1)(6)	3059 CFS347S59 (6)	---

Note (1): Specify seamless.

Note (2): Maximum hardness shall be Rockwell B90.

Note (3): Maximum hardness shall be Rockwell B81.

Note (4): Maximum hardness shall be Rockwell B79.

Note (5): Maximum hardness shall be Rockwell B85.

Note (6): Maximum hardness shall be Rockwell B90.

Note (7): VdTuv-Werkstoffblatt

**STANDARD SPECIFICATION**

ASTM	JIS	BS	DIN
A-214 Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes	G 3461 STB340 (1)(2)	3606 ERW 320 3059 ERW 320 (2) 3059 CEW 320 (2) 3059 ERW 360 (2) 3059 CEW 360 (2)	17177 St37.8
A-226 Electric-Resistance-Welded Carbon Steel Boiler and Superheater Tubes for High-Pressure Service	G 3461 STB340 (1)(2)	3059 ERW320 (2) 3059 CEW320 (2) 3059 ERW360 (2) 3059 CEW360 (2)	17177 St37.8
A-249 Welded Austenitic Steel Boiler, Superheater, Heat-Exchanger, and Condense; Tubes			
TP 304	G 3463 SUS304 TB (3)	---	17457 X5CrNi1810
TP 304H	G 3463 SUS304H TB (3)	3059-ERW304S59 (3)	---
TP 304L	G 3463 SUS304L TB (3)	---	17457 X2CrNi1911
TP 309	G 3463 SUS309S TB (3)	---	---
TP 310	G 3463 SUS310S TB (3)	---	---
TP 316	G 3463 SUS316 TB (3)	---	17457 X5CrNiMo17122
TP 316H	G 3463 SUS316H TB (3)	3059-ERW316S59 (3)	---
TP 316L	G 3463 SUS316L TB (3)	---	17457 X2CrNiMo17132
TP 321	G 3463 SUS321 TB (3)	---	17457 X6CrNiTi1810
TP 321H	G 3463 SUS321H TB (3)	3059 ERW321S59 (3)	---
TP 347	G 3463 SUS347 TB (3)	---	17457 X6CrNiNb1810
TP 347H	G 3463 SUS347H TB (3)	3059-ERW347S59 (3)	---

Note (1): Specify electric resistance-welding.

Note (2): Maximum hardness shall be Rockwell B72.

Note (3): Maximum hardness shall be Rockwell B90.

**STANDARD SPECIFICATION**

ASTM	JIS	BS	DIN
A-268 Seamless and Welded Ferritic Stainless Steel Tubing for General Service			
TP 410	G 3463 SUS410 TB (1)	---	---
TP 430	G 3463 SUS430 TB (2)	---	---
A-269 Seamless and Welded Austenitic Stainless Steel Tubing for General Service			
TP 304	G 3463 SUS304 TB (2)	3605-304S18,S25 (2)	---
TP 304L	G 3463 SUS304L TB (2)	3605-304S14,S22 (2)	---
TP 316	G 3463 SUS316 TB (2)	3605-316S18,S26 (2)	---
TP 316L	G 3463 SUS316L TB (2)	3605-316S14,S22 (2)	---
TP 321	G 3463 SUS321 TB (2)	3605-321S18,S22 (2)	---
TP 347	G 3463 SUS347 TB (2)	3605-347S18,S17 (2)	---
A-271 Seamless Austenitic Chromium Nickel Steel Still Tubes for Refinery Service			
TP 304	G 3463 SUS304 TB (2)(3) G 3467 SUS304 TF (2)	3605-304S18 (2)	17459E X6CrNi1811
TP 304H	G 3463 SUS304H TB (2)(3) G 3467 SUS304H TF (2)	3605-304S59 (2) 3059-CFS304S59 (2)	---
TP 316	G 3463 SUS316 TB (2)(3) G 3467 SUS316 TF (2)	3605-316S18 (4)	17458 X5CrNiMo17122
TP 316H	G 3463 SUS316 HTB (2)(3) G 3467 SUS316 HTF (2)	3605-316S59 (4) 3059-316S59 (4)	17459E X6NiMo1713
TP 321	G 3463 SUS321 TB (2)(3) G 3467 SUS321 TF (2)	3605-321S18 (2)	17458 X6CrNiTi1810
TP 321H	G 3463 SUS321H TB (2)(3) G 3467 SUS321H TF (2)	3605-321S59 Gr 1010 (2) 3059-CFS321S59 Gr 1010(2)	---
TP 347	G 3463 SUS347 TB (2)(3) G 3467 SUS347 TF (2)	3605-347S18 (2)	17458 X6CrNiNb1810
TP 347H	G 3463 SUS347H TB (2)(3) G 3467 SUS347H TF (2)	3605-347S59 (2) 3059-CFS347S59 (2)	---

Note (1): Maximum hardness shall be Rockwell B95.

Note (2): Maximum hardness shall be Rockwell B90.

Note (3): Specify seamless.

Note (4): Maximum carbon content shall be 0.21%

STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A334 Seamless and Welded Carbon And Alloy-Steel Tubes for Low-Temperature Service			
Gr 1	G 3464 STBL380 (1)	3603 CEW410 LT50 (1) 3603 CFS410 LT50 (1) 3603 ERW410 LT50 (1) 3603 HFS410 LT50 (1)	17173 T7St35N 17174 TTSt35N
Gr 3	G 3464 STBL450 (2)	3603 CFS503 LT100 (2) 3603 HFS503 LT100 (2)	17173 10Ni14
Gr 6	---	3603 CEW410 LT50 (2) 3603 CFS410 LT50 (2) 3603 ERW410 LT50 (2) 3603 HFS4110 LT50 (2)	SEW680 TTSt45N
Gr 8	G 3464 STBL690 (2)	3603 CFS509 LT196 (2) 3603 HFS509 LT196 (2)	17173 X8Ni9

Note (1): Maximum hardness shall be Rockwell B85.

Note (2): Maximum hardness shall be Rockwell B90.

## STANDARD SPECIFICATION

Table 4 FORGINGS

ASTM	JIS	BS	DIN
A-105 Forging, Carbon Steel, For Piping Components	G 3202 SFVC2A	1503-221-490	---
A-181 Forging, Carbon Steel, for General - Purpose Piping	G 3202 SFVC1	1503-221-430	17200 C22N
Class 60	G 3202 SFVC2A	1503-221-490	---
Class 70			
A-182 Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High -Temperature Service			
F1 (C-1/2Mo)	G 3203 SFVAF1	1503-245-420 (1)	VdTuv201 16Mo5
FS (5Cr-1/2Mo)	G 3203 SFAF58	1503-625-520	VdTuv1207 12CrMo195
F9 (9Cr-1Mo)	G 3203 SFVAF9	---	W.St.Nr17386
F11 (1-1/4Cr-1/2Mo)	G 3203 SFVAF11A	1503-621-460	X12CrMo910
F12 (1Cr-1/2Mo)	G 3203 SFVAF12	1503-620-540	SEW550 16CrMo44
F21 (3Cr-1Mo)	G 3203 SFVAF21B	---	SEW550 13CrMo44
F22 (2-1/4Cr-1Mo)	G 3203 SFVAF22B	1503-622-560	---
F304 (18Cr-8Ni)	G 3214 SUS304	1503-304S31	SEW550 10CrMo910
F304H (18Cr-8Ni)	G 3214 SUS304H	1503-304S51	17440 X5CrNi1810
F304L (18Cr-8Ni)	G 3214 SUSF304L	1503-304S11	---
F316 (16Cr-12Ni-2Mo)	G 3214 SUSF316	1503-316S31 or 33	17440 X2CrNi1911
F316H (16Cr-12Ni-2Mo)	G 3214 SUSF316H	1503-316S51	17440 X5CrNiMo17122
F316L (16Cr-12Ni-2Mo)	G 3214 SUS316L	1503-316S11 or 13	---
F321 (18Cr-10Ni-Ti)	G 3214 SUS321	1503-321S31	17440 X2CrNiMo17132
F321H (18Cr-10Ni-Ti)	G 3214 SUSF321H	1503-321S51-510	17440 X6CrNiTi1810
F347 (18Cr-10Ni-Cb)	G 3214 SUSF347	1503-347S31	---
F347H (18Cr-10Ni-Cb)	G 3214 SUSF347H	1503-347S51	17440 X6CrNiNb1810
			---

Note (1): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or

## STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-226 Forging, Carbon Steel, for Pressure Vessel Component			
Class 1	G 3202 SFVC1	1503-221-430	17200 C22N
Class 2	G 3202 SFVC2A	1503-221-490	---
Class 4	G 3202 SFVC2B		
A-336 Steel Forging, Alloy, for Pressure and High- Temperature Parts	Refer to A-182	Refer to A-182	Refer to A-182
A-350 Forging, Carbon and Low-Alloy Steel, Requiring Notch Toughness Testing for Piping Component			
LF1	G 3205 SFL1	1503-221-430 (1)	SEW680 TTS41
LF2	G 3205 SFL2	1640 WPLO	SEW680 TTStE36
LF3 (3-1/2Ni)	G 3205 SFL3	1503-221-490 (1) 1640 WPL3 1503-503-490 (1)	17280 10Ni14
A-508 Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forging for Pressure Vessel			
Class 1	G 3202 SFVC2B	---	---
Class 2	G 3204 SFVQ2A	---	SEW640 22NiMoCr37
Class 3	G 3204 SFVQ1A	---	SEW640 20MrMoNi55
A-541 Steel Forging, Carbon and Alloy Quenched and Tempered, for Pressure Vessel Component			
Class 1	G 3202 SFVC2B	1503-221-490 (1)(2)	---
Class 2	G 3204 SFVQ2A	---	---
Class 3	G 3204 SFVQ1A	---	---

Note (1): Specify Impact Test requirement per ASTM.

Note (2): Specify heat treatment and mechanical properties per ASTM.

STANDARD SPECIFICATION  
Table 5 CASTINGS

ASTM	JIS	BS	DIN
A-27 Steel Castings, Carbon, for General Application			
Gr 60-30	G 5101 SC410 (1)	3100 Steel A1	1681 GS-38 (2)
Gr 65-35	G 5101 SC450 (1)	---	1681 GS-45
Gr 70-36	G 5101 SC480 (1)	3100 Steel A2	1681 GS-52
A-47 Ferritic Malleable Iron Castings			
Gr 32510	G 5702 FCM3340	6681 B35-12	1692 GTS-35-10
Gr 35018	G 5702 FCM3360	---	1692 GTS-35-10 (2)
A-48 Gray Iron Castings			
Class 20	G 5501 FC150	1452 Gr 150	1691 GG-15
Class 25	G 5501 FC200	1452 Gr 180	1691 GG-20
Class 30	G 5501 FC200 (2)	1452 Gr 220	1691 GG-20 (2)
Class 35	G 5501 F 250	1452 Gr 260	1691 GG-25
Class 40	G 5501 FC300	1452 Gr 300	1691 GG-30
Class 45	G 5501 FC300 (2)	1452 Gr 300 (2)	1691 GG-30 (2)
Class 50	G 5501 FC350	1452 Gr 350	1691 GG-35
Class 55	---	1452 Gr 400	---
Class 60	---	---	---
A-126 Gray Iron Castings for Valves Flanges and Pipe Fittings			
Class A	G 5501 FC200	1452 Gr 180	1691 GG-15
Class 6	G 5501 FC250	1452 Gr 260	1691 GG-25
Class C	G 5501 FC300	1452 Gr 300	1691 GG-30

Note (1): Specify carbon, manganese, or silicon contents in accordance with ASTM.

Note (2): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-216 Steel Castings, Carbon, Suitable for Fusion Welding, For High-Temperature Service			
WCA	G 5151 SCPH1 (1)	1504-161 Gr 430	17245 GS-C25
WCB	G 5151 SCPH2 (1)	1504-161 Gr 480	17245 GS-C25
WCC	---	1504-161 Gr 540 (2)(3)	---
A-217 Steel Castings, Martensitic Stainless and Alloy, for Pressure-Containing Parts, Suitable for High-Temperature Service			
WC1 (C-1/2Mo)	G 5151 SCPH11 (1)	1504-245	17245 GS-22Mo4
WC6 (1-1/4Cr-1/2Mo)	G 5151 SCPH21 (1)	1504-621	17245 GG-17CrMo55
WC9 (2-1/4Cr-1Mo)	G 5151 SCPH32 (1)	1504-622	17245 CS-19CrMo910
C5 (Cr-1/2Ho)	G 5151 SCPH61 (1)	1504-625	SEW 595 GS-2CrMo195
C12 (9Cr-1Mo)	---	1504-629	SEW 595 GS-2CrMo101
A-297 Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application			
Gr HC	G 5122 SCH2	---	---
Gr HD	G 5122 SCH11	---	---
Gr HE	G 5122 SCH17	3100-309C40	---
Gr HF	G 5122 SCH12	3100-302C35	---
Gr HH	G 5122 SCH13	3100-309C30	---
Gr HI	G 5122 SCH18	---	---
Gr HK	G 5122 SCH22 or 21	3100-310C40	---
Gr HN	G 5122 SCH19	3100-311C11	---
Gr HT	G 5122 SCH15	3100-330C12	---
Gr HU	G 5122 SCH20	3100-331C60	---

Note (1): Test and inspect the product in accordance with ASTM, except for the chemical analysis and mechanical properties of the steel.

Note (2): Specify carbon, manganese, or silicon contents in accordance with ASTM.

Note (3): Specify elongation in accordance with ASTM.



STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-338 Malleable Iron Flanges, Pipe Fittings, and Valve Parts for Railroad, Marine, and Other Heavy Duty Service at Temperatures up to 650°F (345°C)			
A-351 Steel Castings, Austenitic, for High-Temperature Service Gr CF3 (18Cr-8Ni)	G 5121 SCS19A (1)	1504-304C12 (2) 3100-304C12 (2)	---
Gr CF3A (18Cr-8Ni)	---	---	---
Gr CF3M (17Cr-10Ni-2Mo)	G 5121 SCS16A (1)	1504-316C12 (2) 3100-316C12 (2)	---
Gr CF8 (18Cr-8Ni)	G 5121 SCS13A (1)	1504-304C15 3100-304C15	17445 G-X6CrNi189
Gr CF8A (18Cr-8Ni)	---	---	---
Gr CF8C (20Cr-10Ni-Cb)	G 5121 SCS21 (1)	1504-347C17 3100-347C17	17445 G-X5CrNiNb189
Gr CF8M (18Cr-10Ni-2Mo)	G 5121 SCS14A (1)	1504-316C16 3100-316C16	17445 G-X6CrNiMo1810
Gr CH10 (25Cr-13Ni)	G 5121 SCS17 (1)(2)	---	---
Gr CH20 (25Cr-13Ni)	G 5121 SCS17 (1)(3)	3100-309C30	---
Gr CK20 (25Cr-20Ni)	G 5121 SCS18 (1)	---	---
Gr CN7M (28Ni-20Cr-2Mo-3Cb)	G 5121 SCS23 (1)	1504-332C11	---
Gr HK40 (25Cr-20Ni)	G 5122 SCH22 (1)	1504-310C40 3100-310C40	---

Note (1): Test and inspect the product in accordance with ASTM, except for the chemical analysis and mechanical properties of the steel.

Note (2): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

Note (3): Specify mechanical properties. test and inspection in accordance with ASTM.

STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-352 Steel Castings, Ferritic and Martensitic, for Pressure- Containing Parts Suitable for Low-Temperature Service			
LCB	G 5152 SCPL1 (1)	1504-161 Gr 480 LT40	SEW685 GS-CK24
LC1 (C-1/2Mo)	G 5152 SCPL11 (1)	1504-245 LT50 3100-BL1	---
LC2 (2-1/2Ni)	G 5152 SCPL21 (1)	---	---
LC3 (3-1/2Ni)	G 5152 SCPL31 (1)	1504-503 LT60 3100-BL2	SEW685 GS-10Ni14
LC9	---	---	---
A-395 Ferritic Ductile Iron Pressure- Retaining Castings for Use at Elevated Temperatures			
	88243, APPENDIX-1 FCD-S	2789 Gr 420/12 (2)	---
A-447 Steel Castings, Chromium-Nickel -Iron Alloy Castings (25-12 Class) for High-Temperature Service			
	G 5122 SCH13 (3)	3100-309C32	---
A-494 Casting, Nickel and Nickel Alloy			
M-35-1	---	3071-NAI	---
M-30H	---	3071-NA2 (4)	---
M-25S	---	3071-NA3	---

Note (1): Test and inspect the product in accordance with ASTM, except for the chemical analysis and mechanical properties of the steel.

Note (2): Specify ferritizing heat treatment, chemical requirement and mechanical properties, except for tensile and yield strengths.

Note (3): Specify mechanical properties, test and inspection in accordance with ASTM

Note (4): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-536 Ductile Iron Castings			
Gr 60-40-18	G 5502 FCD450 (1)	2789 Gr 420/12	---
Gr 65-45-12	G 5502 FCD500 (1)	2789 Gr 500/7	1693 GGG-50
Gr 80-55-06	G 5502 FCD600 (1)	2789 Gr 600/3 (2)	1693 GGG-60
Gr 100-70-03	G 5502 FCD700 (1)	2789 Gr 700/2 (2)	1693 GGG-70
A-743 Castings, Iron-Chromium, Iron-Chromium Nickel, Nickel Base, Corrosion Resistant, for General Application			
Gr CA-15	G 5121 SCS1 (3)	3100-410C21 (2)	17445 G-X20Cr14
Gr CA-40	G 5121 SCS2 (3)	1504-420C29	---
Gr CF-3	G 5121 SCS19A (3)	3100-420C29 1504-344C12	---
Gr CF-3M	G 5121 SCS16A (3)	3100-304C12 1504-316C12	---
Gr CF-8	G 5121 SCS13A (3)	3100-316C12 1504-304C15	17445 G-X6CrNi189
Gr CF-8C	G 5121 SCS21 (3)	3100-304C15 1504-347C17	17445 G-X5CrNiNb189
Gr CF-8M	G 5121 SCS14A (3)	1504-316C16 3100-316C16	17445 G-X6CrNiMo1810
Gr CF-20	G 5121 SCS12 (3)	---	---
Gr CH-20	G 5121 SCS17 (3)	3100-309C30	---
Gr CK-20	G 5121 SCS18 (3)	---	---
Gr CN-7M	G 5121 SCS23 (3)	1504-332C11	---

Note (1): Specify elongation in accordance with ASTM.

Note (2): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or specify minimum tensile and yield strengths per ASTM.

Note (3): Test and inspect the product in accordance with ASTM, except for the chemical analysis and mechanical properties of the steel.

## STANDARD SPECIFICATION

Table 6 BOLTS AND NUTS

ASTM	JIS	BS	DIN
A-193 Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service			
Gr B5 (5Cr)	G 4107 SNB5	---	---
Gr B6 (12Cr)	G 4303 SUS410	1506-410S21-772	1654 X10Cr13
Gr B7 (Cr-Mo)	G 4107 SNB7	1506-630-860	17200 42CrMo4 17240 24CrMo5 (3)
Gr B7M (Cr-0.2Mo)	G 4107 SNB7 (1)	1506-630-690	17200 42CrMo4 17240 24CrMo5 (3)
Gr B8 CL 1 (304 sol.trt.) CL 4 (304 str.hd.)	G 4303 SUS304 (2)	1506-304S31	17440 X5CrNi1810
Gr B8C CL 1 (347 sol.trt.) CL 2 (347 str.hd.)	G 4303 SUS347 (2)	1506-347S31	17440 X6CrNiNb1810
Gr B8M CL 1 (316 sol.trt.) CL 2 (316 str.hd.)	G 4303 SUS316 (2)	1506-316S31	17440 X5CrNiMo17122
Gr B8T CL 1 (321 sol.trt.) CL 2 (321 str.hd.)	G 4303 SUS321 (2)	1506-321S31	17440 X6CrNiMTi1810
Gr B16 (Cr - Mo - V)	G 4107 SNB16	1506-670-860	17240 40CrMoV47
A-194 Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service			
Gr 2H	G 4051 S45C (3)	1506-162	17240 C35 1654 Cq45
Gr 4 (C-Mo)	--	---	17240 24CrMo5
Gr 6 (12Cr)	G 4303 SUS410 (3)	1506-410S21-770	1654 X10Cr13
Gr 8 (304)	G 4303 SUS304 (2)	1506-304S31	17440 X5CrNi1810
Gr 8MA (316)	G 4303 Sus316 (2)	1506-316S31	17440 X5CrNiMo17122
A-307 Carbon Steel Externally Threaded Standard Fasteners			
Gr B	G 3101 SS400 (4) G 4051 S25C (4)	4190-Gr 4,6	17100 St44.2 17100 St44.3 17200 CK25 1654 Cq22

Note (1): Specify heat treatment and mechanical properties per ASTM.

Note (2): Specify ASTH dimensional requirements, tolerances and inspection.

Note (3): Specify mechanical properties, test and inspection in accordance with ASTM.

Note (4): Test and inspect the product in accordance with ASTM, except for the chemical analysis and mechanical properties of the steel.

STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
A-320 Alloy Steel Bolting Materials for Low Temperature Service			
Gr L7 (Cr-Mo)	G 4107 SNB7 (1)	1506-630-860	17200 42CrMo4 17240 24CrMo5
Gr L43 (Ni-Cr-Mo)	G 4103 SNCM439	---	---
Gr B8 (304 str.hd.)	G 4303 SUS304 (2)	1506-304S31	17440 X5CrNi1810
Gr B8C (347 str.hd.)	G 4303 SUS347 (2)	1506-347S31 970-347S31	17440 X6CrNiNb1810
Gr B8T (321 str.hd.)	G 4303 SUS321 (2)	1506-321S31 970-321S31	17440 X6CrNiTi1810
Gr B8M (316 str.hd.)	G 4303 SUS316 (2)	1506-316S31 970-316S31	17440 X5CrNiMo17122
A-325 High-Strength Bolts for Structure Steel Joints	G 4051 S33C	3139	1654 Cq35
A-354 Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners			
Gr BC	---	---	--
Gr BD	---	---	--
A-453 Bolting Materials, High-Temperature , 50 to 120 KSI (345 to 827 Mpa) Yield Strength, with Expansion Coefficients Comparable to Austenitic Steels			
Gr 660 Class A & B (14Cr-24Ni)	---	---	---
Gr 651 Class A & B (19Cr-9Ni)	---	---	---

Note (1): Specify Impact Test requirement per ASTM.

Note (2): Specify ASTM dimensional requirements, tolerances and inspection.

STANDARD SPECIFICATION  
Table 7 BARS AND SHAPES

ASTM	JIS	BS	DIN
A-276 Stainless and Heat-Resisting Steel Bars and Shapes Type 420	G4303 J1	970-420S37	17440 X20Cr13
A-576 Steel Bars, Carbon, Hot-Wrought Special Quality			
Gr 1020	G4051 S20C	---	17200 CK22
Gr 1025	G4051 S25C	---	17200 CK25
Gr 1030	G4051 S30C	---	17200 CK30
Gr 1035	G4051 S35C	---	17200 CK35
Gr 1040	G4051 S40C	---	17200 CK40
Gr 1045	G4051 S45C	---	17200 CK45
A-615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement			
Gr 40	G3112 SD295	Gr 250 (1)	--
Gr 60	G3112 SD390 (1)	Gr 460/425 (1)	488 BSt420S
A-675 Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties			
Gr 45	G3101 SS330	Gr 40A (1)	17100 St33
Gr 50	G3101SS330 (1)	Gr 40A (1)	17100 St33
Gr 55	G3101 SS400	Gr 40A (1)	17100 St44-2 17100 St44-3
Gr 60	G3101 SS400 (1)	Gr 43A	17100 St44-2 17100 St44-3
Gr 65	G3101 SS490	Gr 50A (1)	17100 St52-3
Gr 70	G3101 SS490	Gr 55C or 50A (1)	17100 St52-3
Gr 75	G3101 SS540	Gr 55C or 50A (1)	---
Gr 80	G3101 SS540 (1)	Gr 55C (1)	---

Note (1): Recognize lower minimum tensile or yield strengths of the underlined substitute materials in design consideration, or

STANDARD SPECIFICATION

Table 8 PIPING FITTINGS

ASTM	JIS	BS	DIN
A-234 Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures			
WPB	B 2312 PT410 6 2313 PT410W	1640 WPB	---
WPC	B 2312 PT480 B 2313 PT480W	---	---
WP1 (C-1/2Mo)	B 2312 PA12 B 2313 PA12W	1640 WP1	---
WP5 (5Cr-1/2Mo)	B 2312 PA25 B 2313 PA25W	1640 WP5	---
WP9 (9Cr-1/2Mo)	8 2312 PA26 B 2313 PA-96W	---	---
WP11 (1-1/4Cr-1/2Mo)	B 2312 PA23 B 2313 PA23W	1640 WP11	---
WP12 (1Cr-1/2Mo)	B 2312 PA22 B 2313 PA22W	---	---
WP22 (2-1/4Cr-1Mo)	B 2312 PA24 8 2313 PA24W	1640 WP22	---
A-403 Wrought Austenitic Stainless Steel Piping Fittings			
WP 304 (18Cr-8Ni)	B2312 SUS304 B2313 SUS304W	1640-WP304	---
WP 304H(18Cr-8Ni)	B2312 SUS304H	---	---
WP 304L (18Cr-8Ni)	B2312 SUS304L B2313 SUS304LW	1640-WP304L	---
WP 316 (16Cr-12Ni-2Mo)	B2312 SUS316 B2313 SUS316W	1640-WP316	---
WP 316H (16Cr-12Ni-2Mo)	B2312 SUS316H	---	---
WP 316L (16Cr-12Ni-2Mo)	B2312 SUS316L B2313 SUS316LW	1640-WP316L	---
WP 321 (18Cr-10Ni-Ti)	B2312 SUS321 B2313 SUS321W	1640-WP321	---
WP 321H (18Cr-10Ni-Ti)	B2312 SUS321H	---	---
WP 347 (18Cr-10Ni-Cb)	B2312 SUS347 B2313 SUS347W	1640-WP347	---
WP 347H (18Cr-10Ni-Cb)	B2312 SUS347H	---	---

## STANDARD SPECIFICATION

	JIS	BS	DIN
A-420 Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low Temperature Service WL3 (3-1/2Ni)	B 2312 PL450 B 2313 PL450W	1640-WPL3	---
WL6	B 2312 PL380 B 2313 PL38OW	1640-WPL0	---
WL8 (9Ni)	B 2312 PL690	---	---



STANDARD SPECIFICATION

Table 9 NONFERROUS MATERIALS

ASTM	JIS	BS	DIN
PIPE			
B-42 Seamless Copper Pipe, Standards Sizes	H3300 C1020	2871-C103	1787 OF-Cu
B-43 Seamless Red Brass Pipe, Standard Sizes	H3300 C4430	---	17671 CuZn15
B-165 Nickel-Copper Alloy Seamless Pipe and Tube N04400	H4552 NCUT	3074	---
B-167 Nickel-Chromium-Iron Alloys Seamless Pipe and Tubes			
N06600	G4903 NCF600TP		
B-337 Seamless and Welded Titanium and Titanium Alloy pipe			
Gr 1	H4630 TTP28	---	17850 Ti1
Gr 2	H4630 TTP35	---	17850 Ti2
Gr 3	H4630 TTP49	---	17850 Ti3
Gr 7	---	---	
B-407 Nickel-Iron-Chromium. Alloy Seamless Pipe and Tube			
N08800	G4903 NCF 800TP	---	---
N08810	G4903 HCF 800HTP G4903 NCF 825TP	---	---
B-466 Seamless Copper-Nickel Pipe and Tube			
C70600	H3300 C7060	2871-CN102	17664 CuNi10Fe1Mn
C71500	H3300 C7150	2871-CN107	17664 CuNi30Mn1Fe

## STANDARD SPECIFICATION

ASTM	JIS	BS	DIN
B-467 Welded Copper-Nickel Pipe			
C70600 C71500	H3320 C7060 H3320 C7150	2871-CN102 2871-CN107	17664 CuNi10Fe1Mn 17664 CuNi30Mn1Fe
CASTINGS			
B-61 Steam or Valve Bronze Castings	H5111 BC7	1400-LG4	---
B-62 Composition Bronze or Ounce Metal Castings	H5111 BC6	1400-LG2	1705 G-CuSn5ZnPb